Komoditas : Serealia
Tahun 2004-2008 (100 judul)

Matthias Knodler, Maike Most, Andreas Schieber, Reinhold Carle, A novel approach to authenticity control of whole grain durum wheat (Triticum durum Desf.) flour and pasta, based on analysis of alkylresorcinol composition, Food Chemistry, Volume 118, Issue 1, 1 January 2010, Pages 177-181, ISSN 0308-8146, DOI: 10.1016/j.foodchem.2009.04.080.
(http://www.sciencedirect.com/science/article/B6T6R-4W6Y5PV-3/2/2da55af26ce1898a7bd5c7a48559d4b0)
Abstract:
Since durum wheat is ~20% more expensive than common wheat and considered of superior quality for the manufacture of pasta products, efficient methods for the detection of accidental or intentional admixtures of common wheat to durum wheat products are required. This paper describes a novel approach for the detection and quantification of whole grain common wheat adulteration in whole grain durum flour and dried pasta. We found that differences in the C17:0 to C21:0 alkylresorcinol homologue ratios between the two cereal species may serve as a suitable tool for whole grain durum product authentification. To detect and estimate adulteration, the C17:0/C21:0 ratios of flour and pasta admixtures with added whole grain flour of common wheat were analysed. A linear relationship between C17:0/C21:0 ratios and level of admixture in pasta samples showed that adulteration can be estimated within the range of 5-100% of admixture. Furthermore, di- and triunsaturated as well as oxygenated alk(en)ylresorcinols are reported to occur in Triticum durum Desf. for the first time.
Keywords: Alkylresorcinols; Triticum durum Desf.; T. aestivum L.; Homologue composition; Whole grain pasta; Adulteration

Antonia Garrido Frenich, Jose Luis Martinez Vidal, Roberto Romero-Gonzalez, Maria del Mar Aguilera-Luiz, Simple and high-throughput method for the multimycotoxin analysis in cereals and related foods by ultra-high performance liquid chromatography/tandem mass spectrometry, Food Chemistry, Volume 117, Issue 4, 15 December 2009, Pages 705-712, ISSN 0308-8146, DOI: 10.1016/j.foodchem.2009.04.045.
(http://www.sciencedirect.com/science/article/B6T6R-4W4CWTB-6/2/83544549850c98ec47f8b7e87d7a2930)
Abstract:
A rapid, reliable and sensitive method was developed to determine 12 mycotoxins (deoxynivalenol, aflatoxins B1, B2, G1, G2 and M1, fumonisins B1 and B2, ochratoxin A, HT-2 and T-2 toxin and zearalenone) simultaneously in maize, walnuts, biscuits and breakfast cereals. The method is based on a single extraction step using acetonitrile/water mixture (80/20 v/v) followed by ultra-high performance liquid chromatography coupled with tandem mass spectrometry (UHPLC-MS/MS). The selectivity of the MS/MS detection allowed the elimination of further clean up steps. Extraction, chromatographic and detection conditions were optimised in order to increase sample throughput and sensitivity. Matrix-matched calibration was used for quantification and recoveries of the extraction process ranged from 70.0% and 108.4%, with relative standard deviations lower than 25% in all the cases, when samples were fortified at 5 and 50 [mu]g/kg. Limits of detection ranged from 0.01 to 2.1 [mu]g/kg and limits of quantification ranged from 0.03 to 6.30 [mu]g/kg, which were always below the tolerance levels of mycotoxins set by European Union in the matrices evaluated. Several samples were analysed and aflatoxins B1, B2, G1, G2 and T-2 toxin were detected in one maize sample, with concentrations lower than 6.0 [mu]g/kg and deoxynivalenol was detected in a breakfast cereal at 42.1 [mu]g/kg.

Keywords: Mycotoxins; Food analysis; Ultra-high performance liquid chromatography; Tandem mass spectrometry; Sample throughput

Carmen Cabrera-Vique, Paula R. Bouzas, Chromium and manganese levels in convenience and fast foods: In vitro study of the dialyzable fraction, Food Chemistry, Volume 117, Issue 4, 15 December 2009, Pages 757-763, ISSN 0308-8146, DOI: 10.1016/j.foodchem.2009.04.060.
(http://www.sciencedirect.com/science/article/B6T6R-4W6XW2X-6/2/4b8ae9014b517a033d389ea66c672326)
Abstract:
Chromium and manganese presence was determined in a total of 170 samples of convenience and fast foods widely consumed in Spain. Electrothermal atomic absorption spectrometry was used as analytical technique. Reliability of the procedure was checked. Cr levels ranged from 0.01 to 1.10 [mu]g/g (fresh weight of edible portion). The most elevated levels were found in beef and pork based-food, food with a greater content of spices and aromatic herbs, whole cereals, dry fruits and cheese. Mn levels ranged from 0.15 to 2.90 [mu]g/g (fresh weight of edible portion). The most elevated levels of Mn were found in chicken and pork-based foods and sauces. Mean Cr and Mn dialyzable fraction estimated by in vitro assays ranged from 0.38% to 1.05% and from 7.75% to 15.60%, respectively. These findings revealed that certain convenience and fast foods contribute a considerable fraction of Cr and Mn dietary intake.
Keywords: Chromium; Manganese; Convenience foods; Fast foods; Dietary intake; Dialyzable fraction

Stavros Yanniotis, Jiri Blahovec, Model analysis of sorption isotherms, LWT - Food Science and Technology, Volume 42, Issue 10, December 2009, Pages 1688-1695, ISSN 0023-6438, DOI: 10.1016/j.lwt.2009.05.010.
(http://www.sciencedirect.com/science/article/B6WMV-4WBT4CX-3/2/b9d36cab945d024e50642d67aea37885)
Abstract:
The equation developed by Blahovec and Yanniotis, which is based on surface adsorption and solution water, was applied for fitting experimental sorption data for starchy and high protein foods, fruits and vegetables, nuts, legumes, and seeds. Analysis of sorption isotherms shows that surface adsorption is more important than solution water in the isotherms for cereals, potatoes, legumes and seeds, while in vegetables, fruits, meat, milk products and some nuts solution water is more important. The ratio of solution water to surface adsorption increases as water activity increases, it is higher for the adsorption isotherm than the desorption isotherm at any water activity value and decreases as temperature increases.
Keywords: Water activity; Sorption isotherm; Sorption models; Sorption mechanism; Classification; Desorption; Adsorption; Langmuir

Marion Alignan, Jane Roche, Andree Bouniols, Muriel Cerny, Zephirin Mouloungui, Othmane Merah, Effects of genotype and sowing date on phytostanol-phytosterol content and agronomic traits in wheat under organic agriculture, Food Chemistry, Volume 117, Issue 2, 15 November 2009, Pages 219-225, ISSN 0308-8146, DOI: 10.1016/j.foodchem.2009.03.102.
(http://www.sciencedirect.com/science/article/B6T6R-4W0WJB9-2/2/8c93b3b7c3ab4cc0a74eac05c155135f)
Abstract:
Cereals are an important source of sterols and stanols in the human diet. The present study underlines the effect of genotype and weather conditions in bread wheat, on total sterol and stanol content (TSS), agronomic traits, proteins and ash content under organic conditions. Variations in TSS as well as other characters between two sowing dates were observed. A broad genotypic variability was also reported since extreme genotypes differed by more than 30 mg 100 g-1 DW for

TSS, with total stanol content varying twofold. Moreover, two groups of genotypes that differed in agronomic production, ash and protein content were depicted, based on their response to an increase in temperature. This result suggests that the genotypic factor prevails over the sowing date factor for determining sterol and stanol traits in wheat cultivated under organic conditions. Nevertheless, a strong interaction exists between the two factors, which can be used to drive bioaccumulation of these molecules.
Keywords: Bread wheat; Phytosterols; Phytostanols; Genetic variability; Crop management; Organic conditions; Bioaccumulation

Umran Uygun, Berrin Senoz, Serpil Ozturk, Hamit Koksel, Degradation of organophosphorus pesticides in wheat during cookie processing, Food Chemistry, Volume 117, Issue 2, 15 November 2009, Pages 261-264, ISSN 0308-8146, DOI: 10.1016/j.foodchem.2009.03.111.
(http://www.sciencedirect.com/science/article/B6T6R-4W0WJB9-C/2/c132d25e8fe9c0a47f1b1e57cb376940)
Abstract:
For investigating carryover of some organophosphorus pesticide residues in the cereal food chain from grain to consumer, a study was set up on wheat bran, flour and cookies, with and without bran. Special emphasis was given to malathion and chlorpyrifos-methyl residues in cookies for better protection of consumers. Pesticide-free wheat was placed in a small-scale model of a commercial storage vessel and treated with these pesticides. The residue levels of insecticides were determined in wheat, as well as in bran, flour and cookies produced from stored wheat at various time intervals during storage. A multiresidue analysis was performed using GC-NPD and GC-MS. Malathion and chlorpyrifos-methyl residue levels were higher than the maximum residue limits (MRLs) in wheat after 240 days of storage. MRLs established by the EC for malathion and chlorpyrifos-methyl in wheat are 8 and 3 mg kg-1, respectively. The residue levels of insecticides in flour samples also exceeded the MRL (2 mg kg-1 for both insecticides). Eight months of storage were not effective for reducing the residues in wheat to the levels below MRLs. Although, considerable amounts of the insecticides remained in the bran and flour, the cookie processing significantly reduced the concentrations in general. Chlorpyrifos-methyl was more persistent than was malathion and comparatively less degradation occurred during milling and cookie processing due to its physicochemical properties.
Keywords: Malathion; Chlorpyrifos-methyl; Wheat; Cookies

Ivan Salmeron, Pablo Fucinos, Dimitris Charalampopoulos, Severino S. Pandiella, Volatile compounds produced by the probiotic strain Lactobacillus plantarum NCIMB 8826 in cereal-based substrates, Food Chemistry, Volume 117, Issue 2, 15 November 2009, Pages 265-271, ISSN 0308-8146, DOI: 10.1016/j.foodchem.2009.03.112.
(http://www.sciencedirect.com/science/article/B6T6R-4W0R0PS-4/2/58fdec47896c1d1ab90775a86d15513d)
Abstract:
The production of volatile compounds by the probiotic strain, Lactobacillus plantarum NCIMB 8826, in cereal-based media (oat, wheat, barley and malt) was investigated. Sixty compounds, including fatty acids and their esters, amides, alcohols, aldehydes, aromatic hydrocarbons, furans, ketones, peroxides and pyrans, were identified. L. plantarum significantly changed the aroma profile of the four cereal broths, and each substrate showed a specific volatiles profile. Oat and barley media were the substrates more influenced by the fermentation process. The most abundant volatiles detected in oat, wheat, barley and malt were oleic acid, linoleic acid, acetic acid, and 5-hydroxymethylfurfural, respectively. Analysis of these products confirmed the heterofermentative pathway of L. plantarum. Maillard compounds were not detected during sterilisation and fermentation. This study is the first to report the volatile composition of probiotic

drinks produce with non-supplemented cereal-based media and the results obtained could contribute to the development of new non-dairy probiotic formulations.
Keywords: Lactic acid bacteria; Lactobacillus plantarum; Probiotic; Cereal-based media; Volatile compounds; Flavour

Luca Bechini, Nicola Castoldi, On-farm monitoring of economic and environmental performances of cropping systems: Results of a 2-year study at the field scale in northern Italy, Ecological Indicators, Volume 9, Issue 6, November 2009, Pages 1096-1113, ISSN 1470-160X, DOI: 10.1016/j.ecolind.2008.12.008.
(http://www.sciencedirect.com/science/article/B6W87-4VH8Y57-2/2/eeb010376d95f56e7c91657a36f53a6e)
Abstract:
Cropping systems in northern Italy are intensively managed, but an integrated environmental accounting of these systems has not been published yet. We conducted this study to evaluate cropping systems management in a study area in northern Italy using indicators. The study area is a regional agricultural Park, with cereal and livestock farms, cultivating mostly maize, rice, meadows, and winter cereals.
To select the indicators, we identified for the study area the most relevant issues concerning the potential impact of agriculture on the environment: nutrient and pesticide management, use of fossil energy and soil management. Subsequently, we selected indicators from the literature, which could address these issues. We also added indicators describing the economic performance. The data were collected at the field level by periodic face-to-face interviews with seven farm managers over 2 years. Indicators were calculated for all crops cultivated in each field (n = 266).
According to the methodology proposed, the best economic performance (gross margin) was obtained by rice, followed by maize, winter cereals, and forage crops. Nitrogen and phosphorus surpluses were high for maize (due to a large use of animal manures), and moderate for rice and permanent meadows (where mineral fertilisers are not usually applied). Maize used high fossil energy inputs; however, the output/input ratio (an indicator of the dependence of food and feed production on non-renewable energy) was elevated, due to high aboveground biomass production. The potential impact due to pesticide use (evaluated with indicators that consider the toxicity and the exposure to active ingredients) was relevant only for rice, moderate for maize and other cereals, and null for forages. Finally, soil management was evaluated for the 2-year crop succession on each field (n = 131): permanent meadows are excellent (due to continuous soil cover and large returns of organic carbon to soil), rice-based successions are unsatisfactory (due to low residues and manure application and continuous cropping), and maize successions are intermediate. This work shows that good quality data can be collected on-farm for economic and environmental accounting at field level. The indicators chosen for the analysis describe a range of issues in the study area, and make it possible to clearly separate and characterise different cropping systems. The procedure for their calculation is transparent and sound, and can be applied for ex-ante, ex-post, and monitoring procedures.
Keywords: Assessment; Economic costs; Energy; Nitrogen; Environmental accounting; Pesticides; Phosphorus; Soil organic matter

Hai-Yen Lee, Lay-Ching Chai, Sui-Yan Tang, Selamat Jinap, Farinazleen Mohammad Ghazali, Yoshitsugu Nakaguchi, Mitsuaki Nishibuchi, Radu Son, Application of MPN-PCR in biosafety of Bacillus cereus s.l. for ready-to-eat cereals, Food Control, Volume 20, Issue 11, November 2009, Pages 1068-1071, ISSN 0956-7135, DOI: 10.1016/j.foodcont.2009.01.009.
(http://www.sciencedirect.com/science/article/B6T6S-4VHSDDF-2/2/6f76b1ad134d90f7a3775564e00c1250)
Abstract:

Since Bacillus cereus is one of the important foodborne pathogens, it is interesting to investigate the biosafety of Bacillus spp. and B. cereus in ready-to-eat cereals marketed local supermarkets. For this investigation, the prevalence and enumeration of Bacillus spp. and B. cereus were assayed using MPN-PCR method. Results showed that 78% of the processed cereal products intended for direct consumption were positive for the presence of B. cereus with concentrations ranging from as low as 30 MPN/g to more than 24,000 MPN/g. The concentration obtained from this study also reflects on the differences in the contamination level between the infant food, raw cereals, cereal bars, ready-to-eat breakfast cereals and pre-mixed drinks examined. Hence, application of the MPN-PCR method was found to be useful to address the biosafety concerns of B. cereus in ready-to-eat cereals.
Keywords: Biosafety; Prevalence; Enumeration; Bacillus cereus; Ready-to-eat cereals

David C. Sands, Cindy E. Morris, Edward A. Dratz, Alice L. Pilgeram, Elevating optimal human nutrition to a central goal of plant breeding and production of plant-based foods, Plant Science, Volume 177, Issue 5, November 2009, Pages 377-389, ISSN 0168-9452, DOI: 10.1016/j.plantsci.2009.07.011.
(http://www.sciencedirect.com/science/article/B6TBH-4WXSJW1-3/2/601109e9fa39fd8d28259b9dbfb0ef76)
Abstract:
High-yielding cereals and other staples have produced adequate calories to ward off starvation for much of the world over several decades. However, deficiencies in certain amino acids, minerals, vitamins and fatty acids in staple crops, and animal diets derived from them, have aggravated the problem of malnutrition and the increasing incidence of certain chronic diseases in nominally well-nourished people (the so-called diseases of civilization). Enhanced global nutrition has great potential to reduce acute and chronic disease, the need for health care, the cost of health care, and to increase educational attainment, economic productivity and the quality of life. However, nutrition is currently not an important driver of most plant breeding efforts, and there are only a few well-known efforts to breed crops that are adapted to the needs of optimal human nutrition. Technological tools are available to greatly enhance the nutritional value of our staple crops. However, enhanced nutrition in major crops might only be achieved if nutritional traits are introduced in tandem with important agronomic yield drivers, such as resistance to emerging pests or diseases, to drought and salinity, to herbicides, parasitic plants, frost or heat. In this way we might circumvent a natural tendency for high yield and low production cost to effectively select against the best human nutrition. Here we discuss the need and means for agriculture, food processing, food transport, sociology, nutrition and medicine to be integrated into new approaches to food production with optimal human nutrition as a principle goal.
Keywords: Breeder's dilemma; Plant genetic engineering; Biotechnology; Malnutrition; Plant pathology; Green revolution

Spurthi N. Nayak, Jayashree Balaji, Hari D. Upadhyaya, C. Tom Hash, P.B. Kavi Kishor, Debasis Chattopadhyay, Lina Maria Rodriquez, Matthew W. Blair, Michael Baum, Kenneth McNally, Dominique This, David A. Hoisington, Rajeev K. Varshney, Isolation and sequence analysis of DREB2A homologues in three cereal and two legume species, Plant Science, Volume 177, Issue 5, November 2009, Pages 460-467, ISSN 0168-9452, DOI: 10.1016/j.plantsci.2009.07.009.
(http://www.sciencedirect.com/science/article/B6TBH-4WXSJW1-2/2/fcdcca44bab26a5f21107b9d54822351)
Abstract:
The transcription factor, DREB2A, is one of the promising candidate genes involved in dehydration tolerance in crop plants. In order to isolate DREB2A homologues across cereals (rice, barley and sorghum) and legumes (common bean and chickpea), specific or degenerate primers were used. Gene/phylogenetic trees were constructed using a non-redundant set of 19 DREB1A and 27

DREB2A amino acid sequences and were combined with taxonomic/species tree to prepare reconciled phylogenetic trees. In total, 86 degenerate primers were designed for different clades and 295 degenerate primer combinations were used to amplify DREB homologues in targeted crop species. Successful amplification of DREB2A was obtained in case of sorghum. In parallel, gene-specific primers were used to amplify DREB2A homologues in rice, barley, common bean and chickpea. Seven to eight diverse genotypes from targeted species were used for sequence analysis at DREB2A locus identified/isolated. A maximum of eight SNPs were found in the common bean DREB2A, indicating two distinct haplotypes, three SNPs with five haplotypes were observed in barley whereas a single SNP was observed in rice, sorghum and chickpea. Parsimony based phylogenetic tree revealed distinct clustering of cereals and legumes. Furthermore, alignment of corresponding amino acid sequences showed conservation of AP2 domain across the targeted species.
Keywords: DREB; Candidate gene; Drought stress; SNP; Haplotype

Nadia Boudries, Naima Belhaneche, Boubekeur Nadjemi, Claude Deroanne, Mohamed Mathlouthi, Barbara Roger, Marianne Sindic, Physicochemical and functional properties of starches from sorghum cultivated in the Sahara of Algeria, Carbohydrate Polymers, Volume 78, Issue 3, 15 October 2009, Pages 475-480, ISSN 0144-8617, DOI: 10.1016/j.carbpol.2009.05.010.
(http://www.sciencedirect.com/science/article/B6TFD-4W9XG81-3/2/9be3fc8d48e8b828f4520c97121ef40f)
Abstract:
Pure starches were isolated from white and red sorghum cultivated in Tidikelt, a hyper arid region situated in south Algeria. Amylose content, X-ray pattern and rheological properties of starches were examined. The amylose content in white sorghum starch (27.1%) was slightly higher than that in red sorghum (24.8%). The swelling power and the solubility behavior of both starches were nearly similar below 65 [degree sign]C. At higher temperatures, starch isolated from the white sorghum cultivar showed higher swelling power and lower solubility index than pigmented sorghum starch. The pasting properties of starches determined by RVA, Rapid Visco Analyser showed different viscosity peaks. Red sorghum starch had a higher value (4731 cP) than white sorghum starch (4093 cP). For both sorghum, X-ray diffractograms exhibit an A-type diffraction pattern, typical of cereal starches and the relative degrees of crystallinity were estimated at 22.72% and 28.91%, respectively, for local white and red sorghum starch. DSC analysis revealed that sorghum starches present higher temperatures at the peak (70.60 and 72.28 [degree sign]C for white and red sorghum starches, respectively) and lower gelatinization enthalpies (9.087 and 8.270 J/g for white and red sorghum starches, respectively) than other cereal starches.
The results showed that physicochemical and functional properties of sorghum cultivar starches were influenced by the genotype and the environment.
Keywords: Sorghum starch; Starch color; Amylose content; Rheology; X-ray pattern

A.X. Jin, J.L. Ren, F. Peng, F. Xu, G.Y. Zhou, R.C. Sun, J.F. Kennedy, Comparative characterization of degraded and non-degradative hemicelluloses from barley straw and maize stems: Composition, structure, and thermal properties, Carbohydrate Polymers, Volume 78, Issue 3, 15 October 2009, Pages 609-619, ISSN 0144-8617, DOI: 10.1016/j.carbpol.2009.05.024.
(http://www.sciencedirect.com/science/article/B6TFD-4WGF12V-8/2/519cd95572bd5c4854a924cd4cc50ae1)
Abstract:
Three organic solvents and one aqueous alkaline solution for fully fractional dissolving hemicelluloses from mild ball-milled cell wall of lignified barley straw and maize stems are described: 90% neutral dioxane, 80% dioxane containing 0.05 M HCl, dimethyl sulfoxide (DMSO), and 8% aqueous KOH. The four successive extractions resulted in dissolution of 94.6% and 96.4% of the original hemicelluloses and 93.7% and 95.3% of the original lignin from barley straw

and maize stems, respectively. The structures of the hemicellulosic fractions released during the treatment with the neutral solvents of 90% dioxane and DMSO was found to remain intact, while the extractions with 80% acidic dioxane and 8% KOH under the conditions used resulted in a partial depolymerization of dissolved polysaccharides by cleavage of the glycosidic bonds and saponification of the ester groups in the polymers. The 90% neutral dioxane-soluble hemicellulosic fractions consisted mainly of the more branched arabinoxylans and mixed-linkage glucans such as [beta]-glucans, whereas the hemicellulosic fractions solubilized during the sequential treatments with 80% acidic dioxane, DMSO, and 8% KOH are composed of arabino-(4-O-methyl-d-glucurono) xylans as the major hemicellulosic materials. In addition, the hemicellulosic polymers contained small amounts of ferulic and p-coumaric acids and lignins, revealing that the hemicelluloses removed are mostly unbound to the lignins in the cell walls of cereal straws. This non-degradative cell wall dissolution offers the potential to analyze polysaccharide components for the first time, and improve current hemicellulosic isolation method by using high concentration of aqueous alkali from the delignified cell walls.
Keywords: Hemicelluloses; Lignin; Cellulose; Fractionation; Arabino-(4-O-methyl-d-glucurono) xylans; Structure

Mariola Korycinska, Karolina Czelna, Anna Jaromin, Arkadiusz Kozubek, Antioxidant activity of rye bran alkylresorcinols and extracts from whole-grain cereal products, Food Chemistry, Volume 116, Issue 4, 15 October 2009, Pages 1013-1018, ISSN 0308-8146, DOI: 10.1016/j.foodchem.2009.03.056.
(http://www.sciencedirect.com/science/article/B6T6R-4VWB1DY-9/2/61699f98e6d9b983a5a47bc612062c1a)
Abstract:
The antioxidant properties of rye bran alkylresorcinols (C15:0-C25:0) and extracts from whole-grain cereal products were evaluated using their radical-scavenging activity on DPPH and the chemiluminescence method (CL). DPPH radical reduction varied from ~10% to ~60% for the alkylresorcinol homologues at concentrations from 5 to 300 [mu]M and was not dependent on the length of the alkyl side chain of the particular homologue. Differences in the EC50 values for the studied compounds were not statistically significant, the values varying from 157 [mu]M for homologue C23:0 to 195 [mu]M for homologue C15:0. Moreover, values of EC50 for all the alkylresorcinol homologues were significantly higher than those for Trolox and [alpha]-, [delta]-, and [gamma]-tocopherols, compounds with well-defined antioxidant activity and used as positive controls. CL inhibition was evaluated for all the tested alkylresorcinol homologues at concentrations of 5 and 10 [mu]M and varied from ~27% to ~77%. Similar to the DPPH method, the slight differences in CL inhibition suggest that the length of the alkyl side chain had no major impact on their antioxidant properties. The extracts from whole-grain products were added to the DPPH and CL reaction systems and their antioxidant activities were tested and compared with the total amount of alkylresorcinols evaluated in the extracts. DPPH radical and CL reduction for the whole-grain products varied from ~7% to ~43% and from ~37% to ~91%, respectively. A clear relationship between DPPH radical and CL reduction levels and the amount of total alkylresorcinols was obtained for whole-grain breakfast cereals, in which the reduction level decreased in the order rye > wheat > mixed > barley. Therefore it may be considered that the antioxidant activity of alkylresorcinols could be of potential importance to the food industry, which is continuously searching for natural antioxidants for the protection of food products during their processing and storage.
Keywords: Alkylresorcinols; Whole-grain products; Antioxidant activity; DPPH; Luminol

Pierre Beziat, Eric Ceschia, Gerard Dedieu, Carbon balance of a three crop succession over two cropland sites in South West France, Agricultural and Forest Meteorology, Volume 149, Issue 10, 1 October 2009, Pages 1628-1645, ISSN 0168-1923, DOI: 10.1016/j.agrformet.2009.05.004.

(http://www.sciencedirect.com/science/article/B6V8W-4WKS6BJ-1/2/66dab29119b7e3346298d02b7cc5e4c4)
Abstract:
Long term flux measurements of different crop species are necessary to improve our understanding of management and climate effects on carbon flux variability as well as cropland potential in terrestrial carbon sequestration. The main objectives of this study were to analyse the seasonal dynamics of CO2 fluxes and to establish the effects of climate and cropland management on the annual carbon balance.
CO2 fluxes were measured by means of the eddy correlation (EC) method over two cropland sites, Aurade and Lamasquere, in South West France for a succession of three crops: rapeseed, winter wheat and sunflower at Aurade, and triticale, maize and winter wheat at Lamasquere. The net ecosystem exchange (NEE) was partitioned into gross ecosystem production (GEP) and ecosystem respiration (RE) and was integrated over the year to compute net ecosystem production (NEP). Different methodologies tested for NEP computation are discussed and a methodology for estimating NEP uncertainty is presented.
NEP values ranged between -369 +/- 33 g C m-2 y-1 for winter wheat at Lamasquere in 2007 and 28 +/- 18 g C m-2 y-1 for sunflower at Aurade in 2007. These values were in good agreement with NEP values reported in the literature, except for maize which exhibited a low development compared to the literature. NEP was strongly influenced by the length of the net carbon assimilation period and by interannual climate variability. The warm 2007 winter stimulated early growth of winter wheat, causing large differences in GEP, RE and NEE dynamics for winter wheat when compared to 2006. Management had a strong impact on CO2 flux dynamics and on NEP. Ploughing interrupted net assimilation during voluntary re-growth periods, but it had a negligible short term effect when it occurred on bare soil. Re-growth events after harvest appeared to limit carbon loss: at Lamasquere in 2005 re-growth contributed to store up to 50 g C m-2. Differences in NEE response to climatic variables (VPD, light quality) and vegetation index were addressed and discussed.
Net biome production (NBP) was calculated yearly based on NEP and considering carbon input through organic fertilizer and carbon output through harvest. For the three crops, the mean NBP at Aurade indicated a nearly carbon balanced ecosystem, whereas Lamasquere lost about 100 g C m-2 y-1; therefore, the ecosystem behaved as a carbon source despite the fact that carbon was imported through organic fertilizer. Carbon exportation through harvest was the main cause of this difference between the two sites, and it was explained by the farm production type. Lamasquere is a cattle breeding farm, exporting most of the aboveground biomass for cattle bedding and feeding, whereas Aurade is a cereal production farm, exporting only seeds.
Keywords: Crop; Carbon balance; Net ecosystem exchange; Eddy covariance; Management; Uncertainties

Irene Bisang, Ariel Bergamini, Luc Lienhard, Environmental-friendly farming in Switzerland is not hornwort-friendly, Biological Conservation, Volume 142, Issue 10, October 2009, Pages 2104-2113, ISSN 0006-3207, DOI: 10.1016/j.biocon.2009.04.006.
(http://www.sciencedirect.com/science/article/B6V5X-4WBB71H-2/2/ad5cb7062dd2f949a792a5589e52a4c1)
Abstract:
Traditionally managed arable fields host a specialised flora adapted to regular disturbance through tillage. Agricultural intensification during the 20th century resulted in a pronounced biodiversity decline in European agroecosystems. Anthoceros agrestis and Phaeoceros carolinianus, both largely confined to cultivated land in Central Europe and the only representatives of hornworts in northern Switzerland, are examples of species that decreased in Central Europe during the last century. A repeated survey of 28 arable fields in the Swiss Plateau from 1989 to 1995 demonstrated that crop type and associated farming routines were critical in determining hornwort

occurrences. During the 10 years following the completion of this survey, agri-environment schemes were introduced aiming at a more environmental-friendly agricultural production. We re-investigated the selected sites in 2005-2007 to examine whether these programmes favoured hornworts. We found a significant decrease of untilled autumn stubble-fields, which accounted for a decline of hornworts. High relative summer air humidity positively affected hornwort occurrence. Gametophytic populations of both taxa regenerated from the persistent diaspore bank after years of unfavourable conditions. To ensure the long-term persistence of hornworts in the Swiss Plateau, we recommend three alternative modifications of current Swiss agri-environment schemes to be implemented in cereal fields with known hornwort occurrences: (1) Tailored conservation headlands, (2) Autumn stubble-fields and (3) Field margin strips sown with arable flora but without crop plants. The proposed practices will promote other typically ephemeral arable bryophytes and seed plants and are likely to be advantageous also for other organisms, such as farmland birds.
Keywords: Agri-environment schemes; Arable management; Bryophytes; Diaspore banks; Swiss Plateau; Weather conditions

H. Nordmeyer, Spatial and temporal dynamics of Apera spica-venti seedling populations, Crop Protection, Volume 28, Issue 10, October 2009, Pages 831-837, ISSN 0261-2194, DOI: 10.1016/j.cropro.2009.06.006.
(http://www.sciencedirect.com/science/article/B6T5T-4WXGVV9-1/2/b75a483e7f631587224244128966 2c6d)
Abstract:
Apera spica-venti is an important weed problem in winter cereals in Europe. Spatial and temporal dynamics of A. spica-venti were investigated to test the hypothesis that this species has a spatially aggregated distribution. A. spica-venti distribution was quantified over several crop rotation sequences in three commercial fields. From 1999 to 2006, the spatial pattern of A. spica-venti was sampled yearly at the same grid points. Geostatistical techniques were used to characterise the spatial and temporal variability of A. spica-venti density. The spatial pattern was analysed by Lloyd's index of patchiness. From year to year, differing aggregation of A. spica-venti resulted in weed patchiness. The Spearman Rank Correlation Coefficient (rs) was used to discover the strength of A. spica-venti occurrence in several years. For two sites there were significant correlations of weed occurrence between years but the relationship was less strong for the third field. Based on rank correlation coefficients, the temporal dynamics were marked by an overall continuity of distribution patterns. Knowing that spatial distributions of weeds vary little in time can reduce sampling efforts, and increases feasibility of site-specific weed control.
Keywords: Grass weed; Geostatistics; Indices of aggregation; Kriging; Patchiness; Spatial distribution

Mohamed Aqiel Dalvie, Leslie London, Risk assessment of pesticide residues in South African raw wheat, Crop Protection, Volume 28, Issue 10, October 2009, Pages 864-869, ISSN 0261-2194, DOI: 10.1016/j.cropro.2009.07.008.
(http://www.sciencedirect.com/science/article/B6T5T-4WXXV32-1/2/f1d246912d68e2ce5ee808135cab0bec)
Abstract:
The presence of pesticide residues in wheat produced and imported in South Africa was determined and their health risks assessed. Pesticides were detected in all local (median = 1, range: 1-3, n = 71) and imported (median = 1, range: 1-6, n = 13) samples. Multiple pesticides (>1 pesticide) were detected in about 30% local samples and 39% imported samples. Eight different pesticides were detected in total. The most frequently detected pesticides were mercaptothion (99%), permethrin (19%) and chlorpyrifos (17%). Nine (11%) samples exceeded the EU wheat MRL for permethrin (0.05 mg/kg) which included 7 (10%) local samples and 2 (15%) imported samples. The highest fenitrothion level (0.65 mg/kg) corresponds to an intake that was below but

near the estimated short-term safety threshold. The results call for an investigation into the levels of pesticide residues in cereal-based food and for tighter regulation and regular monitoring by government and industry.
Keywords: Pesticides; Wheat; Health standards; Acceptable daily intake; Cancer; Endocrine disruption

Manuela Mariotti, Mara Lucisano, M. Ambrogina Pagani, Perry K.W. Ng, The role of corn starch, amaranth flour, pea isolate, and Psyllium flour on the rheological properties and the ultrastructure of gluten-free doughs, Food Research International, Volume 42, Issue 8, October 2009, Pages 963-975, ISSN 0963-9969, DOI: 10.1016/j.foodres.2009.04.017.
(http://www.sciencedirect.com/science/article/B6T6V-4W7J0X8-2/2/fcfe0a8f4a7f80f8c6dcb72e9b56732f)
Abstract:
The removal of gluten from bakery products, in order to produce foods (mainly based on gluten-free cereal flours and starch) for people with celiac disease, impairs dough's capacity to properly develop during leavening and baking. The main aim of this research was to produce and evaluate some experimental gluten-free (GF) doughs containing different levels of corn starch, amaranth flour (to enhance the nutritional benefits), pea isolate (to increase the protein content) and Psyllium fiber (as thickening agent and fiber source) in order to study the influence of the different ingredients on the rheological properties and on the ultrastructure of the doughs. Psyllium fiber generally enhanced the physical properties of the doughs, due to the film-like structure that it was able to form, and the most complex among the experimental formulations looked promising in terms of final bread technological and nutritional quality even when compared to two different commercial GF mixtures.
Keywords: Gluten-free; Dough; Amaranth; Pea isolate; Psyllium; Rheology; CLSM; SEM

Nancy L. Garcia, Lucia Fama, Alain Dufresne, Mirta Aranguren, Silvia Goyanes, A comparison between the physico-chemical properties of tuber and cereal starches, Food Research International, Volume 42, Issue 8, October 2009, Pages 976-982, ISSN 0963-9969, DOI: 10.1016/j.foodres.2009.05.004.
(http://www.sciencedirect.com/science/article/B6T6V-4WBC1N7-1/2/4bbb9903cec46ce4354ca3acca833ea6)
Abstract:
Biofilms based on waxy maize and cassava starches (cereal and tuber starch, respectively), plasticized with glycerol were characterized through their crystallinity, dynamic-mechanical behavior (DMA), thermal degradation (TGA), moisture content and water vapor permeability (WVP). X-ray diffraction experiments show that both materials were mainly amorphous, with the waxy starch presenting a discreetly A-type X-ray pattern. Microscopic investigation of the cryo-fractured surfaces supported this observation. The glass transition of the glycerol-rich phase (measured by DMA) occurs at higher temperatures for cassava than for waxy maize starch, suggesting that the dispersion level of glycerol is higher in the former. TGA showed that maize starch has a slightly higher thermal stability than cassava starch, while glycerol interacts more strongly with the last one. The WVP was 18% higher in the case of the cassava starch film.
Keywords: Biofilms; Starch; Mechanical properties; TGA; X-ray; FTIR; SEM

D. Sabanis, D. Lebesi, C. Tzia, Effect of dietary fibre enrichment on selected properties of gluten-free bread, LWT - Food Science and Technology, Volume 42, Issue 8, October 2009, Pages 1380-1389, ISSN 0023-6438, DOI: 10.1016/j.lwt.2009.03.010.
(http://www.sciencedirect.com/science/article/B6WMV-4VXB92N-2/2/dae1f6de4c8b1d7d19d62beef6cf3df5)
Abstract:

The enrichment of gluten-free baked products with dietary fibre seems to be necessary since it has been reported that coeliac patients have generally a low intake of fibre due to their gluten-free diet. In the present study different cereal fibres (wheat, maize, oat and barley) were added at 3, 6 and 9 g/100 g level into a gluten-free bread formulation based on corn starch, rice flour and hydroxypropyl methyl cellulose (HPMC). Doughs were evaluated based on consistency, viscosity and thermal properties. Results showed that maize and oat fibre can be added to gluten-free bread with positive impact on bread nutritional and sensory properties. All breads with 9 g/100 g fibre increased the fibre content of control by 218%, but they were rated lower than those with 3 and 6 g/100 g fibre due to their powdery taste. The formulation containing barley fibre produced loaves that had more intense color and volume comparable to the control. During storage of breads a reduction in crumb moisture content and an increase in firmness were observed. The micrographs of the crumb showed the continuous matrix between starch and maize and/or oat fibre obtaining a more aerated structure.
Keywords: Coeliac disease; Dietary fibre; Enrichment; Bread; Sensory

S. El-Meccawi, M. Kam, A. Brosh, A.A. Degen, Energy intake, heat production and energy and nitrogen balances of sheep and goats fed wheat straw as a sole diet, Livestock Science, Volume 125, Issue 1, October 2009, Pages 88-91, ISSN 1871-1413, DOI: 10.1016/j.livsci.2009.02.018.
(http://www.sciencedirect.com/science/article/B7XNX-4VVN50X-1/2/d7c32efb490c8c0cad72494aa6103239)
Abstract:
Large areas of the Negev desert are used for rain-fed winter cereal production. Consequently, cereal straw is an important dietary component of sheep and goats raised by the Bedouin in the Negev Desert under both grazing and pen-fed conditions. Often, it is the sole feed offered, although it is relatively low in crude protein content and metabolizable energy yield. We determined metabolizable energy intake and heat production in desert adapted fat-tailed Awassi sheep (n = 8; 49.5 +/- 6.6 kg) and mixed breed goats (n = 8; 42.6 +/- 11.7 kg) when offered only wheat straw ad libitum, and calculated their energy and nitrogen balances. We hypothesized that there is a difference between sheep and goats in the ability to use wheat straw and predicted that goats would be better able to use wheat straw as an energy and nitrogen source than would sheep. Dry matter intakes of the wheat straw by sheep and goats were similar, 43.4 and 42.6 g kg- 0.75 d- 1, respectively, as were apparent dry matter digestibilities, 44.1% and 43.6%, respectively. Metabolizable energy intakes in sheep and goats were also similar, 308.9 and 302.9 kJ kg - 0.75 d- 1, respectively, as were their heat productions, 502.3 and 501.0 kJ kg - 0.75 d- 1, respectively. Sheep and goats were in negative energy balance, and both lost similar amounts of body reserves, 193.6 and 198.1 kJ kg - 0.75 d- 1, respectively. Also, both were in negative nitrogen balances; however, the goats were in a lesser deficit ($P < 0.05$) than the sheep, 0.161 and 0.196 g kg - 0.75 d- 1, respectively. Therefore, our predictions were partially confirmed in that the goats were better able to use the nitrogen but not the energy when consuming low-quality wheat straw.
Keywords: Desert adapted sheep and goats; Low-quality wheat straw; Dry matter intake and digestibility; Heat production; Energy balance; Nitrogen balance

Ingrid Vervuert, Katrin Voigt, Teresa Hollands, Derek Cuddeford, Manfred Coenen, Effect of feeding increasing quantities of starch on glycaemic and insulinaemic responses in healthy horses, The Veterinary Journal, Volume 182, Issue 1, October 2009, Pages 67-72, ISSN 1090-0233, DOI: 10.1016/j.tvjl.2008.04.011.
(http://www.sciencedirect.com/science/article/B6WXN-4SS8NDG-1/2/8b459cec38de88d227a1e2913d7ef8b8)
Abstract:
The aim of this study was to investigate the effect of increasing the intake of starch on the glycaemic and insulinaemic responses of horses. A cross-over study design was used in which

four horses were fed increasing amounts of a compound feed (0.5-3.5 kg) to provide 0.3, 0.6, 0.8, 1.1, 1.4 and 2 g starch/kg bodyweight (BW)/meal. The glycaemic response increased with starch intake ($P < 0.05$), while feeding <1.1 g starch/kg BW resulted in a lowered response, compared to when 1.1-2 g starch/kg BW was fed ($P < 0.01$). The results suggested that insulin responses may be more appropriate to define the effect of feeding different starch levels than glycaemic responses. A starch intake of <1.1 g/kg BW/meal produced only moderate glucose and insulin responses, even though highly processed cereals were used. It is therefore recommended that a starch intake of <1.1 g/kg BW/meal or a meal size of 0.3 kg/100 kg BW (starch content of 30-40%) is used for horses.
Keywords: Horse; Compound feed; Starch digestion; Glycaemic and insulinaemic responses; Meal size limitation

Sarina Macfadyen, Rachel Gibson, Lorna Raso, Daniela Sint, Michael Traugott, Jane Memmott, Parasitoid control of aphids in organic and conventional farming systems, Agriculture, Ecosystems & Environment, Volume 133, Issues 1-2, September 2009, Pages 14-18, ISSN 0167-8809, DOI: 10.1016/j.agee.2009.04.012.
(http://www.sciencedirect.com/science/article/B6T3Y-4WBY4YR-1/2/5b2904f871048a3dd6905dc6e7441170)
Abstract:
Organic farmers cannot use most commonly available synthetic insecticides to control crop pests and reduce economic losses due to pest outbreaks. Instead, they rely heavily on the activities of naturally occurring predators and parasitoids, particularly in broad-acre crops such as cereals. It is still unclear whether organic farms which typically support greater levels of biodiversity also experience greater levels of pest control services. We assess whether organic farming systems were better able to control cereal aphids due to a greater diversity and activity of naturally occurring parasitoid species. We anticipated greater parasitism rate of aphids in organic arable fields due to closer proximity to plants that provide resources for adult parasitoids and places that are suitable for overwintering, and the presence of alternate aphid hosts when cereals are absent. Aphids were collected from organic and conventional cereal crops, and screened for parasitoid DNA using diagnostic polymerase chain reaction (PCR). Aphid abundance was low across the season, however organic cereal fields had significantly greater aphid abundance. From the 1446 aphids screened we detected 12 parasitoid taxa. There was no difference in parasitism rate between the farming systems (org. mean mortality 20.9 +/- 3.3% s.e., con. 29.8 +/- 4.9%). Furthermore, there was no difference between farming systems in hyperparasitoid attack and multiparasitism rates, parasitoid richness and parasitoid community diversity. The most abundant species recorded on organic and conventional farms was the generalist aphid primary parasitoid Ephedrus plagiator. It appears that the extra plant diversity and greater area of semi-natural habitats on organic farms offer no advantage for increasing cereal aphid parasitoid diversity, at least at the aphid abundances encountered during the sampling period.
Keywords: Biological control; Natural enemies; Parasitoids; Sitobion avenae; Molecular parasitoid detection

Sebastiana Melero, Rosa Lopez-Garrido, Engracia Madejon, Jose Manuel Murillo, Karl Vanderlinden, Rafaela Ordonez, Felix Moreno, Long-term effects of conservation tillage on organic fractions in two soils in southwest of Spain, Agriculture, Ecosystems & Environment, Volume 133, Issues 1-2, September 2009, Pages 68-74, ISSN 0167-8809, DOI: 10.1016/j.agee.2009.05.004.
(http://www.sciencedirect.com/science/article/B6T3Y-4WGJKDP-1/2/abc907f1b02dc541ef7fcaf3f570b719)
Abstract:
Long-term field experiments can provide relevant information regarding soil organic carbon sequestration under different soil tillage systems. Especially, conservation tillage (CT) has been

proved to be a practice that highly contributes to improve soil quality. For that reason, the study of soil quality indicators, such as organic fractions, are useful tools to assess changes caused by different soil tillage systems in long-term field experiments. We evaluated long-term effects of conservation tillage on soil carbon fractions and biological properties in a sandy clay loam Entisol (soil A) and in a clay Vertisol (soil B) located in semi-arid SW Spain. Cereal-sunflower-legume rotations under rainfed conditions were used in both soils in which conservation tillage (CT) was compared to traditional tillage (TT). Soil samples were collected at three depths (0-5, 5-10 and 10-20 cm) four months after sowing a pea crop (Pisum arvense L.) in the Entisol and a wheat crop (Triticum aestivum L.) in the Vertisol. Labile fractions of the total organic carbon (TOC) were determined as active carbon (AC) and water soluble carbon (WSC). Biological status was evaluated using soil microbial biomass carbon (MBC) and enzymatic activities [dehydrogenase activity (DHA), o-diphenol oxidase activity (Dphox), and [beta]-glucosidase activity ([beta]-glu)]. As a rule, the contents of AC, WSC, MBC, [beta]-glu and Dphox in soil A and contents of TOC, AC and DHA in soil B were higher in CT than in TT, at the 0-5 cm depth. In both soils, the studied parameters decreased with depth under both tillage treatments (TT and CT). Values of AC, TOC, MBC and [beta]-glu were positively correlated with each other ($p < 0.05$) in both soils. The principal component analysis (PCA) showed that two principal components explained 44.17% and 21.2% of the total variability in the Entisol and 47.3% and 19.3% in Vertisol. The first principal component was influenced mostly by AC and [beta]-glucosidase in the Entisol, while it was influenced by DHA, MBC and AC in Vertisol. Discriminant analysis (DA) showed as discriminant function was strongly correlated with MBC, AC and Dphox in soil A and with TOC, AC and WSC in soil B. From both analyses (PCA and DA) in this study, AC content was the most sensitive and consistent indicator for assessing the impact of different soil managements on soil quality in our two types of soil. Long-term conservation tillage in dryland farming systems improved the quality of both soils, especially at the surface, by enhancing soil organic carbon and biological status.
Keywords: Direct drilling; Tillage; Permanganate oxidizable carbon; Microbial biomass carbon (MBC) to TOC ratio; Diphenol oxidase activity; [beta]-Glucosidase activity

J.L. Hernanz, V. Sanchez-Giron, L. Navarrete, Soil carbon sequestration and stratification in a cereal/leguminous crop rotation with three tillage systems in semiarid conditions, Agriculture, Ecosystems & Environment, Volume 133, Issues 1-2, September 2009, Pages 114-122, ISSN 0167-8809, DOI: 10.1016/j.agee.2009.05.009.
(http://www.sciencedirect.com/science/article/B6T3Y-4WJ2C9H-1/2/9a3784a82a2f68f5a82b69aab72573a1)
Abstract:
The stratification of soil organic matter at different depths is common under conservation tillage and especially under no-tillage. The degree of stratification, or stratification ratio (SR), can be used as an indicator of soil quality because surface organic matter is essential to erosion control, water infiltration, and the conservation of nutrients. In the semiarid regions of the Mediterranean which are devoted to rain-fed crop production, soil has low organic carbon content because of the high mineralization rates of soil organic matter and the lack of crop residue after periods of drought. Twenty-year effects (1985-2006) of tillage systems on soil organic carbon (SOC) stratification were studied in a Vertic Luvisol with a loam texture. SOC was expressed in carbon concentration (Cc) and in equivalent soil mass (esm). The tillage treatments used were conventional tillage (CT), minimum tillage (MT), and no-tillage (NT). These treatments were under winter wheat (Triticum aestivum L.), vetch (Vicia sativa L.) and pea (Pisum sativum L.) rotation (W-VP). Similarly, several stratification ratios (SRs) were assessed as indicators of SOC's time evolution. Before the start of the experiment the crop rotation was cereal-fallow (C-F). In each treatment and replication four soil layers of the same thickness (10 cm) were sampled to obtain soil bulk density (BD) and Cc. After 20 years the study revealed that the adoption of a W-VP rotation was at least as important as the shift from CT to NT in the increase of stocked SOC in the soil profile. This last treatment was the

tillage system with the highest SOC, whereas no significant differences were encountered between MT and CT. The average SOC was 14% higher in NT than in MT and CT. This trend has been systematically observed practically since 1996 to the present in all treatments. The steady state of SOC sequestration was reached after 11 years of starting the experiment in NT and 12 years in CT and MT. SOC, expressed as Cc and esm, showed the highest stratification in NT, second highest in MT and lowest in CT. In NT, stocked SOC increased from 1996 to 2005 in the top layer but it declined systematically in the bottom layer.
Keywords: Long-term effect; Tillage system; Soil organic carbon; Stratification ratio; Semiarid condition

Weihua Lai, Daniel Y.C. Fung, Xu Yang, Liu Renrong, Yonghua Xiong, Development of a colloidal gold strip for rapid detection of ochratoxin A with mimotope peptide, Food Control, Volume 20, Issue 9, September 2009, Pages 791-795, ISSN 0956-7135, DOI: 10.1016/j.foodcont.2008.10.007.
(http://www.sciencedirect.com/science/article/B6T6S-4TTMJP1-1/2/91a74ea360e6a877928c281f7d198f6b)
Abstract:
Ochratoxin A (OTA), a mycotoxin mainly produced by some Aspergillus and Penicillium species, is found in cereals, coffee, wine, pork and grapes. The kidney and liver are the target organs of OTA, resulting in teratogenicity, carcinogenicity, and mutagenicity. To avoid the risk of OTA consumption, raw materials should be identified and removed from distribution. Current procedures for detection of OTA are time-consuming and involve sophisticated equipment. Furthermore, materials containing OTA is a biohazard for manufacturers and consumers. In this study, a rapid, inexpensive, and user-friendly lateral flow strip assay ideally suited for on site testing of OTA was developed. Moreover, mimotope peptide capable of mimicking OTA by panning from a M13 phage-displayed random seven-peptide was used instead of OTA-protein conjugate. Ten ppb of OTA was detected in 10 min by this new strip. The results indicated that a rapid method without using the mycotoxin, but using mimotope peptides was developed to screen OTA; related methods also can be developed to screen other mycotoxins.
Keywords: Ochratoxin A; Strip; Mimotope peptide

R. Kivela, L. Nystrom, H. Salovaara, T. Sontag-Strohm, Role of oxidative cleavage and acid hydrolysis of oat beta-glucan in modelled beverage conditions, Journal of Cereal Science, Volume 50, Issue 2, September 2009, Pages 190-197, ISSN 0733-5210, DOI: 10.1016/j.jcs.2009.04.012.
(http://www.sciencedirect.com/science/article/B6WHK-4WBT459-2/2/c736426e69d2cd935bfd1e6def24c15f)
Abstract:
The effects of organic acids (ascorbic, citric and malic acids) associated with beverages were studied in an unpurified oat beta-glucan extract with the purpose of examining the stability of cereal beta-glucan in beverage conditions. Addition of ascorbic acid caused an immediate decrease in viscosity of the extract and the MW of beta-glucan. Citric and malic acid affected moderately and only after a heat treatement. This indicated a dominating role of ascorbic acid induced oxidative cleavage compared to the generally proposed acid hydrolysis of beta-glucan. The nature of ascorbic acid induced cleavage was studied with inhibitors (glucose, mannitol, catalase and phytic acid) and catalysts (Cu- and Fe-ions) of hydroxyl radical attacks. Glucose, mannitol and catalase inhibited and the metals effectively catalysed the viscosity decrease. These indicated that the degradation of beta-glucan in the ascorbic acid treated extract was induced by metal-catalysed hydroxyl radicals. Also, the beta-glucan extract used as a matrix lost its viscosity during storage (+6 [degree sign]C) concurrently with MW decrease of beta-glucan. When added to the extract, mannitol, glucose and catalase each showed a slight stabilising trend and Fe2+-ions

caused an immediate decrease in viscosity. The oxidative cleavage appeared to be an important factor to consider in developing novel aqueous beta-glucan enriched products.
Keywords: Beta-glucan; Degradation; Ascorbic acid; Oxidative cleavage

Ghaid J.S. Al-Rabadi, Robert G. Gilbert, Michael J. Gidley, Effect of particle size on kinetics of starch digestion in milled barley and sorghum grains by porcine alpha-amylase, Journal of Cereal Science, Volume 50, Issue 2, September 2009, Pages 198-204, ISSN 0733-5210, DOI: 10.1016/j.jcs.2009.05.001.
(http://www.sciencedirect.com/science/article/B6WHK-4WD1BYY-1/2/f9748fc8b83fdf31564fdc010350f781)
Abstract:
The influence of milled grain particle size on the kinetics of enzymatic starch digestion was examined. Two types of cereals (barley and sorghum) were ground, and the resulting grounds separated by size using sieving, with sizes ranging from ~0.1 to ~3 mm. In vitro enzymatic digestion was performed, using pancreatic alpha-amylase, amyloglucosidase and protease, to determine fractional-digestion rates over 24 h. The resulting glucose production rate data were well fitted by simple first-order kinetics. For each sieve screen size, the digestion rate of barley was always higher than that of sorghum. The rate coefficients for digestion showed a decrease with increasing size, and could be well fitted by an inverse square relationship. This is consistent with the supposition that starch digestion in these systems is controlled by diffusion of enzyme through the grain fragment. Apparent diffusion coefficients of alpha-amylase obtained by fitting the size dependence were 0.76 (sorghum) and 1.7 (barley) x 10-7 cm2 s-1, 9 (sorghum) and 4 (barley) times slower than predicted for a molecule of the size of alpha-amylase in water.
Keywords: Starch digestion; alpha-Amylase; Grain particle size; Diffusion

Dhananjay A. Pai, Orane A. Blake, Bruce R. Hamaker, Osvaldo H. Campanella, Importance of extensional rheological properties on fiber-enriched corn extrudates, Journal of Cereal Science, Volume 50, Issue 2, September 2009, Pages 227-234, ISSN 0733-5210, DOI: 10.1016/j.jcs.2009.05.007.
(http://www.sciencedirect.com/science/article/B6WHK-4WH2M0H-2/2/7096ad265d62687027d4f71580e627ad)
Abstract:
Incorporation of insoluble fibers into extruded cereals severely limits their expansion and reduces crispness. The specific objective of this work was to investigate how corn bran and its fractions mixed with cornmeal affect rheology and extrudate expansion. Alkali-treated bran (ATB) and alkaline-soluble bran (ASB) were prepared from unmodified corn bran (UMB). Mixtures of the different corn bran fractions and degermed cornmeal having a 26% (w/w) of total dietary fibers were extruded in a twin screw extruder and expansion of the extrudates was determined. Melt shear rheology of mixtures of cornmeal and different corn bran fractions having a 20% total dietary fiber was determined using a capillary rheometer at 120 [degree sign]C while the extensional rheology was determined using lubricated squeezing flow. The expansion of extrudates containing ATB was larger than those containing UMB, while extrudates containing ASB showed a greater expansion that was close to that of the control. Addition of UMB to cornmeal increased shear and extensional viscosity significantly as compared to the control. ATB addition increased the shear viscosity of the mixture to a small extent but showed the highest extensional viscosity amongst the samples. Addition of ASB resulted in mixtures having lower shear and extensional viscosities than the control.
Keywords: Corn bran; Extrusion; Shear rheology; Extensional rheology

F. Saura-Calixto, J. Perez-Jimenez, I. Goni, Contribution of cereals to dietary fibre and antioxidant intakes: Toward more reliable methodology, Journal of Cereal Science, Volume 50, Issue 2, September 2009, Pages 291-294, ISSN 0733-5210, DOI: 10.1016/j.jcs.2009.04.008.
(http://www.sciencedirect.com/science/article/B6WHK-4WB3NB8-8/2/9e3a33f61c84e8b6360fd3b685afad1f)
Keywords: Dietary fibre; Antioxidants; Dietary intake

Ann M. Albertson, Sandra G. Affenito, Robert Bauserman, Norton M. Holschuh, Alison L. Eldridge, Bruce A. Barton, The Relationship of Ready-to-Eat Cereal Consumption to Nutrient Intake, Blood Lipids, and Body Mass Index of Children as They Age through Adolescence, Journal of the American Dietetic Association, Volume 109, Issue 9, September 2009, Pages 1557-1565, ISSN 0002-8223, DOI: 10.1016/j.jada.2009.06.363.
(http://www.sciencedirect.com/science/article/B758G-4X25VJY-M/2/9f64b69b7dd3878e88791c73e177bbf5)
Abstract: Objective
To examine sex differences and longitudinal changes in ready-to-eat (RTE) cereal and breakfast consumption in the Dietary Intervention Study in Children, and the relationship between RTE cereal intake with nutrient intake, blood lipids, and body mass index (BMI).Design
Secondary analyses based on data from Dietary Intervention Study in Children, a randomized, controlled, multicenter, clinical trial with five sets of three 24-hour recalls.Subjects/setting
Children (n=660) from six clinics aged 8 to 10 years at study entry. Participants had serum low-density lipoprotein cholesterol levels between the 80th and 98th percentiles for age, and were followed for a mean of 7.5 years.Intervention
Children were randomized to a total fat- and saturated fat-modified dietary intervention or usual care.Statistical analyses
Frequency of RTE cereal and breakfast consumption was examined by sex and age. Mixed models by sex were used to examine the relationship of RTE cereal consumption to average daily intake of nutrients, blood lipids, and BMI.Results
For all children, RTE cereal and breakfast consumption declined with age. Boys consumed RTE cereal more often compared with girls. Except for energy, RTE cereal consumption was positively associated with all measures of nutrients for both sexes. In boys, higher RTE cereal consumption was associated with lower total and low-density lipoprotein cholesterol levels and lower BMI.Conclusions
Food and nutrition professionals should continue to educate youth and their parents on the nutritional benefits of routinely eating RTE cereal.

N. Weltman, S. Angadi, J. Patrie, K. Frick, J. Rutkowski, J. Rodriguez, J. Weltman, A. Weltman, G.A. Gaesser, A High-Fiber Breakfast Cereal Attenuates Postprandial Triglyceridemia and Associated Impairment of Endothelial Function Following a High-Fat Meal in Youth, Journal of the American Dietetic Association, Volume 109, Issue 9, Supplement 1, ADA Food & Nutrition Conference & Expo, September 2009, Page A31, ISSN 0002-8223, DOI: 10.1016/j.jada.2009.06.086.
(http://www.sciencedirect.com/science/article/B758G-4X25VK2-34/2/bd7d33b4cda2826a083c1841ed6daa17)

Susana B. Rosas, German Avanzini, Evelin Carlier, Carolina Pasluosta, Nicolas Pastor, Marisa Rovera, Root colonization and growth promotion of wheat and maize by Pseudomonas aurantiaca SR1, Soil Biology and Biochemistry, Volume 41, Issue 9, September 2009, Pages 1802-1806, ISSN 0038-0717, DOI: 10.1016/j.soilbio.2008.10.009.
(http://www.sciencedirect.com/science/article/B6TC7-4TTF82N-9/2/f45d2eecf92875980bfefe1855ea5c74)

Abstract:
Wheat (Triticum aestivum L.), rice (Oryza sativa) and maize (Zea mays L.) are the most important cereals worldwide. However, in the last few years, soil has been submitted to both use and handling pressures due to the increase in agricultural practices, which are leading to its degradation. The use of plant growth-promoting rhizobacteria (PGPR) as inoculants constitutes a biological alternative for sustainable production. Pseudomonas aurantiaca SR1 was formulated as an inoculant in order to evaluate its growth promotion effect in the field when applied on maize and wheat seeds at the sowing time. P and N fertilization treatments were also included in the assays. P. aurantiaca SR1 colonized the root system of both crops and it persisted at appropriate population densities. It also showed a significant plant growth-promoting effect that was reflected in the yield. Another relevant finding was that both crops, when inoculated with P. aurantiaca SR1, presented higher yields with fertilization doses lower than those conventionally applied. This indicated its potential use as a reasonable alternative for crop production, with a minimization of the ecological impact.
Keywords: Pseudomonas aurantiaca SR1; Wheat; Maize; Inoculation; Growth promotion

Michael G. Ganzle, From gene to function: Metabolic traits of starter cultures for improved quality of cereal foods, International Journal of Food Microbiology, Volume 134, Issues 1-2, Food Micro 2008 'Evolving Microbial Food Safety and Quality' 1-4 September 2008, Aberdeen, Scotland, UK, 31 August 2009, Pages 29-36, ISSN 0168-1605, DOI: 10.1016/j.ijfoodmicro.2009.05.018.
(http://www.sciencedirect.com/science/article/B6T7K-4WBT41P-4/2/d13fc92c088c2ecbe54b2567bf5252fe)
Abstract:
Food fermentations with lactic acid bacteria (LAB) are employed to produce safe and shelf stable food products with characteristic flavour and texture. Advances in genomics and physiology of lactic acid bacteria enabled to link individual genetic and metabolic traits of starter cultures to specific food quality attributes. The empirical selection of starter cultures is increasingly supported by the targeted selection of functional starter cultures to achieve an improved quality of fermented foods. This review highlights recent developments related to metabolic traits of LAB that are relevant for the quality of foods; emphasis is placed on starter cultures for use in bread production. Although the food use of antibacterial metabolites of LAB is well established, antifungal compounds were only recently shown to extend the shelf life of foods. Redox reactions catalysed by LAB alter the technological functionality of proteins and influence the (off)-flavour development through lipid oxidation pathways. LAB produce polysaccharides and oligosaccharides from sucrose through the glycansucrase activities. The exploitation of glycansucrase biodiversity enables the generation of a large variety of glucans or fructans in food fermentation. Poly- and oligosaccharides influence food texture, increase the dietary fibre content of foods and can be applied to protect bacterial during culture preparation and storage. The transformation of amino acids or peptides to aroma compounds contributes substantially to food flavour of food and particularly the conversion of glutamate by LAB enables the targeted optimisation of food flavour.
Keywords: Antifungal activity; Reutericyclin; Exopolysaccharides; Glutamate metabolism; Lactobacilli; Starter cultures

Jan Hubert, Marta Nesvorna, Vaclav Stejskal, The efficacy of sieving, filth flotation and Tullgren heat extraction for detecting various developmental stages of Tribolium castaneum and Ephestia kuehniella in samples of wheat grain, flour and semolina, Journal of Stored Products Research, In Press, Corrected Proof, Available online 29 August 2009, ISSN 0022-474X, DOI: 10.1016/j.jspr.2009.05.003.
(http://www.sciencedirect.com/science/article/B6T8Y-4X3VM07-1/2/22332b71154c8cc5f8c5ea1b3ba67e59)
Abstract:

A prerequisite for effective pest risk management in food is the unbiased interpretation of results obtained by various detection methods. In this study we compared the sensitivity of filth flotation tests, sieving and heat extraction in Tullgren-Berlese funnels for detecting insect contaminants. Samples of wheat grain, flour and semolina were contaminated with eggs, juveniles and adults of Tribolium castaneum, and eggs or larvae of Ephestia kuehniella. Calibration methods were applied for every detection method, and total and sample recoveries and detection limits were calculated for each method, food substrate and contaminant type. The tested contaminants were not detected on a qualitative level by any single technique, instead a combination of techniques was necessary for detection. Sieving was the method with the highest total recoveries, ranging from 90 to 100%. Filth flotation was a uniquely effective for egg detection, with total recoveries ranging from 65 to 95%. The extraction of adults and larvae of both species in Tullgren-Berlese funnels failed in semolina and flour, and was of very limited success in grain. The detection limits for sieving were from 1 to 16 contaminants/kg commodity. The detection limits for filth flotation were from 224 to 508 eggs, and 58 to 507 adults or larvae/kg commodity. The sample recoveries were usually influenced by sample size, species, stadium and their interactions, and indicated how to optimize method protocols. The calibration of methods provided estimates of contaminant densities different from those obtained without calibration. Our work revealed that some currently used methods are not sensitive enough to detect all stages of insect pests, or in some cases, low levels of pest infestation. This lack of sensitivity potentially enables the infested cereal food product to continue down the food processing chain even after laboratory inspection.
Keywords: Stored-product insects; Storage; Detection; Filth flotation; Sieving; Tullgren-Berlese funnels

Olaf Erenstein, Comparing water management in rice-wheat production systems in Haryana, India and Punjab, Pakistan, Agricultural Water Management, In Press, Corrected Proof, Available online 27 August 2009, ISSN 0378-3774, DOI: 10.1016/j.agwat.2009.07.018.
(http://www.sciencedirect.com/science/article/B6T3X-4X3DRY7-2/2/fd94996002f60f86455ed6f3786677b5)
Abstract:
The intensive irrigated rice-wheat systems in the northwest Indo-Gangetic Plains of South Asia are built on a long tradition of canal irrigation and the more recent advent of tubewells. Findings from farm surveys are used to examine water management and water productivity in the rice-wheat belt of India's Haryana State and Pakistan's Punjab province. Attributes of the irrigation sources help explain the widespread interest in groundwater use and the relative demise of canal water use. In each area groundwater now is the main irrigation source, used either solely or in conjunction with surface water. The ownership of tubewells is near universal among the surveyed farms, whereas conjunctive water use is more widespread during the monsoon season, among better endowed farmers and in the Pakistan Punjab. In Pakistan Punjab farmers primarily rely on diesel powered tubewells whereas Haryana farmers mainly use relatively cheaper electric power. Water productivity indicators for rice are markedly lower than those for wheat--largely reflecting significantly higher water inputs in paddy cultivation--but also vary between the study areas and by the prevailing water use, reflecting the limited incentives for farmers to use water wisely. A combination of technological, land use and market based approaches is likely to be most effective in achieving sustainable water management in these intensive cereal systems.
Keywords: Irrigated farming; Intensive cereal systems; Indo-Gangetic Plains; South Asia; Conjunctive water use; Canal irrigation; Tubewell irrigation

Zhaozhan Zhong, Reynald L. Lemke, Louise M. Nelson, Nitrous oxide emissions associated with nitrogen fixation by grain legumes, Soil Biology and Biochemistry, In Press, Uncorrected Proof, Available online 27 August 2009, ISSN 0038-0717, DOI: 10.1016/j.soilbio.2009.08.009.

(http://www.sciencedirect.com/science/article/B6TC7-4X3D8RB-1/2/4c1602784bdeba0094a0f5b956d74d1e)
Abstract:
Nitrous oxide (N2O) emissions and biological nitrogen (N2) fixation by grain legumes are two major processes of N transformation in agroecosystems. However, the relationship between these two processes is not well understood. The objective of this study was to quantify N2O emissions associated with N2 fixation by grain legumes under controlled conditions. The denitrifying capability of two Rhizobium leguminosarum biovar viciae strains, 99A1 and RGP2, was tested in pure culture in the presence of nitrate and in symbiosis with lentil (Lens esculenta Moench) and pea (Pisum sativum L.), respectively, in sterile Leonard jars. Lentil and pea, either inoculated or N-fertilized, were grown in soil boxes under controlled conditions. Profile N2O concentration and surface N2O emissions were measured from soil-crop systems, and were compared with that of a cereal - spring wheat (Triticum aestivum L. ac. Barrie). Results indicated that: 1) neither R. leguminosarum strain, 99A1 or RGP2 was capable of denitrification in pure culture, nor in symbiosis with lentil and pea in sterile Leonard jars, suggesting that introducing these Rhizobium into soils through rhizobial inoculation onto lentil and pea will not increase denitrification or N2O emissions; 2) soil-emitted N2O from well-nodulated lentil and pea crops grown under controlled conditions was not significantly different than that from the check treatments, indicating that biological N2 fixation by lentil and pea was not a direct source of N2O emissions.
Keywords: Grain legumes; Biological nitrogen fixation; Rhizobium; Denitrification; N2O emissions

J.E. Cairns, T.L. Botwright Acuna, F.A. Simborio, G. Dimayuga, M. Lakshmi Praba, H. Leung, R. Torres, H.R. Lafitte, Identification of deletion mutants with improved performance under water-limited environments in rice (Oryza sativa L.), Field Crops Research, In Press, Corrected Proof, Available online 26 August 2009, ISSN 0378-4290, DOI: 10.1016/j.fcr.2009.07.019.
(http://www.sciencedirect.com/science/article/B6T6M-4X36TR5-1/2/ba2e3fd9841103d7a320903040e07933)
Abstract:
Rice (Oryza sativa L.) is a semi-aquatic member of the grass family that is poorly adapted to dry environments and has greater sensitivity to water-deficits than other important cereals in this family. To increase productivity in aerobic or water-limited environments rice must overcome its adaptations to flooded environments. Deletion mutants offer an alternative genetic resource for improving drought tolerance. Almost 3500 IR64 deletion mutants were screened under vegetative and reproductive stage drought stress in the field and evaluated for leaf drying and/or grain yield. Seven novel conditional mutants of rice which showed gain of function through continued growth as drought stress developed compared to the wild type were identified. Mutant recovery rate was 0.1%. Further evaluation of putative drought mutants revealed that their average shoot biomass at maturity and grain yield per plant under stress exceeded those of the wild type by two-fold. Studies under controlled conditions confirmed mutants to have continued growth of both roots and shoots as drought developed compared to the wild type, and a tendency for greater water extraction. We propose that deletions in these mutants have affected a regulator of the highly conservative growth response common to irrigated lowland rice cultivars. Our results suggest that screening deletion mutants for performance under managed drought stress in the field could be a highly effective way to identify valuable genetic resources for improved drought response and aerobic adaptation in rice.
Keywords: Rice; Oryza sativa L.; Drought stress; Deletion mutants; Aerobic adaptation

Olivier Tranquet, Luc Saulnier, Jean-Pierre Utille, John Ralph, Fabienne Guillon, Monoclonal antibodies to p-coumarate, Phytochemistry, In Press, Corrected Proof, Available online 25 August 2009, ISSN 0031-9422, DOI: 10.1016/j.phytochem.2009.06.019.

(http://www.sciencedirect.com/science/article/B6TH7-4X35K1N-2/2/90caefff65bbc6df40b32a58816609c8)
Abstract:
p-Coumaric acid is one of the predominant phenolic acids acylating the cell walls of grasses; p-coumarates are mainly esterified by lignins and arabinoxylans. Here we describe the production and characterisation of two monoclonal antibodies against p-coumarates.
The 5-O-pCou-Ara(1 --> 4)Xyl was chemically synthesized and conjugated to a carrier protein. Two interesting antibodies were obtained, hereinafter named INRA-COU1 and INRA-COU2. The specificity of these monoclonal antibodies has been evaluated using competitive-inhibition assays with different oligosaccharides and phenolic compounds. INRA-COU1, recognized free p-coumaric acid or p-coumarate esters. INRA-COU1 did not react with any of the other hydroxycinnamic acids and related compounds found in plants. INRA-COU2, only recognizes esterified p-coumarate. These antibodies were used to study the localization of p-coumarates in the cell walls of grasses. Immunocytochemical analyses indicated noticeable amounts of p-coumarate in the cell walls of the aleurone layer of wheat grain, in the epiderm of cereal straw, and in the exoderm of wheat root.
The use of these antibodies will contribute to a better understanding of the organisation and developmental dynamics of cell walls in Graminaceae.
Keywords: Graminaceous plant; Cell wall; p-Coumaric acid; p-Coumarate; Monoclonal antibody

Kurt Moller, Inner farm nutrient flows between arable land and permanent grassland via the stable in organic cropping systems, European Journal of Agronomy, In Press, Corrected Proof, Available online 22 August 2009, ISSN 1161-0301, DOI: 10.1016/j.eja.2009.07.007.
(http://www.sciencedirect.com/science/article/B6T67-4X2BV9K-1/2/4733a5ca7fbc204e6aa3ab3e1b602ed7)
Abstract:
Organic farming systems are characterized by the strong regulation of the import of nutrients into the farming system. Recently, nutrient budgets in organic farming especially with regard to potassium (K) and phosphorus (P) have gained interest. In the present study inner farm mineral nutrient flows of P, K and magnesium (Mg) among the farmland sub-compartments arable land and permanent grassland via the dairy stable were analysed. The objectives of the current study were (1) to quantify the inner farm nutrient flows among different farmland sub-compartments, and (2) to assess the effect of purchased biomass on inner farm nutrient cycles. Results indicated that the ratio of the nutrients N, P and K in the stable inputs (feed, bedding) greatly differed depending on the kind of biomass introduced into the stable (roughage in comparison to concentrates or straw for bedding), i.e. via grassland biomass much more K (7.9 kg) per kg P were introduced than with feeds harvested on arable land like silage maize (4.9 kg K per kg P), concentrates like cereals (1.3-1.6 kg K per kg P) or grain pulses like peas (2.4 kg K per kg P). The different inputs are mixed in the manures leading to intermediate concentration in the stable manures, with the consequence that nutrient composition of the manures does not match the composition of the single stable inputs. Therefore, balances of nutrient flows in such mixed systems indicate a relative transfer of K from grassland to arable land via the stable manure (approximately 10-30% of the manure derived from grassland K, depending among others on the amounts of straw high in K needed for animal bedding), if P was used as reference nutrient for stable manure allocation to permanent grassland and arable land. Yields of non-legumes in arable cropping in organic farming systems is very often limited by nitrogen (N) supply, whereas it is well known that manure additions are rather ineffective on permanent grassland high in legumes. The higher N demand of arable crops as well as P and K offtakes from arable land via sold animal and plant products give some scope for a preferable use of stable manures for manuring arable land to replace mineral nutrient outputs and to improve the soil N and the soil humus status, increasing the demand for supplement of mineral nutrients on the permanent grassland area to avoid long-term impoverishment of soil fertility.
Keywords: Nutrient cycle; Phosphorus; Potassium

M.R. Fernandez, R.P. Zentner, P. Basnyat, D. Gehl, F. Selles, D. Huber, Glyphosate associations with cereal diseases caused by Fusarium spp. in the Canadian Prairies, European Journal of Agronomy, In Press, Corrected Proof, Available online 21 August 2009, ISSN 1161-0301, DOI: 10.1016/j.eja.2009.07.003.
(http://www.sciencedirect.com/science/article/B6T67-4X24C6F-1/2/5494dc7b7f8cf062fae471dbd051cdcd)
Abstract:
Fusarium pathogens cause important diseases, such as root/crown rot and Fusarium head blight (FHB), in cereal crops. These diseases can be caused by similar Fusarium spp. Common root rot (CRR) is widespread in the western Canadian Prairies, whereas FHB has potential of becoming an important disease in this region. There are no commercially available cereal cultivars with good resistance to these diseases. It is therefore important to identify agronomic practices that could affect levels of Fusarium pathogens in cereals. This review deals primarily with the effects of tillage systems and glyphosate use on the development of FHB and CRR in wheat and barley in eastern Saskatchewan. Although the FHB study in 1999-2002 indicated that environment was the most important factor determining FHB development, previous glyphosate use and tillage practice were among the production factors with the greatest association with FHB. Overall, disease was highest in crops under minimum-till management. Previous glyphosate use was consistently associated with higher FHB levels caused by the most important FHB pathogens, Fusarium avenaceum and Fusarium graminearum. Cochliobolus sativus, the most common CRR pathogen, was negatively associated with previous glyphosate use, while F. avenaceum, F. graminearum, and other fungi were positively associated, suggesting that glyphosate might cause changes in fungal communities. The occurrence and isolation of F. avenaceum from cereal residues were greater under reduced-till than conventional-till while C. sativus was most common under conventional-till, and F. graminearum was lowest under zero-till. Previous glyphosate applications were again correlated positively with F. avenaceum and negatively with C. sativus. These observations agreed with results from the FHB and CRR studies. These are the first studies that established a relationship between previous glyphosate use and increased Fusarium infection of spikes and subcrown internodes of wheat and barley, or Fusarium colonization of crop residues. However, because of the close association between noncereal crops, reduced tillage and glyphosate use, it was not possible to completely separate the effects of these factors on Fusarium infections. Determining the relative contribution of these popular production trends to the development of diseases caused by Fusarium spp. are essential for devising appropriate agronomic recommendations to prevent their further spread in western Canada, and to reduce the impact that these diseases are having in areas where they are already established. The consistent association between previous glyphosate use and Fusarium infections also warrants further research to elucidate the nature of this association and the underlying mechanisms determining these effects.
Keywords: Fusarium head blight; Fusarium root rot; Fusarium graminearum; Cochliobolus sativus; Wheat; Barley; Herbicide; Glyphosate

Som Dev Sharma, Pramod Kumar, Harender Raj, Satish Kumar Bhardwaj, Isolation of arbuscular mycorrhizal fungi and Azotobacter chroococcum from local litchi orchards and evaluation of their activity in the air-layers system, Scientia Horticulturae, In Press, Corrected Proof, Available online 21 August 2009, ISSN 0304-4238, DOI: 10.1016/j.scienta.2009.07.019.
(http://www.sciencedirect.com/science/article/B6TC3-4X24C5R-2/2/ea772a186a2a43793ad1324baa1a373c)
Abstract:
Soil samples were collected from rhizosphere of litchi-growing areas of North-Western Himalayan Region (NWHR) of India, for finding qualitative and quantitative differences in arbuscular mycorrhizal (AM) fungi and Azotobacter chroococcum. These samples were taken from plants

being grown in different cultivation types namely, weed control with weedicides or tillage; orchard floor either clear or with cover crops; intercropping with cereals and legumes. Qualitative and quantitative differences were noticed with different cultivation types and a marked reduction in the AM fungi was observed in orchards where chemicals were used for weed control and intensive farming system was used on the orchard floor. AM fungi were generally abundant in the soils with range pH 5.5-6.6. Among different AM fungi retrieved from the soils, Glomus spp. was most dominant. Fifteen AM fungal species were isolated, identified and characterized and along with their ability to colonize the roots. In the soil samples, a marked variation in viable bacterial count of A. chroococcum was also noticed due to varied physico-chemical characteristics of the orchard soils. The changes in AM fungal species composition can be attributed to changes in soil chemical properties resulting from cultural practices such as ploughing, application of chemical fertilizers and weedicides. An experiment was also conducted to study the comparative efficacy of four dominant and frequently occurring indigenous AM species namely, Glomus fasciculatum (Thaxter sensu Gerdemann), G. magnicaulis (Hall), G. mosseae (Nicol. & Gerd.), Gigaspora heterogamma (Nicol. & Gerd.) and two A. chroococcum strains viz., AZ1 and AZ2 singly and in dual combination to evaluate their effect in air-layers system. Dual inoculation of G. fasciculatum and AZ1 increased total root length of air-layered shoots by 81.39% over uninoculated control. These studies indicated that indigenously isolated AM fungal species and A. chroococcum strains can be used for air-layering for better adaptation under specific agro-climatic and ecological zone conditions.
Keywords: Glomus spp.; Azotobacter strains; Inoculum; Root growth

V. Berthelot, P. Bas, P. Schmidely, Utilization of extruded linseed to modify fatty composition of intensively-reared lamb meat: effect of associated cereals (wheat vs corn) and linoleic acid content of the diet, Meat Science, In Press, Accepted Manuscript, Available online 19 August 2009, ISSN 0309-1740, DOI: 10.1016/j.meatsci.2009.08.034.
(http://www.sciencedirect.com/science/article/B6T9G-4X1SBJB-3/2/ac6ee241f50cbd2470cff1d4beee10be)
Abstract:
Sixty male lambs were used in 2 trials to study the efficiency of transfer and elongation of linolenic acid (ALA) in muscle and caudal adipose tissue and to assess factors affecting this process and related changes in fatty acid (FA) profile. In exp. 1, lambs were fed a control diet or extruded linseed (L) diet either with wheat (W, rapid starch) or corn (C, slow starch). In exp. 2, lambs were fed L with normal rapeseed, or high oleic rapeseed, or soybean. In exp. 1, L increased ALA proportion and total n-3 PUFA in muscle and adipose tissue. In adipose tissue but not in muscle, LC-lambs had higher proportion of ALA than LW-lambs. In exp. 2, increasing linoleic acid (LA) intake increased LA proportion in muscle and adipose tissue but did not modify ALA proportion. Moreover, in muscle, it did not change the desaturation and elongation processes of ALA to long-chain n-3 PUFA.
Keywords: Lamb; Muscle; Fat supplementation; Polyunsaturated fatty acids

Kristian Kirk, Hans Jorgen Andersen, Anton G. Thomsen, Johannes R. Jorgensen, Rasmus N. Jorgensen, Estimation of leaf area index in cereal crops using red-green images, Biosystems Engineering, In Press, Corrected Proof, Available online 18 August 2009, ISSN 1537-5110, DOI: 10.1016/j.biosystemseng.2009.07.001.
(http://www.sciencedirect.com/science/article/B6WXV-4X1GG10-1/2/b9526f3b1b69fd992c033a988fab7d0b)
Abstract:
A new method for estimating the leaf area index (LAI) in cereal crops based on red-green images taken from above the crop canopy is introduced. The proposed method labels pixels into vegetation and soil classes using a combination of greenness and intensity derived from the red and green colour bands. The intensity feature is included to give better separation of the classes,

especially under difficult sunny conditions. The performance of the method was investigated in three field experiments during the period 2004-2006. LAI was estimated using gap fraction inversion with an exponential gap fraction model and an ellipsoidal leaf angle distribution. The LAI estimates were compared with measurements taken using a LAI-2000 Plant Canopy Analyzer in terms of their correlation with results from harvested samples scanned with the LI-3100 Area Meter. The results showed that the method was capable of estimating LAI with a precision similar to that of LAI-2000. Correlations with LAI-values estimated by scanning harvested samples showed coefficient of determination (R2) values of 0.68 and 0.81 for the camera method, compared to 0.78 and 0.90 for the LAI-2000. However, an important feature of the proposed method was that it was able to estimate LAI at an early state of growth (LAI < 1) with R2 in the range 0.71-0.79, whereas methods that look upwards through the canopy cannot be applied in this situation. From the perspective of developing an LAI-sensor suitable for operational use, the method is interesting because the colour information used by the method can be acquired by an ordinary inexpensive colour camera, and the sensor does not need to be colour-calibrated.

Paola Ovando, Pablo Campos, Rafael Calama, Gregorio Montero, Landowner net benefit from Stone pine (Pinus pinea L.) afforestation of dry-land cereal fields in Valladolid, Spain, Journal of Forest Economics, In Press, Corrected Proof, Available online 18 August 2009, ISSN 1104-6899, DOI: 10.1016/j.jfe.2009.07.001.
(http://www.sciencedirect.com/science/article/B7GJ5-4X1GG46-1/2/f145e2e1312590826f2203ff22ad6c96)
Abstract:
This analysis measures the net benefit that a landowner could obtain from changing current dry-land cereal fields into Stone pine plantations in Portillo and Viana (Valladolid, Spain). We apply cost-benefit analysis techniques to estimate the present value of Stone pine afforestation net benefit by considering an infinite series of forestry rotations. We simulate three Stone pine silviculture models at each of the two sites. In addition, we estimate landowner extended net benefits from Stone pine afforestation when we consider a hypothetical payment for the carbon sequestration service. Results show that, when government subsidies are included, Stone pine afforestation only offers positive landowner net benefit in Portillo when both medium and high-stocking silviculture models are applied. Taking into account carbon prices up to [euro]45 tC-1 ([euro]12.3 tCO2-1), Stone pine afforestation gives landowner positive extended net benefits for the three silviculture models simulated at the Portillo and Viana sites.
Keywords: Cost-benefit analysis; Silviculture models; Carbon sequestration; Government subsidies

X. Carolina Lizana, Susan Hess, Daniel F. Calderini, Crop phenology modifies wheat responses to increased UV-B radiation, Agricultural and Forest Meteorology, In Press, Corrected Proof, Available online 14 August 2009, ISSN 0168-1923, DOI: 10.1016/j.agrformet.2009.07.003.
(http://www.sciencedirect.com/science/article/B6V8W-4X0MP6H-1/2/cc38598b64f8e4ff08fa5c7045ed650c)
Abstract:
Ozone layer depletion increases the level of ultraviolet radiation reaching the earth's surface affecting both natural and agricultural ecosystems, especially in the Southern Hemisphere. Considering the harmful effects UV-B radiation has on plant growth the future productivity of wheat crops in Southern Chile could be challenged by both (i) the forthcoming level of UV-B increase and (ii) the sensitivity of this crop to higher UV-B radiation. In this study the effect of increased UV-B radiation at different phenophases on a spring wheat cultivar (Pandora) was investigated in two experiments at plant and crop levels under out-door conditions. The experiments consisted of controls, increased UV-B radiation at specific phenophases (from 3 leaf stage to booting 3L-Bo, and from booting to maturity Bo-PM), and increased UV-B radiation for the majority of the crop

cycle (from 3 leaf stage to maturity). UV-B radiation was increased by Q panel UV-313 lamps set in plastic framed structures. Control plants were grown either without frames or below the same framed structures as those which received increased UV-B treatments. Phenology, above-ground biomass, grain yield, components, grain protein concentration, leaf area index (LAI), Fv/Fm and pigments were measured at booting and/or at harvest. Above-ground biomass and yield decreased by 11-19 and 12-20%, respectively, when UV-B radiation was increased at the 3L-Bo phase, while no effect was observed when irradiation was applied later in the crop cycle (Bo-PM). No additional UV-B effects to those observed at booting were detected in plants irradiated during the majority of the entire crop cycle (3L-PM). Biomass variation was strongly associated ($r = 0.99$; $P < 0.01$) with UV-B/PAR ratio in the sensitive treatments to UV-B increases (3 L-Bo) of both experiments. Flour protein was not affected by UV-B increases at any phenophase evaluated in this study. In both experiments, leaf green area and weight were negatively affected by increased UV-B radiation and no effect on specific leaf area (SLA) was found. Lower Fv/Fm, chlorophyll, carotenoid concentration and carotenoid:chlorophyll ratio were found at crop level (experiment 2) under higher UV-B in the 3L-Bo and 3L-PM treatments. The flavonoid concentration responded differently in the two experiments, probably due to the optimum responses these pigments had to expose UV-B doses.
Keywords: Ozone depletion; UV-B; Environmental stress; Development; Cereals; Grain yield

Anja Coors, Joost Vanoverbeke, Tom De Bie, Luc De Meester, Land use, genetic diversity and toxicant tolerance in natural populations of Daphnia magna, Aquatic Toxicology, In Press, Accepted Manuscript, Available online 14 August 2009, ISSN 0166-445X, DOI: 10.1016/j.aquatox.2009.08.004.
(http://www.sciencedirect.com/science/article/B6T4G-4X0PBVW-1/2/acb01c6ba84ce68158b020d73395d557)
Abstract:
Provided that gene flow is not too high, selection by local environmental conditions in heterogeneous landscapes can lead to genetic adaptation of natural populations to their local habitat. Pollution with anthropogenic toxicants may create pronounced environmental gradients that impose strong local selection pressures. Toxic contaminants may also directly impact genetic structure in natural populations by exhibiting genotoxicity or by causing population declines resulting in genetic bottlenecks. Using populations of Daphnia magna established from the dormant egg banks of ponds located in a landscape dominated by anthropogenic impact, we aimed at detecting evidence for local adaptation to environmental contamination. We explored the relationship between land use around the ten investigated ponds, population genetic diversity as measured by neutral genetic markers (polymorphic allozymes) and the tolerance of the populations originating from these ponds to acute lethal effects of two model toxicants, the pesticide carbaryl and the metal potassium dichromate. Genetic diversity of the populations as observed by neutral markers tended to be negatively impacted by agricultural land use intensity (Spearman rank correlation, $R = -0.614$, $P = 0.059$), indicating that genetic bottlenecks may have resulted from anthropogenic impact. We experimentally observed differences in susceptibility to both carbaryl and potassium dichromate among the studied pond populations of D. magna (analysis of deviance, $P < 0.001$). Because the experimental design excluded the possibility of physiological adaptation of the test animals to the toxicants, we conclude that the differences in susceptibility must have a genetic basis. Moreover, carbaryl tolerance levels of the populations tended to increase with increasing agricultural land use intensity as described by ranked percentage of land coverage with cereal and corn crop in the proximity of the ponds (Spearman rank correlation, $R = 0.602$, $P = 0.066$). Together, these two findings provide evidence for local adaptation of D. magna populations to pesticide contamination. Overall, the results demonstrate the potential selection pressure imposed by anthropogenic pollution and provide evidence that genetic erosion in natural Daphnia populations is related to anthropogenic impact.

Keywords: Daphnia magna; Pesticide; Dormant egg bank; Evolutionary ecotoxicology; Local adaptation; Genetic diversity

Jianwei He, Ting Zhou, J. Christopher Young, Greg J. Boland, Peter M. Scott, Chemical and biological transformations for detoxification of trichothecene mycotoxins in human and animal food chains: A review, Trends in Food Science & Technology, In Press, Accepted Manuscript, Available online 14 August 2009, ISSN 0924-2244, DOI: 10.1016/j.tifs.2009.08.002.
(http://www.sciencedirect.com/science/article/B6VHY-4X0PBYV-2/2/97f6a331c12c86ab1dac9b5d5d5479ce)
Abstract:
Trichothecene mycotoxins are found worldwide in cereal grains and in animal feed and human food produced from contaminated grains, which creates a food safety risk. Chemical and biological reactions are being evaluated for their usefulness in transforming trichothecene mycotoxins into other, less toxic, compounds for improved safety in food chains. Trichothecene transformation reactions discovered to date include alkalization, oxidation, reduction, hydrolysis, hydration and conjugation. Many of these reactions can change the structures of selected mycotoxins but not necessarily reduce their toxicity. More emphasis should be placed on understanding detoxification reactions, the toxicity of transformation products, and enzymes responsible for the transformations.

Fazia Mouhouche, Francis Fleurat-Lessard, Zouaoui Bouznad, Laboratory assessment of toxic activity of purified peptides extracted from chickpea seeds to two strains of the rice weevil Sitophilus oryzae (L.) (Coleoptera: Curculionidae), Journal of Stored Products Research, In Press, Corrected Proof, Available online 6 August 2009, ISSN 0022-474X, DOI: 10.1016/j.jspr.2009.04.006.
(http://www.sciencedirect.com/science/article/B6T8Y-4WXXV80-2/2/605957c50b45c3ca0c4b1bb3fea7ca6f)
Abstract:
Several peptides with entomotoxic properties were extracted from seeds of different chickpea varieties, by either aqueous or alcoholic phase extraction. The extracts were purified by anion-exchange chromatography followed by membrane dialysis. The toxicity of the purified extracts was tested on two different strains of the rice weevil, Sitophilus oryzae: a French strain feeding only on cereal grain and sensitive to pea phytotoxins (SS strain) and a Chinese strain naturally breeding on split pea (RS strain). The toxic activity of the different fractions isolated from the purified extracts was evaluated by the `artificial kernel method', incorporating the fraction into a reconstituted (`artificial') kernel made from whole wheat flour. The toxicity of the fractions was assessed by determining the mortality of young adults of each S. oryzae strain after 7 and 14 d feeding. With the more toxic acidic fraction incorporated into the artificial kernel, the mortality rate of SS strain weevils was 83% and 100% after 7 and 14 d feeding, respectively. With all the alcoholic fractions, mortality of the SS strain remained very low. With RS strain weevils, mortality was negligible after 7 d or 14 d feeding on any peptide fraction of the extracts.
Keywords: Chickpea; Antinutritional compound; Peptides; Purified extract; Artificial kernel toxicity test; Sitophilus oryzae

Dexian Dong, Jie Sun, Feiyun Huang, Qian Gao, Yi Wang, Rongxiu Li, Using trifluoroacetic acid to pretreat lignocellulosic biomass, Biomass and Bioenergy, In Press, Corrected Proof, Available online 5 August 2009, ISSN 0961-9534, DOI: 10.1016/j.biombioe.2009.07.013.
(http://www.sciencedirect.com/science/article/B6V22-4WXRDJ4-3/2/ce7addd8b7738c0a8fbd4df7b0c3402b)
Abstract:

Biomass pretreatment is one of major bottlenecks to convert biomass to bioethanol at present. We found that cereal straw could be completely dissolved in a 10-fold volume excess of trifluoroacetic acid (>=99%) (TFA). Pretreatment with TFA completely disrupted the dense cellulose crystallinity of the biomass. Further research showed that the TFA dissolved, but did not degrade, the cellulose in the straw. TFA did, however, degrade 65.65% of xylan in the straw, as well as reduce 20.0-23.3% of the acid-insoluble lignin. Isopropanol could precipitate 92.7% of the material dissolved in the TFA solution. These results led us to design a procedure for pretreatment of cellulosic biomass involving a dissolving step with TFA and a precipitation step with isopropanol. Experiments show that the procedure is technically feasible. Moreover, TFA and isopropanol could be completely evaporated off the supernatant and precipitate, and recycled back into the process.
Keywords: wheat; Rice; Maize; Sabai grass; Straw; Stover; Xylan; Cellulose; Lignin; Isopropanol; Pichea pastoris; Trifluoroacetic acid; Pretreatment; Lignocellulosic; Biomass conversion

Giles Elliott, Anne Durand, Richard K. Hughes, Paul A. Kroon, Renato D'Ovidio, Nathalie Juge, Isolation and characterisation of a xylanase inhibitor Xip-II gene from durum wheat, Journal of Cereal Science, In Press, Corrected Proof, Available online 5 August 2009, ISSN 0733-5210, DOI: 10.1016/j.jcs.2009.06.013.
(http://www.sciencedirect.com/science/article/B6WHK-4WXSK0F-1/2/ca9624f0660c401501798b5eb7692b93)
Abstract:
Cereals contain xylanase inhibitor proteins (XIPs) which inhibit microbial xylanases from glycoside hydrolase families 10 and 11. Here, we report for the first time the isolation and characterisation of a genomic clone containing a xylanase inhibitor gene. This gene, Xip-II, isolated from a durum wheat genomic library (Triticum durum Desf.) encodes a mature protein of 307 amino acid (aa) residues that shares highest aa sequence identity (64%) with the rice RIXI xylanase inhibitor. XIP-II showed inhibition against family 11 xylanases and no chitinase activity. In silico analysis of the 5' promoter region of Xip-II revealed sequences with similarity to known cis regulatory elements upstream from the initiation codon. In particular, the identification of a number of cis-acting elements controlling the expression of defence and seed-specific genes supports the role for this class of inhibitors in plant defence against pathogens but also provides new clues on a potential role in plant development.
Keywords: Xylanase inhibitor; Glycoside hydrolase family 18; Durum wheat; Chitinase; Pathogenesis-related proteins

Nicolas A. Gualano, Roberto L. Benech-Arnold, Predicting pre-harvest sprouting susceptibility in barley: Looking for 'sensitivity windows' to temperature throughout grain filling in various commercial cultivars, Field Crops Research, In Press, Corrected Proof, Available online 3 August 2009, ISSN 0378-4290, DOI: 10.1016/j.fcr.2009.06.016.
(http://www.sciencedirect.com/science/article/B6T6M-4WXB51F-1/2/8b8e7a926e5e33e3c3eedecd46423d3c)
Abstract:
Pre-harvest sprouting (PHS) is common in cereals that lack grain dormancy if maturing grain is exposed to rain. This phenomenon leads to immediate loss of seed viability, and since the malting process requires germination, its occurrence is highly undesirable in malting barley crops. Dormancy release rate is genetically and environmentally controlled. We evaluated the effect of temperature during grain filling on the dormancy release pattern (and then on the PHS susceptibility) of grains from five malting barley (Hordeum vulgare L.) cultivars widely sown in Argentina, with the aim of predicting PHS susceptibility of a barley crop from easy-to-gather data. Barley cultivars (Quilmes Ayelen, Q. Palomar, Q. Paine, B1215 and Scarlett) were sown on different dates over a 3-year period for generating variability in the thermal environment during grain filling. The period from pollination to physiological maturity (PM) was adjusted to a thermal

time (TT) scale, which was then arbitrarily divided into 50 [degree sign]C d intervals. Mean air temperature within each interval and for the whole filling period was calculated for the different sowing dates. Dormancy release pattern was followed by determining a weighed germination index (GI) throughout grain filling and maturation. We sought a linear relationship between temperature during grain filling and GI at some moment after PM. For all barley cultivars, except B1215, a significant ($p < 0.001$) and positive correlation was found between the GI of grains with 10-20% moisture content (fresh basis) and mean temperature within TT intervals located at the last stages of seed development. Then, simply temperature-based models for predicting crop PHS susceptibility were generated for each barley cultivar. Moreover, we intended a single, universal prediction model constructed with data from all cultivars. Two general forms were proposed, but the relationships were slightly less tight when each barley cultivar model was used. A preliminary validation for each cultivar model was done for three genotypes with independent data from four sites of the major barley production area in Argentina. When comparing experimental and field data regressions we did not find significant differences in slope for any cultivar ($p > 0.25$). However, most of the observed GIs were higher than predicted. This upwards displacement of GI-temperature relationship suggests the role of other environmental factors (i.e. water and soil N availability, day length), differing among tested locations. We are currently evaluating and quantifying the effect of these factors with the aim of improving PHS susceptibility prediction in malting barley crops.
Keywords: Pre-harvest sprouting; Malting barley; Hordeum vulgare L.; Temperature; Seed dormancy; Grain filling

Tijana M. Dordevic, Slavica S. Siler-Marinkovic, Suzana I. Dimitrijevic-Brankovic, Effect of fermentation on antioxidant properties of some cereals and pseudo cereals, Food Chemistry, In Press, Corrected Proof, Available online 3 August 2009, ISSN 0308-8146, DOI: 10.1016/j.foodchem.2009.07.049.
(http://www.sciencedirect.com/science/article/B6T6R-4WXC26Y-2/2/ff43cc66bcc371b4657b04144da69a29)
Abstract:
The influence of fermentation by two types of microorganisms (lactic acid bacteria Lactobacillus rhamnosus, and yeast Saccharomyces cerevisiae) on antioxidant activities and total phenolics of 4 cereals, namely buckwheat, wheat germ, barley and rye, was determined and compared with those of their unfermented counterparts. The total phenolic content (TPC), determined by the Folin-Ciocalteu method, increased upon fermentation. Antioxidant activities (AOA) were assessed using 2,2-diphenyl-1-picrylhydrazyl (DPPH) scavenging capacity, ferric ion-reducing antioxidant power (FRAP) and thiobarbituric acid (TBA) methods. The presence of those microorganisms was more or less important for enhanced levels of antioxidant activity. Thus fermentation offers a tool to further increase the bioactive potential of cereal products.
Keywords: Cereals; Fermentation; Total phenolic content (TPC); Antioxidant activity; DPPH; FRAP; TBA test

Xavier Gellynck, Bianka Kuhne, Filip Van Bockstaele, Davy Van de Walle, Koen Dewettinck, Consumer perception of bread quality, Appetite, Volume 53, Issue 1, August 2009, Pages 16-23, ISSN 0195-6663, DOI: 10.1016/j.appet.2009.04.002.
(http://www.sciencedirect.com/science/article/B6WB2-4W2NDK6-1/2/21ab25578e9b99eadaf331b0c3a863a4)
Abstract:
Bread contains a wide range of important nutritional components which provide a positive effect on human health. However, the consumption of bread is declining during the last decades. This is due to factors such as changing eating patterns and an increasing choice of substitutes like breakfast cereals and fast foods. The aim of this study is to investigate consumer's quality perception of

bread towards sensory, health and nutrition attributes. Four consumer segments are identified based on these attributes. The different consumer segments comprise consumers being positive to all three quality aspects of bread ('enthusiastic') as wells as consumers perceiving bread strongly as 'tasteless', 'non-nutritious' or 'unhealthy'. Moreover, factors are identified which influence the consumers' quality perception of bread. The results of our study may help health professionals and policy makers to systematically inform consumers about the positive effects of bread based on its components. Furthermore, firms can use the results to build up tailor-made marketing strategies.
Keywords: Consumer; Quality perception; Health; Bread; Belgium

Zdenka Lososova, Sarka Cimalova, Effects of different cultivation types on native and alien weed species richness and diversity in Moravia (Czech Republic), Basic and Applied Ecology, Volume 10, Issue 5, August 2009, Pages 456-465, ISSN 1439-1791, DOI: 10.1016/j.baae.2008.11.001.
(http://www.sciencedirect.com/science/article/B7GVS-4VP1CTH-1/2/371ff8f55e0d16a038a59615ef4c4e6a)
Abstract:
Changes in weed species richness and beta-diversity are partly attributable to different types and intensity of disturbance and partly to broad-scale variation in environmental conditions. We compiled a data set of 434 vegetation plots of weed vegetation in root crop and cereal fields in Moravia (eastern Czech Republic) to compare the effects of environmental conditions and different disturbance regimes on species richness and beta-diversity. To detect changes in species richness, we related the variation in species richness to individual environmental conditions. To assess differences in beta-diversity between the vegetation of cereal and root crop fields, we used Whittaker's measure of beta-diversity. The relative importance of each environmental variable for the variation in species composition was evaluated using canonical correspondence analysis. All analyses were done for all vascular plant species and separately for native species, archaeophytes and neophytes. A comparison of weed vegetation of root crops and cereals showed a distinct dichotomy between these two types of weed vegetation. There was no significant difference in total species richness and native species richness; however, cereal fields were richer in archaeophytes and root crop fields were richer in neophytes. The beta-diversity of weed vegetation was higher in root crops. Environmental factors explained a significant part of the variability in richness of both natives and aliens. The richness of native species increased and beta-diversity decreased with increasing precipitation. The opposite relationship was found for archaeophytes, in both cereals and root crops. These results confirmed the importance of climatic factors and management practices for changes in weed species composition. They also showed a distinct pattern of species richness and beta-diversity of native and alien weed species.
Keywords: Beta-diversity; Czech Republic; Cereals; Root crop

Ledicia Rey-Salgueiro, Elena Martinez-Carballo, Mercedes Sonia Garcia-Falcon, Carmen Gonzalez-Barreiro, Jesus Simal-Gandara, Occurrence of polycyclic aromatic hydrocarbons and their hydroxylated metabolites in infant foods, Food Chemistry, Volume 115, Issue 3, 1 August 2009, Pages 814-819, ISSN 0308-8146, DOI: 10.1016/j.foodchem.2008.12.095.
(http://www.sciencedirect.com/science/article/B6T6R-4VBT27F-5/2/2c6b1837eeaa91e6f2b794a89cde5c8b)
Abstract:
Eleven polycyclic aromatic hydrocarbons (PAHs) have been analysed in commercial milk formulae and infant cereals. Two hydroxylated PAHs metabolites (1-OH-Pyr and 3-OH-B[a]P) and their conjugates were also analysed in milk samples. To determine the selected PAH metabolites, a simple, fast quantitative and economic method was developed. This method comprising ultrasound-assisted solvent extraction, enzymatic hydrolysis, solid-phase clean-up and detection by liquid chromatography with fluorescence detection (LC-FD) and liquid chromatography tandem

mass spectrometry (LC-MS/MS) as confirmatory technique. The method was evaluated by constructing calibration curves, measurement of recovery, precision and the limits of detection. The purpose of this survey was to determine the selected analytes, to assess the exposure of babies and infants and to produce data for comparison with proposed limits that were being considered at the time of the survey. The results showed that not only no samples would have exceeded the limit for benzo[a]pyrene which is used as an indicator for the presence of PAHs, but also no hydroxy PAH metabolites have been detected.
Keywords: Polycyclic aromatic hydrocarbons; Polycyclic aromatic hydrocarbons metabolites; HPLC-fluorescence; Infant foods; Baby foods; Milks; Cereals

D.A. Sampietro, M.A. Vattuone, C.A.N. Catalan, A new colorimetric method for determination of alkylresorcinols in ground and whole-cereal grains using the diazonium salt Fast Blue RR, Food Chemistry, Volume 115, Issue 3, 1 August 2009, Pages 1170-1174, ISSN 0308-8146, DOI: 10.1016/j.foodchem.2008.12.086.
(http://www.sciencedirect.com/science/article/B6T6R-4VBDKP8-4/2/f58ec6fd9df14a5b98fe470b1251baa2)
Abstract:
A fast and inexpensive method was developed to determine the content of alkylresorcinols (ARs) in ground and whole-cereal grains. This method is based on the ability of ARs to couple with Fast Blue RR salt in alkaline medium, yielding coloured azo-derivatives that can be quantified colorimetrically. Good linearity was observed for olivetol in the range of 1-10 [mu]g with methanol as solvent ([lambda]max = 480 nm) and 1-7 [mu]g with butanol as solvent ([lambda]max = 530 nm). Sensitivity obtained in butanol was comparable to that obtained in the Fast Blue B based method (methanol as solvent, [lambda]max = 520 nm). In the new colorimetric method described here, incubation time was reduced to 20 min and the stability of the reaction products was as long as 3 h. The method appears promising for the analysis of 1,3-dihydroxybenzene derivatives in samples from plant breeding and food analyses.
Keywords: Alkylresorcinols; Fast Blue B salt; Fast Blue RR salt; Cereal grains

Jaba Debnath, Asha Martin, Lalitha R. Gowda, A polymerase chain reaction directed to detect wheat glutenin: Implications for gluten-free labelling, Food Research International, Volume 42, Issue 7, August 2009, Pages 782-787, ISSN 0963-9969, DOI: 10.1016/j.foodres.2009.02.028.
(http://www.sciencedirect.com/science/article/B6T6V-4VT14F0-1/2/45b0b3944e3e25861475ffa452ce9edf)
Abstract:
Gluten enteropathy or celiac disease (CD) is treated by strict adherence to gluten-free diet for life. Trace amounts of wheat in food from farm to table manifests as a major risk to these individuals. A qualitative polymerase chain reaction method was developed by selectively amplifying a 135 bp fragment of the glutenin gene to detect wheat DNA in a plethora of raw and heat processed foods. The limit of detection was 21.5 pg of DNA. The absence of amplification in other cereals such as oat, rye, barley and maize renders this method exclusive for detection of wheat. The detection of wheat DNA in thermally processed foods by this method, despite extensive DNA fragmentation, evinces the suitability and applicability of the method for labeling gluten-free foods. This method complements the immunochemical methods toward addressing food safety in CD patients and wheat allergics.
Keywords: Gluten free food; Processed food; Low molecular weight glutenin; Traditional Indian foods; Gluten enteropathy

Isabel Goni, M. Elena Diaz-Rubio, Jara Perez-Jimenez, Fulgencio Saura-Calixto, Towards an updated methodology for measurement of dietary fiber, including associated polyphenols, in food

and beverages, Food Research International, Volume 42, Issue 7, August 2009, Pages 840-846, ISSN 0963-9969, DOI: 10.1016/j.foodres.2009.03.010.
(http://www.sciencedirect.com/science/article/B6T6V-4VXDTTJ-1/2/9f32eb56523ec746888419561daf100d)
Abstract:
The analytical dietary fiber (DF) methods most widely used today were developed to determine non-starch polysaccharides and lignin. Updated dietary fiber definition includes all indigestible plant food constituents. Recent methods have proposed the measurement of resistant starch and oligosaccharides, but other major indigestible constituents such as polyphenolic compounds and resistant protein are still omitted in dietary fiber analysis. There is scientific evidence that an appreciable amount of dietary polyphenols are associated with the dietary fiber matrix, being a fermentable substrate for bacterial microflora. The objective of this work was to show polyphenols compounds are major constituents of dietary fiber and to propose a procedure for their measurement. Results showed that polyphenols are major constituents of DF, accounting from 1.4% to 50.7% (dry weight) of insoluble dietary fiber in plant foods and from 2.9% to 62.8% of soluble dietary fiber in common beverages.
Keywords: Dietary fiber; Analytical method; Resistant protein; Associated polyphenols; Plant food; Beverages

Mansooreh Mazaheri, Determination of aflatoxins in imported rice to Iran, Food and Chemical Toxicology, Volume 47, Issue 8, August 2009, Pages 2064-2066, ISSN 0278-6915, DOI: 10.1016/j.fct.2009.05.027.
(http://www.sciencedirect.com/science/article/B6T6P-4WCTWWR-5/2/895c167e5a8d029bae152612ca7358ee)
Abstract:
Aflatoxins (AFs) are highly toxic and carcinogenic secondary fungal metabolites and have been detected in various food commodities including cereals. Rice were imported to Iran during March 2006-March 2007 analyzed for aflatoxin B1 (AFB1), aflatoxin B2 (AFB2), aflatoxin G1 (AFG1) and aflatoxin G2 (AFG2) using immunoaffinity column and quantitated by HPLC. In this regard, 71 rice samples were collected. After dividing samples to sub-samples, AF analyses were done. Among 71 samples analyzed, AFB1 was detected in 59 samples (83% of the total). The mean of AFB1 was 1.89 ng/g for all samples (with the not detected samples taken as zero). Total AF (AFT) was detected in 59 samples (83% of the total). The mean of AFT was 2.09 ng/g for all samples. AFB1 level in two samples (2.8%) was above the maximum tolerated level (MTL) of AFB1 in Iran (5 ng/g). Regarding AFT, the mean contamination level (2.09 ng/g) was lower than MTL of AFT in rice in Iran as well as lower than maximum level of EU for AFT (4 ng/g), and only nine samples had levels above the MTL of EU in AFT.
Keywords: Aflatoxins; Rice; Iran; HPLC; Incidence

Hemlata M. Kotkar, Priya J. Sarate, Vaijayanti A. Tamhane, Vidya S. Gupta, Ashok P. Giri, Responses of midgut amylases of Helicoverpa armigera to feeding on various host plants, Journal of Insect Physiology, Volume 55, Issue 8, August 2009, Pages 663-670, ISSN 0022-1910, DOI: 10.1016/j.jinsphys.2009.05.004.
(http://www.sciencedirect.com/science/article/B6T3F-4WD0W44-1/2/96e6bc463b5b8f48fbd54a9669030e52)
Abstract:
Midgut digestive amylases and proteinases of Helicoverpa armigera, a polyphagous and devastating insect pest of economic importance have been studied. We also identified the potential of a sorghum amylase inhibitor against H. armigera midgut amylase. Amylase activities were detected in all the larval instars, pupae, moths and eggs; early instars had lower amylase levels which steadily increased up to the sixth larval instar. Qualitative and quantitative differences

in midgut amylases of H. armigera upon feeding on natural and artificial diets were evident. Natural diets were categorized as one or more members of legumes, vegetables, flowers and cereals belonging to different plant families. Amylase activity and isoform patterns varied depending on host plant and/or artificial diet. Artificial diet-fed H. armigera larvae had comparatively high amylase activity and several unique amylase isoforms. Correlation of amylase and proteinase activities of H. armigera with the protein and carbohydrate content of various diets suggested that H. armigera regulates the levels of these digestive enzymes in response to macromolecular composition of the diet. These adjustments in the digestive enzymes of H. armigera may be to obtain better nourishment from the diet and avoid toxicity due to nutritional imbalance. H. armigera, a generalist feeder experiences a great degree of nutritional heterogeneity in its diet. An investigation of the differences in enzyme levels in response to macronutrient balance and imbalance highlight their importance in insect nutrition.
Keywords: Helicoverpa armigera larvae; Diet; Midgut amylase; Amylase inhibitors; Proteinases

D. Sola-Oriol, E. Roura, D. Torrallardona, Use of double-choice feeding to quantify feed ingredient preferences in pigs, Livestock Science, Volume 123, Issues 2-3, August 2009, Pages 129-137, ISSN 1871-1413, DOI: 10.1016/j.livsci.2008.10.015.
(http://www.sciencedirect.com/science/article/B7XNX-4V3S590-1/2/3c5103ee3e9657774eaee93ae03dd0f9)
Abstract:
Four experiments were conducted to evaluate the palatability of sorghum, maize, rye and lupine for pigs. Diets containing sorghum, maize, rye or lupine (test diets) were offered in a series of double choice tests against a reference diet. To prepare the reference diets, white broken rice in the experiments with cereals, and SBM-56 (a soy protein product low in anti-nutritional factors) in the experiment with lupine, were used as the cereal and the protein source of reference, respectively. Six test diets containing sorghum, maize or rye were prepared by replacing either 250 or 500 g kg- 1 of broken rice from the reference diet. Similarly, two test diets containing lupine were prepared by replacing 75 or 150 g kg- 1 of SBM-56 from the reference diet. Additionally, the pure ingredients were also evaluated against pure broken rice (sorghum, maize or rye) and pure SBM-56 (lupine). In each experiment, the corresponding ingredient was tested at two levels of inclusion and in pure form, using both newly weaned pigs and pigs at four weeks post-weaning. The palatability for each test diet expressed as % of preference was calculated as the percentage contribution of the test diet to total feed intake (test + reference diets). The preferences obtained ranged between 16 and 29% for sorghum, 16 and 35% for maize and 19 and 49% for rye. Except for rye at 500 g kg- 1 (49%), preference values were significantly different from 50% which indicates a higher preference for the broken rice in the reference diet than for sorghum, maize and rye. Preference for lupine ranged between 39 and 56% and no difference in preference was observed between the lupine in the test diets and the SBM-56 in the reference diets. The dietary preferences could already be observed in the first days of experiment, and they did not change substantially thereafter. The levels of inclusion tested did not have an effect on preference for any of the ingredients. The age of the animals did not affect preference and the values obtained in newly weaned and post-weaned pigs were generally in good agreement. However the use of the older animals resulted in higher feed intakes and more accurate measurements. It is concluded that feedstuff palatability can be quantified with a double choice protocol using a reference diet. This should allow the formulation of feeds for weaning pigs taking into account the palatability of the ingredients, in addition to other nutritional criteria. Preference evaluation may become a useful tool to improve the palatability of the diets and facilitate piglets feed initiation at weaning.
Keywords: Cereals; Double-choice; Preference; Pigs; Protein sources

Raquel Rozada, Jose Antonio Vazquez, Dimitris Charalampopoulos, Keith Thomas, Severino S. Pandiella, Effect of storage temperature and media composition on the survivability of

Bifidobacterium breve NCIMB 702257 in a malt hydrolisate, International Journal of Food Microbiology, Volume 133, Issues 1-2, 31 July 2009, Pages 14-21, ISSN 0168-1605, DOI: 10.1016/j.ijfoodmicro.2009.04.003.
(http://www.sciencedirect.com/science/article/B6T7K-4W2W5G3-2/2/bd2a84e70e1803244736c950b23ca24a)
Abstract:
The aim of this study was to evaluate the survivability of Bifidobacterium breve NCIMB 702257 in a three malt-based media supplemented with cysteine and yeast extract, and to determine the protective effect of these growth factors. A number of parameterised mathematical models were used to predict of kinetics of viability and total acidity during storage at different temperatures. Results demonstrated a good fit to the experimental mathematical model. The Arrhenius equations showed only reasonable fits and the polynomial plots contained a large area without data between 4 and 25 [degree sign]C. In addition, it was shown that cysteine promotes growth and acid production by bifidobacteria, but does not extend survivability. On the other hand, increasing the yeast extract content of the fermentation media enhances the survivability of B. breve. To our knowledge, this is the first study to address the modelling of the survivability of probiotic bacteria in a cereal based fermentation media at different temperatures, introducing a more quantitative approach to the study of the shelf-life of a probiotic product.
Keywords: Bifidobacterium breve; Probiotic; Malt hydrolisate; Survival; Storage temperature; Mathematical model; Logistic equation

Natalia Schroeder, Daniel D. Gallaher, Elizabeth A. Arndt, Len Marquart, Influence of whole grain barley, whole grain wheat, and refined rice-based foods on short-term satiety and energy intake, Appetite, In Press, Corrected Proof, Available online 28 July 2009, ISSN 0195-6663, DOI: 10.1016/j.appet.2009.07.019.
(http://www.sciencedirect.com/science/article/B6WB2-4WW2SCH-1/2/9d6532ad529ac74c249b57d79c4afbb4)
Abstract:
This study compared the effect of whole grain high-fiber barley, whole grain wheat and refined rice-based foods on energy intake and satiety. Forty-seven healthy subjects consumed a breakfast of hot cereal and a snack mix containing either barley, wheat, or refined rice, followed by an ad libitum smorgasbord lunch using a crossover design. Energy intake was measured at the lunch using plate waste. Hunger, fullness, desire to eat, amount of food consumed, and thirst were assessed using a modified Visual Analog Scale (VAS) before and after the breakfast, snack and lunch. Energy intake at lunch did not differ among products. There were no differences in the area under the time curve in modified VAS scores among products for any parameter. However, subjects reported significantly less hunger before lunch compared to their hunger before breakfast when consuming the barley, but there was no significant reduction in hunger before lunch after consumption of wheat or rice. In conclusion, intake of a whole grain high-fiber barley, whole grain wheat, or refined rice breakfast and snack did not decrease energy intake acutely, but consumption of whole grain high-fiber barley foods significantly decreased hunger whereas whole wheat and refined rice foods did not.
Keywords: Whole grains; Barley; Wheat; Rice; Satiety; Energy intake; VAS; Hunger; Fiber; beta-Glucan

M. Larsen, P. Lund, M.R. Weisbjerg, T. Hvelplund, Digestion site of starch from cereals and legumes in lactating dairy cows, Animal Feed Science and Technology, In Press, Corrected Proof, Available online 25 July 2009, ISSN 0377-8401, DOI: 10.1016/j.anifeedsci.2009.06.017.
(http://www.sciencedirect.com/science/article/B6T42-4WVCSYD-1/2/9088287ac7074d33135eeeb13691b641)
Abstract:

The effect of grinding and rolling (i.e. processing) of cereals and legumes (i.e. source) on site of starch digestion in lactating dairy cows was tested according to a 2x2 factorial design using a dataset derived from an overall dataset compiled from four experiments conducted at our laboratory that investigated effects of various processing techniques on digestion kinetics. Data originated from four experiments with cows cannulated in the rumen, duodenum and ileum, and fed rations composed of the respective starch source and grass-clover silage balanced with soy bean meal and a mineral premix. In addition to apparent digestibilities of starch in the rumen, small intestine and hind gut, true ruminal starch digestibilties and duodenal flow of microbial starch was estimated by regression analysis. There was an interaction between starch source and processing, as the apparent and true ruminal digestibility of starch was decreased by rolling for legumes, whereas the three other source by processing combinations did not differ. The duodenal flow of microbial starch was estimated to 276 g/d as the intercept in the regression analysis. Apparent ruminal digestibilities of starch seemed to underestimate true ruminal digestibility in rations with low starch intake due to a relatively higher contribution of microbial starch to total duodenal starch flow compared to rumen escape feed starch. The small intestinal and total tract digestibility of legume starch was lower compared with starch from cereals. Rolling reduced the small intestinal and total tract digestibility of starch from both cereals and legumes compared to grinding. Reductions in ruminal starch digestion were generally not associated with increases in small intestinal starch digestion, but were associated with increases in hind gut and reductions in total tract digestion of starch. Starch from legumes had lower ruminal and small intestinal digestibilities compared to starch from barley and wheat, indicating that action of bacterial and pancreatic amylase is limited by the same factors. Rolling did not provide sufficient physical processing of legume seeds to obtain a high digestibility of starch before the hind gut.
Keywords: Rumen; Small intestine; Hind gut; Processing; Cereals; Peas

Sonia Arora, Sudesh Jood, N. Khetarpaul, Effect of germination and probiotic fermentation on nutrient composition of barley based food mixtures, Food Chemistry, In Press, Corrected Proof, Available online 23 July 2009, ISSN 0308-8146, DOI: 10.1016/j.foodchem.2009.07.035.
(http://www.sciencedirect.com/science/article/B6T6R-4WV15W4-2/2/864ed27ddf0101476e5c2457b83aac42)
Abstract:
Food mixtures formulated from non-germinated and germinated barley flour, whey powder and tomato pulp (2:1:1w/w) were autoclaved, cooled and fermented with 5% Lactobacillus acidophilus curd (106 cells/ml) at 37 [degree sign]C for 12 h. The cell count was found significantly higher (8.88 cfu/g) in the fermented food mixture formulated from germinated flour as compared to the non-germinated barley based food mixture. A significant drop in pH with corresponding increase in titratable acidity was found in the germinated barley flour based food mixture. Processing treatments like germination, autoclaving and probiotic fermentation did not bring about any significant change in ash and fat contents, but significant decrease was noticed in crude protein, crude fibre, starch, total and insoluble dietary fibre contents. The combined processing caused significant improvement in reducing sugar, thiamine, niacin, lysine and soluble dietary fibre contents of barley based food mixtures. In conclusion, a combination of germination and fermentation is a potential process for enhancing the nutritional quality of food mixtures based on coarse cereals.
Keywords: Food mixtures; Germination; Lactobacillus acidophilus; pH; Titratable acidity; Proximate composition; Vitamins; Lysine; Available carbohydrates; Dietary fibre

S.T. Broad, S.N. Lisson, N.J. Mendham, Agronomic and gross margin analysis of an insect pest suppressive broccoli cropping system, Agricultural Systems, In Press, Corrected Proof, Available online 19 July 2009, ISSN 0308-521X, DOI: 10.1016/j.agsy.2009.06.007.

(http://www.sciencedirect.com/science/article/B6T3W-4WT39W9-1/2/906d34f21a8f57cf4eaf38f9badfecee)
Abstract:
The current reliance on insecticides in broccoli production systems has resulted in consumer concerns in relation to chemical residues, quality assurance issues and pest control failures. An alternative to conventional production methods has been shown to reduce insecticide requirements, however the economic feasibility of the new system needs to be considered to facilitate adoption by farmers. Therefore, the agronomic and economic performance of an insect pest suppressive broccoli and cereal rye cover crop system was compared to a broccoli strip crop system and conventional practice (broccoli monoculture). The broccoli cover cropping system resulted in fewer leaves, smaller plants and a slightly reduced yield when compared to the other systems. Strip cropping broccoli with potatoes did not convey any agronomic advantages. Gross margin analysis revealed that on a total system basis, a 2.2% yield improvement or a 7% price premium was required to make the cover crop system perform as well as conventional practice.
Keywords: Broccoli; Pest suppression; Cover crop; Strip crop; Gross margins; Cereal rye; Sustainability

Kaisa Poutanen, Laura Flander, Kati Katina, Sourdough and cereal fermentation in a nutritional perspective, Food Microbiology, In Press, Corrected Proof, Available online 18 July 2009, ISSN 0740-0020, DOI: 10.1016/j.fm.2009.07.011.
(http://www.sciencedirect.com/science/article/B6WFP-4WSY4C0-3/2/56b41679af6154d32e2f03e67b659bc1)
Abstract:
Use of sourdough is of expanding interest for improvement of flavour, structure and stability of baked goods. Cereal fermentations also show significant potential in improvement and design of the nutritional quality and health effects of foods and ingredients. In addition to improving the sensory quality of whole grain, fibre-rich or gluten-free products, sourdough can also actively retard starch digestibility leading to low glycemic responses, modulate levels and bioaccessibility of bioactive compounds, and improve mineral bioavailability. Cereal fermentation may produce non-digestible polysaccharides, or modify accessibility of the grain fibre complex to gut microbiota. It has also been suggested that degradation of gluten may render bread better suitable for celiac persons.
The changes in cereal matrix potentially leading to improved nutritional quality are numerous. They include acid production, suggested to retard starch digestibility, and to adjust pH to a range which favours the action of certain endogenous enzymes, thus changing the bioavailability pattern of minerals and phytochemicals. This is especially beneficial in products rich in bran to deliver minerals and potentially protective compounds in the blood circulation. The action of enzymes during fermentation also causes hydrolysis and solubilisation of grain macromolecules, such as proteins and cell wall polysaccharides. This changes product texture, which may affect nutrient and non-nutrient absorption. New bioactive compounds, such as prebiotic oligosaccharides or other metabolites, may also be formed in cereal fermentations.
Keywords: Sourdough; Cereal fermentation; Nutrition

L. De Vuyst, G. Vrancken, F. Ravyts, T. Rimaux, S. Weckx, Biodiversity, ecological determinants, and metabolic exploitation of sourdough microbiota, Food Microbiology, In Press, Corrected Proof, Available online 18 July 2009, ISSN 0740-0020, DOI: 10.1016/j.fm.2009.07.012.
(http://www.sciencedirect.com/science/article/B6WFP-4WSY4C0-1/2/b37417201e00cb40eb9b5ac6348db315)
Abstract:
Sourdough is a microbial ecosystem of lactic acid bacteria (LAB) and yeasts in a matrix of mainly cereal flour and water. Culture-dependent and culture-independent microbiological analysis

together with metabolite target analyses of different sourdoughs enabled to understand this complex fermentation process. It is difficult to link the species diversity of the sourdough microbiota with the (geographical) type of sourdough and the flour used, although the type and quality of the latter is the main source of autochthonous LAB in spontaneous sourdough fermentations and plays a key role in establishing stable microbial consortia within a short time. Carbohydrate fermentation targeted towards maltose catabolism, the use of external alternative electron acceptors, amino acid transamination reactions, and/or the arginine deiminase pathway are metabolic activities that favour energy production, cofactor (re)cycling, and/or tolerance towards acid stress, and hence contribute to the competitiveness and dominance of certain species of LAB found in sourdoughs. Also, microbial interactions play an important role. The availability of genome sequences for several LAB species that are of importance in sourdough as well as technological advances in the fields of functional genomics, transcriptomics, and proteomics enable new approaches to study sourdough fermentations beyond the single species level and will allow an integral analysis of the metabolic activities and interactions taking place in sourdough. Finally, the implementation of selected starter cultures in sourdough technology is of pivotal importance for the industrial production of sourdoughs to be used as flavour carrier, texture-improving, or health-promoting dough ingredient.
Keywords: Sourdough fermentation; Lactic acid bacteria; Yeasts; Biodiversity

Michael G. Ganzle, Chonggang Zhang, Bonno-Sekwati Monang, Vivian Lee, Clarissa Schwab, Novel metabolites from cereal-associated lactobacilli - Novel functionalities for cereal products?, Food Microbiology, In Press, Corrected Proof, Available online 17 July 2009, ISSN 0740-0020, DOI: 10.1016/j.fm.2009.07.009.
(http://www.sciencedirect.com/science/article/B6WFP-4WSRF1C-2/2/cb5ac25b17b6c0a3d1a72a29d3325bf5)
Abstract:
Predictions from genome sequence data of sourdough lactobacilli, novel applications of known metabolic traits such as glycansucrases, as well as the exploitation of biodiversity of lactobacilli from traditional fermentations remain an important resource for identification of novel metabolic traits of lactobacilli for use in bread production and the production of value-added food ingredients. Cornerstones of heterofermentative lactic metabolism in cereal fermentations are the rapid utilization of maltose as preferred carbon source, and the production of lactate, CO2, and the alternative products ethanol and acetate. This review will highlight selected novel aspects of carbohydrate metabolism that are related to the production of maltose and the utilisation of lactate by lactobacilli in cereal fermentations. Several species of lactobacilli convert glycerol and lactate to 1,3 and 1,2 propanediol, respectively. Both metabolic pathways are relevant for food preservation as reuterin is an intermediate of 1,3 propanediol formation, and 1,2 propanediol is further converted to propionate. Glycansucrases, disaccharide hydrolases and disaccharide phosphorylases catalyse oligosaccharide formation from sucrose, maltose, or lactose. Lactobacilli in sourdough generally harbour several enzymes capable of oligosaccharide formation from disaccharides. Oligosaccharide formation by sourdough lactobacilli can be exploited for fermentative production of novel oligosaccharides in bread and a wide spectrum of other food applications.
Keywords: Sourdough; Starter culture; Propionate; Oligosaccharides

Diana I. Serrazanetti, Maria Elisabetta Guerzoni, Aldo Corsetti, Rudi Vogel, Metabolic impact and potential exploitation of the stress reactions in lactobacilli, Food Microbiology, In Press, Corrected Proof, Available online 17 July 2009, ISSN 0740-0020, DOI: 10.1016/j.fm.2009.07.007.
(http://www.sciencedirect.com/science/article/B6WFP-4WSRF1C-1/2/ba90c94615c10da6f34df64af00bb762)
Abstract:

Lactic acid bacteria (LAB) are a functionally related group of organisms known primarily for their bioprocessing roles in food and beverages. The largest variety of metabolic properties is found in the group of lactobacilli the vast majority of which has been isolated in cereal environments, namely sourdoughs, in which their role ranges from sporadic contaminants to major fermentative flora. Growth or survival in each of these environmental niches depends on the ability of the organism to sense and respond to varying conditions such as temperature, pH, nutrients availability and cell population density. Fermentation process conditions, including temperature range, dough yield, oxygen, pH as well as the amount and composition of starter cultures, determine the cells' metabolic response. In fact, the exposure of microbial cells to stressful conditions during fermentation involves a broad transcriptional response with many induced or repressed genes. The complex network of such responses, involving several metabolic activities will reflect upon the metabolome of the fermentative flora, and thus on the composition and organoleptic properties of the final products. This review shall provide insight into stress response mechanisms and delineate the vast potential residing in the exploitation of the stress dependent metabolome of LAB focusing on bacteria of the sourdough environment as one of the richest sources of lactobacilli.
Keywords: Stress exploitation; Lactic acid bacteria; Metabolism

M.J.Rob Nout, Rich nutrition from the poorest - Cereal fermentations in Africa and Asia, Food Microbiology, In Press, Corrected Proof, Available online 15 July 2009, ISSN 0740-0020, DOI: 10.1016/j.fm.2009.07.002.
(http://www.sciencedirect.com/science/article/B6WFP-4WS9BMM-1/2/d1aacc15f3ae26cdcdfe5c89ef5db241)
Abstract:
Cereal fermentations in Africa and Asia involve mainly the processing of maize, rice, sorghum and the millets. Lactic acid bacteria (Lactobacillus, Pediococcus), Enterobacter spp., yeasts (Candida, Debaryomyces, Endomycopsis, Hansenula, Pichia, Saccharomyces and Trichosporon spp.) and filamentous fungi (Amylomyces, Aspergillus, Mucor, and Rhizopus spp.) contribute to desirable modifications of taste, flavour, acidity, digestibility, and texture in non-alcoholic beverages (e.g., uji, and ben-saalga), porridges (e.g., mawe) and cooked gels (e.g., kenkey, idli, and mifen). In addition, alcoholic beverages (beers such as tchoukoutou and jnard; and spirits e.g. jiu) are obtained using malt, or using amylolytic mixed microbial starter cultures as generators of fermentable substrates. Wet processing, marketing of multi-purpose intermediate products, co-fermentation for texture and nutrition, and mixed culture fermentations as practiced in indigenous fermentation processes are of interest for industrial innovation and for better control of natural mixed culture fermentation systems. On the other hand, the nutritional properties of traditional cereal fermented products can be enhanced by increasing their nutrient and energy density, as well as by increasing their mineral status by combining mineral fortification and dephytinization.
Keywords: Maize; Sorghum; Millet; Rice; Lactic acid bacteria; Yeasts; Filamentous fungi; Mixed fermentation; Co-fermentation; Micronutrients; Digestibility; Mineral fortification; Phytic acid; NaFeEDTA

Catherine Molloy, Claire Cagney, Stephen O'Brien, Carol Iversen, Seamus Fanning, Geraldine Duffy, Surveillance and characterisation by Pulsed-Field Gel Electrophoresis of Cronobacter spp. in farming and domestic environments, food production animals and retail foods, International Journal of Food Microbiology, In Press, Corrected Proof, Available online 13 July 2009, ISSN 0168-1605, DOI: 10.1016/j.ijfoodmicro.2009.07.007.
(http://www.sciencedirect.com/science/article/B6T7K-4WRV0HX-1/2/b64b50c07512dc217aa6f61b133df353)
Abstract:

Cronobacter spp. (formally Enterobacter sakazakii) has been linked to illness in infants from contaminated powdered infant formula, however, there is limited information on the environmental sources and potential transmission routes of this pathogen. The aim of this study was to establish if food production animals (cattle, pigs), and the wider farm environment were playing a role in the transmission of Cronobacter spp. and also to assess the risk of cross contamination in the home where infant formula is prepared, from the presence of the pathogen on other foods and the general domestic environment. A wide range of samples (n = 518) was collected at dairy farms, meat abattoirs, retail food stores and domestic environs and examined for the pathogen using an adapted ISO/DTS 22964 cultural protocol. The modified method included incubation at 42 [degree sign]C instead of 44 [degree sign]C and serial dilution of the enriched media prior to plating on Druggan-Forsythe-Iversen agar. Presumptive Cronobacter spp. colonies were confirmed by Real Time PCR targeting the dnaG on the MMS operon. All Cronobacter spp. isolated were speciated using biochemical tests, tested for resistance to 8 antibiotics and characterised using pulsed field gel electrophoresis. Cronobacter spp. was not recovered from cattle faeces, farm soil or trough water but isolates (n = 33) were recovered from a variety of other sample types including cattle feed, pork and beef cuts, beef burgers and beef mince, green vegetables as well as organic breakfast cereals and domestic vacuum cleaner dust. The species recovered included C. Sakazakii (n = 21), C. malonaticus (n = 1) and C. turicensis (n = 1). Of the 33 isolates 51% were resistant to Cephalothin but sensitive to all other 7 tested antibiotics. Sub-typing of the recovered isolates by PFGE showed considerable clonal diversity, though a number of persistent PFGE profiles were observed. In conclusion the study showed that Cronobacter spp. was not carried by food production animals but was present in a range of diverse sample types and environs with particular association with dry environments.
Keywords: Cronobacter spp.; Enterobacter sakazakii; Food animals; Farms; Retail; Domestic; Pulsed-Field Gel Electrophoresis

Dominik Wisser, Steve Frolking, Ellen M. Douglas, Balazs M. Fekete, Andreas H. Schumann, Charles J. Vorosmarty, The significance of local water resources captured in small reservoirs for crop production - A global-scale analysis, Journal of Hydrology, In Press, Corrected Proof, Available online 11 July 2009, ISSN 0022-1694, DOI: 10.1016/j.jhydrol.2009.07.032.
(http://www.sciencedirect.com/science/article/B6V6C-4WRD3RW-H/2/584f978cb3077c77316f7b37a7be28bb)
Abstract: Summary
Rainwater harvesting, broadly defined as the collection and storage of surface runoff, has a long history in supplying water for agricultural purposes. Despite its significance, rainwater harvesting in small reservoirs has previously been overlooked in large-scale assessments of agricultural water supply and demand. We used a macroscale hydrological model, observed climate data and other physical datasets to explore the potential role of small, localized rainwater harvesting systems in supplying water for irrigated areas. We first estimated the potential contribution of local water harvesting to supply currently irrigated areas. We then explored the potential of supplemental irrigation applied to all cropland areas to increase crop evapotranspiration (or green water flow), using locally stored surface runoff in small reservoirs for different scenarios of installed reservoir capacity. The estimated increase in green water flow varied between 623 and 1122 km3 a-1. We assessed the implications of this increase in green water flows for cereal production by assuming a constant crop water productivity in areas where current levels of crop yield are below global averages. Globally, the supplemental irrigation of existing cropland areas could increase cereal production by ~35% for a medium variant of reservoir capacity, with large potential increases in Africa and Asia. As small reservoirs can significantly impact the hydrological regime of river basins, we also assessed the impacts of small reservoirs on downstream river flow and quantified evaporation losses from small reservoirs.
Keywords: Small reservoirs; Global modelling; Food security; Crop yield

Stefan Siebert, Petra Doll, Quantifying blue and green virtual water contents in global crop production as well as potential production losses without irrigation, Journal of Hydrology, In Press, Corrected Proof, Available online 11 July 2009, ISSN 0022-1694, DOI: 10.1016/j.jhydrol.2009.07.031.
(http://www.sciencedirect.com/science/article/B6V6C-4WRD3RW-G/2/492b43a91debc4600734249a19691549)
Abstract: Summary
Crop production requires large amounts of green and blue water. We developed the new global crop water model GCWM to compute consumptive water use (evapotranspiration) and virtual water content (evapotranspiration per harvested biomass) of crops at a spatial resolution of 5' by 5', distinguishing 26 crop classes, and blue versus green water. GCWM is based on the global land use data set MIRCA2000 that provides monthly growing areas for 26 crop classes under rainfed and irrigated conditions for the period 1998-2002 and represents multi-cropping. By computing daily soil water balances, GCWM determines evapotranspiration of blue and green water for each crop and grid cell. Cell-specific crop production under both rainfed and irrigated conditions is computed by downscaling average crop yields reported for 402 national and sub-national statistical units, relating rainfed and irrigated crop yields reported in census statistics to simulated ratios of actual to potential crop evapotranspiration for rainfed crops. By restricting water use of irrigated crops to green water only, the potential production loss without any irrigation was computed. For the period 1998-2002, the global value of total crop water use was 6685 km3 yr-1, of which blue water use was 1180 km3 yr-1, green water use of irrigated crops was 919 km3 yr-1 and green water use of rainfed crops was 4586 km3 yr-1. Total crop water use was largest for rice (941 km3 yr-1), wheat (858 km3 yr-1) and maize (722 km3 yr-1). The largest amounts of blue water were used for rice (307 km3 yr-1) and wheat (208 km3 yr-1). Blue water use as percentage of total crop water use was highest for date palms (85%), cotton (39%), citrus fruits (33%), rice (33%) and sugar beets (32%), while for cassava, oil palm and cocoa, almost no blue water was used. Average crop yield of irrigated cereals was 442 Mg km-2 while average yield of rainfed cereals was only 266 Mg km-2. Average virtual water content of cereal crops was 1109 m3 Mg-1 of green water and 291 m3 Mg-1 of blue water, while average crop water productivity of cereal crops was 714 g m-3. If currently irrigated crops were not irrigated, global production of dates, rice, cotton, citrus and sugar cane would decrease by 60%, 39%, 38%, 32% and 31%, respectively. Forty-three per cent of cereal production was on irrigated land, and without irrigation, cereal production on irrigated land would decrease by 47%, corresponding to a 20% loss of total cereal production. The largest cereal production losses would occur in Northern Africa (66%) and Southern Asia (45%) while losses would be very low for Northern Europe (0.001%), Western Europe (1.2%), Eastern Europe (1.5%) and Middle Africa (1.6%). Uncertainties and limitations are discussed in the manuscript, and a comparison of GCWM results to statistics or results of other studies shows good agreement at the regional scale, but larger differences for specific countries.
Keywords: Crop water requirement; Global crop water model; Virtual water content; Irrigation water use; Crop production; Crop yield

Guenaelle Corre-Hellou, Marieline Faure, Marie Launay, Nadine Brisson, Yves Crozat, Adaptation of the STICS intercrop model to simulate crop growth and N accumulation in pea-barley intercrops, Field Crops Research, Volume 113, Issue 1, 10 July 2009, Pages 72-81, ISSN 0378-4290, DOI: 10.1016/j.fcr.2009.04.007.
(http://www.sciencedirect.com/science/article/B6T6M-4W80C8H-1/2/0da07cf38624b49219e7487f819a35b5)
Abstract:
Cereal-legume intercrops are gaining increasing interest in Europe. Modelling, by taking into account the complexity of species interactions, can be a very useful tool to study such systems

and to test new strategies in various soil and climatic conditions. The present work describes the adaptation of an intercrop model for pea-barley intercrops through the extrapolation of the STICS sole crop model and its parameterisation from experimental data recorded on sole crops. Several improvements have been added to the existing crop model to allow an inversion of dominance in height between species during the crop cycle and a trophic link between crop growth rate and the potential for N2 fixation. A 2-year dataset on pea and barley sole crops grown under non-limiting water conditions and with full crop protection was first used for calibration. The intercrop model was subsequently tested on experimental datasets of pea-barley intercrops grown under the same conditions as the sole crops. The intercrop experiments used to test the intercrop model differed in soil type, soil N supply and plant densities of each species.
The development of the intercrop model through the extrapolation of the sole crop model and its parameterisation from experimental data recorded in sole crops allowed an accurate simulation of the interactions for nitrogen between intercropped species. The simulated crop growth, N accumulation and N2 fixation in intercrops were in agreement with the observations from the experimental dataset. Moreover the behaviour of the model was consistent with the general knowledge about those intercropping systems. However the simulation of competition for light needs to be improved, especially the simulation of height growth. A thorough validation on many data sets, independent of those used for parameterisation, is still required. This model needs to be tested under a wider range of situations and for other limiting factors than nitrogen occurring in low-input farming systems.
Keywords: Intercropping; Crop modelling; Nitrogen; N2 fixation; Pea; Barley

Pirjo Peltonen-Sainio, Lauri Jauhiainen, Ari Rajala, Susanna Muurinen, Tiller traits of spring cereals under tiller-depressing long day conditions, Field Crops Research, Volume 113, Issue 1, 10 July 2009, Pages 82-89, ISSN 0378-4290, DOI: 10.1016/j.fcr.2009.04.012.
(http://www.sciencedirect.com/science/article/B6T6M-4WBR6GK-2/2/1cd6c44c52cac46f5662af30377b68cb)
Abstract:
Long days partially depress tiller growth of spring cereals. In this study we characterised and quantified growing conditions and cultivar-induced variation in tiller traits and contribution of tillers to grain yield. Experiments were done at two locations in southern Finland, incorporating two nitrogen fertiliser application rates (80 and 120 kg N ha-1) and 12 two-row barley (Hordeum vulgare L.), 10 six-row barley, ten oat (Avena sativa L.) and 11 wheat (Triticum aestivum L.) cultivars. Spring cereal species differed significantly in their tillering: two-row barley was superior compared with other spring cereals, with the highest number and growth capacity of tillers and head-bearing tillers. Grain yield produced by tillers was, however, always modest compared with that of main shoots, ranging from 13% and 15% in oat and wheat to 20% in six-row barley and 64% in two-row barley. Cultivar and growing condition-induced differences were marked in tiller traits, but tillers were never able to out-yield the main shoot. This is likely to be emphasised by standard use of high seeding rates. Tillers are dominated by the main shoot under long day conditions at high latitudes, and tiller yield potential remains clearly underutilised even under conditions favouring growth.
Keywords: Barley; Oat; Wheat; Tiller; Main shoot; Competition; Growth; Yield

Graeme J. Doole, Ellen Weetman, Tactical management of pasture fallows in Western Australian cropping systems, Agricultural Systems, In Press, Corrected Proof, Available online 3 July 2009, ISSN 0308-521X, DOI: 10.1016/j.agsy.2009.06.002.
(http://www.sciencedirect.com/science/article/B6T3W-4WNPDPK-1/2/1c6f096bc277528b8e752548b15f2c8c)
Abstract:

Agricultural systems in the Western Australian wheatbelt are increasingly moving towards specialist crop production due to elevated cereal prices, depressed markets for livestock products, and ongoing labour scarcity. However, the profitability of crop-only farms is threatened by increasing levels of herbicide resistance and declining soil fertility. This study determines the value of ungrazed pasture fallows grown tactically between crop phases to address these agronomic constraints. A novel metaheuristic optimisation technique, compressed annealing, is used to determine profitable flexible land-use sequences in a complex simulation model. Tactical use of single-year, ungrazed pasture phases is found to be more valuable than the use of break crops in crop-only systems. In contrast to previous analysis, it is identified that rotation of short periods of crop and pasture is more profitable than extended phases of both. Effective weed control without dependence on selective herbicides is the key agronomic characteristic determining the value of intermittent pasture phases. Accordingly, the number of single-year pasture phases employed in a sequence should increase with the severity of herbicide resistance. Compressed annealing is shown to be a practical method of identifying profitable land-use sequences that respond to information that unfolds dynamically.
Keywords: Land-use sequences, Optimisation, Rotations, Tactical management

F.X. Philippe, B. Canart, M. Laitat, J. Wavreille, M. Vandenheede, N. Bartiaux-Thill, B. Nicks, J.F. Cabaraux, Gaseous emissions from group-housed gestating sows kept on deep litter and offered an ad libitum high-fibre diet, Agriculture, Ecosystems & Environment, Volume 132, Issues 1-2, July 2009, Pages 66-73, ISSN 0167-8809, DOI: 10.1016/j.agee.2009.02.016.
(http://www.sciencedirect.com/science/article/B6T3Y-4W09GDB-1/2/cb9ef32cce91c64491a88c690033d263)
Abstract:
Gaseous emissions from agriculture contribute to a number of environmental effects. Carbon dioxide (CO2), methane (CH4) and nitrous oxide (N2O) are greenhouse gases taking part in the global problem of climate change. Ammonia (NH3) emissions are responsible of soil and water acidification and eutrophication and contribute also to indirect emissions of N2O. The objective of this study was to investigate the effects of a high-fibre diet offered ad libitum to gestating sows on gaseous emissions (NH3, N2O, CH4, CO2 and water vapour (H2O)). Four successive batches of 10 gestating sows were used for this trial. Each batch was divided into 2 homogeneous groups randomly allocated to a treatment: restricted conventional cereals based diet or high-fibre diet based on sugar beet pulp (42%). The groups were separately kept in two identical rooms equipped with a straw-bedded pen of 12.6 m2. For restricted sows, meals were provided once a day in individual feeding stalls available only during the feeding time. In both rooms, ventilation was automatically adapted to maintain a constant ambient temperature. The gas emissions were measured by infrared photoacoustic detection during 6 consecutive days at the 6th, 9th and 12th weeks of gestation.
Sows performance (body weight gain, backfat thickness, number and weight of piglets) was not significantly different according to the diet. With sows offered high-fibre diet and compared to sows offered restricted diet, gaseous emissions were significantly greater for NH3 (9.64 g NH3-N d-1 sow-1 vs. 5.37 g NH3-N d-1 sow-1; $P < 0.001$), CH4 (17.20 g d-1 sow-1 vs. 15.21 g d-1 sow-1; $P < 0.01$), CO2 (3.00 kg d-1 sow-1 vs. 2.41 kg d-1 sow-1; $P < 0.001$) and H2O (4.71 kg d-1 sow-1 vs. 3.68 kg d-1 sow-1; $P < 0.001$) and significantly lower for N2O (0.97 g N2O-N d-1 sow-1 vs. 2.48 g N2O-N d-1 sow-1; $P < 0.001$) and CO2 equivalents (0.88 kg d-1 sow-1 vs. 1.55 kg d-1 sow-1; $P < 0.001$).
In conclusion, the effects of high-fibre diet offered to gestating sows on deep litter on environment seem ambiguous with an increase of NH3 emissions but a decrease of N2O and CO2 equivalent emissions.
Keywords: Ammonia; Deep litter; Gestating sow; Greenhouse gases; High-fibre diet; Sugar beet pulp

Peer Urbatzka, Rudiger Gra[ss], Thorsten Haase, Christian Schuler, Jurgen He[ss], Fate of legume-derived nitrogen in monocultures and mixtures with cereals, Agriculture, Ecosystems & Environment, Volume 132, Issues 1-2, July 2009, Pages 116-125, ISSN 0167-8809, DOI: 10.1016/j.agee.2009.03.006.
(http://www.sciencedirect.com/science/article/B6T3Y-4W386W6-1/2/f6d3babd15d3904a3d02cecd6acab15f)
Abstract:
Cropping grain legumes can cause benefits due to symbiotic nitrogen (N) fixation, but on a downside there are environmental risks like nitrogen losses especially after grain harvest. Until now, hardly any knowledge has been available on these effects of N derived from a preceding crop like spring peas (Pisum sativum L.) mixed with cereals or from winter peas. Therefore, field experiments were conducted in order to examine N mineralization and N preceding crop effect from six different winter pea genotypes (five regular-leaf-type peas and one semi-leafless pea) and one semi-leafless spring pea in three subsequent years (2003/04-2005/06) in pure and mixed stands with cereals on a silty loam, at the research farm of the University of Kassel, Germany. Immediately after grain harvest, total above-ground biomass was removed apart from the stubble, and a catch crop of either mustard and oil radish or mustard was sown, which was harvested in the first half of October.
N uptake of catch crops was usually significantly higher after regular-leaf winter peas in pure stands (80-90 kg ha-1) when compared with semi-leafless winter and spring peas (69 and 49 kg ha-1), respectively. In mixtures, the N preceding crop effect of regular-leaf-type peas was more pronounced than that of the semi-leafless peas. It could be shown that winter peas make a higher contribution to the N supply of a subsequent crop in rotation than spring pea.
For regular-leaf-type winter peas there was a significant correlation between N uptake of the catch crop and the amount of mineralized N at grain harvest. At this time under pure stands, on average 44, 15 and 12 kg Nmin (NO3-N + NH4-N) ha-1 in top soil and 25, 7 and 22 kg Nmin ha-1 in 30-90 cm soil depth were recorded for regular-leaf-type winter pea, semi-leafless winter pea and spring pea, respectively. Under mixtures, similar values for the different genotypes were recorded (15 and 7 kg Nmin ha-1 for topsoil and subsoil, respectively). This might be explained by the different uptake of mineralized N, the differentiated above-ground biomass and a probably higher root biomass, which may have caused increased rhizodeposition, assuming that root biomass is positively correlated with above-ground biomass.
Based on these experiments it can be concluded that, after pea pure stands, the cultivation of catch crops is an absolutely essential measure to conserve mineralized N, which can be expected to be as high as 100 kg ha-1. In the present experiments even these high amounts could be reduced to an environmentally irrelevant level of 30 kg ha-1 by cultivation of a catch crop.
Keywords: Winter pea; N dynamics; N leaching; N utilization efficiency; Pre-crop effect; Intermediate crop

Amanda L. Thompson, Michelle A. Mendez, Judith B. Borja, Linda S. Adair, Catherine R. Zimmer, Margaret E. Bentley, Development and validation of the Infant Feeding Style Questionnaire, Appetite, In Press, Corrected Proof, Available online 1 July 2009, ISSN 0195-6663, DOI: 10.1016/j.appet.2009.06.010.
(http://www.sciencedirect.com/science/article/B6WB2-4WNB4XR-1/2/7f19d8948a8826fb9ebe7d1e2afd6bfb)
Abstract:
This study describes and validates the Infant Feeding Style Questionnaire (IFSQ), a self-report instrument designed to measure feeding beliefs and behaviors among mothers of infants and young children. Categorical confirmatory factor analysis was used to estimate latent factors for five feeding styles, laissez-faire, restrictive, pressuring, responsive and indulgent, and to validate that

items hypothesized a priori as measures of each style yielded well-fitting models. Models were tested and iteratively modified to determine the best fitting model for each of 13 feeding style sub-constructs, using a sample of 154 low-income African-American mothers of infants aged 3-20 months in North Carolina. With minor changes, models were confirmed in an independent sample of 150 African-American first-time mothers, yielding a final instrument with 39 questions on maternal beliefs, 24 questions on behaviors and an additional 20 behavioral items pertaining to solid feeding for infants over 6 months of age. Internal reliability measures for the sub-constructs ranged from 0.75 to 0.95. Several sub-constructs, responsive to satiety cues, pressuring with cereal, indulgent pampering and indulgent soothing, were inversely related to infant weight-for-length z-score, providing initial support for the validity of this instrument for assessing maternal feeding beliefs and behaviors that may influence infant weight outcomes.
Keywords: Feeding styles; Confirmatory factor analysis; Infant feeding; Obesity; African-American

Radhakrishnan Srinivasan, Filip To, Eugene Columbus, Pilot scale fiber separation from distillers dried grains with solubles (DDGS) using sieving and air classification, Bioresource Technology, Volume 100, Issue 14, July 2009, Pages 3548-3555, ISSN 0960-8524, DOI: 10.1016/j.biortech.2009.02.049.
(http://www.sciencedirect.com/science/article/B6V24-4VY168M-7/2/522f2b61db9eac0081e41ac821b8a44d)
Abstract:
Distillers dried grains with solubles (DDGS), the coproduct of fuel ethanol production from cereal grains like corn, is mainly used as cattle feed and is used at low inclusion levels in poultry and swine diets because of high fiber content. Elusieve process, the combination of sieving and air classification (elutriation), was developed in laboratory scale to separate fiber from DDGS to result in a low fiber product which would be more suitable for poultry and swine. In this pilot scale study, DDGS was sieved at a rate of 0.25 kg/s (1 ton/h) into four sieve fractions using a sifter and the three largest sieve fractions were air classified using aspirators to separate fiber on a continuous basis. Results were similar to laboratory scale. Nearly 12.4% by weight of DDGS was separated as Fiber product and resulted in two high protein products that had low fiber contents. Payback period for the Elusieve process in an existing dry grind plant processing corn at the rate of 2030 metric tonnes/day (80,000 bushels/day) would be 1.1 yr.
Keywords: DDGS; Sieving; Elutriation; Elusieve; Distillers dried grains

Bent T. Christensen, Jim Rasmussen, Jorgen Eriksen, Elly M. Hansen, Soil carbon storage and yields of spring barley following grass leys of different age, European Journal of Agronomy, Volume 31, Issue 1, July 2009, Pages 29-35, ISSN 1161-0301, DOI: 10.1016/j.eja.2009.02.004.
(http://www.sciencedirect.com/science/article/B6T67-4VVN4XV-1/2/ec3246a3055e4d1f7b2c4f398e5b00fc)
Abstract:
The inclusion of leys in arable cropping is generally found to improve soil fertility. The effect of leys depends on their botanical composition and management, but the significance of individual management factors remains confounded in most studies. We quantified the effects of one- to six-year-old grass-only leys on soil C (0-20 cm) and yields of three subsequent test crops of spring barley (Hordeum vulgare) under-sown with Italian ryegrass (Lolium perenne). Each ley was a mixture of four grass species (Lolium perenne, Festuca pratensis, Phleum pratense, Poa pratensis), exposed to three to four cuts annually. Only mineral fertilizers were applied (225 kg N ha-1 yr-1). The yield of barley was tested at six rates of N fertilizer (0-150 kg N ha-1). The effect of leys on nitrate leaching losses was determined in a separate experiment. Grass yields were consistently high during the ley phase (11.2-12.5 t DM ha-1 yr-1), and the amount of N in grass cuts equalled that applied in fertilizers. The annual accumulation of soil C during the ley phase averaged 1.1 t C ha-1. Nitrate leaching losses were halved after ley establishment, remained low

until the ley was ploughed, and returned then to pre-ley levels. In the first test crop, the grain yields of barley increased with ley age. However, addition of fertilizer N eliminated the benefits of older leys. In the second and third test crop, grain yields were unaffected by ley age. Although grain N contents in the first test crop were higher following older leys, fertilizer N rate was the dominant factor. More N was removed in barley grain plus straw than was added in N fertilizers (except at 150 kg N ha-1). The amount of soil C remained nearly constant during the test phase, probably due to the use of grass catch crops. We conclude that the main impact on soil fertility of non-leguminous leys, subject to cutting and well-balanced mineral N fertilizer management, is in the accumulation of soil C and reduction of leaching losses of soil nitrate, whereas effects on subsequent cereal crops are small and transient.
Keywords: Grass ley; Soil C accumulation; Nitrate leaching; Residual effect; Spring barley; Fertilizer N response

P.K. Ghosh, A.K. Tripathi, K.K. Bandyopadhyay, M.C. Manna, Assessment of nutrient competition and nutrient requirement in soybean/sorghum intercropping system, European Journal of Agronomy, Volume 31, Issue 1, July 2009, Pages 43-50, ISSN 1161-0301, DOI: 10.1016/j.eja.2009.03.002.
(http://www.sciencedirect.com/science/article/B6T67-4W7HP4Y-1/2/e19b98f62eed8ca23d37a61c7e1d1c21)
Abstract:
Intercropping system of cereals with legume is common in semi-arid tropics of India. However, little attention has been paid to assessing nutrient competition in the system. Seasonal changes in relative dry matter yield (RDY), relative nitrogen yield (RNY), relative phosphorus yield (RPY) and relative potassium yield (RKY) are useful indices to estimate the N, P and K status in intercropping system. The competitive effect of soybean (Glycine max L.) in association with sorghum (Sorghum bicolor L. Moench) was assessed using these indices under six nutrient treatments (0, 75% NPK, 100% NPK, 75% NPK + 5 Mg farmyard manure, 75% NPK + 5 Mg phosphocompost and 75% NPK + 1.5 Mg poultry manure) from a 5-year field experiment conducted in a N and P deficient Vertisol of Central India. The RDY and RNY of sorghum were greater than the values of RDY and RNY of soybean indicating inter-species competition for N between component crops, peak competition being at 80 days after sowing (DAS). Using the concept of RDY and RNY, it was observed that having coincided the maturity period and peak demand for N of both the crops, soil N was exhausted by sorghum because of its strong competitive ability and N was liming for soybean at 80 DAS. Strong competitive ability of sorghum was also evident from higher biomass, root mass, root length density and contribution to the mixture yield. Once sorghum entered its maturity phase, its competitive effect on soybean was greatly reduced. Competition for P between two species is more prominent up to 60 DAS and P was not limiting to none of the species after 60 DAS as the RPY values were equal to corresponding RDY values. Based on RKY value, none of the component species suffered from K deficiency at any stage even if it was not applied. This implied that competition exists for soil N and P but not for K up to 60-80 DAS in soybean/sorghum intercropping system. The result showed that competition between two crops measured in terms of RNY, RPY and RKY under organic-fertilizer was less; however, recorded higher soybean equivalent yield and monetary advantage index than inorganic-fertilizer. The study thus suggests that in soybean/sorghum intercropping system to minimize competition between two crops in N and P deficient Vertisol, application of 75% NPK + FYM/poultry manure/phosphocompost is a viable nutrient management option.
Keywords: Nutrient competition; Intercropping; Legume; Vertisol

Mario Vega, Katherine Munoz, Carolina Sepulveda, Mario Aranda, Victor Campos, Ricardo Villegas, Orialis Villarroel, Solid-phase extraction and HPLC determination of Ochratoxin A in

cereals products on Chilean market, Food Control, Volume 20, Issue 7, July 2009, Pages 631-634, ISSN 0956-7135, DOI: 10.1016/j.foodcont.2008.09.014.
(http://www.sciencedirect.com/science/article/B6T6S-4TMBPRS-5/2/7c01d9710b645c7bbdb5f17c065bed22)
Abstract:
Ochratoxin A (OTA) is a mycotoxin produced by different species of Aspergillus and Penicillium fungi. The presence of this mycotoxin in cereals-based products has relation with manufacturing practices, especially with storage conditions. An extraction procedure for OTA from wheat-based products was implemented in this study. The method uses an alkaline extraction with NaHCO3, purification with Sep-Pak(R) RP-18 cartridges; and quantitative analysis by high performance liquid chromatography with fluorescence detection. The presence of OTA was confirmed by the formation of Ochratoxin A methyl ester. The method shows good validation parameters with a rate of recovery rate over 95%, limits of detection and quantification of 0.6 and 2.1 [mu]g kg-1, respectively. Once the method was validated; 31 samples including, flour, corn starches and rice were analyzed. About 70% of flour samples, 50% of rice and 63% of corn starch samples resulted positives for OTA.
Keywords: Ochratoxin A; Cereals; Mycotoxin; Chile and HPLC

Shyh-Shin Hwang, Yu-Che Cheng, Chen Chang, Huu-Sheng Lur, Ta-Te Lin, Magnetic resonance imaging and analyses of tempering processes in rice kernels, Journal of Cereal Science, Volume 50, Issue 1, July 2009, Pages 36-42, ISSN 0733-5210, DOI: 10.1016/j.jcs.2008.10.012.
(http://www.sciencedirect.com/science/article/B6WHK-4W1JW0J-1/2/e711892f814f00281d22c3beeb43f66b)
Abstract:
This research involved a magnetic resonance imaging (MRI) technique that was applied to examine water distribution and migration in single rice kernels during the tempering process. The imaging experiments were performed in a Bruker 9.4T MRI system. Three-dimensional spin-echo (SE) imaging sequences were optimized by adjusting the scanning parameters of echo time (TE) and repetition time (TR) to obtain images with maximum contrast. The MR images showed that the moisture distribution in the rice kernel is non-uniform and compartmental. The embryo region exhibited much higher MR signal intensity than the starchy endosperm portion. The tempering process was analyzed with spatial-temporal signal intensities of the endosperm following the drying process of the rice kernel. The transient change of the signal intensities in the endosperm was well fitted with a double exponential function suggesting that both convection and diffusion contributed to the reduction of the moisture gradient within the rice kernel during tempering. This hypothesis was further supported by the experimental data of the insulated rice kernel whose convective mass transfer was excluded. The experimental results revealed that MR imaging of rice kernels could be used as an efficient tool to examine the mechanisms of moisture migration within cereal grains.
Keywords: Magnetic resonance imaging (MRI); Kernel; Moisture content; Drying

Suman Mishra, John A. Monro, Digestibility of starch fractions in wholegrain rolled oats, Journal of Cereal Science, Volume 50, Issue 1, July 2009, Pages 61-66, ISSN 0733-5210, DOI: 10.1016/j.jcs.2009.03.002.
(http://www.sciencedirect.com/science/article/B6WHK-4W38RG8-5/2/e5f5633a715ed45711cf3fa81b806234)
Abstract:
A practical in vitro method was tested for measuring differences in rapidly digested starch (RDS measured at 20 min), slowly digested starch (SDS between 20 and 120 min) and inaccessible digestible starch (IDS as carbohydrate digested after homogenising at 120 min to release inaccessible starch and digesting for a further 40 min) in wholegrain cereal samples retaining

some grain structure, using in vitro pancreatic digestion after a 'gastric' pepsin-HCl pre-treatment. The persistence of digestive capacity, the influence of homogenising on digestive capacity, and the benefit of adding supplementary amyloglucosidase after 120 min digestion were tested as effects on capacity to digest a further 2.5 g portion of finely ground wholegrain added to selected 120 min digests. The results showed that sufficient digestive capacity remained to digest the IDS released by homogenising the wholegrains after 120 min prior digestion. The method measured all fractions with good precision (CV < 6%), and was shown to be capable of measuring a wide degree of variation in starch fractions of differing digestibility in rolled oats from an oat breeding population, so may be useful in detecting the effects of variations in grain structure that influence the glycemic impact of wholegrain products.
Keywords: Glycemic impact; Starch; Oats; Digestibility

A.M. Matalanis, O.H. Campanella, B.R. Hamaker, Storage retrogradation behavior of sorghum, maize and rice starch pastes related to amylopectin fine structure, Journal of Cereal Science, Volume 50, Issue 1, July 2009, Pages 74-81, ISSN 0733-5210, DOI: 10.1016/j.jcs.2009.02.007.
(http://www.sciencedirect.com/science/article/B6WHK-4W3HX64-1/2/3ad79ed71de8219bbffa1f7d833b1dcc)
Abstract:
Storage retrogradation behavior and properties of sorghum, maize, and rice starches were compared to better understand the relationship of amylopectin fine structure to quality issues. Long-term changes in texture of starch gels were attributed to amylopectin retrogradation. In starch pastes aged 7 days at 4 [degree sign]C, change in the storage modulus ([Delta]G') during heating (representing intermolecular associations) was highly and positively correlated ($r = 0.93$, $p < 0.01$) with the proportion of fraction I (FrI) long chains from debranched amylopectin. One sorghum cultivar, Mota Maradi, showed a dramatic increase in the storage modulus (G') over the 7 day storage period that was related to its high proportion of FrI. Pastes/gels made from starches with normal (20-30%) amylose content and higher proportions of FrI long chains from debranched amylopectin tended to become firmer with more syneresis during extended storage. Both degree of polymerization measurements and previous models for amylopectin structure indicate that FrI represents long B chains of amylopectin. Cereal cultivars having amylopectin structures with lower proportion of long B chains were speculated to give improved quality products with lower rates of retrogradation and staling. This is particularly an issue in sorghum foods where products generally lack storage stability and tend to stale relatively quickly.
Keywords: Starch retrogradation; Amylopectin; Paste and gel rheology; Cereals

D. Solis-Morales, C.M. Saenz-Hernandez, E. Ortega-Rivas, Attrition reduction and quality improvement of coated puffed wheat by fluidised bed technology, Journal of Food Engineering, Volume 93, Issue 2, July 2009, Pages 236-241, ISSN 0260-8774, DOI: 10.1016/j.jfoodeng.2009.01.020.
(http://www.sciencedirect.com/science/article/B6T8J-4VHSD8V-3/2/e816c48b9e90b2522ce9c4a455662b4d)
Abstract:
Puffed wheat coated with sweet coverings is a ready-to-eat (RTE) breakfast cereal of popular consumption worldwide. Coating of puffed wheat is conventionally performed by tumbling, heating and syrup pouring, within a tumbling vessel. This tumbling process promotes attrition and causes uneven distributions of the coating syrup, with a consequent variability in quality of the final product. A fluidised bed processor, built with a top spraying nozzle, was tested as an alternative for coating of puffed wheat particulates with a sweet chocolate cover. The fluidised bed technique was compared with a tumbling method in which syrup was applied by spraying, as well as with a commercial sample. Crispness, colour, flavour and attrition resistance, were compared for the different coating techniques. No significant difference was perceived in colour, but the fluidised

bed treated sample was considered crispy and more related to chocolate flavour than the commercial sample. In terms of attrition, the fluidised bed sample lost about 1% weight, while the tumbled-coated sample lost around 5% weight, and the commercial sample lost nearly 10% weight.
Keywords: Fluidisation; Coating; Puffed wheat; Friability testing; Texture attributes

G.S. Germinara, A. De Cristofaro, G. Rotundo, Antennal olfactory responses to individual cereal volatiles in Theocolax elegans (Westwood) (Hymenoptera: Pteromalidae), Journal of Stored Products Research, Volume 45, Issue 3, July 2009, Pages 195-200, ISSN 0022-474X, DOI: 10.1016/j.jspr.2009.02.002.
(http://www.sciencedirect.com/science/article/B6T8Y-4W7B53X-1/2/9dc427b4a1b0399a8189d17b229d9e7e)
Abstract:
Theocolax elegans (Westwood) is a pteromalid wasp that parasitizes immature stages of stored-grain insect pests. In a previous study, uninfested wheat kernels and their hexane extracts were shown to be attractive to the adult wasps. To contribute to the understanding of the olfactory basis of the host-habitat recognition, the electroantennographic (EAG) responses of both sexes of T. elegans to a range of volatile compounds previously identified from grains of various cereals were recorded. All compounds tested elicited measurable EAG responses. The largest EAG amplitudes were evoked by 2-octanone, 1-hexanol, 2-heptanone, (E)-2-nonenal, decanal, (E)-2-hexenal, propionic acid, (E)-2-octenal and hexanoic acid in males, and by propionic acid, 2-hexanone, (E)-2-heptenal, 2-heptanone, hexanal, (E,E)-2,4-heptadienal, butanal, hexanoic acid and octanal in females. Aromatic compounds were the weaker antennal stimulants in both sexes. Sexual differences in the EAG amplitude to some compounds were found, with males being significantly more responsive to 13 of the 34 compounds tested. Comparison of EAG responses to various chemicals indicated a strong antennal capability to differentiate in respect to structure (aliphatics and aromatics), carbon chain length, functional group (acid, alcohol, aldehyde, ketone) and absence/presence of double bonds (saturated, mono- and di-unsaturated compounds). Possible roles of cereal volatiles in host-habitat location of T. elegans are discussed in relation to the possible future implementation of T. elegans-based biological control strategies.
Keywords: Parasitic wasp; EAG; Internal grain pests; Antennal stimulants; Host-habitat location

Gregor Ernst, Isabell Henseler, Daniel Felten, Christoph Emmerling, Decomposition and mineralization of energy crop residues governed by earthworms, Soil Biology and Biochemistry, Volume 41, Issue 7, July 2009, Pages 1548-1554, ISSN 0038-0717, DOI: 10.1016/j.soilbio.2009.04.015.
(http://www.sciencedirect.com/science/article/B6TC7-4W73KP5-4/2/db4624960488bf0c7d5f6785dd34f009)
Abstract:
Energy crops are increasingly cultivated in agricultural management systems world-wide. A substitution of food crops (e.g. cereals) by energy crops may generally alter the biological activity and litter decomposition in soil due to their varying structural and chemical composition and subsequently modify soil functioning. A soil microcosm experiment was performed to assess the decomposition and microbial mineralization of different energy crop residues in soil compared to a food crop, with or without earthworms. Residues of the energy crops winter rape (Brassica napus), maize (Zea mays), miscanthus (Miscanthus giganteus) and the food crop oat (Avena sativa) were each provided as food source for a mixed earthworm population, each consisting of one individual of Lumbricus terrestris, Aporrectodea caliginosa, and Octolasion tyrtaeum. After 6 weeks, the rate of litter loss from the soil surface, earthworm biomass, microbial biomass-C and -N, microbial activity, and enzyme activities were determined. The results emphasized, that litter loss and microbial parameters were predominantly promoted by earthworms and were additionally

influenced by the varying structural and chemical composition of the different litter. Litter decay by earthworms was highest in N-rich maize litter treatment (C-N ratio 34.8) and lowest in the case of miscanthus litter (C-N ratio 134.4). As a consequence, the microbial biomass and basal respiration in soils with maize litter were higher, relative to other litter types. MBC-MBN ratio in soil increased when earthworms were present, indicating N competition between earthworms and microorganisms. Furthermore, enzyme activities responded in different ways on the varying types of litter and earthworm activity. Enzymes involved in the N-cycle decreased and those involved in the C-cycle tended to increase in the presence of earthworms, when litter with high C-N ratio was provided as a food source. Especially in the miscanthus treatments, less N might remain for enzymatic degradation, indicating that N competition between earthworms and microorganisms may vary between different litter types. Especially, an expansion of miscanthus in agricultural management systems might result in a reduced microbial activity and a higher N deficit for microorganisms in soil.
Keywords: Energy crops; Decomposition; Earthworms; Microbial biomass; Microbial activity; Fluorimetric enzyme assay

Jehan Bakht, Mohammad Shafi, Mohammad Tariq Jan, Zahir Shah, Influence of crop residue management, cropping system and N fertilizer on soil N and C dynamics and sustainable wheat (Triticum aestivum L.) production, Soil and Tillage Research, Volume 104, Issue 2, July 2009, Pages 233-240, ISSN 0167-1987, DOI: 10.1016/j.still.2009.02.006.
(http://www.sciencedirect.com/science/article/B6TC6-4W1JY1N-1/2/131bfc04c5d083201fffb53d52acb211)
Abstract:
Management of N is the key for sustainable and profitable wheat production in a low N soil. We report results of irrigated crop rotation experiment, conducted in the North West Frontier Province (NWFP), Pakistan, during 1999-2002 to evaluate effects of residue retention, fertilizer N application and mung bean (Vigna radiata) on crop and N yields of wheat and soil organic fertility in a mung bean-wheat sequence. Treatments were (a) crop residue retained (+residue) or (b) removed (-residue), (c) 120 kg N ha-1 applied to wheat, (d) 160 kg N ha-1 to maize or (e) no nitrogen applied. The cropping system was rotation of wheat with maize or wheat with mung bean. The experiment was laid out in a spit plot design. Postharvest incorporation of crop residues significantly ($p < 0.05$) increased the grain and straw yields of wheat during both years. On average, crop residues incorporation increased the wheat grain yield by 1.31 times and straw yield by 1.39 times. The wheat crop also responded strongly to the previous legume (mung bean) in terms of enhanced grain yield by 2.09 times and straw yield by 2.16 times over the previous cereal (maize) treatment. Application of fertilizer N to previous maize exerted strong carry over effect on grain (1.32 times) and straw yield (1.38 times) of the following wheat. Application of N fertilizer to current wheat produced on average 1.59 times more grain and 1.77 times more straw yield over the 0 N kg ha-1 treatment. The N uptake in wheat grain and straw was increased 1.31 and 1.64 times by residues treatment, 2.08 and 2.49 times by mung bean and 1.71 and 1.86 times by fertilizer N applied to wheat, respectively. The soil mineral N was increased 1.23 times by residues, 1.34 times by mung bean and 2.49 times by the application of fertilizer N to wheat. Similarly, the soil organic C was increased 1.04-fold by residues, 1.08 times by mung bean and 1.00 times by the application of fertilizer N. We concluded that retention of residues, application of fertilizer N and involvement of legumes in crop rotation greatly improves the N economy of the cropping system and enhances crop productivity in low N soils.
Keywords: Crop residues; Cropping system; N; C; Wheat

Sebastiana Melero, Rosa Lopez-Garrido, Jose Manuel Murillo, Felix Moreno, Conservation tillage: Short- and long-term effects on soil carbon fractions and enzymatic activities under Mediterranean

conditions, Soil and Tillage Research, Volume 104, Issue 2, July 2009, Pages 292-298, ISSN 0167-1987, DOI: 10.1016/j.still.2009.04.001.
(http://www.sciencedirect.com/science/article/B6TC6-4W80C4M-1/2/5a03d7e70e68e8b25eb1e059d38e8bff)
Abstract:
Short- and long-term field experiments are necessary to provide important information about how soil carbon sequestration is affected by soil tillage system; such systems can also be useful for developing sustainable crop production systems. In this study, we evaluated the short- and long-term effects of conservation tillage (CT) on soil organic carbon fractions and biological properties in a sandy clay loam soil. Both trials consisted of rainfed crop rotation systems (cereal-sunflower-legumes) located in semi-arid SW Spain. In both trials, results were compared to those obtained using traditional tillage (TT). Soil samples were taken in flowering and after harvesting of a pea crop and collected at three depths (0-5, 5-10 and 10-20 cm). The soil organic carbon fractions were measured by the determination of total organic carbon (TOC), active carbon (AC) and water soluble carbon (WSC). Biological status was evaluated by the measurement of soil microbial biomass carbon (MBC) and enzymatic activities [dehydrogenase activity (DHA), o-diphenol oxidase activity (DphOx), and [beta]-glucosidase activity ([beta]-glu)].
The contents of AC and MBC in the long-term trial and contents of AC in the short-term trial were higher for CT than TT at 0-5 cm depth for both sampling periods. Furthermore, DHA and [beta]-glucosidase values in the July sampling were higher in the topsoil under conservation management in both trials (short- and long-term). The parameters studied tended to decrease as depth increased for both tillage system (TT and CT) and in both trials with the exception of the DphOx values, which tended to be higher at deeper layers.
Values of DHA and [beta]-glu presented high correlation coefficients (r from 0.338 to 0.751, $p <= 0.01$) with AC, WSC and TOC values in the long-term trial. However, there was no correlation between either TOC or MBC and the other parameters in the short-term trial. In general, only stratification ratios of AC were higher in CT than in TT in both trials. The results of this study showed that AC content was the most sensitive and reliable indicator for assessing the impact of different soil management on soil quality in the two experiments (short- and long-term).
Conservation management in dryland farming systems improved the quality of soil under our conditions, especially at the surface layers, by enhancing its storage of organic matter and its biological properties, mainly to long-term.
Keywords: Sustainable agriculture; Tillage; Soil active carbon; Microbial biomass carbon; Enzymatic activities

Maria Eugenia Barcenas, Rossana Altamirano-Fortoul, Cristina M. Rosell, Effect of high pressure processing on wheat dough and bread characteristics, LWT - Food Science and Technology, In Press, Corrected Proof, Available online 30 June 2009, ISSN 0023-6438, DOI: 10.1016/j.lwt.2009.06.019.
(http://www.sciencedirect.com/science/article/B6WMV-4WN2Y1M-2/2/3ecc1aab80617b724d389fbc5d83b216)
Abstract:
Microbial, physical and structural changes in high pressured wheat dough were studied as a function of pressure level (50-250 MPa) and holding time (1-4 min). Thereafter, selected conditions of high hydrostatic processing (HPP) were applied to bread dough and the technological quality of the obtained breads was studied. The effect of HPP on wheat dough was investigated by determining microbial population (total aerobic mesophilic bacteria, moulds and yeasts), color and mechanical and texture surface related dough parameters (cohesiveness, adhesiveness, hardness and stickiness). HPP reduced the endogenous microbial population of wheat dough from 104 colony forming units/g (CFU) to levels of 102 CFU. HPP treatment significantly ($P < 0.05$) increased dough hardness and adhesiveness, whereas treatment time reduced its stickiness.

Scanning electron micrographs suggested that proteins were affected when subjected to pressure levels higher than 50 MPa, but starch modification required higher pressure levels. HPP treated yeasted doughs led to wheat breads with different appearance and technological characteristics; crumb acquired brownish color and heterogeneous cell gas distribution with increased hardness due to new crumb structure. This study suggests that high hydrostatic processing in the range 50-200 MPa could be an alternative technique for obtaining novel textured cereal based products.
Keywords: Wheat dough; High pressure processing; Microbiology; Dough texture; Bread

Zeyaur R. Khan, Charles A.O. Midega, Japhether M. Wanyama, David M. Amudavi, Ahmed Hassanali, Jimmy Pittchar, John A. Pickett, Integration of edible beans (Phaseolus vulgaris L.) into the push-pull technology developed for stemborer and Striga control in maize-based cropping systems, Crop Protection, In Press, Corrected Proof, Available online 28 June 2009, ISSN 0261-2194, DOI: 10.1016/j.cropro.2009.05.014.
(http://www.sciencedirect.com/science/article/B6T5T-4WMKXNM-2/2/75579febc25839049e8380c9bd3782aa)
Abstract:
Smallholder farming systems in eastern Africa are characterized by cereal/edible legume intercrops in fields severely constrained by parasitic weed, Striga hermonthica, cereal stemborers and declining soil fertility. The push-pull technology concurrently addresses these constraints. It involves intercropping maize with stemborer repellent fodder legume, Desmodium spp. (push), with an attractant crop, Napier grass, Pennisetum purpureum (pull), planted around this intercrop, thus making it difficult to interplant edible legumes. We assessed farmers' practice and perceptions on intercropping and willingness to integrate beans in their push-pull plots from a sample of 300 farmers in six districts in western Kenya. All the respondents traditionally intercropped maize with beans, planted either between the rows of maize, in the same holes with maize or in between maize plants within a row. The majority (92%) were willing to integrate beans in their push-pull plots. We, therefore, evaluated effects of integrating beans in the maize-desmodium intercrops. Treatments comprised a maize monocrop, maize-bean intercrop and three maize-desmodium intercrops, two of which were integrated with beans, either in the same holes with maize or in between maize plants in a row (bean integration plots). On-farm trials were similarly established among 56 farmers in four districts in western Kenya to assess the two integration methods. S. hermonthica counts and stemborer damage to maize were significantly lower and maize yields significantly higher in the maize-desmodium and bean integration plots than in the other systems. Overall, integration of beans in the maize-desmodium intercrops and the planting arrangement did not compromise the S. hermonthica and stemborer control efficacy of desmodium. Integration of beans significantly increased labour and total variable costs, with these being significantly higher in plots with both crops in different holes than in the same hole. Total revenue, gross benefits and benefit cost ratios did not significantly differ between the bean integration and maize-desmodium intercrops. Furthermore, these parameters were for most part not affected by the planting arrangements, both on-station and on-farm. These results show that integration of beans in the maize-desmodium and indeed push-pull technology while guaranteeing an additional crop, a protein source, to the farmers does not compromise the observed benefits of the technology but yields same economic benefits. Where labour is easily available, farmers are, however, advised to plant maize and beans in separate holes to avoid the risk of competition for moisture and nutrients where these might be limiting.
Keywords: Intercropping; Push-pull; Maize; Bean; Striga; Stemborers; Farmers' perceptions; Economics; Western Kenya

C. Carranca, M.O. Torres, J. Baeta, White lupine as a beneficial crop in Southern Europe. II. Nitrogen recovery in a legume-oat rotation and a continuous oat-oat, European Journal of

Agronomy, In Press, Corrected Proof, Available online 26 June 2009, ISSN 1161-0301, DOI: 10.1016/j.eja.2009.05.010.
(http://www.sciencedirect.com/science/article/B6T67-4WM68KT-1/2/a327720f8fba8f9d6bd3ccddd0bd4ae2)
Abstract:
One experiment lasting for two years was carried out at Pegoes (central Portugal) to estimate the impact of mature white lupine residue (Lupinus albus L.) on yield of fodder oat (Avena sativa L. cv. Sta. Eulalia) as the next crop in rotation, comparing with the continuous cultivation of cereal, under two tillage practices (conventional tillage and no-till) and fertilized with five mineral nitrogen (N) rates, with three replicates. Oat as a first crop in the rotation provided more N to the agro-ecosystem (63 kg N ha-1) than did lupine (30-59 kg N ha-1). This was at a cost of 100 kg of mineral N ha-1, whereas lupine was grown without addition of N. A positive response of oat as a second crop was obtained per kg of lupine-N added to the system when compared with the continuous oat-oat. The cereal also responded positively to mineral N in the legume amended soil in contrast with the oat-oat sequence where no response was observed, partly due to the fast mineralization rate of lupine residue and a greater soil N immobilization in the continuous oat system. Each kg N ha-1 added to the soil through the application of 73 kg DM ha-1 mature lupine residue (above- and belowground material) increased by 72 kg DM ha-1 the oat biomass produced as the second crop in rotation when 150 kg mineral N ha-1 were split in the season, independent of tillage practice. Mature legume residue conserved in the no-tilled soil depressed the yield of succeeding cereal but less than the continuous oat-oat for both tillage practices, where the application of mineral N did not improve the crop response.
Keywords: Dry matter yield; Mature residue; N fertilization; Tillage practice

Annelie Barnard, Marie F. Smith, The effect of rainfall and temperature on the preharvest sprouting tolerance of winter wheat in the dryland production areas of the Free State Province, Field Crops Research, Volume 112, Issues 2-3, 26 June 2009, Pages 158-164, ISSN 0378-4290, DOI: 10.1016/j.fcr.2009.02.011.
(http://www.sciencedirect.com/science/article/B6T6M-4VXJVX1-2/2/4eacfa388873456dab85fc515f9912ee)
Abstract:
Preharvest sprouting (PHS) is a risk factor in winter cereal farming in certain environments as even mild sprouting affects the suitability of wheat for end-use products. This is because even mild sprouting affects the suitability of wheat for end-use products. The extent of PHS is hard to predict. To establish a quantitative relationship between PHS and different climatic characteristics, eighteen winter wheat cultivars were planted in three regions representative of the wheat growing conditions of the Free State Province of South Africa over four years. Climatic characteristics during six environmental periods were investigated, namely planting to harvest (PH), anthesis to harvest (AH), grain filling (GF), 14 days prior to physiological maturity (14M) and 10 and 20 days prior to harvest (10H and 20H) respectively. These data sets were correlated with PHS resistance determined in a rain simulator to determine if climate during various stages of grain development had an effect on the expression of dormancy and subsequent PHS. Principal component analysis (PCA) on mean PHS values identified three distinct groupings of cultivars, ranging from PHS susceptible to PHS resistant. A fairly strong positive correlation ($r = 0.715$, $P = 0.008$) was found between PHS and minimum temperature during grain filling. Large variations in PHS values were also observed between the various cultivars, indicating that certain cultivars, such as Caledon, Gariep, Limpopo, Matlabas, PAN 3118, PAN 3120, PAN 3377 and SST 334, are more sensitive to environmental effects than others and that the variation in cultivar PHS is not consistent across sites and years.
Keywords: Preharvest sprouting; Rainfall; Temperature; Grain filling

B.M. McKenzie, A.G. Bengough, P.D. Hallett, W.T.B. Thomas, B. Forster, J.W. McNicol, Deep rooting and drought screening of cereal crops: A novel field-based method and its application, Field Crops Research, Volume 112, Issues 2-3, 26 June 2009, Pages 165-171, ISSN 0378-4290, DOI: 10.1016/j.fcr.2009.02.012.
(http://www.sciencedirect.com/science/article/B6T6M-4W1BFN6-1/2/88588c91877caab882e385b529cdbf8f)
Abstract:
Lack of water is a major limitation to crop production, particularly where roots of cereal crops are not able to access water stored in the subsoil. One way that roots penetrate the subsoil to access water is by following natural biopores - paths created by roots from previous crops, or as burrows from soil fauna. Burying a mesh layer horizontally in the soil can prevent root penetration to the subsoil. We used this technique with the novel modification that the mesh was punctured to create a defined number of holes per unit area; controlling access to the subsoil and to the water therein. The holes were of similar size to biopores.
Five barley genotypes were late sown and grown during a dry summer. Monitoring of crop performance included plant height, leaf area and Normalized Difference Vegetation Index (NDVI). Crops grown with unrestricted access to the subsoil outperformed crops with limited or no access to the subsoil. Crops grown with controlled, limited access to the subsoil performed better than those with no access and the performance was generally related to amount of access. Changes in soil water content were in line with the amount of root access to the subsoil; confirming the association between subsoil water and crop growth and development in drought conditions. While there were no significant interactions between the genotypes and treatments used here, the method offers promise for studying some aspects of cereal ecophysiology and could be used to identify promising germplasm that may be of interest in plant breeding. Further testing is required to adapt the method for a wider range of crop types and soil conditions and testing for crops grown to maturity.
Keywords: Biopores; Cereals; Root growth; Drought stress; Subsoil water; Plough pan

E. Perez-Torrado, J. Blesa, J.C. Molto, G. Font, Pressurized liquid extraction followed by liquid chromatography-mass spectrometry for determination of zearalenone in cereal flours, Food Control, In Press, Corrected Proof, Available online 23 June 2009, ISSN 0956-7135, DOI: 10.1016/j.foodcont.2009.06.016.
(http://www.sciencedirect.com/science/article/B6T6S-4WKK1J4-3/2/41307db1a06b2770f26c810a5c02f833)
Abstract:
A method for determination of zearalenone in cereal flour has been developed applying pressurized liquid extraction (PLE) using methanol/acetonitrile (50:50 v/v) as the extraction solvent. The extracted samples were analyzed with liquid chromatography coupled to mass spectrometry (LC-MS) with an electro spray ionisation interface (ESI). The method was validated as a quantitative confirmatory method according to the Eu Commission Decision 2002/657/EC. Recoveries of the extraction step data were satisfactory with values higher then 70%. Quantification limits (LOQ) were 5 [mu]g/kg for ESI (+) and 1 [mu]g/kg for ESI (-). Twenty one flour samples produced in different countries were extracted and analyzed by LC-MS (ESI) negative ionisation followed by LC-MS (ESI) positive ionisation for confirmative purposes, quantification was based on matrix-matched standard curves to compensate disturbing matrix effect. Only one sample was confirmed containing zearalenone below levels regulated by European Commission.
Keywords: Zearalenone; Mycotoxins; Cereal flours; Pressurized liquid extraction; LC-MS

Corina Carranca, Adilia Oliveira, Elisa Pampulha, Maria Odete Torres, Temporal dynamics of soil nitrogen, carbon and microbial activity in conservative and disturbed fields amended with mature

white lupine and oat residues, Geoderma, Volume 151, Issues 1-2, 15 June 2009, Pages 50-59, ISSN 0016-7061, DOI: 10.1016/j.geoderma.2009.03.012.
(http://www.sciencedirect.com/science/article/B6V67-4W3G65J-1/2/5875f148a1424ae84fce82b33bceb8ac)
Abstract:
In order to better understand the role of crop residues in soil protection, soil organic matter, nutrient conservation and cycling in Mediterranean agro-ecosystems, it is necessary to develop research since only limited information is available. Few studies have compared the decomposition rates of legume and cereal residues in the field, particularly under soil conservation practice with respect to residue management. In disturbed and undisturbed Portuguese light soils amended with mature lupine and oat labelled 15N residues, nitrogen, carbon and microbial activity dynamics were investigated in situ using undisturbed soil cores in completely randomized blocks with three replications. Crop residue labelled with 15N allowed the estimation of N mineralization/immobilization and nitrification and the level of leaching losses. Most nitrates were produced in summer, especially in buried top soil with legume residue, and leaching (about 7% of residue-N) occurred mostly in October. A preferentially labile C loss by an intense CO2 emission by microbial respiration was observed in oat residue managed soil after September, with the consequent increase of greenhouse gas concentration in the atmosphere, overall a 2% of organic C was accumulated in this soil after six months. Legumes, with smaller C:N and total lignin:total N ratios resulted in a more efficient conversion to stable soil organic matter than cereals. Changes in soil microbial activity were largely controlled by the quantity and quality of available C and by N in soil, and less affected by soil disturbance. A more intensive activity was observed in cereal amended plots, especially in the top soil caused by a greater organic N level ($r = 0.38$, $p < .05$), although the decomposition rate of oat residue was slower when compared with legume residue.
Keywords: Dehydrogenase activity; Gross N immobilization; In situ incubation; Leaching; Mineralization/nitrification; 15N

U. Tiwari, E. Cummins, Nutritional importance and effect of processing on tocols in cereals, Trends in Food Science & Technology, In Press, Corrected Proof, Available online 13 June 2009, ISSN 0924-2244, DOI: 10.1016/j.tifs.2009.06.001.
(http://www.sciencedirect.com/science/article/B6VHY-4WHFD4V-1/2/0a0ec94d84e28b6e28994711729ae3de)
Abstract:
Over the past decade greater consumer demand for nutritious cereal-based food products with minimal artificial additives has been met with increased research and development from the food industry. Recent research has highlighted the importance of tocols in human health and nutrition. Tocols are natural antioxidants present in food of plant origin, including cereals. Cereal and cereal-based foods (breakfast cereals, bread, cookies, extruded snacks, etc.) are common and widely consumed in many parts of the world. Available literature reveals that the level of tocols in a finished product depends upon the food processing operations carried out. For example, milling of cereal grains and subsequent baking may have a major impact on tocol levels in the final product. Food manufacturing procedures could incorporate the pearling by-products of cereals, which are rich in tocols, and hence increase the nutrition and health benefits of the end product (e.g. bread). In this study the role of tocols, from various cereal sources and cereal-based products, on human health are reviewed. Factors influencing levels and stability during processing and storage are also discussed.

Fatma Bensassi, Chiraz Zaied, Salwa Abid, Mohamed Rabeh Hajlaoui, Hassan Bacha, Occurrence of deoxynivalenol in durum wheat in Tunisia, Food Control, In Press, Corrected Proof, Available online 11 June 2009, ISSN 0956-7135, DOI: 10.1016/j.foodcont.2009.06.005.

(http://www.sciencedirect.com/science/article/B6T6S-4WH2KY7-2/2/21bb843d0507818a4a8ef5f09730a7c6)
Abstract:
Wheat is frequently contaminated by the deoxynivalenol (DON) which is a member of the trichotecene family, the most important group of mycotoxins produced by the Fusarium moulds. As Tunisian population is a big consumer of cereals mainly durum wheat, human exposure to DON can be, consequently high. This survey was performed to study the occurrence of DON in Tunisian durum wheat area during the crop of 2007. A total of 65 samples of durum wheat from five cultivating locations in the North of Tunisia, the major cropping area, were analysed. To detect and to quantify the mycotoxin DON, an efficient HPLC/UV method was developed, including immunoaffinity step for DON extraction from durum wheat followed by liquid chromatography (LC) for quantification. As DON is a water soluble toxin, the extraction procedure from wheat samples was performed using water. Samples were centrifuged then passed through the immunoaffinity columns. After column's washing, the toxin was slowly eluted by methanol. Wheat sample extracts were injected to the LC system set at a wavelength of 220 nm. From 65 samples, 83% showed DON contamination with averages ranging from 12.8 +/- 5% to 30.5 +/- 13.3% [mu]g/g exceeding the maximum permitted limit of 1.75 [mu]g/g set by the European Commission in wheat.
Keywords: Trichothecenes; Deoxynivalenol; HPLC; Durum wheat; Contamination

A. Hargreaves, J. Hill, J.D. Leaver, Effect of stage of growth on the chemical composition, nutritive value and ensilability of whole-crop barley, Animal Feed Science and Technology, Volume 152, Issues 1-2, 10 June 2009, Pages 50-61, ISSN 0377-8401, DOI: 10.1016/j.anifeedsci.2009.03.007.
(http://www.sciencedirect.com/science/article/B6T42-4W3P05H-1/2/d49a86e4594ffc0344390c297336abb0)
Abstract:
Chemical composition, nutritive value and ensilability of whole-crop barley as a supplementary feed for dairy cows was investigated using a range of maturities of barley (seed coat ripe--GS 69, early dough stage--GS 82, soft dough--GS 87 and grain ripe--GS 90) in small scale silos. The ensiling experiment was based on a complete randomised design with three replicate silos per harvest date. Twelve 0.225 m3 plastic silo (were used in the experiment and silo were sampled on opening for chemical composition and nutritive value. The fermentation process reduced the concentrations of water-soluble carbohydrate in the ensiled forage compared to the fresh forage. The proportion of residual WSC in silage did however increase with increasing crop maturity (0.051, 0.077, 0.167 and 0.560 of WSC retained in the silage after the process of fermentation from forages cut at GS 69, 82, 87 and 90 respectively). Silages that were made from forage cut at the most mature stage of growth had a substantially lower production ($P<0.001$) of total fermentation acids (38.9 g/kg DM for GS 90) compared to those made from the least mature forage (203.4 g/kg DM for GS 69). The pH and concentrations of the various fermentation acids for silages made with the least mature forage (GS 69) were typical of acetic acid dominated fermentation. These silages contained little or no butyric acid and had a pH of 4.5 and contained high concentrations of ammonia-N (186 g/kg total N). Silages produced from forages cut at growth stage 82 were similar to those conserved from immature forages, having acetic acid dominated fermentation (lactic acid to acetic acid ratio of 1:1.22), relatively high pH (4.85) and high concentrations of ammonia-N (141 g/kg total N). These silages differed from those made from the most immature forage insofar that they contained high concentrations of butyric acid (50.5 g/kg DM). The processes of fermentation were affected by the stage of growth of the forage at ensiling and hence the economics of silage production. If the forage was too immature at ensiling, the yield of crop would be compromised but the silage produced may have moderate to high nutritive value and reasonable aerobic stability during the feed out phase. If the whole-crop forage was grown as a crop to secure high levels of supplementary feed from an alternative forage source (other than

grass), the trade-off between yield, nutritive value and losses of feed immediately after silo opening would suggest the crop should be harvested between 350 and 450 g DM/kg dry matter.
Keywords: Cereal silage; Chemical composition; Nutritive value; Deterioration

Luc Saulnier, Paul Robert, Mathilde Grintchenko, Frederic Jamme, Brigitte Bouchet, Fabienne Guillon, Wheat endosperm cell walls: Spatial heterogeneity of polysaccharide structure and composition using micro-scale enzymatic fingerprinting and FT-IR microspectroscopy, Journal of Cereal Science, In Press, Corrected Proof, Available online 9 June 2009, ISSN 0733-5210, DOI: 10.1016/j.jcs.2009.05.003.
(http://www.sciencedirect.com/science/article/B6WHK-4WGK4H5-2/2/7e5d567ff63143fe6c2e2e92a64e8618)
Abstract:
Micro-scale enzymatic fingerprinting and FT-IR microspectroscopy were used to investigate changes of polysaccharide structure and composition in cell walls from wheat endosperm. These methods were applied to transverse and longitudinal sections of wheat grains harvested at maturity and 270[degree sign]D. Principal component analysis treatment of the data revealed marked differences in the (1,3)-(1,4)-beta-glucans (BG)/arabinoxylans (AX) ratio and in the structure of AX depending on both cell position in the grain and stage of development. Cell walls close to the germ were enriched in BG in both developing and mature grain. AX in developing grain were characterized by a higher proportion of di-substitution by arabinose as compared to mature grain AX. In addition, AX in mature grains exhibited a different structure depending on prismatic or central origin of cell walls in the grain. These results indicated a high spatial and temporal control of the biosynthesis of AX and BG in wheat endosperm.
Keywords: Arabinoxylans; (1,3)-(1,4)-beta-glucans; Cereal; Grain; Endoxylanase; Lichenase

Kizito Mazvimavi, Steve Twomlow, Socioeconomic and institutional factors influencing adoption of conservation farming by vulnerable households in Zimbabwe, Agricultural Systems, Volume 101, Issues 1-2, June 2009, Pages 20-29, ISSN 0308-521X, DOI: 10.1016/j.agsy.2009.02.002.
(http://www.sciencedirect.com/science/article/B6T3W-4VY16GR-1/2/11fbe45b9eabdf670dae2ddf6d1dcb31)
Abstract:
Since 2004, there has been a series of initiatives in Zimbabwe to promote conservation agriculture (CA) through various donor-funded relief initiatives with the aim of improving crop production among vulnerable farmers. In April 2007, the International Crops Research Institute for the Semi-Arid Tropics (ICRISAT) implemented a survey to collect data from 12 districts and 232 households that had been practicing hand hoe-based conservation farming (CF) for at least one prior season with extension and input support from non-governmental organizations. This study was undertaken to better understand the household and institutional factors that influence CF adoption patterns among the beneficiaries of these relief initiatives. Results from the study show that institutional support and agro-ecological location have strong statistical influence on the adoption intensity of different CF components. Besides the practice of preparing basins, at least 70% of the households had also adopted the following components of CF: manure application in the planting basin, topdressing with nitrogen fertilizer at the 5-6 leaf stage of the cereal crop, and timely post-planting weeding. Household labor availability and impacts of HIV/AIDS did not limit the intensity of adoption of CF. An enterprise budget analysis proved that because of the significant yield gains realized with CF, the technology is more viable than conventional tillage practices of broadcasting manure and overall spring tillage on the day of planting. The increased profitability in adopting CF was also reflected in steady increases in the area each household committed to CF from an average area of 1450 m2 in 2004 to more than 2000 m2 in 2007.
Keywords: Conservation farming; Adoption intensity; Tobit model; Extension; Labor availability

R. Caballero, X. Fernandez-Santos, Grazing institutions in Castilla-La Mancha, dynamic or downward trend in the Spanish cereal-sheep system, Agricultural Systems, Volume 101, Issues 1-2, June 2009, Pages 69-79, ISSN 0308-521X, DOI: 10.1016/j.agsy.2009.03.004.
(http://www.sciencedirect.com/science/article/B6T3W-4W4JR6H-1/2/be2200e9864bc2bb88bf5e87174fb013)
Abstract:
In most parts of the world, pastoral societies are governed by internal rules or legal bodies and legal rules (institutions) at the regional and national scale. In the Large Scale Grazing Systems (LSGS) of the European Union (EU), institutional management is also dependent on EU regulations, which underpin a considerable part of total policy support. In this research we argue that the effectiveness of policy intervention should be determined 'on the ground' and taking into account the structural and social features of particular LSGS. Under a community-based research approach, the main stakeholders (arable farmers and landless pastoralists) and organisations governing the cereal-sheep farming system in Castilla-La Mancha (South-Central Spain) were consulted with the aim of assessing the sustainability of the mixed cereal and sheep system. In this area, sheep farming is a secondary land use relying on the agricultural residues from arable farming, but representing some 35% of the total value of production farming per land unit. Our results showed that regional and EU regulations are uncoordinated and uncongenial for the continuity of the mixed cereal and sheep operation. They are supported by separate policy schemes, while operating on the same land units. Arable farming is more affected by EU regulations and corresponding policy support schemes, while sheep farming is more regulated by regional institutions. EU support was 32% and 13% of total farm income for cereal and sheep farmers, respectively. Arable farmers received a regulated non-market grazing fee. They abide by the law, but have no incentive to facilitate the sheep subsystem. The farming practices of sheep farmers are more market-driven as the value of production makes up the bulk of their total income. However, they are squeezed by strict regional regulations when implementing pastoral surviving strategies (mobility, accessibility, and diversity of land based resources). Both subsystems are following disconnected trends, with increasing cultivation intensity in arable farming and the abandonment of shepherding and a consequent consolidation of sheep flocks and an increase in indoor feeding. This research suggests that sensible institutional management should be derived from a proper knowledge of the social and structural features of particular grazing systems and the disentangling of their main constraints.
Keywords: Mixed grazing systems; Mobility; Accessibility; Land resources; Incentive compatibility; Policy support

Sonia Quiroga, Ana Iglesias, A comparison of the climate risks of cereal, citrus, grapevine and olive production in Spain, Agricultural Systems, Volume 101, Issues 1-2, June 2009, Pages 91-100, ISSN 0308-521X, DOI: 10.1016/j.agsy.2009.03.006.
(http://www.sciencedirect.com/science/article/B6T3W-4W7HP4G-2/2/de8a8baed753bf21b4c157dd1ad78d5c)
Abstract:
The landscape of the Mediterranean rural areas is shaped with crops that are well-adapted to semi-arid zones. In this paper we aim to understand the interactions between factors that impact agriculture and management interventions of agricultural systems - including cereal, citrus, olives and grapevine - with a special focus on climate risks. We use statistical models of yield response functions to address how temperature and precipitation variability affect the crops of a traditional Mediterranean farming system. While simple functions will never provide the level of detail possible with more complex models, the direct interpretation of the results by farmers and policy-makers may assist the risk management and decision-making process. Our results show that observed yield patterns contain substantial information on the relative importance of the climate and management variables for yield variability, responding to the critical need for knowledge on

crop response to extreme precipitation and temperature events with implications for the risk management of agricultural systems. Our method was applied to address policy and management factors affecting the risk level of Mediterranean farming systems in Spain, such as the role of EU agricultural and environmental policy in yield output, as well as the risk management implications in drought conditions.
Keywords: Statistical models of yield response; Climate variability; Drought; Management; Mediterranean crops

Francine Lenfant, Chrystel Loret, Nicolas Pineau, Christoph Hartmann, Nathalie Martin, Perception of oral food breakdown. The concept of sensory trajectory, Appetite, Volume 52, Issue 3, June 2009, Pages 659-667, ISSN 0195-6663, DOI: 10.1016/j.appet.2009.03.003.
(http://www.sciencedirect.com/science/article/B6WB2-4VVR1R0-1/2/f017f1d807d4b6a80c85216b6400481f)
Abstract:
Texture perceived in mouth largely depends on the behaviour of the food when it is broken down and transformed by the mouth elements. Texture results from a dynamic process in which texture attributes are continuously analysed by the oral sensory systems during mastication. However, the particular sequence of perceptual events that occur during oral food breakdown remains unknown. The aim of the present study is to describe the succession of perceptual events that happen in mouth during mastication and to show that for each food a texture pathway can be built. This for, we used a sensory method enabling to evaluate the dynamics of texture perceptions during food consumption: the Temporal Dominance of Sensation. On different breakfast cereals, we measured the sensation dominating at each point of the mastication process. We showed that the dynamics of appearance and disappearance of each texture sensation experienced in mouth during the eating process differed among cereals. However, some common features in this sensory trajectory were also observed for the category of products studied. Hardness, crackliness and crispness were rather perceived at the beginning of the mastication period, brittleness and lightness in the middle and stickiness at the end.
Keywords: Food breakdown; Texture perception; In-mouth performance; Dynamics of perception; Sensory trajectory

Wim Verbeke, Joachim Scholderer, Liisa Lahteenmaki, Consumer appeal of nutrition and health claims in three existing product concepts, Appetite, Volume 52, Issue 3, June 2009, Pages 684-692, ISSN 0195-6663, DOI: 10.1016/j.appet.2009.03.007.
(http://www.sciencedirect.com/science/article/B6WB2-4VXMPH8-2/2/fe4937909c6202414a85af432582b03b)
Abstract:
This paper reports on consumers' reactions towards calcium-enriched fruit juice, omega-3 enriched spread and fibre-enriched cereals, each with a nutrition claim, health claim and reduction of disease risk claim. Cross-sectional data were collected in April 2006 from a sample of 341 consumers in Belgium. Consumers' reactions to the carrier product, functional ingredient and claim combinations were assessed as perceived convincingness of the claim, credibility of the product, attractiveness of the product, and intention to buy the product, while accounting for differences in product familiarity, attitudinal and demographic characteristics. Generally, health claims outperformed nutrition claims, and both of these claim types outperformed reduction of disease risk claims. Comparing consumer reactions across product concepts revealed clear preferences for fibre-enriched cereals as compared to the other two concepts. The interaction effects between claim type and product concept indicated that reduction of disease risk claims are perceived very well in omega-3 enriched spreads, particularly in terms of perceived convincingness of the claim, while not appealing to consumers in the other product concepts. Positive attitudes towards functional foods and familiarity with the concrete functional product category boosted the claim

type and product ratings, whereas perceived control over own health and perceiving functional foods as a marketing scam decreased all product concept's appeal.
Keywords: Functional foods; Nutrition and health claims; Consumer; Omega-3; Breakfast cereals; Fruit juice

M. Takeda, T. Nakamoto, K. Miyazawa, T. Murayama, H. Okada, Phosphorus availability and soil biological activity in an Andosol under compost application and winter cover cropping, Applied Soil Ecology, Volume 42, Issue 2, June 2009, Pages 86-95, ISSN 0929-1393, DOI: 10.1016/j.apsoil.2009.02.003.
(http://www.sciencedirect.com/science/article/B6T4B-4VV1B6R-1/2/ef8ed254ed8f7bcc9a6299a32ae685bd)
Abstract:
In Andosols, available P for crops is limited primarily by sorption and precipitation processes, but application of organic materials may improve the P availability by enhancing organic P mineralization. A field study was conducted during 2005-2007 on a Silandic Andosol in Fukushima, Japan, to investigate whether and how applications of composted cattle manure (0, 61, and 122 or 183 kg P ha-1) and/or cover-crop residue (no cover crop, rapeseed, and cereal rye) would improve P availability to soybean. Cover crops were grown over winter and incorporated into the soil 2 weeks before compost application. Soybean P uptake at flowering was improved by application of compost and/or rye residue. Bray-2 soil P (i.e., readily soluble and desorbable P) increased only in the compost treatment. Soil phosphatase activity and microbial P, both representing the potential of P mineralization, were enhanced in treatments with compost and rye. Rapeseed had minor effects on the soil P parameters. Soil nematode community structure was evaluated as an indicator for soil conditions including decomposition pathways. Compost application increased free-living nematodes, especially fungal-feeding nematodes, implying that fungal decomposition dominated in the soil. The increase in free-living nematodes was less pronounced in the cover-crop treatments than in the compost treatment; only bacterial-feeding nematodes consistently increased after the rye treatment. The different changes in the community composition of soil nematodes and the P parameters indicate that the use of a rye cover crop affected P availability to soybean differently to compost application. The density of Pratylenchidae, the prevailing plant feeder in the soil investigated, declined in the treatments with compost and rye, but increased in the rapeseed treatment. The feeding activity of Pratylenchidae may also have affected root growth and consequently P uptake by soybean.
Keywords: Soil phosphorus; Phosphatase; Microbial biomass; Nematode communities; Compost; Winter cover crops

Y. Lechon, H. Cabal, C. de la Rua, N. Caldes, M. Santamaria, R. Saez, Energy and greenhouse gas emission savings of biofuels in Spain's transport fuel. The adoption of the EU policy on biofuels, Biomass and Bioenergy, Volume 33, Issues 6-7, June-July 2009, Pages 920-932, ISSN 0961-9534, DOI: 10.1016/j.biombioe.2009.02.001.
(http://www.sciencedirect.com/science/article/B6V22-4VW4V6B-1/2/0d9712cd128ba45f36d83461b69e2fd9)
Abstract:
Using Life Cycle Assessment (LCA) the fossil energy benefits and avoided global warming emissions have been evaluated for the EU Biofuels goals in Spain. The Biofuels considered are cereal ethanol, biodiesel from residual oils, and from palm, sunflower, soybeans and rapeseed vegetable oils. Our findings are that the source of the cereal and vegetable oil influences the efficacy of the Biofuels and that results greatly depend on whether or not electricity has been produced as co-product in bioethanol plants and that without CHP the energy balance of ethanol is negative with few greenhouse gas offsets.

Keywords: Bioethanol; Biodiesel; Biofuel policy; Life Cycle Assessment; Environmental benefits; Greenhouse gas emissions; Global warming; Triticum aestivum L.; Hordeum vulgare L.; Elaeis guinnensis Jacq. 1897; Helianthus annuus L.; Glycine max L.; Brassica napus L

Nzigamasabo Aloys, Nimpagaritse Angeline, Traditional fermented foods and beverages in Burundi, Food Research International, Volume 42, Issues 5-6, June-July 2009, Pages 588-594, ISSN 0963-9969, DOI: 10.1016/j.foodres.2009.02.021.
(http://www.sciencedirect.com/science/article/B6T6V-4VR9FFN-1/2/45db7d30977b85dc0aa864fb5026b6ac)
Abstract:
Several traditional fermented foods and beverages are produced at the household level in Burundi. These include milk products (urubu, amateregua and amavuta), cereal and banana-based beverages (Urwarwa, Isongo, Impeke and Kanyanga) and cassava-based fermented foods (Ikivunde, Inyange, Imikembe and Ubswage). Literature on Burundian fermented foods and beverages is non-existent. Therefore, the objective of this review is to document the methods by which these Burundian foods and beverages are produced and to devise scientific means to improve their quality and optimize their production methods.
Keywords: Traditional fermented foods and beverages; Milk products; Cereal and banana-based beverages and cassava-based foods

Carlos Aguilar-Perez, Juan Ku-Vera, Fernando Centurion-Castro, Philip C. Garnsworthy, Energy balance, milk production and reproduction in grazing crossbred cows in the tropics with and without cereal supplementation, Livestock Science, Volume 122, Issues 2-3, June 2009, Pages 227-233, ISSN 1871-1413, DOI: 10.1016/j.livsci.2008.09.004.
(http://www.sciencedirect.com/science/article/B7XNX-4TKNJFC-1/2/0f901aecf6d93acfa0c30967a4241b95)
Abstract:
This study was designed to evaluate the role of supplementation with a cereal-based concentrate on energy balance, milk production and reproduction of suckling crossbred cows, grazing star grass in the tropics. Forty-eight Holstein x Zebu cows were used in a 2 x 2 factorial design from calving to 98 days post-partum. Treatment factors were diet (Control vs. Supplemented) and season of calving (dry vs. rainy). The supplement consisted of sorghum (69%), soya bean meal (14%), wheat bran (15%) and minerals (2%), contained 878 g/kg dry matter (DM), 168 g/kg DM crude protein (CP) and 11.8 MJ/kg DM metabolisable energy (ME), and was offered at 0.9% of live weight. There was no interaction between diet and season. Supplementation increased ($P < 0.001$) intakes of DM, ME and CP, and increased milk yield by 30% ($P < 0.001$). Supplementation eliminated negative energy balance (NEB) on day 21 post-calving (3.3 vs. - 22.9 MJ/day) and on day 84 post-calving (1.1 vs. - 12.1 MJ/day). The proportion of cows that showed oestrus was higher ($P = 0.025$) for Supplemented cows (74%), compared with Control cows (39%) and the proportion of cows that ovulated tended to be greater ($P = 0.073$) for Supplemented (58%) than for Control (30%) cows. Supplemented cows had a greater ($P = 0.003$) population of large ovarian follicles (0.6 vs. 0.3), shorter ($P = 0.025$) calving to first oestrus interval (62.8 +/- 6.9 days vs. 68.2 +/- 3.8 days) and tended to have ($P = 0.079$) a higher pregnancy rate at 90 days (47% vs. 22%). It is concluded that grazing crossbred cows in the tropics may experience a period of NEB post-partum, which can be reduced using cereal-based concentrates, whilst improving milk production and reproductive performance.
Keywords: Energy use; Dual-purpose; Milk yield; Reproductive performance; Concentrate

Sadur Rehman, Shad K. Khalil, Abdur Rehman, Amanullah, Amir Z. Khan, Nazir Hussain Shah, Micro-watershed enhances rain water use efficiency, phenology and productivity of wheat under

rainfed condition, Soil and Tillage Research, Volume 104, Issue 1, June 2009, Pages 82-87, ISSN 0167-1987, DOI: 10.1016/j.still.2008.12.013.
(http://www.sciencedirect.com/science/article/B6TC6-4VHXDPJ-1/2/9cb95d928b559f2e984e8536ab5a1472)
Abstract:
Wheat yield is low under rainfed condition in many countries of the world. The objective of this study was to determine whether micro-watershed treatment can improve rainfall use efficiency and yield of wheat under rainfed condition. Field trials were conducted during 2003-2004 and 2004-2005 under rainfed condition at Cereal Crops Research Institute Pirsabak, NWFP (Northwest Frontier Province) Pakistan. Five micro-watershed, raised 0.45-0.5 m above ground level, were treated with either (1) plastic sheets, (2) stones, (3) compacted soil, (4) un-compacted soil, (5) left as untreated control. The experiment was conducted according to randomized complete block (RCB) design with six replications. Micro-watershed treatments significantly affected emergence m-2, days to 50% heading, plant height, spikes m-2, grains spike-1, grain yield and rainfall use efficiency. Maximum emergence m-2 (83.1) and plant height (94.7 cm) were recorded from micro-watershed treatments covered with plastic sheet, while maximum spikes m-2 (173.8), grains spike-1 (56.0), grain yield (2394 kg ha-1) and rainfall use efficiency (6.22) were recorded from micro-watersheds treatments covered with stones. Maximum days to 50% heading (116.4) were recorded in control plots. Micro-watershed enhanced days to 50% heading (114.5). It is concluded that the stone or plastic sheet covered soil surface was the best micro-watershed treatment that improved crop yield and rainfall use efficiency.
Keywords: Micro-watershed; Rainwater use efficiency; Phenology and grain yield

G. Vuataz, V. Meunier, J.C. Andrieux, TG-DTA approach for designing reference methods for moisture content determination in food powders, Food Chemistry, In Press, Corrected Proof, Available online 31 May 2009, ISSN 0308-8146, DOI: 10.1016/j.foodchem.2009.05.066.
(http://www.sciencedirect.com/science/article/B6T6R-4WDNKVB-3/2/f07b6ac9930057f52903d044b6363b77)
Abstract:
There is no systematic procedure described in the literature to establish a robust and accurate reference method for determining the moisture content in any solid food product. In this paper, we are proposing a new approach based on simultaneous thermogravimetry and differential thermal analysis (TG-DTA), with data for several amorphous food powders that result from spray-drying, freeze-drying or extrusion. In the first step, by heating a representative sample of about 20 mg at 2 [degree sign]C/min we would detect the temperature and the mass loss at the inflection point that characterises, if there is an inflection, the end of the drying and the onset of chemical reactions. In cases of not too much sensitive products, the mass loss at the inflection may be considered as a good estimation of the moisture content. At 2 [degree sign]C/min heating rate, the inflection temperature Ti is an indicator that allows estimating the optimal isothermal drying temperature Td about 15-30 [degree sign]C below Ti, depending on the product sensitivity to heat treatments and the kinetics of water molecule diffusion through the amorphous matrix. Then, a series of three isothermal drying are performed at about Td-12 [degree sign]C, Td and Td+8 [degree sign]C, and a simple multilinear model allows calculating the best oven temperature to achieve the optimal moisture content determination in 2 h. This procedure is described and results are shown for several dehydrated food products: milk, coffee, cereal and pet food. This fast procedure may be applied either for establishing optimal oven conditions for most amorphous new products or for revising conditions that have been established in the past but are not robust enough for several ones.
Keywords: Water; Moisture; Content; Dehydration; Thermogravimetry; Oven; Methods; Milk powder; Coffee powder; Cereals; Pet food; Food powders

John J. Obrycki, James D. Harwood, Timothy J. Kring, Robert J. O'Neil, Aphidophagy by Coccinellidae: Application of biological control in agroecosystems, Biological Control, In Press, Corrected Proof, Available online 30 May 2009, ISSN 1049-9644, DOI: 10.1016/j.biocontrol.2009.05.009.
(http://www.sciencedirect.com/science/article/B6WBP-4WDGCPR-5/2/c8ead11180cc6ef93b1814bec814fae2)
Abstract:
Coccinellids and aphids interact in a wide range of agricultural and forest habitats and the value of coccinellid predation for aphid suppression in these systems varies from a minor role to significant reductions leading to within-season control. Although aphid-feeding coccinellids rarely play a role in the long-term regulation of population dynamics of aphid species within agroecosystems, they are effective predators reducing within-season densities of selected species of aphid pests. For example, conserving Coccinellidae through the presence of non-target aphid prey has resulted in reliable suppression of target aphid pests in cereal grain crops. Methods to manipulate within field-distributions of Coccinellidae have been developed (e.g., semiochemically based lures, artificial food sprays) and associations with flowering plants and extrafloral nectaries have been documented, but these components have yet to be integrated into biological control systems based on experimental assessments of the numerical, reproductive, and functional responses of these predators. A comparative discussion of the management of the cotton aphid (Aphis gossypii Glover) and the soybean aphid (Aphis glycines Matsumura) highlights the importance of documenting levels of pest mortality by coccinellids. Recently, the planting of transgenic cotton varieties has reduced insecticide use in cotton, thereby allowing predaceous Coccinellidae to be incorporated into IPM treatment decisions for A. gossypii. Detailed long-term field research was required to include coccinellid predation into economic thresholds for management of the cotton aphid. In contrast, the relatively recent pest status of the soybean aphid in North America has resulted in a series of studies showing the variation in the role of predation by Coccinellidae and other natural enemies across the aphid's North American range. Our understanding of coccinellid predation in aphid suppression will ultimately be enhanced through comprehensive behavioral studies that include manipulative laboratory experimentation, field studies and molecular techniques to analyze coccinellid feeding behavior and enhance our understanding of intercrop movement and their dispersal among crop and non-crop habitats.
Keywords: Aphid predation; Arthropod predators; Biological control; Pest management; Aphid suppression; Conservation biological control

Emmie Dornez, Kurt Gebruers, Jan A. Delcour, Christophe M. Courtin, Grain-associated xylanases: Occurrence, variability, and implications for cereal processing, Trends in Food Science & Technology, In Press, Corrected Proof, Available online 23 May 2009, ISSN 0924-2244, DOI: 10.1016/j.tifs.2009.05.004.
(http://www.sciencedirect.com/science/article/B6VHY-4WC113T-3/2/a5b47f34ff8dbc7a29c60ffa85de5a9b)
Abstract:
Xylanases (EC 3.2.1.8) hydrolyse the backbone of cereal cell wall arabinoxylans and often have a significant impact on cereal-based processes and end-products. The use of microbial xylanases as processing aids in this respect is well established and has been extensively studied. Much less research has focused on inherently present cereal-associated xylanases and their possible impact. Cereals produce xylanases for re-modeling and expansion of cereal cell walls during normal cell growth and for more drastic cell wall degradation during seed germination. Besides these endogenous xylanases, cereals also contain microbial xylanases from micro-organisms populating the outer grain kernels layers. Unfortunately, these microbial xylanases are often inhibited by wheat proteinaceous xylanase inhibitors and they hence escape standard xylanase activity measurements. It is more correct to refer to these activity levels as `apparent' xylanase activity

levels. As a result, the occurrence of cereal-associated xylanases might have been largely underestimated in the past and hence unjustly been disregarded. The levels and the types of cereal-associated xylanases differ strongly between grain species, varieties, and tissues, and are largely affected by grain growing conditions. These variations in the levels of grain-associated xylanase activity affect several cereal-based food and feed applications. This paper provides an overview of the occurrence and variability of cereal-associated xylanases and of their potential impact on bread making, shelf life of refrigerated doughs, brewing, animal feed efficiency, pasta production, and wheat gluten-starch separation.

NeBambi Lutaladio, Luigi Castaldi, Potato: The Hidden Treasure, Journal of Food Composition and Analysis, In Press, Accepted Manuscript, Available online 22 May 2009, ISSN 0889-1575, DOI: 10.1016/j.jfca.2009.05.002.
(http://www.sciencedirect.com/science/article/B6WJH-4WBT44K-2/2/d7e8034f39d00594ef31edbcf9e7611b)
Abstract:
The United Nations General Assembly decided in December 2005 to declare 2008 as the International Year of the Potato (IYP). Potato is the world's number one non-grain food commodity, with production reaching a record 320 million tonnes in 2007 (FAO, 2007). Consumption is expanding steadily in the developing countries, where potato is an increasingly important source of food, employment and income. Global interest in the potato has increased sharply in 2008 as world food prices soared, threatening the food security and stability of dozens of low-income countries. Unlike major cereals, the potato is not a globally traded commodity and prices are usually determined by local production costs. Increasingly, therefore, the potato is being seen as a vital food-security crop and as a substitute for costly cereal imports.
Keywords: United Nations International Year of the Potato; Potato; Solanum tuberosum; Nutrient content; Nutrient composition; Staple crop; Food security; Food crisis; Food prices; Food analysis; Food composition

Shu Guan, Jianwei He, J. Christopher Young, Honghui Zhu, Xiu-Zhen Li, Cheng Ji, Ting Zhou, Transformation of trichothecene mycotoxins by microorganisms from fish digesta, Aquaculture, Volume 290, Issues 3-4, 19 May 2009, Pages 290-295, ISSN 0044-8486, DOI: 10.1016/j.aquaculture.2009.02.037.
(http://www.sciencedirect.com/science/article/B6T4D-4VRX644-2/2/fd714064f621231c961e5025664210f9)
Abstract:
Trichothecene mycotoxins are commonly found in cereals worldwide and bring significant threats to the food industry and animal production. The aim of this research was to search for microbes from fish guts capable of transforming trichothecenes into less toxic compounds. Digesta of 62 fishes from nine species were screened for their ability to transform 4-deoxynivalenol (DON). Liquid chromatography-mass spectrometry was used to determine the reduction of DON concentrations and structures of DON-transformation products. The microbial community from one catfish Ameiurus nebulosus, namely microbial culture C133, completely transformed DON to deepoxy DON (dE-DON) at 15 [degree sign]C in full medium after 96 h incubation. Various media and culture conditions were tested to evaluate their effect on DON transformation. Microbial culture C133 maintained high transformation ability over a broad range of temperatures from 4 to 25 [degree sign]C and pH values from 4.5 to 10.4. The transformation of DON to dE-DON was enhanced in a rich medium such as full medium, nutrient broth and corn meal broth. Microbial culture C133 was then tested for its ability to transform other trichothecene mycotoxins; most of the toxins were transformed to deacetyl and/or deepoxy products. This is the first report on trichothecene transformation by microbes from the intestinal tract of fish.

Keywords: Ameriurus nebulosus; Catfish; Microbial culture; Trichothecene; Mycotoxin; Transformation

Aleida J. Sandoval, Martin Nunez, Alejandro J. Muller, Guy Della Valle, Denis Lourdin, Glass transition temperatures of a ready to eat breakfast cereal formulation and its main components determined by DSC and DMTA, Carbohydrate Polymers, Volume 76, Issue 4, 16 May 2009, Pages 528-534, ISSN 0144-8617, DOI: 10.1016/j.carbpol.2008.11.019.
(http://www.sciencedirect.com/science/article/B6TFD-4TYYSXB-2/2/3b50e3d119668f01be67f36885b7e20e)
Abstract:
The effect of water content on the glass transition temperatures of a ready to eat cereal formulation was determined, as well as for its major components, oat flour, rice flour and an oat-rice flour blend, in the same ratio as they are present in the formulation. All samples were compression moulded at high temperature and were moisture conditioned in a 10-22% interval (dry basis). Glass transition temperatures (Tg) were measured by differential scanning calorimetry (DSC) and the main mechanical relaxation temperatures (T[alpha]), measured by dynamic mechanical thermal analysis (DMTA). The relaxation temperatures taken at tan [delta] peaks, were found 20-30 [degree sign]C larger than Tg. Besides the plasticizing effect of water adequately described by the Gordon-Taylor equation, no differences of Tg (and T[alpha]) values between the major components were obtained at a constant moisture content. The Tg and T[alpha] values of the RTE formulation were found to be about 30 [degree sign]C lower than its components, a result which was attributed to the plasticizing effect of the minor components in the formulation (sugar and malt extract).
Keywords: DMTA; DSC; Starch; Oat flour; Rice flour; RTE breakfast formulation

Christopher N Rhodes, Karl Heaton, Ian Goodall, Paul A Brereton, Gas chromatography carbon isotope ratio mass spectrometry applied to the detection of neutral alcohol in Scotch whisky: an internal reference approach, Food Chemistry, Volume 114, Issue 2, 15 May 2009, Pages 697-701, ISSN 0308-8146, DOI: 10.1016/j.foodchem.2008.09.059.
(http://www.sciencedirect.com/science/article/B6T6R-4TJTXC6-4/2/9cfd6c74a06e950a8dc56268a7c6c579)
Abstract:
Ethanol and the volatile congeners of Scotch whisky have been analysed by GC-combustion stable isotope ratio mass spectrometry (GC-C-IRMS). Ethanol, propan-1-ol, 2-methylpropan-1-ol and methylbutan-1-ol (2- and 3-methylbutan-1-ol) have been separated using gas chromatography and their ratios of stable isotopes of carbon (13C/12C) determined by combustion isotope ratio mass spectrometry. The internal isotopic correlations for the ethanol and the congeners from the same sample were determined. A close and reproducible correlation was found for 13C/12C ratios of propan-1-ol and ethanol in authentic whisky samples and is the basis for determining the addition of neutral alcohol to whisky. Initial studies suggest that the method has the ability to detect the addition of neutral alcohol, depending on the cereal source of the whisky and neutral alcohol concerned, without the need for reference to databases.
Keywords: Authentication; Stable isotope; Carbon; Whisky

I. Giannenas, P. Nisianakis, A. Gavriil, G. Kontopidis, I. Kyriazakis, Trace mineral content of conventional, organic and courtyard eggs analysed by inductively coupled plasma mass spectrometry (ICP-MS), Food Chemistry, Volume 114, Issue 2, 15 May 2009, Pages 706-711, ISSN 0308-8146, DOI: 10.1016/j.foodchem.2008.09.079.
(http://www.sciencedirect.com/science/article/B6T6R-4TJX1W5-B/2/426953dadb69f9f939eb41547fc76969)
Abstract:

We investigated the contents in yolk and albumen of the trace minerals Se, Zn, Mn, Co, Cu, Mo, V, Cr, Ni, Tl, As and Cd in eggs from hens from three husbandry systems by ICP-MS. Conventional hens were given a commercial feed with added minerals, organic hens were given a feed based on organic feedstuffs also with added minerals, and courtyard hens were fed on cereals, legumes, grass and swill. Dietary Se, Zn, Mn, Co and Cu concentrations were lower in courtyard compared to conventional and organic diets; Cr concentration was highest in courtyard compared to organic diet. Trace element contents in yolks were higher than those in albumen. The highest content of Se in yolks was in organic, followed by conventional eggs. Zn contents were highest in courtyard yolk, followed by conventional, which in turn was higher than organic. Mn yolk contents were lowest in courtyard eggs; Cr contents were highest in courtyard eggs. The differences in albumen were in Zn and Cr values, which were highest in courtyard eggs. [Tau]he results provide baseline measurements of trace mineral contents of eggs and suggest measurable differences amongst eggs from hens in different husbandry systems; the physiological significance of these differences are discussed.
Keywords: Trace elements; ICP-MS; Egg; Hen; Conventional; Organic; Courtyard

N.L. Tatsadjieu, A. Yaouba, E.N. Nukenine, M.B. Ngassoum, C.M.F. Mbofung, Comparative study of the simultaneous action of three essential oils on Aspergillus flavus and Sitophilus zeamais Motsch, Food Control, In Press, Corrected Proof, Available online 10 May 2009, ISSN 0956-7135, DOI: 10.1016/j.foodcont.2009.05.004.
(http://www.sciencedirect.com/science/article/B6T6S-4W85MBV-2/2/4ee698378897cfa51631e47fb2f94fa6)
Abstract:
Maize is among the most important produced and consumed crops in Cameroon. However, the availability of this cereal is limited by post-harvest losses, especially in the course of storage. Therefore, there is an urgent need to overcome this phenomenon through the use of efficient, cheap methods. To this effect, the simultaneous action of three essential oils, obtained by hydrodistillation from leaves of Ocimum gratissimum and Lippia rugosa and fruits of Xylopia aethiopica, on Aspergillus flavus and Sitophilus zeamais was investigated using a 24 factorial design. The three essential oils and the storage time were considered as factors. The results revealed that low volume (60 [mu]l/200 g grain) for O. gratissimum and high volume for L. rugosa (310 [mu]l/200 g grain) and X. aethiopica (250 [mu]l/200 g grain) showed the most important efficiencies against A. flavus and S. zeamais in a 2 weeks storage. Hence, the rate of mortality for S. zeamais was 92% and 89%, respectively, in samples of maize infested by S. zeamais and samples of maize infested by S. zeamais and A. flavus. Ninety five percent of A. flavus conidia were inhibited in samples of maize infested by A. flavus and samples of maize infested by S. zeamais and A. flavus.
Keywords: Experimental design; Essential oil; Aspergillus flavus; Sitophilus zeamais

A. Zinedine, J. Blesa, N. Mahnine, A. El Abidi, D. Montesano, J. Manes, Pressurized liquid extraction coupled to liquid chromatography for the analysis of ochratoxin A in breakfast and infants cereals from Morocco, Food Control, In Press, Corrected Proof, Available online 4 May 2009, ISSN 0956-7135, DOI: 10.1016/j.foodcont.2009.04.009.
(http://www.sciencedirect.com/science/article/B6T6S-4W6Y5GR-2/2/03c45c9ddd20c0e519f48493743f4c9c)
Abstract:
A sensitive and reliable method using pressurized liquid extraction (PLE) and liquid chromatography (LC) has been developed for the analysis of ochratoxin A (OTA) in breakfast and infants cereals. Influence of several extraction solvents that affect PLE efficiency was studied. The selected PLE operating method was: 10 g of sample was packed into 22 ml stainless-steel cell and OTA was extracted with acetonitrile/water (80:20) at 40 [degree sign]C, 34 atm in one cycle of 5

min at 60% flush. The mean recovery of OTA was 82 +/- 4 at fortification level of 3 ng/g OTA. The limit of quantification (LOQ) of OTA was 0.25 ng/g. The proposed method was successfully applied to the analysis of 68 samples of breakfast and infants cereals products collected from different supermarkets and pharmacies in Rabat. Results showed that all analyzed infant cereals were free of OTA contamination. However, four samples of breakfast cereals were contaminated with OTA. Levels of OTA in positive samples ranged between 5.1 and 224.6 ng/g. All positive samples (5.8% of total samples) were above the maximum level set by EU regulations for OTA in cereal derivatives products.
Keywords: Ochratoxin A; Pressurized liquid extraction (PLE); LC; Infant cereals; Breakfast cereals

Hwa-Jung Lee, Hyun-Joo Ahn, Chan-Soon Kang, Jae-Chun Choi, Hee-Ju Choi, Kwang-Geun Lee, Jae-In Kim, Hee-Yun Kim, Naturally occurring propionic acid in foods marketed in South Korea, Food Control, In Press, Corrected Proof, Available online 4 May 2009, ISSN 0956-7135, DOI: 10.1016/j.foodcont.2009.04.006.
(http://www.sciencedirect.com/science/article/B6T6S-4W6Y344-2/2/c3ec102bae23f3426236bf45b186b34d)
Abstract:
Propionic acid levels in fermented products, non-fermented products and foodstuffs, and medicinal herbs were analyzed total 263 samples retailed in Korean market. Propionic acid was detected in some Korean traditional fermented products such as salted and fermented fish sauce, Chunggukjang and salted and fermented fish. A small amount of propionic acid was also detected in fermented soybean paste, soy sauce, seasoned soybean paste, vinegar and fermented milk. Significantly, propionic acid in vinegar showed high levels among fermented products ($P<0.05$). Among non-fermented products and foodstuffs, propionic acid in shellfish showed high level, while propionic acid was not detected in cereal and sauce. A statistically significant difference was shown in propionic acid levels of shellfish. propionic acid in brackish water clam showed significantly higher levels than that of others. Ark shell and scallop also showed high levels in propionic acid. Among 10 kinds of medicinal herbs, propionic acid was detected in 3 samples (Lycium chinensis Miller, Astragali radix and Atractylodes rhizoma).
Keywords: Propionic acid; Fermentation; Korean traditional fermented foods; Medicinal herb

N.-O. Bertholdsson, A. Kolodinska Brantestam, A century of Nordic barley breeding--Effects on early vigour root and shoot growth, straw length, harvest index and grain weight, European Journal of Agronomy, Volume 30, Issue 4, May 2009, Pages 266-274, ISSN 1161-0301, DOI: 10.1016/j.eja.2008.12.003.
(http://www.sciencedirect.com/science/article/B6T67-4VF4YYH-1/2/999a386b35e0e5d48ba207b9e4e52053)
Abstract:
In cereals early vigour has been identified as an important trait affecting drought tolerance, nutrient uptake, weed competitive ability and yield. To further study how this trait has changed following years of barley (Hordeum vulgare L.) breeding for improved yield, landraces and cultivars from Sweden and Denmark were analysed for seedling root and shoot growth in hydroponics. The Swedish and Danish materials, 35 and 39 cultivars, respectively, represented the gene pool used during one hundred years of barley breeding. Besides seedling growth characteristics, straw length, harvest index and 1000-grain weight were studied in field trials over two years in Sweden, Norway and Latvia. From 1890 to 2005 straw length has decreased from 110 cm to 60-70 cm and harvest index has improved from 0.42 to 0.55, with highly significant linear relationships with year of introduction ($r = -0.87$ and $r = 0.89$, $p < 0.001$, for straw length and HI, respectively). Other traits like 1000-grain weight, heading and maturity date have been less affected. Seedling root weight has also decreased by 33.9 and 25% in Swedish and Danish germplasms, respectively. The decrease in shoot weight is similar to that of the root biomass. Seedling root length (longest

seminal root) has decreased by about 10%, while specific root length (mm root mg-1 root dry matter) has increased by 28.6 and 19.0% in Swedish and Danish cultivars, respectively, indicating the development of finer roots in modern cultivars. There are indications that during recent years the deceasing trends have been broken by the introduction of new high yielding cultivars with improved seedling growth. In line with this there are also significant positive relationships between both seminal root length ($r = 0.60$-0.84, $p < 0.05$-0.001) and root weight ($r = 0.62$-0.78, $p < 0.05$-0.001) and grain yield from official variety trials carried out in Sweden in 1995-1999 and in Sweden and Denmark in 1999-2005. Reasons for the previously decreasing trends and the new trend in modern cultivars are discussed as well as the possibility of using hydroponics for selection.
Keywords: Early vigour; Root growth; Shoot growth; Seedlings; Hydroponics; Breeding; Barley

Jose A. Rufian-Henares, Cristina Delgado-Andrade, Francisco J. Morales, 'Assessing the Maillard reaction development during the toasting process of common flours employed by the cereal products industry', Food Chemistry, Volume 114, Issue 1, 1 May 2009, Pages 93-99, ISSN 0308-8146, DOI: 10.1016/j.foodchem.2008.09.021.
(http://www.sciencedirect.com/science/article/B6T6R-4TFM7M6-3/2/5efec73eb5149c684ac20cd36a92cd21)
Abstract:
The present paper aimed to study the development of the Maillard reaction during the drying-toasting step of different flours usually employed for the formulation of cereal-based products. The results state the idea that a great part of hydroxymethylfurfural (HMF) and furfural found in cereal-based products are supplied by the rest of the ingredients composing these foods and not from the toasting of the flours employed. Moreover, a high furfural generation was associated to the fibre-enrichment of whole wheat flour. Glucosylisomaltol (GIM) measurement could be established as a useful indicator for controlling the manufacture conditions of cereal-based products, if significant amounts of maltose are present. Furosine determination is suitable for flours with either low or high reactivity due to its inherent sensibility to thermal treatment but, in extremely reactive flours like soybean, HMF shows better application. Finally, the [Delta]E parameter resulted in a reliable measurement of the visible colour production for the toasting step of the flours studied.
Keywords: Maillard reaction; Cereal-based products; Hydroxymethylfurfural; Glucosylisomaltol; Furfural; Furosine; Colour

Polixeni Villa, Panagiota Markaki, Aflatoxin B1 and ochratoxin A in breakfast cereals from athens market: Occurrence and risk assessment, Food Control, Volume 20, Issue 5, May 2009, Pages 455-461, ISSN 0956-7135, DOI: 10.1016/j.foodcont.2008.07.012.
(http://www.sciencedirect.com/science/article/B6T6S-4T193YX-1/2/37663c44f1efa0ae04491314edefbc12)
Abstract:
A method for aflatoxin B1 (AFB1) and ochratoxin A (OTA) determination in breakfast cereals is described using a simultaneous methanolic-aqueous extraction followed by immunoaffinity columns clean-up step and High Pressure Liquid Chromatography (HPLC) with Fluorescence Detector (FD). Recoveries were found to be 78% and 83% for AFB1 and OTA, respectively, while the detection limit (DL) was 0.02 ng g-1 for both mycotoxins. Both determinations were applied in fifty five samples of breakfast cereals purchased from Athens market. Results revealed the presence of AFB1 in 56.3% of the samples examined (mean 1.42 ng AFB1 g-1). Seven samples (median 3.5 ng AFB1 g-1) were found to be contaminated at levels higher than the EU limit (2 g g-1). OTA was detected in 60% of the samples (mean 0.18 ng g-1). Nineteen samples were found to be contaminated by both mycotoxins. In addition in the present study the daily exposure to AFB1 and OTA is discussed.
Keywords: Aflatoxin B1; Ochratoxin A; breakfast cereals; HPLC

G. Madhavi Latha, G. Muralikrishna, Effect of finger millet (Eleusine coracana, Indaf-15) malt esterases on the functional characteristics of non-starch polysaccharides, Food Hydrocolloids, Volume 23, Issue 3, May 2009, Pages 1007-1014, ISSN 0268-005X, DOI: 10.1016/j.foodhyd.2008.07.021.
(http://www.sciencedirect.com/science/article/B6VP9-4T4XRDY-2/2/9be5971f3a4711ab1a7940b275b7e93d)
Abstract:
Acetic acid esterase (AAE) (E.C 3.1.1.6) and ferulic acid esterase (FAE) (E.C 3.1.1.73) cleaves the acetyl groups substituted at O-2/O-3 of the xylan backbone and feruloyl groups substituted at 5'-OH group of arabinosyl residues, respectively of arabinoxylans. These enzymes modulate the functional properties of cereal arabinoxylans such as viscosity, foam stabilization and gelling. In the present study, water-soluble non-starch polysaccharides (WSPs) from ragi, wheat flours were isolated, and their functional characteristics were studied in the presence of purified esterases. Relative viscosities of the enzyme treated WSPs were marginally less than the untreated ones. Untreated WSPs from wheat and ragi were found to stabilize the thermal disruption of protein foams compared to the esterase treated ones. AAE treated WSPs of wheat and ragi showed increased gelation while FAE treated ones showed slight decrease in comparison with their respective controls. Xanthan gum (XG), which was deacetylated by purified AAE, showed improved gelation (ratio of relative viscosities for 0, 1 and 2 h of control and enzyme treated blend is 1:1.16, 1:1.35 and 1:1.20, respectively) when blended with locust bean gum (LBG).
Keywords: Finger millet; Acetic acid esterase; Ferulic acid esterase; Water-soluble polysaccharides

Edith K. Huttner, Fabio Dal Bello, Kaisa Poutanen, Elke K. Arendt, Fundamental evaluation of the impact of high Hydrostatic Pressure on oat batters, Journal of Cereal Science, Volume 49, Issue 3, May 2009, Pages 363-370, ISSN 0733-5210, DOI: 10.1016/j.jcs.2008.12.005.
(http://www.sciencedirect.com/science/article/B6WHK-4VC7DWP-2/2/e067f5310b7e21a6d8fa63eb4db3135f)
Abstract:
The use of grains alternative to wheat or rye is a challenging task for cereal technologists, and currently new technologies are under investigation as tools to improve the performances of these alternative grains. In this work the effects of high Hydrostatic Pressure (HP) on oat batters were investigated. Oat batters were treated for 10 min at 200, 300, 350, 400 or 500 MPa. Scanning electron microscopy and bright field microscopy showed that high HP significantly affected oat batter microstructure, and both starch and proteins were affected. Treatment at high HP significantly improved batter viscosity and elasticity. At pressures <=300 MPa the increase in the viscous component was higher than the increase in the elastic component. On the contrary, at pressures >=350 MPa the elastic component was predominant. Differential scanning calorimetry revealed that high HP induced starch gelatinisation, which started at 300 MPa and was almost complete after treatment at 500 MPa. High HP also affected water- and salt-soluble as well as urea-soluble oat proteins. Analysis of proteins soluble in different buffers revealed that pressures >=300 MPa induced the formation of urea-insoluble complexes and/or disulfide bonds. Overall, the extent of starch gelatinisation and protein modification was dependent on the applied pressure, but the results collected so far clearly show that high HP can be used to improve the functionality of oat batters.
Keywords: Oats; High Hydrostatic Pressure; Starch gelatinisation; Disulfide bonds

Frederic Auger, Marie-Helene Morel, Muriel Dewilde, Andreas Redl, Mixing history affects gluten protein recovery, purity, and glutenin re-assembly capacity from optimally developed flour-water batters, Journal of Cereal Science, Volume 49, Issue 3, May 2009, Pages 405-412, ISSN 0733-5210, DOI: 10.1016/j.jcs.2009.01.008.

(http://www.sciencedirect.com/science/article/B6WHK-4VRP24J-2/2/0ac9b91160792c87ae162f7c23f792b1)
Abstract:
Batters, from three wheat cultivars, were mixed up to their maximal consistency (tpeak) at different mixing speeds (N) and flour/water ratios [Auger, F., Morel, M.H., Lefebvre, J., Dewilde, M., Redl, A., 2008. A parametric and microstructural study of the formation of gluten network in mixed flour-water batter. Journal of Cereal Science 48, 349-358]. Gluten and starch were extracted from those batters using a process which included two successive steps: dilution and sieving. In order to reveal the specific influence of the mixing step, a standardized gentle washing and sieving procedure was selected. Mixing the batters at tpeak guaranteed a high and stable gluten protein recovery (ca. 82%) irrespective of mixing conditions. SE-HPLC analysis of protein, from flours and batters sampled at tpeak, demonstrated that mixing led to the almost total breakdown of the unextractable glutenin polymers (ca. 80%), whereas their re-assembly occurred during gluten extraction. The extent of glutenin re-assembly in gluten was influenced by the batter mixing history and was mainly related to the number of mixing rotations (N.tpeak). Gluten protein contents were also found related to N.tpeak. We proposed that the leaching of starch from the batter during gluten extraction was controlled by the elasticity of the protein network, i.e. the gluten content in unextractable glutenin. An innovating scheme relating the glutenin re-assembly capacity to the irreversible thiol protein oxidation is proposed.
Keywords: Batter; Mixing process; Glutenin polymer; Wet gluten/starch separation; Disulfur bonds

Brenda Bustillos, Joseph R. Sharkey, Jenna Anding, Alex McIntosh, Availability of More Healthful Food Alternatives in Traditional, Convenience, and Nontraditional Types of Food Stores in Two Rural Texas Counties, Journal of the American Dietetic Association, Volume 109, Issue 5, May 2009, Pages 883-889, ISSN 0002-8223, DOI: 10.1016/j.jada.2009.02.011.
(http://www.sciencedirect.com/science/article/B758G-4W4MCPR-R/2/9aad9c1fd76227e98eefccf8c7dab246)
Abstract:
Limited research has focused on the availability of more healthful food alternatives in traditional food stores (supermarkets and grocery stores) in rural areas. Current market trends suggest that food items may be available for purchase in stores other than traditional food stores. An observational survey was developed and used on-site to document the availability and variety of fruit and vegetables (fresh, canned, and frozen), meats (meat, poultry, fish, and eggs), dairy (milk, yogurt, and cheese), and grains (whole grains and refined grains) in all traditional food stores, convenience stores, and nontraditional food stores (dollar stores and mass merchandisers) in two rural Texas counties. Descriptive statistics and t tests identified that although the widest selection of more healthful food items was available in supermarkets, not all supermarkets carried all items. Grocery stores carried less variety of fresh fruits (8+/-0.7 vs 4.7+/-0.3; $P<0.01$) and vegetables (10.7+/-0.2 vs 6+/-0; $P<0.001$) than supermarkets. Fresh fruits and vegetables were not readily available in convenience or nontraditional food stores. Among convenience and nontraditional food stores, 'dollar' stores offered the best variety of more healthful canned fruits and vegetables, whole-wheat bread, and whole-grain cereal. Mass merchandisers and dollar stores offered a greater variety of more healthful types of canned tuna and poultry, reduced-fat and skim milk, and low-fat tortillas. In these rural counties, traditional food stores offered greater availability of more healthful food choices across food groups. More healthful food choices in canned fruits and vegetables, canned meat and fish, milk, and grains were also available in dollar stores, mass merchandisers, and convenience stores. Results suggest that a complete understanding of the food environment, especially in rural areas, requires knowledge of the availability and variety of healthful food in all types of stores that are accessible to families.

Arto Huuskonen, The effect of cereal type (barley versus oats) and rapeseed meal supplementation on the performance of growing and finishing dairy bulls offered grass silage-based diets, Livestock Science, Volume 122, Issue 1, May 2009, Pages 53-62, ISSN 1871-1413, DOI: 10.1016/j.livsci.2008.07.023.
(http://www.sciencedirect.com/science/article/B7XNX-4T893KG-1/2/32d4a88d5b499942d85aae7ed19a578d)
Abstract:
A 3 x 2 factorial design with growing dairy bulls offered a grass silage-based diets was used to study the effects on animal performance of (1) cereal type (flattened barley versus flattened oats) and (2) inclusion of rapeseed meal (RSM) in the diet. Two feeding trials comprised a total of 42 Finnish Ayrshire and 18 Holstein-Friesian bulls. The animals were housed in a tie-up barn and fed individually. All bulls were offered grass silage (686 g digestible organic matter in kg dry matter (DM)) ad libitum. The target for average concentrate level during the experiment was 400 g/kg DM for all treatments. Three cereal feeding treatments were flattened barley, flattened barley + flattened oats (1:1 on DM basis) and flattened oats, fed either without RSM (RSM-) or with RSM (RSM+). In the RSM- diets the crude protein (CP) content of the concentrate was 132 g/kg DM. Rapeseed meal was given so that the CP content of the concentrate was raised to 160 g/kg DM in the RSM+ diets, which increased the CP content 21% with RSM supplementation. The mean initial live weight (LW) of the bulls was 257 +/- 26.6 kg and the mean final LW 687 +/- 30.9 kg. Increasing the proportion of oats in the diet decreased the live weight gain (LWG) ($P < 0.05$). Linearly impaired LWG was a consequence of decreased metabolizable energy intake ($P < 0.05$) with increasing oats proportion. Because there was no difference in DM intake, also feed conversion efficiency (kg DM/kg LWG) reduced ($P < 0.05$) with increasing oats proportion. There were no effects of treatments on the dressing proportion, carcass conformation score or carcass fat score. The RSM supplement had no effect on performance parameters, and there were no significant cereal type x RSM interactions for any of the measured parameters. In conclusion, the LWG and feed conversion of growing dairy bulls reduced with increasing oats proportion. Since rapeseed meal did not affect animal performance, there is no reason to use RSM for finishing dairy bulls when they are fed good-quality grass silage and grain-based concentrate.
Keywords: Beef production; Dairy bulls; Supplementary protein; Concentrate supplementation

Johanna Wallsten, Elisabet Nadeau, Jan Bertilsson, Kjell Martinsson, Voluntary intake and diet selection by dairy heifers fed ensiled whole-crop barley and oats harvested at different stages of maturity, Livestock Science, Volume 122, Issue 1, May 2009, Pages 94-98, ISSN 1871-1413, DOI: 10.1016/j.livsci.2008.07.031.
(http://www.sciencedirect.com/science/article/B7XNX-4THB4N5-1/2/4c20a2f506580f02208d62ace97af8ed)
Abstract:
This study evaluated feed intake and diet selection of dairy heifers fed whole-crop cereal silage made from oats and six-rowed barley harvested at the heading, early milk and early dough stages, and two-rowed barley harvested at the early milk and early dough stages of maturity. The silages were fed ad libitum to 32 Swedish Red dairy heifers, during three 17-day periods. The oat silage harvested at the early dough stage resulted in a higher dry-matter intake (DMI; 1.92 kg/100 kg live weight (LW)) and a higher organic matter intake (OMI; 1.73 kg/100 kg LW) than the oat silage harvested at the heading stage (DMI = 1.57 kg/100 kg LW; OMI = 1.37 kg/100 kg LW). The DMI, OMI and NDFI of six-rowed barley silage were higher when harvested at the heading stage (2.08, 1.80 and 1.06 kg/100 kg LW) than when harvested at the early milk (1.74, 1.48 and 0.76 kg/100 kg LW) and early dough stages (1.62, 1.46 and 0.70 kg/100 kg LW). The DMI, OMI and NDFI were higher for six-rowed barley than for oat silage harvested at heading, whereas feeding oat silage resulted in a higher NDFI than six-rowed barley silage when harvested at the early dough stage. Reduced intake of barley silage harvested at the early dough stage probably was due to the

presence of barbed awns, whilst reduced intake of the early harvested oat silage was most likely due to a low DM content and a high content of fermentation products. When fed oat or two-rowed barley silage harvested at the early dough stage, the heifers selected fractions low in NDF. This indicates that heifers are likely to feed selectively when fed whole-crop cereal silages prepared from crops harvested at the early dough stage.
Keywords: Avena sativa; Hordeum vulgare; Whole-crop cereal silage; Intake; Diet selection

Qian-Feng Li, Gui-Yun Zhang, Zhi-Wei Dong, Heng-Xiu Yu, Ming-Hong Gu, Samuel S.M. Sun, Qiao-Quan Liu, Characterization of expression of the OsPUL gene encoding a pullulanase-type debranching enzyme during seed development and germination in rice, Plant Physiology and Biochemistry, Volume 47, Issue 5, May 2009, Pages 351-358, ISSN 0981-9428, DOI: 10.1016/j.plaphy.2009.02.001.
(http://www.sciencedirect.com/science/article/B6VRD-4VKP3VP-2/2/f10dc0a451702da2b9c1eb81232dc67a)
Abstract:
Starch-debranching enzymes (DBEs) are key enzymes involved in starch metabolism in cereals, having a dual function, in both starch synthesis and degradation. However, their precise roles in this pathway, particularly their expression profiles, remain unclear. In the present study, we performed a quantitative real-time PCR (Q-PCR) analysis of the expression pattern of the OsPUL gene encoding a pullulanase-type DBE in different tissues as well as in seeds at different developmental stages. The results showed that this gene was expressed only in seeds. In addition, the 1177-bp OsPUL promoter sequence was cloned, and some endosperm-specific motifs such as the GCN4 and AACA motifs were observed to exist in this region. The promoter was then fused with the GUS reporter gene and its expression was carefully investigated in transgenic rice. The data from both histochemical and fluorometric analyses showed that the OsPUL promoter was capable of driving the target gene to have a high level of endosperm-specific expression. The OsPUL gene maintained a relatively high expression level during the entire period of seed development, and peaked in the middle and late stages. This observation was very consistent with that of the endogenous transcription analysis by Q-PCR. Furthermore, the seed germination experiment showed that the OsPUL promoter actively functions in the late stage of seed germination. The expression of the OsPUL gene was maintained at a significant level during the entire grain filling period and in the late stage of seed germination, which coincided with its involvement in starch anabolism and catabolism.
Keywords: Rice (Oryza sativa L.); Pullulanase-type starch-debranching enzyme; Promoter analysis; Endosperm-specific expression; Real-time PCR; GUS activity

O. Piquer, L. Rodenas, C. Casado, E. Blas, J.J. Pascual, Whole citrus fruits as an alternative to wheat grain or citrus pulp in sheep diet: Effect on the evolution of ruminal parameters, Small Ruminant Research, Volume 83, Issues 1-3, May 2009, Pages 14-21, ISSN 0921-4488, DOI: 10.1016/j.smallrumres.2008.11.009.
(http://www.sciencedirect.com/science/article/B6TC5-4W5VDBV-1/2/80902629ee3089e3ade7df77b86be929)
Abstract:
Five ruminally fistulated Manchega ewes were fed twice daily (0900 and 1500 h) with five experimental diets in a 5 x 5 Latin square design to determine the effect of the diets on ruminal parameters. The diets were control based on wheat grain (0WCF), three diets in which whole citrus fruits (WCF) replaced wheat grain at 13% (13WCF), 26% (26WCF) and 39% (39WCF), and one diet with 26% of citrus pulp (26CP) replacing wheat grain. After 10 days of adaptation, the rumen pH, volatile fatty acids (VFA) and NH3-N of the experimental animal were measured at 0, 2, 4, 6, 8, 10 and 12 h after the first feeding.

The 39WCF diet ingestion was significantly lower than that of the other four diets. Ruminal pH increased linearly with the inclusion of WCF (+0.05 per 10%), although it was similar 2 h after meals, while VFA concentration decreased (-2.31 mmol/l per 10%), especially 4 h after the meals. Ruminal NH3-N concentration decreased with the inclusion of WCF (-0.61 mmol/l per 10%), especially during the first 5 h as of the first meal.
The acetate proportion increased from 0.61 to 0.66 mmol/mmol, while propionate proportion reduced from 0.20 to 0.18 mmol/mol when dietary WCF was increased from 0% to 39%. Also acetate:propionate ratio increased linearly from 3.2 to 4.1, while butyrate proportion decreased linearly from 0.15 to 0.11 mmol/mmol. The concentration of i-butyrate and i-valerate also decreased while that of valerate and caproate increased.
Main ruminal parameters for 26WCF and 26CP diets were similar. However, ruminal concentrations of NH3-N and molar proportion of butyrate and caproate were significantly lower when the animals received the 26CP diet (-1.1, -0.021 and -0.003 mmol/l, respectively).
Highly degradable citrus carbohydrates could be used as an alternative to cereal starch to cover the energy requirements of ewes, and did not seem to suppose a risk, as even a higher ruminal pH was maintained throughout the day. The fermentative behaviour of WCF was similar to that of CP, although higher butyrate and NH3-N production was observed.
Keywords: Ammonia; Carbohydrate; Citrus fruit; pH; Ruminant; Sheep; VFA; Wheat

Pierre-Antoine Gilbert, Anne Vanasse, Denis A. Angers, Harrowing for weed control: Impacts on mineral nitrogen dynamics, soil aggregation and wheat production, Soil and Tillage Research, Volume 103, Issue 2, Contains papers from HighLand 2006: Land Degradation and Soil and Water Conservation in Tropical Highlands, Mekelle, Ethiopia, 21-25 September 2006, May 2009, Pages 373-380, ISSN 0167-1987, DOI: 10.1016/j.still.2008.12.001.
(http://www.sciencedirect.com/science/article/B6TC6-4VF0XP3-1/2/9bf82f1477f9958332de4570d4dee155)
Abstract:
Tillage with a spring tine harrow has become a recommended mechanical weeding technique for cereal crops. In this study, the impact of its use on soil mineral N content, soil aggregation and spring wheat (Triticum aestivum L.) production was investigated. The experiment was performed during 2 successive years (2005-2006) on a clay loam and on a silty loam. The two-main plot treatments consisted of a wheat crop subjected or not to intensive harrow use in a weed-free production system. Two N fertilizer treatments (mineral fertilizer and dry granular poultry manure) were also included as subplots within these main treatments and compared to a non-fertilized control. Harrowing had significant and variable effects on soil NO3- contents in the 0-5 cm soil layer. Slightly higher NO3- contents (average difference of 3.2 kg NO3- ha-1) were measured in the harrowed treatments than in the undisturbed plots in the clay loam soil in 2006. However, significantly lower mineral N contents were observed in the harrowed treatments than in the undisturbed plots in the clay loam soil in 2005 and in the silty loam soil in 2006. This apparent N immobilization amounted to 19 kg NO3- ha-1 in the clay loam soil in 2005 (for both fertilizers) and 30 kg NO3- ha-1 in the silty loam soil in 2006 (only in mineral fertilizer plots) after the successive harrowing treatments. In all cases, data of the last sampling dates in the fall indicated that residual NO3- content was not affected by the treatments. Overall harrowing had a minor decreasing and transient effect on the mean weight diameter (MWD) of soil aggregates while the dry poultry manure tended to increase MWD. The harrowing treatment had no significant effect on wheat, grain N uptake and yield. In conclusion, harrow use had variable impacts on soil NO3- content and a minor decreasing effect on the MWD of soil aggregates. Of note, significant apparent mineral N immobilization was observed on a few sampling dates following the harrow treatments.
Keywords: Mechanical weed control; Spring tine harrow; N immobilization; Organic fertilizer; Soil aggregation; Wheat

A.K. Bakken, L.O. Brandsaeter, R. Eltun, S. Hansen, K. Mangerud, R. Pommeresche, H. Riley, Effect of tractor weight, depth of ploughing and wheel placement during ploughing in an organic cereal rotation on contrasting soils, Soil and Tillage Research, Volume 103, Issue 2, Contains papers from HighLand 2006: Land Degradation and Soil and Water Conservation in Tropical Highlands, Mekelle, Ethiopia, 21-25 September 2006, May 2009, Pages 433-441, ISSN 0167-1987, DOI: 10.1016/j.still.2008.12.010.
(http://www.sciencedirect.com/science/article/B6TC6-4VFJS1N-2/2/06ba0b8304c257c2f64ea86ade107d9c)
Abstract:
The relative effects of using light (2-3 Mg) versus heavier (5-7 Mg) tractors, shallow (15 cm) versus deeper (25 cm) ploughing and on-land versus in-furrow wheel placement during ploughing were investigated from 2003 to 2006 in organic rotations (wheat or barley, green manure, oats with peas) and conventionally fertilized barley. Trials were located on loam soil in south-eastern Norway and silty clay loam in central Norway. Ploughing was performed in spring, when the topsoil moisture content was at or below field capacity, using single furrow ploughs that allowed alternative wheel placement and resulted in complete coverage of the surface by wheels each year (ca. 3 times the normal coverage during ploughing). Low tyre inflation pressures (<=80 kPa) were used throughout. The use of a heavy tractor increased topsoil bulk density slightly in the loam soil, and, in combination with in-furrow wheeling, it reduced air-filled pore space and air permeability at 18-22 cm. On the silty clay loam, the use of a heavy tractor did not increase bulk density, but it reduced air-filled pore space throughout the topsoil. In-furrow wheeling reduced air-filled pore space in this soil also, compared to on-land wheeling. Penetration resistance was in this soil always greater at 15-25 cm depth after shallow than after deep ploughing, especially with in-furrow rather than on-land wheeling. Shallow ploughing led on both soils to marked increases in perennial weed biomass compared to deep ploughing. Earthworms were hardly affected by the treatments, but in the loam in 2006 a higher number of individuals were found where the light rather than the heavy tractor had been used. Few significant treatment effects were found on grain yield and quality. Deep ploughing with a light tractor gave the highest wheat yield and protein content in 2 years on the loam soil, and on the silty clay loam the yield of conventionally fertilized barley was higher after deep than after shallow ploughing. In summary, limited evidence was found to support the use of on-land rather than in-furrow wheeling when ploughing is performed at favourable soil moisture and with tractor weights < 5 Mg. There is, however, reason to be wary of using heavy tractors (>5 Mg), even under such conditions. With regard to ploughing depth in organic rotations dominated by cereals, the need to combat perennial weeds by deep ploughing weighs probably more heavily than any possible beneficial effect of shallow ploughing on stimulating nutrient turnover.
Keywords: Earthworm; On-land ploughing; Penetration resistance; Perennial weed; Soil compaction

Ian Hodge, Mark Reader, The introduction of Entry Level Stewardship in England: Extension or dilution in agri-environment policy?, Land Use Policy, In Press, Corrected Proof, Available online 26 April 2009, ISSN 0264-8377, DOI: 10.1016/j.landusepol.2009.03.005.
(http://www.sciencedirect.com/science/article/B6VB0-4W55T55-1/2/54ada0a013c0bb155d39d2b060bc1fc5)
Abstract:
Agri-environment schemes were introduced in the mid-1980s. Their primary objectives have developed from initially aiming to hold back intensification towards stimulating environmental enhancement. The introduction of Entry Level Stewardship (ELS) in England represents a third stage in seeking to extend the coverage of schemes across the majority of agricultural land. This aims to influence land use along the whole of the intensive margin. The ELS offers a wide range of options for which farmers are awarded points. Selection of options equivalent to 30 points per ha

in lowland areas entitles farmers to a payment of [pound sign]30 per ha. By September 2007, 4.4 million ha had been entered into the scheme, equivalent to 47% of the agricultural area. From amongst the options on offer, 34% of points were for boundary options, 20% for intensive grass options, 16% for management plans and 13% for options taking arable land out of production. The choice of options varies across the country with a higher proportion of the agricultural area entered in the East. Entry into the scheme is associated with total agricultural area, cereals farming, larger farms, a lower proportion of area in Environmentally Sensitive Area and Countryside Stewardship schemes and grazing livestock numbers. While the ELS has introduced a large number of new entrants into agri-environment schemes, the extent of the environmental impact is uncertain. Given the large number of options available, it is likely that farmers will have chosen options that involve relatively little change and incur limited cost. At the same time, it would be surprising if the environmental gains were of the types most valued within local areas. The ELS approach implies that public goods provided from agricultural land should be paid for irrespective of what would have happened in the absence of the scheme. While this may be a fairer approach, it may also undermine the idea of land stewardship and imply that payments will continue to be required in the long term in order to sustain provision. The ELS does establish a framework within which incentives could be targeted to deliver specific benefits within particular contexts and suggestions are made as to how policy might be developed for this.
Keywords: Agri-environment schemes; Entry Level Stewardship; Rural environmental policy; England Rural Development Programme; Common Agricultural Policy; Agricultural land

Eveline S.C. Stilma, Karel J. Keesman, Wopke van der Werf, Recruitment and attrition of associated plants under a shading crop canopy: Model selection and calibration, Ecological Modelling, Volume 220, Issue 8, 24 April 2009, Pages 1113-1125, ISSN 0304-3800, DOI: 10.1016/j.ecolmodel.2009.01.015.
(http://www.sciencedirect.com/science/article/B6VBS-4VTC8WY-1/2/3a36482d30a8f9b20166f9d849322b2d)
Abstract:
Associated plant and animal diversity provides ecosystem services within crop production systems. The importance of the maintenance or restoration of diversity is therefore increasingly acknowledged. Here we study the population dynamics of associated annual plants (`weeds') during the growth of a crop in a season and introduce a minimal model to characterize the recruitment and attrition of the associated plants under the influence of shading by the crop. A mechanistically based, logistic, light interception model was parameterized with light interception measurements in two single crops (barley and rye) and in mixtures of these cereals with peas. Population dynamics data were collected for the annuals Papaver rhoeas, Centaurea cyanus, Chrysanthemum segetum, and Misopates orontium. A minimal population dynamics model was identified for each annual plant species, using system identification techniques as model selection and calibration.
For three of the four species, a two-parameter model consisting of light-dependent recruitment in combination with a constant death rate, explained 75-96% of the variation in plant densities over the season. Model fit for P. rhoeas improved when a germination delay of 200 [degree sign]Cd after sowing was included, resulting in a three-parameter model. The developed models have a simple yet biologically meaningful structure and the values of the parameters give a useful summary of the population dynamics of an annual plant population under the influence of the dynamic leaf cover of a shading crop. Further development of these models can contribute to systems design for maintaining plant diversity in crop systems.
Keywords: System identification; Model calibration; Minimal model; Population dynamics; Crop weeds; Plant recruitment; Attrition

C.W. Bamforth, Current perspectives on the role of enzymes in brewing, Journal of Cereal Science, In Press, Corrected Proof, Available online 17 April 2009, ISSN 0733-5210, DOI: 10.1016/j.jcs.2009.03.001.
(http://www.sciencedirect.com/science/article/B6WHK-4W38RG8-4/2/d5d83ecf9ec2c57de082ddd814e608d8)
Abstract:
The brewing of beer is a very traditional process, based upon a complex endogenous enzymology occurring during the malting of grain, mashing of grist and fermentation. The relevant cereal-derived enzymes that are involved are reviewed. It is likely that the production of alcoholic beverages in breweries in the projected future will assume different paradigms, procedures which are already realistic for the production of flavoured alcoholic beverages (malternatives) and 'near-beer' drinks (happoshu and other beer-like beverages) in Japan. A range of exogenous enzymes--such as glucanases, acetolactate decarboxylase and prolyl endopeptidase--are available for enhancement of the existing brewing process.
Keywords: Beer; Enzymes; New paradigms

Rikard Landberg, Annica A.M. Andersson, Per Aman, Afaf Kamal-Eldin, Comparison of GC and colorimetry for the determination of alkylresorcinol homologues in cereal grains and products, Food Chemistry, Volume 113, Issue 4, 15 April 2009, Pages 1363-1369, ISSN 0308-8146, DOI: 10.1016/j.foodchem.2008.08.072.
(http://www.sciencedirect.com/science/article/B6T6R-4TBGF0S-9/2/6fd21c005a9655752ecaacc427e32005)
Abstract:
Cereal alkylresorcinols (ARs), a group of phenolic lipids mainly found in the outer parts of wheat and rye kernels, are currently being studied for possible use as biomarkers of intake of whole grain wheat and rye foods. Several different techniques have been used for quantitative AR analysis over the years, but with limited attempts to compare them. In this present study, two commonly used methods, gas chromatography and colorimetry, were evaluated and compared. Gas chromatographic and the colorimetric methods showed good agreement. The GC-method provides the total amount of AR and relative homologue composition, whereas the colorimetric method, which is based on azo-coupling of a Fast Blue salt to the hydroxyl group(s) in the alkylresorcinol molecule, only provides the total amount, but is much faster and does only requires a UV-spectrophotometer.
Keywords: Alkylresorcinols; AR; Cereals; Wheat; Rye; Barley; Analysis; Gas chromatography; Colorimetry

Diana L.D. Lima, Sergio M. Santos, Heinrich W. Scherer, Rudolf J. Schneider, Armando C. Duarte, Eduarda B.H. Santos, Valdemar I. Esteves, Effects of organic and inorganic amendments on soil organic matter properties, Geoderma, Volume 150, Issues 1-2, 15 April 2009, Pages 38-45, ISSN 0016-7061, DOI: 10.1016/j.geoderma.2009.01.009.
(http://www.sciencedirect.com/science/article/B6V67-4VJJWF2-1/2/a14b62fcccf5d822a28cbcf69cbddf96)
Abstract:
The aim of this work was to investigate the effects of long-term application of different organic fertilizers (sewage sludge, farmyard manure, compost) as compared to mineral fertilizer on the structure of the soil organic matter. Capillary electrophoresis was employed for the quantification of monosaccharides and phenolic compounds, whereas NMR and FT-IR were used for the overall characterization of the soils organic matter. Application of farmyard manure results in a higher content of organic matter derived from angiosperms, suggested by the higher levels of syringic and vanillic phenols. Spectroscopic studies show an increase of lignin and lignin-like products in the organic matter of the soil, which may be derived from the cereal straw supplied with farmyard

manure. According to spectroscopic analysis, 13C CPMAS-NMR and FT-IR spectra, higher contents of methylene groups (- CH2) from proteins and protein-like compounds, as well as higher levels of carbohydrates, were found in the soil supplied with compost. The monosaccharide (rhamnose, xylose, glucose, mannose, arabinose, fucose and galactose) content was not significantly influenced by the different organic fertilizers, suggesting that the type of amendment used does not affect any of these six studied monomers. Comparing the three organic amendments the most significant differences were observed after long-term application of farmyard manure, with an increase in lignin and lignin-like products in the soil organic matter, and compost, which appears to contribute to an increase of protein and protein-like, as well as carbohydrates content on soil organic matter. The knowledge of such changes can be essential to understand the sorption and bioavailability of pollutants, as well as establish/unestablish ways to recycling organic residues as organic fertilizers.
Keywords: Soil amendment; Organic matter characterization; Phenols; Monosaccharide; CZE; FT-IR; 13C NMR

Isabel Miralles, Raul Ortega, Gonzalo Almendros, Manuel Sanchez-Maranon, Miguel Soriano, Soil quality and organic carbon ratios in mountain agroecosystems of South-east Spain, Geoderma, Volume 150, Issues 1-2, 15 April 2009, Pages 120-128, ISSN 0016-7061, DOI: 10.1016/j.geoderma.2009.01.011.
(http://www.sciencedirect.com/science/article/B6V67-4VP1734-1/2/8e0602a3af0f66b5a382749bd3cb54c1)
Abstract:
Soil physical and chemical characteristics as well as climatic and geomorphological factors have been determined in 68 sites of a mountain calcimorphic ecosystem (Sierra Maria-Los Velez Natural Park, Almeria) in Southeastern Spain. Land use and vegetation were natural pine forest, evergreen oak forest, reforested pine forest of different ages, bush, juniper forest, and olive, almond and cereal crops under conventional tillage. By using multivariate data treatments, 17 soil variables were processed. A large part of the total variability was controlled by local topographical features through their effect on moisture retention and vegetation. Most characteristics were significantly correlated with total organic C (mean = 28.5 +/- 4.6 g kg- 1), which demonstrates the central role of the organic matter in the functioning of the whole ecosystem. New soil quality descriptors consisting of ratios to soil organic carbon were obtained, informing about the specific activity (per C unit) or performance of the organic matter, independently of its total content. When soil data are directly processed by using principal component analysis, we found a set of high quality soils under natural and old reforested forests, where environmental services provided by soil depend on the high levels of quality descriptors related to organic carbon, e.g. cation exchange capacity (CEC), total porosity, or aggregate stability. When variables such as CEC, porosity and aggregate stability are calculated as ratios to the total organic carbon, a new classification pattern is obtained, allowing to detect soils with organic matter of high maturity which in general do not coincide with soils with high organic matter content. The results suggest the assessment of soil quality based on ratios informing on the organic matter performance should be emphasized as an alternative to direct descriptors based on the total organic carbon content.
Keywords: Forest soils; Cleared soils; Physico-chemical indicators; Aggregate stability/C; Porosity/C; Topographic attributes

Stephanie A. Vogelmann, Michael Seitter, Ulrike Singer, Markus J. Brandt, Christian Hertel, Adaptability of lactic acid bacteria and yeasts to sourdoughs prepared from cereals, pseudocereals and cassava and use of competitive strains as starters, International Journal of Food Microbiology, Volume 130, Issue 3, 15 April 2009, Pages 205-212, ISSN 0168-1605, DOI: 10.1016/j.ijfoodmicro.2009.01.020.

(http://www.sciencedirect.com/science/article/B6T7K-4VGPGS6-1/2/8255e3e8a1d8d0df8de6699616c89be6)
Abstract:
The adaptability of lactic acid bacteria (LAB) and yeasts to sourdoughs prepared from cereals, pseudocereals and cassava was investigated using PCR-DGGE and bacteriological culture combined with rRNA gene sequence analysis. Sourdoughs were prepared either from flours of the cereals wheat, rye, oat, barley, rice, maize, and millet, or from the pseudocereals amaranth, quinoa, and buckwheat, or from cassava, using a starter consisting of various species of LAB and yeasts. Doughs were propagated until a stable microbiota was established. The dominant LAB and yeast species were Lactobacillus fermentum, Lactobacillus helveticus, Lactobacillus paralimentarius, Lactobacillus plantarum, Lactobacillus pontis, Lactobacillus spicheri, Issatchenkia orientalis and Saccharomyces cerevisiae. The proportion of the species within the microbiota varied. L. paralimentarius dominated in the pseudocereal sourdoughs, L. fermentum, L. plantarum and L. spicheri in the cassava sourdough, and L. fermentum, L. helveticus and L. pontis in the cereal sourdoughs. S. cerevisiae constituted the dominating yeast, except for quinoa sourdough, where I. orientalis also reached similar counts, and buckwheat and oat sourdoughs, where no yeasts could be detected. To assess the usefulness of competitive LAB and yeasts as starters, the fermentations were repeated using flours from rice, maize, millet and the pseudocereals, and by starting the dough fermentation with selected dominant strains. At the end of fermentation, most of starter strains belonged to the dominating microbiota. For the rice, millet and quinoa sourdoughs the species composition was similar to that of the prior fermentation, whereas in the other sourdoughs, the composition differed.
Keywords: Sourdough; Cereals; Pseudocereals; Cassava; Lactic acid bacteria; Yeasts

T. Kulik, M. Jestoi, Quantification of Fusarium poae DNA and associated mycotoxins in asymptomatically contaminated wheat, International Journal of Food Microbiology, Volume 130, Issue 3, 15 April 2009, Pages 233-237, ISSN 0168-1605, DOI: 10.1016/j.ijfoodmicro.2009.01.036.
(http://www.sciencedirect.com/science/article/B6T7K-4VJ4WHG-3/2/c16be2c2c8b58ee27e198384bbb68d5d)
Abstract:
Recent surveys have identified increased predominance of Fusarium poae causing FHB (Fusarium Head Blight) of wheat in Europe. Several studies revealed a correlation between levels of F. poae DNA and nivalenol (NIV) and enniatins (ENNs) in highly contaminated cereal grain. In this study, F. poae specific TaqMan assays and mycotoxin analysis were performed on 48 asymptomatically contaminated wheat grain samples obtained from six different locations in northern Poland in 2006 and 2007. TaqMan assays revealed the presence of F. poae DNA in all samples analyzed, however the amounts of target DNA between the samples differed. Mycotoxin analysis revealed the presence of 13 toxins in the grain analyzed, however only ENN B and B1 were detected at quantifiable concentrations. A significant positive correlation was revealed between F. poae DNA (R = 0.75) and monthly mean rainfalls recorded in May (a month before wheat anthesis) in both years. Additionally, a significant positive correlation was found between levels of ENN B+B1 (R = 0.49) and rainfalls in May, however, no correlation was found between the quantity F. poae DNA and the level of ENN B+B1. This paper confirms the increasing importance of F. poae in the FHB complex of wheat in Poland.
Keywords: Fusarium poae; TaqMan assay; Wheat; Enniatins

L.T. Songre-Ouattara, C. Mouquet-Rivier, C. Icard-Verniere, I. Rochette, B. Diawara, J.P. Guyot, Potential of amylolytic lactic acid bacteria to replace the use of malt for partial starch hydrolysis to produce African fermented pearl millet gruel fortified with groundnut, International Journal of Food Microbiology, Volume 130, Issue 3, 15 April 2009, Pages 258-264, ISSN 0168-1605, DOI: 10.1016/j.ijfoodmicro.2009.02.002.

(http://www.sciencedirect.com/science/article/B6T7K-4VJBTHY-2/2/93642345c4e38068ba0fba760cbf323b)
Abstract:
Fermentation and starch hydrolysis of a pre-cooked pearl millet-groundnut (MG) slurry inoculated with amylolytic lactic acid bacteria (ALAB) or by back slopping was investigated as a substitute for the addition of malt to prepare infant gruels. The ALAB collection strain Lb. plantarum A6, and the endogenous microflora provided by back slopping were more efficient in acidifying and partially hydrolysing starch in the MG slurry than Lb. plantarum 6.1, isolated from the traditional process in Burkina Faso. Large amounts of maltotriose and maltotetraose accumulated in slurry fermented by strain A6. No accumulation of maltose was observed, which could be an advantage to prevent the growth of microbial contaminants such as yeasts. Starch hydrolysis in the MG slurry inoculated with strain A6 or by back slopping enabled preparation of high-energy density gruels (84.7 +/- 4.4 and 80.4 +/- 23.8 kcal/100 g of gruel, respectively) of liquid consistency. However variability was higher with back slopping.
Keywords: Cereal fermentation; Lactic acid bacteria; Amylase; Starter culture; Complementary food; Energy density

I. Rosenfeld, D. Austbo, Digestion of cereals in the equine gastrointestinal tract measured by the mobile bag technique on caecally cannulated horses, Animal Feed Science and Technology, Volume 150, Issues 3-4, 14 April 2009, Pages 249-258, ISSN 0377-8401, DOI: 10.1016/j.anifeedsci.2008.09.002.
(http://www.sciencedirect.com/science/article/B6T42-4TTDYVN-1/2/dc553c961a64949c9f37d3b2d88d64b8)
Abstract:
The mobile bags procedure was used to measure the disappearance of starch and proteins in the precaecal as well as in the total intestinal tract of four caecally cannulated horses. Experimental grains were oats, barley and maize, each in four different forms: ground, pelleted, extruded and micronized. The horses had 16 to 20 mobile nylon bags containing one of the experimental cereals intubated through a nasogastric tube together with the morning meal. Some of the bags were captured with a magnet through the caecal cannula and analysed for contents of starch and protein. The remaining bags were captured from the faeces and underwent the same analysis, and the digestibilities in the different parts of the gastrointestinal (GI) tract were calculated. Oats had a high degree of starch digestibility (0.949 precaecally and 0.990 totally), considerably higher ($P<0.05$) than barley (0.705 precaecally and 0.960 totally) and maize (0.663 precaecally and 0.910 totally). However, oats had a higher precaecal digestibility of protein ($P<0.10$), but a lower total tract digestibility than the other grains ($P<0.01$). The high-temperature treated cereals (extruded and micronized) had a higher total tract digestibility of protein than the untreated cereals ($P<0.01$). The pelleted and micronized cereals had the highest precaecal digestibility of protein. Differences in digestibility should be considered when formulating rations for the athletic horse.
Keywords: Feed technological treatment; Horse; Mobile bag; Precaecal digestion; Protein; Starch

Johan Patring, Margareta Wandel, Margaretha Jagerstad, Wenche Frolich, ORA Folate content of Norwegian and Swedish flours and bread analysed by use of liquid chromatography-mass spectrometry, Journal of Food Composition and Analysis, In Press, Accepted Manuscript, Available online 14 April 2009, ISSN 0889-1575, DOI: 10.1016/j.jfca.2009.02.007.
(http://www.sciencedirect.com/science/article/B6WJH-4W2NDPC-2/2/e3376d987264b43d829b4afb3f19e0cb)
Abstract:
Liquid chromatography-mass spectrometry (LC-MS) was used to determine folate profiles for various flours and bread from Norway and Sweden. The following ranges in total folate (expressed in [mu]g folic acid equivalents/100 g fresh weight (FW)) were found in Norwegian/Swedish

samples: sifted wheat flour (14-20/4-7), wholegrain wheat flour (34-47/20-40), wheat bran (94/109), sifted rye flour (12-30/26-31), wholegrain rye flour (23-50/48-79), rolled oats (21/26), oat bran (27/46), soft bread (17-33/14-40), and crisp bread (40-80, all from Sweden). Generally, Norwegian sifted and wholegrain wheat flours were richer in folate compared with Swedish samples. Conversely, Swedish rye flours were richer in folate than Norwegian samples. Folate content in bread was slightly higher in Swedish samples, especially for crisp bread. The major folate forms found in cereals were 5-HCO-H4folate, 10-HCO-H4folate and 5-CH3-H4folate. A higher content of 5-CH3-H4folate was found in bread than in flour, due to yeast; indeed, 45-70% of the folate found in bread was estimated to originate from baker's yeast. Among the breads, those with the highest folate content were crisp bread made from rye and yeast. Most soft breads were moderate folate sources, even though they were baked with wholemeal flours.
Keywords: Folate; Vitamin; Flour; Bread; Cereal products; Liquid chromatography-mass spectrometry; Folate determination; Norway; Sweden; Food analysis; Food composition

Karsten von Berg, Carsten Thies, Teja Tscharntke, Stefan Scheu, Cereal aphid control by generalist predators in presence of belowground alternative prey: Complementary predation as affected by prey density, Pedobiologia, In Press, Corrected Proof, Available online 5 April 2009, ISSN 0031-4056, DOI: 10.1016/j.pedobi.2009.03.001.
(http://www.sciencedirect.com/science/article/B7CW5-4W0R22J-1/2/7b60c076ce51f8e6604c3c990adb01d8)
Abstract: Summary
Generalist predators are important antagonists of pest species in agroecosystems. Increasing populations of alternative prey through detrital subsidies is one way to foster these predators. However, alternative prey may also distract generalist predators from their prey thereby diminishing the efficiency of biological control. To develop reliable predictions for biological control, it is essential to evaluate the relative importance of generalist predators, pests, alternative prey and their respective interactions. We investigated the effects of an assemblage of generalist predators on the grain aphid Sitobion avenae in winter wheat. Treatments with 10, 100 and 1000 aphids were established inside 2 m2 sized caged plots with control and reduced density of predators. Three weeks after the experiment started, samples were taken to estimate the size of aphid populations and those of alternative prey. Three prey taxa were significantly reduced by generalist predators: the grain aphid S. avenae (Aphidina), the click beetle Adrastus pallens (Elateridae) and the springtail Isotoma viridis (Collembola). Springtails were decreased by generalist predators independent of aphid densities, indicating complementary predation of springtails and aphids. At high aphid densities, grain aphid population peaks were decreased to the threshold level of economic damage, demonstrating efficient aphid suppression by the predator community. Click beetle numbers declined only at low and medium aphid densities. The results suggest that generalist predators preferentially fed on click beetles at low and medium aphid densities and switched to aphids at high aphid densities. Early-season predators likely had the greatest influence on aphid suppression. Our results indicate that alternative prey from the belowground system forms a substantial food resource for generalist predators, suggesting that the belowground subsystem modulates predator-prey interactions above the ground.
Keywords: Agricultural ecosystems; Conservation biological control; Multitrophic interactions; Aphidina; Elateridae; Collembola

D.B.M. Ficco, C. Riefolo, G. Nicastro, V. De Simone, A.M. Di Gesu, R. Beleggia, C. Platani, L. Cattivelli, P. De Vita, Phytate and mineral elements concentration in a collection of Italian durum wheat cultivars, Field Crops Research, Volume 111, Issue 3, 3 April 2009, Pages 235-242, ISSN 0378-4290, DOI: 10.1016/j.fcr.2008.12.010.
(http://www.sciencedirect.com/science/article/B6T6M-4VH333B-1/2/6bdc3e15879fefce64109f1abd2add8a)

Abstract:
Mineral deficiencies are prevalent in human populations and the improvement of the mineral content in cereal products represents a possible strategy to increase the human mineral intake. Nevertheless, most of the inorganic phosphorus (Pi) present in mature cereal seeds (40-80%) is stored as phytate, an anti-nutritional factor that forms complexes with minerals such as Ca, Mg, Zn and Fe reducing their bioavailability. The present study was undertaken: (i) to determine the variation in phytate and mineral concentrations in the whole grains of 84 Italian durum wheat (Triticum durum Desf.) cultivars representative of old and modern germplasm; (ii) to estimate the magnitude of genotype x environment interaction effects; and (iii) to examine the interrelationships among mineral concentrations in durum wheat with the final aim to identify superior durum wheat cultivars that possess low phytate content and high concentration of mineral elements in their whole-wheat flour. The cultivars were grown in field trials during 2004-2005 at Foggia, Italy and during 2005-2006 at Foggia and Fiorenzuola d'Arda--Southern and Northern Italy. The phytate content was estimated indirectly by using a microtitre plate assay evaluating the Pi absorbance at 820 nm, while the Cu, Fe, Mn, Ca, K, Mg, Na and Zn mineral contents were determined by ICP/OES. The contents of Zn and Fe across years and locations ranged from 28.5 to 46.3 mg/kg for Zn with an average of 37.4 mg/kg and from 33.6 to 65.6 mg/kg for Fe with an average of 49.6 mg/kg. Pi grain content was between 0.46 and 0.76 mg/g showing a positive correlation with all minerals except Cu and Zn. Although breeding activity for Fe and Zn would be difficult because G x E interaction is prevalent, multi-location evaluation of germplasm collection help to identify superior genotypes to achieve this objective. The results here reported open the possibility of designing a specific breeding program for improving the nutritional value of durum wheat through the identification of parental lines with low-Pi and high minerals concentration in whole grains.
Keywords: Phytate; Phosphorus; Iron; Zinc; Durum wheat

Martin Henseler, Alexander Wirsig, Sylvia Herrmann, Tatjana Krimly, Stephan Dabbert, Modeling the impact of global change on regional agricultural land use through an activity-based non-linear programming approach, Agricultural Systems, Volume 100, Issues 1-3, April 2009, Pages 31-42, ISSN 0308-521X, DOI: 10.1016/j.agsy.2008.12.002.
(http://www.sciencedirect.com/science/article/B6T3W-4VDSJRR-1/2/8eeb26fdbb34688fe14e9829dfd80af6)
Abstract:
Assessing the impact of climate change on agriculture is a new challenge for quantitative model-based policy analysis. The impact of climate change will vary strongly across regions depending on pre-existing climatic, agronomic, and political conditions. Most of the present modeling approaches, which aim to analyze the impact of global change on agriculture, deliver aggregated results both with regard to content and spatial resolution. To deliver results with a higher spatial resolution and to produce a more detailed picture of agricultural production, the county-based agro-economic model known as ACRE-Danube was developed. The German and Austrian part of the Upper Danube basin, a study area with great diversity in agricultural landscapes and climatic conditions, was chosen for study. For the analysis, two scenarios of climatic and socio-economic change were derived. The first and more economically and globally oriented scenario, termed 'Full Liberalization,' included significant temperature increases. The second and more environmentally and regionally oriented 'Full Protection' scenario included a moderate temperature increase. Both scenarios produce different results regarding agricultural income and land use. While the developments in the Full Protection scenario are small, the Full Liberalization scenario yields extreme regional changes in agricultural income, an increase in cereal production and extensive grassland farming.
Keywords: Global change; Regional optimization model; Global change scenarios; Agricultural production

Elena Valkama, Risto Uusitalo, Kari Ylivainio, Perttu Virkajarvi, Eila Turtola, Phosphorus fertilization: A meta-analysis of 80 years of research in Finland, Agriculture, Ecosystems & Environment, Volume 130, Issues 3-4, April 2009, Pages 75-85, ISSN 0167-8809, DOI: 10.1016/j.agee.2008.12.004.
(http://www.sciencedirect.com/science/article/B6T3Y-4VF4YKB-1/2/994a21a96955c9322bdb74c17e47248b)
Abstract:
In order to integrate Finnish phosphorus (P) fertilization trials, we performed a meta-analysis on the relationship between P rates (6-100 kg ha-1) and the yield increase of agricultural crops, and studied the source of variation in yield responses (soil group, soil test P, soil pH, plant group, cereal species, productivity without P fertilization, and cultivation zone). Our database consisted of over 400 short- and long-term experiments conducted in Finland over 80 years, between 1927 and 2007. The crops studied were spring-sown barley, oats, spring and autumn-sown wheat and rye, potato, turnip, pea, and perennial grass mixtures. The experiments had been carried out all over the country, on clay, coarse-textured mineral and organic soils.
The meta-analysis demonstrated that P fertilization significantly increased crop yields (by 11%) compared to the control (fertilized with nitrogen and potassium). However, the yield response to P fertilization was highly dependent on the soil group: on clay soils it was only 5%, while on coarse-textured mineral and organic soils it was 10% and 15%, respectively. On clay and organic soils, the lowest P rates (6-15 kg ha-1, mean 13 kg ha-1) were enough to gain the maximum yield increases of cereals, while coarse-textured mineral soils needed higher P rates (16-30 kg ha-1, mean 25 kg ha-1). In the case of perennial grass mixtures, maximum yield increases were obtained in all soil groups with the lowest P rates (6-15 kg ha-1, mean 13 kg ha-1).
Yield responses to P fertilization were apparent on coarse-textured mineral and organic soils with low soil test P, measured by the acid ammonium acetate method (<10 mg PAc l-1, coarse-textured mineral; <8 mg PAc l-1, organic), or on soils with low productivity without P fertilization (<2000 kg ha-1). The responses were negligible or low on soils with medium or high soil test P (>10 mg PAc l-1, coarse-textured mineral soils; >8 mg PAc l-1, organic soils), or with medium (2000-3500 kg ha-1) or high (3500-5000 kg ha-1) productivity. On clay soils, P fertilization increased yields to the same extent regardless of soil test P level or productivity. Finally, neither soil pH (3.2-6.6) nor cultivation zone (with growth periods varying between 100 and 175 days) had any effect on yield responses in any soil group.
For cereals and perennial grass mixtures, the P rates justified by the meta-analysis were only about half of the maximum values allowed by the third Finnish Agri-Environmental Program, or those applied in practice on Finnish livestock farms. Thus excessive P application can be further markedly reduced without measurable yield decrease.
Keywords: Phosphorus; Fertilizer; Cereals; Yield; Soil test P; Meta-analysis

Martin R. Yeomans, Natalie J. Gould, Margaret Leitch, Sirous Mobini, Effects of energy density and portion size on development of acquired flavour liking and learned satiety, Appetite, Volume 52, Issue 2, April 2009, Pages 469-478, ISSN 0195-6663, DOI: 10.1016/j.appet.2008.12.010.
(http://www.sciencedirect.com/science/article/B6WB2-4V74V7N-1/2/012675d42e14576a732ed87b135677f2)
Abstract:
The concept of learned satiety (LS) suggests that associations between the sensory quality and post-ingestive effects of foods may lead to acquired control of meal-size. Although a recent study appeared to support LS since participants learned to eat more of a flavoured cereal with lower energy density (ED) after repeated experience, suggesting that they adjusted voluntary intake to ensure adequate energy was consumed, the large serving portion used in training may have lead to over-satiation. To investigate this further, groups of 12 men were assigned to one of four conditions based on the trained serving portion (150 or 300 g) and presence or absence of cues to

differentiate high and low ED versions. In the absence of sensory cues, neither mass consumed nor rated pleasantness differed between high and low ED conditions either before or after training, resulting in greater energy intake in the high ED condition. When sensory cues differentiated ED, intake increased significantly post-training in both the high ED condition trained with the small portion and low ED condition trained with the large portion, and flavour pleasantness changed similarly. Moreover hunger increased significantly after the food was tasted in both conditions where intake increased. These data provide further evidence that learning can moderate meal-size dependent on energy content, but suggest that these changes are driven by changes in flavour liking rather than LS.
Keywords: Flavour-nutrient learning; Conditioning; Flavour hedonics; Learned satiety

Clive A. Edwards, Norman Q. Arancon, Marcus Vasko-Bennett, Brandon Little, Ahmed Askar, The relative toxicity of metaldehyde and iron phosphate-based molluscicides to earthworms, Crop Protection, Volume 28, Issue 4, April 2009, Pages 289-294, ISSN 0261-2194, DOI: 10.1016/j.cropro.2008.11.009.
(http://www.sciencedirect.com/science/article/B6T5T-4V5NSSB-2/2/fec9017cbb2928a7c261b7a1ec4247d8)
Abstract:
Slugs are suppressed by cereal flour-based baits or pellets containing metaldehyde, or containing iron phosphate plus chelating agents, which are also consumed by earthworms and other invertebrates. These studies compared the effects of metaldehyde and iron phosphate alone, with those of iron phosphate plus chelating agents EDDS and EDTA, and of the chelating agents alone on earthworms.OECD artificial soil test
Earthworms (Eisenia fetida) were exposed directly to the molluscicides in artificial soil. The test chemicals were: metaldehyde; iron phosphate; ethyldiaminetetraceticacid (EDTA), ethylenediaminesuccinicacid (EDDS) and mixtures of iron phosphate and these latter two chemicals. LD50 values were more than 10,000 mg kg-1 for metaldehyde and iron phosphate, 156.5 mg kg-1 for EDTA, 145.6 mg kg-1 for EDDS, 72.2 mg kg-1 for iron phosphate/EDTA, and 83.0 mg kg-1 for iron phosphate/EDDS.Microcosm test
Four mature Lumbricus terrestris were exposed in each microcosm (15 cm diam. x 30 cm deep) to pellets containing: no active ingredient; metaldehyde (4%); iron phosphate/EDTA (1%) (Sluggo(R)); iron phosphate (3%); EDTA (3%); EDDS (3%). Metaldehyde and iron phosphate did not affect earthworm feeding, growth or mortality. Sluggo(R) decreased earthworm feeding and caused loss of weight and mortality. Earthworms consumed fewer pellets containing EDDS or EDTA and lost weight.
Keywords: Molluscicides; Earthworms; Metaldehyde; Iron phosphate; Chelating agents

B. Chauvel, J.-P. Guillemin, N. Colbach, Evolution of a herbicide-resistant population of Alopecurus myosuroides Huds. in a long-term cropping system experiment, Crop Protection, Volume 28, Issue 4, April 2009, Pages 343-349, ISSN 0261-2194, DOI: 10.1016/j.cropro.2008.11.013.
(http://www.sciencedirect.com/science/article/B6T5T-4V9YNGV-1/2/ec0a583462d5e90af8a3aeb1be46a9c3)
Abstract:
Due to heavy reliance on herbicides and a lack of cultural control measures, herbicide-resistant populations of Alopecurus myosuroides Huds. (blackgrass) appeared in the early 1990s in winter cereal rotations in France and in Europe. The aim of the present study was to analyse the effects of different cropping systems on an aryloxy-phenoxypropionate herbicide-resistant population in a field trial. Two crop rotations, one consisting exclusively of winter crops and another including spring crops, were assessed over a six-year period. The rotations were combined with different cultural practices including mouldboard ploughing, delayed sowing, and efficient herbicides for

controlling resistant plants. A. myosuroides densities decreased in all the cropping systems, but the weed management was most effective when herbicides were combined with non-chemical practices. Rotation with an alternation of spring and winter crops was the most efficient solution against A. myosuroides. Moreover, during the six years, the percentage of resistant plants in different crop rotations was estimated independently of the cropping systems. This proportion did not vary during the six years of the experiment, suggesting that the resistance gene persisted, despite the removal of selection pressure by the aryloxy-phenoxypropionate herbicides.
Keywords: Alopecurus myosuroides Huds.; Herbicide resistance; Weed management; Cultural practices; Aryloxy-phenoxyproponiate herbicides; Soil tillage

Stephanie Bolot, Michael Abrouk, Umar Masood-Quraishi, Nils Stein, Joachim Messing, Catherine Feuillet, Jerome Salse, The `inner circle' of the cereal genomes, Current Opinion in Plant Biology, Volume 12, Issue 2, Genome Studies and Molecular Genetics - Edited by Masahiro Yano and Roberto Tuberosa, April 2009, Pages 119-125, ISSN 1369-5266, DOI: 10.1016/j.pbi.2008.10.011.
(http://www.sciencedirect.com/science/article/B6VS4-4V5F020-1/2/7b7e2a396a58626af1be0094988febb9)
Abstract:
Early marker-based macrocolinearity studies between the grass genomes led to arranging their chromosomes into concentric `crop circles' of synteny blocks that initially consisted of 30 rice-independent linkage groups representing the ancestral cereal genome structure. Recently, increased marker density and genome sequencing of several cereal genomes allowed the characterization of intragenomic duplications and their integration with intergenomic colinearity data to identify paleo-duplications and propose a model for the evolution of the grass genomes from a common ancestor. On the basis of these data an `inner circle' comprising five ancestral chromosomes was defined providing a new reference for the grass chromosomes and new insights into their ancestral relationships and origin, as well as an efficient tool to design cross-genome markers for genetic studies.

Geoffrey B Fincher, Exploring the evolution of (1,3;1,4)-[beta]-d-glucans in plant cell walls: comparative genomics can help!, Current Opinion in Plant Biology, Volume 12, Issue 2, Genome Studies and Molecular Genetics - Edited by Masahiro Yano and Roberto Tuberosa, April 2009, Pages 140-147, ISSN 1369-5266, DOI: 10.1016/j.pbi.2009.01.002.
(http://www.sciencedirect.com/science/article/B6VS4-4VFHKBF-1/2/d677e487e92fe991556407b2bc690eb8)
Abstract:
A key distinguishing feature of the grasses is that their cell walls contain (1,3;1,4)-[beta]-d-glucans, which are distributed almost exclusively within the Poaceae. The identification of genes that mediate in (1,3;1,4)-[beta]-d-glucan biosynthesis has been possible through relatively recent genome sequencing programmes and comparative genomics techniques. The evolution of a single new gene appears to have been sufficient for the first synthesis of (1,3;1,4)-[beta]-d-glucans and there is compelling evidence that existing hydrolytic enzymes were adapted for the specific hydrolysis of the polysaccharide during wall turnover or degradation. Manipulation of the expression levels of genes involved in (1,3;1,4)-[beta]-d-glucan synthesis is likely to provide opportunities to enhance the value of grasses and cereals in commercial applications such as human nutrition and biofuel production.

Nathalie Gonzalez, Gerrit TS Beemster, Dirk Inze, David and Goliath: what can the tiny weed Arabidopsis teach us to improve biomass production in crops?, Current Opinion in Plant Biology, Volume 12, Issue 2, Genome Studies and Molecular Genetics - Edited by Masahiro Yano and Roberto Tuberosa, April 2009, Pages 157-164, ISSN 1369-5266, DOI: 10.1016/j.pbi.2008.11.003.

(http://www.sciencedirect.com/science/article/B6VS4-4V8D8T4-1/2/ae88268990fbdcb82e6404682e574c53)
Abstract:
In the next decades, the world market for plant-derived products is expected to expand exponentially. Not only do we rely on plants to feed the growing world population, but plants will also play a pivotal role in providing a significant part of our increasing energy demands. Whereas in the 1960s the green revolution contributed to increase plant productivity, it is expected that biotechnological advances will further boost biomass production and plant yield. To do this effectively, it will be necessary to understand how the molecular machinery that determines yield parameters operates. Although of no direct economic significance, the model plant Arabidopsis can be used to find genes and regulatory networks controlling biomass production, which, in turn, can be applied for further growth improvement in other species including cereals.

A Distelfeld, C Li, J Dubcovsky, Regulation of flowering in temperate cereals, Current Opinion in Plant Biology, Volume 12, Issue 2, Genome Studies and Molecular Genetics - Edited by Masahiro Yano and Roberto Tuberosa, April 2009, Pages 178-184, ISSN 1369-5266, DOI: 10.1016/j.pbi.2008.12.010.
(http://www.sciencedirect.com/science/article/B6VS4-4VHWB0X-1/2/e4382418e22c9c4430f76e250798ac99)
Abstract:
Long exposure to cold (vernalization) accelerates flowering in winter cereals, a process regulated by the VRN1 ([approximate]AP1), VRN2, and VRN3 ([approximate]FT) vernalization genes. Flowering during the fall is prevented by the VRN2 downregulation of VRN3 and low VRN1 transcription. Vernalization induces VRN1, which is followed by the downregulation of VRN2, thereby releasing VRN3. In the longer days of spring, photoperiod genes PPD1 and CO upregulate VRN3, which induces VRN1 above the threshold levels required for flowering initiation. VRN3 transcription is modulated through interactions involving CCT-domain proteins and HAP2/HAP3/HAP5 complexes coded by multiple genes. The vast number of HAP-CCT combinations can provide the flexibility required for integrating seasonal cues and different stress signals in the regulation of the transition to flowering.

Amanda Earnshaw, Rosemary Ann Smith, Linda Owen, How proficiency testing can improve the quality of analytical data using vitamin analysis as an example, Food Chemistry, Volume 113, Issue 3, EuroFIR Special Issue: The role of food composition data in improving quality, healthiness and safety of European diets, 1 April 2009, Pages 781-783, ISSN 0308-8146, DOI: 10.1016/j.foodchem.2008.03.008.
(http://www.sciencedirect.com/science/article/B6T6R-4S1C2RF-4/2/11030c74cf770924879a8ad835c1463c)
Abstract:
Analysis for vitamins is difficult and many factors affect data quality. Factors include the matrix, whether the vitamin is naturally present within the matrix or is added, the molecular form of the vitamin, vitamin stability and solubility. Uniformity of the vitamin within the sample is also known to affect results in addition to the methodology used.
Proficiency testing is an established quality assurance measure and is based on comparison of results of laboratories in an interlaboratory trial [Thompson, M., Ellison, S.L.R., & Wood, R. (2006). The international harmonised protocol for the proficiency testing of analytical chemistry laboratories. Pure and Applied Chemistry, 78(1), 145-196]. It highlights problems in laboratory analysis and can be used as an educational tool to help to improve data quality. FAPAS(R) proficiency tests 2139 [FAPAS(R) (2006a). FAPAS(R) proficiency test 2139: Vitamins in liquid supplement: April-June 2006. York, UK: Central Science Laboratory] and 2141 [FAPAS(R) (2006b). FAPAS(R) proficiency test 2141: Vitamins in breakfast cereal: August-September 2006.

York, UK: Central Science Laboratory] demonstrate this for the analysis of vitamin B2. From the distribution of participants' results, the lower of the two modes or sub-populations identified for the analysis of liquid vitamin supplement is thought to be due to the incomplete conversion of riboflavin-5-phosphate to riboflavin.
Keywords: Vitamin; Vitamin B2; Proficiency test; Riboflavin; Riboflavin-5-phosphate; Breakfast cereal; Liquid vitamin supplement

Abdellah Zinedine, Jordi Manes, Occurrence and legislation of mycotoxins in food and feed from Morocco, Food Control, Volume 20, Issue 4, April 2009, Pages 334-344, ISSN 0956-7135, DOI: 10.1016/j.foodcont.2008.07.002.
(http://www.sciencedirect.com/science/article/B6T6S-4SYCPR0-2/2/0910e8f288a5d9d74fd1d3dcd907a465)
Abstract:
Mycotoxins are natural food and feed contaminants, mainly produced by moulds of genera Aspergillus, Penicillium and Fusarium. The number of mycotoxins known to exert toxic effect on human and animal health is constantly increasing as well as the legislative provisions taken to control their presence in food and feed. Morocco, a North African country, surrounded by the Mediterranean Sea and Atlantic Ocean, has a climate characterized by high humidity and high temperature which favor growth of moulds. This paper gives an overview about the contamination levels and the occurrence of some mycotoxins (e.g. aflatoxins, ochratoxin A, and Fusarium toxins) in cereals, bread, milk, spices, wine, olives, poultry feeds, dried fruits and nuts; the average of contaminated samples was often above 50%. A section on mycotoxin regulations by Moroccan authorities is discussed with a comparison with international and European limits. Recent data about the contamination of foods and feed from Morocco by mycotoxins are considered in this review. Finally, the paper gives a last part with conclusions and principal prospectives and recommendations that should be undertaken by authorities and scientists during monitoring of mycotoxins in food and feed produced and/or commercialized in Morocco.
Keywords: Mycotoxin; Presence; Regulation; Food; Feed; Morocco

Radostina Manova, Rositsa Mladenova, Incidence of zearalenone and fumonisins in Bulgarian cereal production, Food Control, Volume 20, Issue 4, April 2009, Pages 362-365, ISSN 0956-7135, DOI: 10.1016/j.foodcont.2008.06.001.
(http://www.sciencedirect.com/science/article/B6T6S-4SSG4SS-1/2/688d1f538e5e42b9d1c58ded4243fc2a)
Abstract:
Ninty-one small-grain cereals (wheat, barley, maize) collected during the 2007 harvest in Bulgaria were tested for zearalenone (ZON) and fumonisins contamination. Analytical methods based on immunoaffinity clean-up and detection by liquid chromatography was used after validation. Limits of detection for ZON in different matrices were below 4.0 [mu]g/kg in barley and wheat, and slightly higher for maize (17.6 [mu]g/kg). The limit of quantification for ZON was 12 [mu]g/kg in barley and wheat, and 58.8 [mu]g/kg in maize. Recovery values ranged between 84% and 105%. The occurrence of ZON in cereals were rather low and only single incidences was found - up to 148 [mu]g/kg for maize and 36.6 [mu]g/kg for other cereals. Fumonisins in maize have showed a widespread distribution (in 94.7% of tested samples). One of the tested samples was contaminated above the established maximum limits for unprocessed maize.
Keywords: Small-grain cereals; Zearalenone; Fumonisins; Mycotoxins

Jose A. Rufian-Henares, Cristina Delgado-Andrade, Effect of digestive process on Maillard reaction indexes and antioxidant properties of breakfast cereals, Food Research International, Volume 42, Issue 3, April 2009, Pages 394-400, ISSN 0963-9969, DOI: 10.1016/j.foodres.2009.01.011.

(http://www.sciencedirect.com/science/article/B6T6V-4VDS89S-5/2/df803c2fe374c68ecc58133f44787d42)
Abstract:
Extrusion, drying and toasting are the most representative manufacturing processes suffered by breakfast cereals, conjugating thermal/moisture conditions that allow the Maillard reaction (MR) and caramelisation development, as well as the destruction of thermally labile antioxidant compounds. However, other compounds - like Amadori products and hydroxymethylfurfural (HMF) - are originated from the MR and caramelisation, showing different biological activities, as the antioxidant activity. But breakfast cereals are ingested and then affected by the digestive process, and so that the aim of this work was to analyse the effects of the digestion on the bioaccessibility of certain MR products (Amadori compound and HMF) and on the antioxidant activity of corn-based breakfast cereals, using a standardized in vitro gastrointestinal digestion. After digestion approx. 90% HMF remained soluble, but in some cases HMF distribution between soluble/insoluble fractions was higher than the initial HMF measured in the raw cereal, suggesting a release of initially bound Amadori products and its conversion to HMF during the digestion process. The Amadori compound was uniformly distributed between both fractions. The antioxidant activity of the soluble fraction was always higher than that from the raw cereal in any of the antioxidant method employed; therefore the digestion increased the solubility of the antioxidant compounds.
Keywords: Breakfast cereals; In vitro digestion; Maillard reaction; Antioxidant activity

G. Cayci, L.K. Heng, H.S. Ozturk, D. Surek, C. Kutuk, M. Saglam, Crop yield and water use efficiency in semi-arid region of Turkey, Soil and Tillage Research, Volume 103, Issue 1, April 2009, Pages 65-72, ISSN 0167-1987, DOI: 10.1016/j.still.2008.09.004.
(http://www.sciencedirect.com/science/article/B6TC6-4TW535T-2/2/80b8cf5a9bcc3c49d0f1bb61ef61862d)
Abstract:
A 2-year field experiment was carried out to assess the effects of various rotational systems on crop yield, crop water use (CWU) and water use efficiency (WUE) in a semi-arid region of Central Anatolia. Five crops (winter lentil, Lens culinaris L.; chickpea, Cicer arietinum L.; sunflower, Helianthus anuus L.; spring lentil, Lens culinaris L. and winter wheat, Triticum aestivum L.) and fallow were rotated with winter wheat. The experimental set-up involved a rotation of alternative crops (2003-2004) and wheat (2004-2005). Similarly, wheat plots in the 2003-2004 season were then planted with alternative crops in the 2004-2005 season. This experiment took place during the last 2 years of a 21-year long field experiment. Soil moisture was measured using a soil moisture neutron probe, and then soil water storage (SWS) of the plant root zone was calculated up to the depth of 90 cm using precipitation and evapotranspiration values.
In the first year, the highest SWS throughout a depth of 90 cm from sowing was determined to be in the fallow plot (171 mm), followed by winter wheat and winter lentil with 153 and 150 mm, respectively. In the second year, high SWS values were determined for winter lentil (163 mm), fallow (156 mm) and spring lentil (151 mm). The CWU of wheat changed depending on the preceding crop; the highest CWU (254 mm) was obtained in the fallow plot in the first year and in the plot of winter lentil (290 mm) in the second year. The average over 2 years showed that fallow treatment had the highest CWU, 271 mm. The highest crop yield was recorded for wheat, with an average of 2243 kg ha-1 over the 2 years in fallow, followed by spring lentil (2232 kg ha-1) and chickpea (1943 kg ha-1). These differences were not statistically significant. The highest WUE of wheat was obtained in the preceding spring lentil treatment with 9.4 kg/(ha mm-1), followed by chickpea and fallow treatments with 8.6 and 8.4 kg/(ha mm-1), respectively. On the other hand, WUE in the continuous wheat plots was the lowest, with a 2.3 kg/(ha mm-1) average over 2 years. According to the 2-year experimental results under the conditions in Central Anatolia, compared to

fallow spring lentil was the most promising crop among the alternative crops for the two-course rotation system in terms of WUE and yield.
Keywords: Soil water; Soil management; Grain yield; Water consumption; Cereals; Water use efficiency; Fallow

Lothar Mueller, Bev D. Kay, Chunsheng Hu, Yong Li, Uwe Schindler, Axel Behrendt, T. Graham Shepherd, Bruce C. Ball, Visual assessment of soil structure: Evaluation of methodologies on sites in Canada, China and Germany: Part I: Comparing visual methods and linking them with soil physical data and grain yield of cereals, Soil and Tillage Research, Volume 103, Issue 1, April 2009, Pages 178-187, ISSN 0167-1987, DOI: 10.1016/j.still.2008.12.015.
(http://www.sciencedirect.com/science/article/B6TC6-4VGMP0S-1/2/64933b3bd68a866fa73cc1615c3bfd58)
Abstract:
Visual observations of soil structure in the field offer the potential of semi-quantitative information for use in extension and monitoring. The aim of the study was to test the diagnostic value of different visual methods of soil structure assessment in relation to measurements of topsoil physical quality and yield of cereals.
Visual methods that emphasized aggregate and pore characteristics were considered and included procedures of Peerlkamp [Peerlkamp, P.K., 1967. Visual estimation of soil structure. In: de Boodt, M., de Leenherr, D.E., Frese, H., Low, A.J., Peerlkamp, P.K. (Eds.), West European Methods for Soil Structure Determination, vol. 2, no. 11. State Faculty Agric. Sci., Ghent, Belgium, pp. 216-223], Diez and Weigelt [Diez, T., Weigelt, H., 1997. Bodenstruktur erkennen und beurteilen. Anleitung zur Bodenuntersuchung mit dem Spaten. Sonderdruck diz agrarmagazin. Bayer. Landesanstalt fuer Bodenkultur und Pflanzenbau, Freising-Muenchen., 2nd ed., 16 pp.], Shepherd [Shepherd, T.G., 2000. Visual Soil Assessment. Volume 1. Field Guide for Cropping and Pastoral Grazing on Flat to Rolling Country. Horizons.mw/Landcare Research, Palmerston North, 84 pp.], Werner and Thaemert [Werner, D., Thaemert, W., 1989. Zur Diagnose des physikalischen Bodenzustandes auf Produktionsflaechen. Arch. Acker-Pflanzenbau Bodenkd., Berlin 33, 729-739], FAO [FAO, 2006. Guidelines for soil description, 4th ed. FAO, Rome, 95 pp.] and the Peerlkamp method, modified by [Ball, B.C., Batey, T., Munkholm, L.J., 2007. Field assessment of soil structural quality--a development of the Peerlkamp test. Soil Use and Management 23, 329-337]. Measurements of soil quality included soil density (DBD), strength (penetrometer resistance, vane shear strength), permeability (initial infiltration rate) and biological activity (earthworm counts). The study was conducted on sites in Canada (Elora), China (Luancheng), and Germany (Dedelow). Soils were loamy and silty textured Haplic Luvisols (Elora, Dedelow) and Haplic Cambisols (Luancheng).
Results showed that shape and size of aggregates were quickly recognizable diagnostic features of soil structure. Structure scores of most methods gave similar results after standardizing data. Measured soil physical qualities and crop yields correlated significantly with visual soil structure. Unfavourable visual structure was associated with increased dry bulk density, higher soil strength and lower infiltration rate but correlations were site-specific. Biological features like earthworm or root numbers were less reliable indicators of soil structure than aggregate characteristics.
Visual soil structure assessment is a useful diagnostic tool and may indicate soil structure states clearly. Methods should be selected according to site conditions and should include a fast method of the Peerlkamp type.
Keywords: Soil quality; Soil structure; Analysis; Method

Lothar Mueller, Bev D. Kay, Bill Deen, Chunsheng Hu, Yuming Zhang, Maren Wolff, Frank Eulenstein, Uwe Schindler, Visual assessment of soil structure: Part II. Implications of tillage, rotation and traffic on sites in Canada, China and Germany, Soil and Tillage Research, Volume 103, Issue 1, April 2009, Pages 188-196, ISSN 0167-1987, DOI: 10.1016/j.still.2008.09.010.

(http://www.sciencedirect.com/science/article/B6TC6-4V0538P-1/2/598cb36f3d5c68fe14135597f253d94e)
Abstract:
The aim of the paper was to utilize methods of visual structure assessments in conjunction with soil physical measurements for the analysis of the impact of tillage, rotation and traffic on topsoil structure. The study was conducted in long-term-experiments on the Elora rotation (ER) and Elora Landscape (EL) sites in Canada, the Luancheng (LS) site in China and the Dedelow (DT) site in Germany. Texture of soils ranged from loamy sand (DT) to sandy loam (EL, ER) to silt loam (LS), climate ranged from clearly sub-humid (LS), slightly sub-humid (DT) to humid (EL, ER). Two common variants of tillage were compared on all sites: (1) Moldboard Ploughing (MP) and (2) No-Till (NT). Within the plots, wheeltracks were analysed separately on ER and DT sites.
On ER site, different rotation variants were sampled. On EL site, large alfalfa and corn plots and the driveway in between were sampled at different slope positions. Methods of visual structure analysis of Peerlkamp, Diez and Shepherd were tested along with measurements of dry bulk density (DBD), initial infiltration rates and soil penetrometer and shear resistance. Both visual structure assessment and measurements indicated significant differences between variants of tillage and traffic on DT and ER sites. Differences between alfalfa (good structure) and corn rotation (less favourable structure) were also significant on EL and ER sites. Soils in Germany and Canada were partly compacted, under wheeltracks in particular. Most favourable topsoil structure conditions were found under MP plots, most unfavourable structure was detected under wheeeltracks and NT plots. On LS site in China (loess soil, lower weights of machinery) visual structure was overall favourable and no significant differences between tillage variants were found. However, MP plots indicated the beginning of subsoil compaction.
Crop yields confirmed differences between tillage variants. Yields of cereals were significantly higher (350-800 kg ha-1) under MP as compared with NT on ER and DT sites due to a better air capacity.
It may be concluded that (i) results of visual assessments were coincident with those of soil physical measurements and can complement them, (ii) under intensively mechanised soil management in sub-humid to humid regions, NT can lead to sub-optimum topsoil structure states, (iii) subsoil compaction is a risk of MP on all soils, and (iv) controlled traffic and the inclusion of perennials into the rotation may be advantageous for soil structure.
Keywords: Soil structure; Tillage; Method; Crop yield

B.A. Bryan, D. King, J.R. Ward, Modelling and mapping agricultural opportunity costs to guide landscape planning for natural resource management, Ecological Indicators, In Press, Corrected Proof, Available online 24 March 2009, ISSN 1470-160X, DOI: 10.1016/j.ecolind.2009.02.005.
(http://www.sciencedirect.com/science/article/B6W87-4VX9WH0-1/2/7b0edee3e7320084214fd24b63df76f6)
Abstract:
On-farm actions to better manage natural resources often involve an opportunity cost associated with foregone agricultural production. Spatial information on agricultural opportunity costs is a key indicator that has been demonstrated to increase the cost-effectiveness of environmental investment through spatial targeting. In this paper we develop a method for calculating expected profit as a more robust spatial measure of economic rent accruing from agricultural land and indicator of opportunity cost for use in landscape and planning for natural resource management. We apply this method to the Lower Murray region in southern Australia. Agricultural profit is calculated for three farming system phases (cereals, legumes, and grazing) by census zones based on agricultural statistics and cost of production information within a GIS environment. Zonal profit layers are smoothed using pycnophylactic (mass preserving) interpolation. Farming system rotations are quantified as a set of continuous spatial probability layers for each phase using a moving window kernel density technique based on existing land use data and these probability

layers are used in a weighted allocation of expected profit across the landscape. The expected profit layer provides a high spatial resolution description of opportunity costs associated with natural resource management over the Lower Murray region suitable for input into systematic landscape planning analyses. Validation of the opportunity cost layer by field survey identified both random and systematic error. Interpretation of systematic error highlighted the need to augment pycnophylactic interpolation techniques with consideration of covariates of profit such as rainfall for better estimation in areas with high profit gradients.
Keywords: GIS; Landscape planning; Conservation; Agriculture; Economics; Modelling

O. Zimonja, B. Svihus, Effects of processing of wheat or oats starch on physical pellet quality and nutritional value for broilers, Animal Feed Science and Technology, Volume 149, Issues 3-4, 16 March 2009, Pages 287-297, ISSN 0377-8401, DOI: 10.1016/j.anifeedsci.2008.06.010.
(http://www.sciencedirect.com/science/article/B6T42-4T5S4FR-2/2/b783673c9b20c579789be3749c66f818)
Abstract:
Two experiments were conducted to investigate the influence of cereal starch exposed to various processing techniques on physical pellet quality and nutritional value of the diets fed to broiler chickens. In experiment 1, diets with equal amounts of oat hulls, rapeseeds and fish meal were cold-pelleted or steam-conditioned and pelleted with or without inclusion of 200 g pure wheat starch/kg. Durability of the pellets was reduced ($p<0.05$) for the starch-containing diets compared to non-starch diets under both processing conditions. Despite a significant improvement ($p<0.05$) in pellet quality within starch containing-diets as a consequence of gelatinised starch addition, pellet durability was lower ($p<0.05$) for gelatinised starch-containing diets compared to non-starch diets. In experiment 2, wheat and de-hulled oat-based diets were cold-pelleted, steam-pelleted or extruded before being fed to broiler chickens. The extent of starch gelatinisation was higher for oat diets than for wheat diets under all processing conditions. Feed/gain was lower ($p<0.05$) and AMEn higher ($p<0.05$) for oat versus wheat diets. The increase in AMEn was also reflected in starch digestibility which was significantly higher for oats compared to wheat diets in all segments of the gastrointestinal tract. As a consequence of increased gelatinisation a significant improvement ($p<0.05$) in starch digestibility was observed for extruded wheat diets compared with either cold- or steam-pelleted wheat diets. An improved ($p<0.05$) starch digestibility due to extrusion processing was only observed at a duodenal level for oat diets.
Keywords: Gelatinisation; Cold-pelleting; Steam-pelleting; Extrusion; Starch digestibility

Larry R. Beuchat, Hoikyung Kim, Joshua B. Gurtler, Li-Chun Lin, Jee-Hoon Ryu, Glenner M. Richards, Cronobacter sakazakii in foods and factors affecting its survival, growth, and inactivation, International Journal of Food Microbiology, In Press, Corrected Proof, Available online 16 March 2009, ISSN 0168-1605, DOI: 10.1016/j.ijfoodmicro.2009.02.029.
(http://www.sciencedirect.com/science/article/B6T7K-4VVGKJN-1/2/8ef38b104fe3a4ed66a373ff3ca7779b)
Abstract:
Cronobacter sakazakii has been isolated from a wide range of environmental sources and from several foods of animal and plant origin. While infections caused by C. sakazakii have predominantly involved neonates and infants, its presence on or in foods other than powdered infant formula raises concern about the safety risks these foods pose to immunocompromised consumers. We have done a series of studies to better understand the survival and growth characteristics of C. sakazakii in infant formula, infant cereal, fresh-cut produce, and juices made from fresh produce. Over a 12-month storage period, the pathogen survived better in dried formula and cereal at low aw (0.25-0.30) than at high aw (0.69-0.82) and at 4 [degree sign]C compared to 30 [degree sign]C. C. sakazakii grows in formulas and cereals reconstituted with water or milk and held at 12-30 [degree sign]C. The composition of formulas or cereals does not markedly affect the

rate of growth. C. sakazakii grows well on fresh-cut apple, cantaloupe, watermelon, cabbage, carrot, cucumber, lettuce, and tomato at 25 [degree sign]C and in some types of produce at 12 [degree sign]C. Treatment of fresh fruits and vegetables with sanitizers such as chlorine, chlorine dioxide, and a peroxyacetic acid-based solution causes reductions of 1.6-5.4 log CFU/apple, tomato, and lettuce. Cells of C. sakazakii in biofilms formed on stainless steel and enteral feeding tubes or dried on the surface of stainless steel have increased resistance to disinfectants. Death of cells in biofilms is affected by atmospheric relative humidity. These studies have contributed to a better understanding of the behavior of C. sakazakii in and on foods and on food-contact surfaces, thereby enabling the development of more effective strategies and interventions for its control.
Keywords: Cronobacter sakazakii; Enterobacter sakazakii; Foodborne illness; Infant formula

S.M. Haefele, J.D.L.C. Siopongco, A.A. Boling, B.A.M. Bouman, T.P. Tuong, Transpiration efficiency of rice (Oryza sativa L.), Field Crops Research, Volume 111, Issues 1-2, 15 March 2009, Pages 1-10, ISSN 0378-4290, DOI: 10.1016/j.fcr.2008.09.008.
(http://www.sciencedirect.com/science/article/B6T6M-4TYXM37-1/2/f59b8f550944266ec66025a6d21fa36d)
Abstract:
Transpiration efficiency (TE), defined as the total dry matter produced per unit of water transpired, is an important crop characteristic, especially when water resources are becoming scarcer in many regions. But, in contrast to other major food crops, very little is known about the TE of rice (Oryza sativa L.) and its dynamics in relation to climatic conditions in typical rice environments. To close this knowledge gap, we characterized rice TE in several experiments with varying experimental and climatic conditions. All six experiments were pot studies conducted between 1994 and 2006 at the International Rice Research Institute, Los Banos, Philippines. Between experiments, arithmetic means of TE varied from 1.8 to 4.7 g dry matter per liter transpired, whereas linear regressions showed TE means between 2.2 and 4.0 g dry matter per liter transpired. Actual TE values were estimated to be about 10% higher because root biomass was not determined. The corresponding k-factor ranged from 1.4 to 5.1 Pa (arithmetic mean) and 1.3 to 5.0 Pa (linear regression slope), indicating a considerable effect of climatic conditions on CO2 and water vapor diffusion processes at the leaf surface. The analysis of different experimental treatments could not show a significant effect of drought treatments or variety on TE, but significant effects of soil type and water by nutrient interactions were observed. We concluded that the TE of rice is in the lower range of other small grain cereals, possibly comparable to oat. The results of this analysis can serve as a reference for further work on the TE of rice but they need to be verified in studies covering a wider range of climatic conditions and in field experiments.
Keywords: Rice; Transpiration efficiency; Vapor pressure deficit

Amelie Fagerlund, Kerstin Sunnerheim, Lena H. Dimberg, Radical-scavenging and antioxidant activity of avenanthramides, Food Chemistry, Volume 113, Issue 2, 15 March 2009, Pages 550-556, ISSN 0308-8146, DOI: 10.1016/j.foodchem.2008.07.101.
(http://www.sciencedirect.com/science/article/B6T6R-4T5JJ25-1/2/376451a54fb9567d397bf704fd8a0188)
Abstract:
Avenanthramides are amides of cinnamoyl-anthranilic acids and, among cereals, are exclusively found in oats. This study investigated the structure-antioxidant activities of 15 avenanthramides with different substitution patterns in the two aromatic rings, seven of which were new avenanthramides synthesised and characterised in this study. Radical-scavenging activity was tested as reactivity towards 1,1-diphenyl-2-picrylhydrazyl (DPPH). The activity increased with the number of radical-stabilising groups ortho to the phenolic hydroxy group. Both aromatic rings were independently important for activity, while conjugation across the amide bond was of minor importance. Antioxidant activity was determined as inhibition of linoleic acid oxidation. In contrast

to the radical-scavenging activity, antioxidant activity was observed for most avenanthramides, and also for compounds with only one hydroxy group in either of the aromatic rings. Compared with [alpha]-tocopherol, the avenanthramides protected linoleic acid from oxidation to a smaller extent initially, but the effect lasted for a longer time.
Keywords: Antioxidants; Avenanthramides; 1,1-Diphenyl-2-picrylhydrazyl; DPPH; Linoleic acid; Oats

V. Fernandez-Ibanez, A. Soldado, A. Martinez-Fernandez, B. de la Roza-Delgado, Application of near infrared spectroscopy for rapid detection of aflatoxin B1 in maize and barley as analytical quality assessment, Food Chemistry, Volume 113, Issue 2, 15 March 2009, Pages 629-634, ISSN 0308-8146, DOI: 10.1016/j.foodchem.2008.07.049.
(http://www.sciencedirect.com/science/article/B6T6R-4T2S8WH-G/2/aa7fc853b57a688ef23b549d36ec1e42)
Abstract:
The establishment of fast and non-destructive methods for the evaluation of quality and safety of raw grains is being demanded nowadays to avoid toxic substance presence. Aflatoxin B1 (AFB1) has been recognised by the International Agency of Research on Cancer as a group 1 carcinogen for animals and humans and the EU Official Journal has established action levels for AFB1 presence in all feed materials between 5 and 20 ppb. Near infrared spectroscopy (NIRS) is an excellent candidate for a rapid and low-cost method for the detection of aflatoxins in cereals. This study assesses the utility of NIRS for rapid detection of mycotoxigenic fungi as AFB1. A total of 152 samples were involved and analysed for aflatoxin content. The results of spectroscopic models developed have demonstrated that NIRS technology is an excellent alternative for fast AFB1 detection in cereals. The best predictive model to detect AFB1 in maize was obtained using standard normal variate and detrending (SNVD) as scatter correction (r2 = 0.80 and 0.82; SECV = 0.211 and 0.200 for grating and FT-NIRS instruments, respectively). In the case of barley, the best predictive model was developed using SNVD on the dispersive NIRS instrument (r2 = 0.85 and SECV = 0.176) and using spectral data as log 1/R for FT-NIRS (r2 = 0.84 and SECV = 0.183).
Keywords: Aflatoxin B1; NIRS; Cereals; Mycotoxins; Multivariate discriminant analysis

Jens Laurids Sorensen, Jesper Molgaard Mogensen, Ulf Thrane, Birgitte Andersen, Potato carrot agar with manganese as an isolation medium for Alternaria, Epicoccum and Phoma, International Journal of Food Microbiology, Volume 130, Issue 1, 15 March 2009, Pages 22-26, ISSN 0168-1605, DOI: 10.1016/j.ijfoodmicro.2008.12.029.
(http://www.sciencedirect.com/science/article/B6T7K-4V9H367-1/2/f2c7456997c45c25207428d4fe4171de)
Abstract:
A semi-selective medium for isolation of Alternaria spp., Epicoccum sp. and Phoma spp. from soil and plant samples was developed. The basal medium was a modified potato carrot agar (PCA), containing 10 g/L of potato and carrot. It is known that the target genera sporulate well on standard PCA when grown at 25 [degree sign]C with an alternating light/dark cycle consisting of 8 h of cool-white daylight followed by 16 h darkness. Addition of 1.5% MnCl2 4 H2O (w/v) inhibited most other fungi than Alternaria, Epicoccum and Phoma species when tested on pure cultures. The mycobiota of two soil samples and eight grain samples were examined using PCA-Mn and three commonly used isolation media, DRYES, DG18 and V8. On the three conventional media growth of several genera was observed with the predominant being Aspergillus, Eurotium, Fusarium, Mucor, Penicillium and Rhizopus. Of these only F. oxysporum and F. verticillioides were able to grow on PCA-Mn. Alternaria infectoria and Epicoccum nigrum were present in three cereal grain samples, but emerged to a far lower degree on the three conventional media compared to PCA-Mn. Three black spored fungi, identified as Phoma eupyrena, Paraconiothyrium minitan and one

unknown species, were isolated from the two soil samples when incubated on PCA-Mn but were absent on the three conventional media.
Keywords: Food safety; Dematiaceous hyphomycetes; PCA-Mn; Selective medium

Ulku Dilek Uysal, Elif Mine Oncu, Derya Berikten, Nese Yilmaz, Necati Baris Tuncel, Merih Kivanc, Muzaffer Tuncel, Time and temperature dependent microbiological and mycotoxin (ochratoxin-A) levels in boza, International Journal of Food Microbiology, Volume 130, Issue 1, 15 March 2009, Pages 43-48, ISSN 0168-1605, DOI: 10.1016/j.ijfoodmicro.2008.12.032.
(http://www.sciencedirect.com/science/article/B6T7K-4VBDGTT-1/2/a6f747da934bb44bfbbd70a597f05399)
Abstract:
This study describes the examination of microbiological tests and the determination of OTA in boza temperature and time dependently. Prior to the analysis, physicochemical properties of the boza samples such as moisture, total acidity as lactic acid, pH, protein amount and viscosity were investigated.
The incidence of total aerobic bacteria (TAB), lactic acid bacteria (LAB), coliforms, E.coli, Salmonella, S. aureus, B. cereus, yeast and moulds were examined. E.coli, Salmonella, S. aureus and B. cereus were not found in all boza samples. Initally, Aspergillus fumigatus; Acremonium sp.; Geotrichum candidum and Geotrichum capitatum were identified in the samples.
Certain extraction techniques such as direct injection, liquid-liquid and solid phase (SP) were tried for the OTA analysis. The most available way was found to be direct injection among them and the recovery was 70.56% +/- 9.80 (13.89 RSD). OTA amounts were determined in all boza samples utilizing an isocratic HPLC analysis with an ODS column. OTA was detected in only one sample as 3.58 [micro sign]g/kg and this amount is above the limits of European Commission Regulations. Time and temperature-dependent changes were investigated and insignificant variation was observed.
Keywords: Fungi; Bacteria; HPLC; Determination; Ochratoxin A (OTA); Boza; Cereal

M. Aubinet, C. Moureaux, B. Bodson, D. Dufranne, B. Heinesch, M. Suleau, F. Vancutsem, A. Vilret, Carbon sequestration by a crop over a 4-year sugar beet/winter wheat/seed potato/winter wheat rotation cycle, Agricultural and Forest Meteorology, Volume 149, Issues 3-4, 11 March 2009, Pages 407-418, ISSN 0168-1923, DOI: 10.1016/j.agrformet.2008.09.003.
(http://www.sciencedirect.com/science/article/B6V8W-4TVY58B-1/2/94f39877f4a46ff909c510f71534ead8)
Abstract:
A crop managed in a traditional way was monitored over a complete sugar beet/winter wheat/potato/winter wheat rotation cycle from 2004 to 2008. Eddy covariance, automatic and manual soil chamber, leaf diffusion and biomass measurements were performed continuously in order to obtain the daily and seasonal Net Ecosystem Exchange (NEE), Gross Primary Productivity (GPP), Total Ecosystem Respiration (TER), Net Primary Productivity (NPP), autotrophic respiration, heterotrophic respiration and Net Biome Production (NBP). The results showed that GPP and TER were subjected to important inter-annual variability due to differences between crops and to climate variability. A significant impact of intercrop assimilation and of some farmer interventions was also detected and quantified. Notably, the impact of ploughing was found to be limited in intensity (1-2 [mu]mol m-2 s-1) and duration (not more than 1 day). Seasonal budgets showed that, during cropping periods, the TER/GPP ratio varied between 40 and 60% and that TER was dominated mainly by the autotrophic component (65% of TER and more). Autotrophic respiration was closely related to GPP during the growth period. The whole cycle budget showed that NEE was negative and the rotation behaved as a sink of 1.59 kgC m-2 over the 4-year rotation. However, if exports are deducted from the budget, the crop became a small source of 0.22 (+/-0.14) kgC m-2. The main causes of uncertainty with these results were due to

biomass samplings and eddy covariance measurements (mainly, uncertainties about the u* threshold determination). The positive NBP also suggested that the crop soil carbon content decreased. This could be explained by the crop management, as neither farmyard manure nor slurry had been applied to the crop for more than 10 years and because cereal straw had been systematically exported for livestock. The results were also strongly influenced by the particular climatic conditions in 2007 (mild winter, and dry spring) that increased the fraction of biomass returned to the soil at the expense of harvested biomass, and therefore mitigated the source intensity. If 2007 had been a `normal' year, this intensity would have been twice as great. This suggests that, in general, the rotation behaved as a small carbon source, which accords with similar studies based on multi-year eddy covariance measurements and export assessment and with modelling or inventory studies analysing the evolution of crop soil organic carbon (SOC) on a decennial scale.
Keywords: Crop rotational cycle; Net Primary Productivity; Gross Primary Productivity; Total Ecosystem Respiration

Petr Hlavinka, Miroslav Trnka, Daniela Semeradova, Martin Dubrovsky, Zdenek Zalud, Martin Mozny, Effect of drought on yield variability of key crops in Czech Republic, Agricultural and Forest Meteorology, Volume 149, Issues 3-4, 11 March 2009, Pages 431-442, ISSN 0168-1923, DOI: 10.1016/j.agrformet.2008.09.004.
(http://www.sciencedirect.com/science/article/B6V8W-4TWSWF8-1/2/8db1f8ba790be0703721cffb01bce989)
Abstract:
The relationship between seasonal agricultural drought and detrended yields (within a period from 1961 to 2000) of selected crops was assessed in the conditions of the Czech Republic, which are to some extent representative of a wider area of Central Europe. Impact of water stress was analyzed using time series of yields for 8 crops (spring barley, winter wheat, grain maize, potato, winter rape, oats, winter rye and hay from permanent meadows) for 77 districts in the Czech Republic (average district area is 1025 km2). Relative version of Palmer's Z-index (rZ-index or rZ-i) was used as a tool for quantification of agricultural drought. The monthly values of the rZ-index for each individual district were calculated as the spatial average (only for the grids of arable land). The study showed that severe droughts (e.g., in 1981 and 2000) are linked with significant reduction in yields of the main cereals and majority of other crops through the most drought prone regions. We found a statistically significant correlation ($p <= 0.05$) between the sum of the rZ-index for the main growing period of each crop and the yield departures of spring barley within 81% (winter wheat in 57%, maize in 48%, potato in 89%, oats in 79%, winter rye in 52%, rape in 39%, hay in 79%) of the analyzed districts. This study also defined the crop-specific thresholds under which a soil moisture deficit (expressed in terms of rZ-index) leads to severe impact at the district level. This can be expressed as the sum of the monthly rZ-index during the period of high crop sensitivity to drought; for spring barley it is -5, winter wheat -5, maize -9, rape -12, winter rye -10, oat -4, potato -6 and for hay -3. The length of the sensitive period is also crop-specific and includes the months that are important for the yield formation. The results show that yields of spring barley (and spring crops in general) are significantly more affected by seasonal water stress than yields of winter crops and hay from permanent meadows. The study proved that a severe drought spell during the sensitive period of vegetative season does have a quantifiable negative effect, even within more humid regions. These results demonstrate that, at least in some areas of the CR (and probably most of Central Europe), drought is one of the key causes of interannual yield variability.
Keywords: Palmer Z-index; Soil water holding capacity

Y. Gan, R.P. Zentner, C.L. McDonald, T. Warkentin, A. Vandenberg, Adaptability of chickpea in northern high latitude areas--Maturity responses, Agricultural and Forest Meteorology, Volume

149, Issues 3-4, 11 March 2009, Pages 711-720, ISSN 0168-1923, DOI: 10.1016/j.agrformet.2008.10.026.
(http://www.sciencedirect.com/science/article/B6V8W-4V5NSST-1/2/72584fdb7dd3a1affbb9451645e26ba0)
Abstract:
Global climate warming may allow `warm-season' chickpea (Cicer arietinum L.) to be better adapted to the cool, high latitude areas of the world. Chickpea has a strong indeterminacy and continued growth of vegetative tissues during the later part of the reproduction period often delays maturity in high latitude areas. This study was conducted to determine the adaptability of chickpea and evaluate the relative importance of changing environments and optimizing crop management options in affecting crop maturity. Four cultivars were grown on barley and wheat stubble, and on summerfallow using rates of 0, 28, 64, 84, and 112 kg N ha-1 of fertilizer with and without Rhizobium inoculant at six environments in Saskatchewan, Canada, during 2004-2006. Maturity of chickpea ranged from 91 d in 2006 to 136 d in 2004. About 90% of the variation in maturity was due to environments, with the remaining variation related to cultivars, seedbed conditions, and soil fertility. The cultivars `Amit' and `CDC-Anna' matured 2-7 d earlier than `CDC-Frontier' and `CDC-Xena' averaged across diverse environments. Under cool and wet environments, chickpea grown on cereal stubble matured 7-15 d earlier than those grown on summerfallow; chickpea grown at moderate rates of N fertilizer (28-84 kg ha-1) without Rhizobium inoculant matured 15 d earlier than the crop receiving no-N fertilizer with or without inoculation. Under dry and hot environments, only marginal differences in maturity were observed among applied treatments. Our results indicate that chickpea maturity can be advanced as many as 15 days which can help minimize the risk of crop failure due to immaturity; this is achievable through the adoption of early-maturing cultivars, use of moderate rates of N fertilizer, and selection of cereal stubble as preferential seedbed. With current genotypes of chickpea, there is still considerably high risk of adapting this `warm-season' crop in northern high latitude areas because of large environmental variability, but this risk might be reduced with continued global warming.
Keywords: Cicer arietinum; Legumes; Environmental impact; Climate change; Crop maturity; Adaptability; Phenology; Cropping systems; Soil fertility

Nicola Castoldi, Luca Bechini, Integrated sustainability assessment of cropping systems with agro-ecological and economic indicators in northern Italy, European Journal of Agronomy, In Press, Corrected Proof, Available online 10 March 2009, ISSN 1161-0301, DOI: 10.1016/j.eja.2009.02.003.
(http://www.sciencedirect.com/science/article/B6T67-4VT5CRX-1/2/eb9bf63c50bf3aa3a410ae503272038c)
Abstract:
The sustainability of agricultural systems is frequently evaluated with indicators, which are synthetic variables describing complex systems. Each indicator deals with one aspect of sustainability (e.g. nutrients, pesticides, energy), and therefore the result of a complete assessment usually includes several indicator values. These values are frequently presented separately, while an integrated evaluation could benefit from the calculation of a single sustainability index. The aim of this work was to integrate 15 economic and environmental indicator values into a global sustainability index (Sg) ranging from 0 to 1.
To calculate the indicators, we used a large data set of cropping systems management for 131 fields cultivated with arable crops in northern Italy, obtained through periodic interviews with farmers over a 2-year period. The fields were chosen to represent the main cropping systems in the area (cereals and forages, on animal and cereal farms). The 15 indicators describe a large variety of sustainability aspects, i.e. the economic performance and the management of energy, nutrients, soil, and pesticides.

The indicator values were first converted into a sustainability score (Si; 0-1) applying continuous non-linear sustainability functions that use thresholds defining what is sustainable, unsustainable, or intermediate. We obtained 15 values of Si per each field, which we aggregated into Sg using indicator-specific weights provided by different stakeholders. This procedure permits not only the single indicators evaluation, but also to combine indicators for an assessment of cropping systems at field level.
Permanent meadows, due to good management of soil, pesticides and nutrients, obtained the highest Sg, even when different weights were used. Continuous rice obtained the lowest Sg (due to unsatisfactory soil management, low energy production, and high pest and weed pressure, which involved a large use of pesticides), while maize was intermediate, with good economic and energetic performance.
The methodology allows a transparent, repeatable, sound, and quantitative evaluation of sustainability of agricultural systems. It can be easily expanded by adding other indicators, and can be tailored by changing the thresholds used to calculate Si and the weights assigned by stakeholder groups.
Keywords: Fossil energy; Integrated assessment; Nutrient balances; Pesticide; Soil management; Stakeholders; Sustainability functions

D.I. Givens, D.J. Humphries, K.E. Kliem, P. Kirton, E.R. Deaville, Whole crop cereals: 1. Effect of method of harvest and preservation on chemical composition, apparent digestibility and energy value, Animal Feed Science and Technology, Volume 149, Issues 1-2, 2 March 2009, Pages 102-113, ISSN 0377-8401, DOI: 10.1016/j.anifeedsci.2008.05.007.
(http://www.sciencedirect.com/science/article/B6T42-4SY6YD4-1/2/f82d026e64b37e3f0e11e50843a236ce)
Abstract:
A total of 133 samples (53 fermented unprocessed, 18 fermented processed, 62 urea-treated processed) of whole crop wheat (WCW) and 16 samples (five fermented unprocessed, six fermented processed, five urea-treated processed) of whole crop barley (WCB) were collected from commercial farms over two consecutive years (2003/2004 and 2004/2005). Disruption of the maize grains to increase starch availability was achieved at the point of harvest by processors fitted to the forage harvesters. All samples were subjected to laboratory analysis whilst 50 of the samples (24 from Year 1, 26 from Year 2; all WCW except four WCB in Year 2) were subjected to in vivo digestibility and energy value measurements using mature wether sheep. Urea-treated WCW had higher ($P<0.05$) pH, and dry matter (DM) and crude protein contents and lower concentrations of fermentation products than fermented WCW. Starch was generally lower in fermented, unprocessed WCW and no effect of crop maturity at harvest (as indicated by DM content) on starch concentrations was seen. Urea-treated WCW had higher ($P<0.05$) in vivo digestible organic matter contents in the DM (DOMD) in Year 1 although this was not recorded in Year 2. There was a close relationship between the digestibility values of organic matter and gross energy thus aiding the use of DOMD to predict metabolisable energy (ME) content. A wide range of ME values was observed (WCW, 8.7-11.8 MJ/kg DM; WCB 7.9-11.2 MJ/kg DM) with the overall ME/DOMD ratio (ME = 0.0156 DOMD) in line with studies in other forages. There was no evidence that a separate ME/DOMD relationship was needed for WCB which is helpful for practical application. This ratio and other parameters were affected by year of harvest ($P<0.05$) highlighting the influence of environmental and other undefined factors. The variability in the composition and nutritive value of WCW and WCB highlights the need for reliable and accurate evaluation methods to be available to assess the value of these forages before they are included in diets for dairy cows.
Keywords: Whole crop wheat; Forage conservation; Chemical composition; Digestibility; Energy value

E.R. Deaville, D.J. Humphries, D.I. Givens, Whole crop cereals: 2. Prediction of apparent digestibility and energy value from in vitro digestion techniques and near infrared reflectance spectroscopy and of chemical composition by near infrared reflectance spectroscopy, Animal Feed Science and Technology, Volume 149, Issues 1-2, 2 March 2009, Pages 114-124, ISSN 0377-8401, DOI: 10.1016/j.anifeedsci.2008.05.008.
(http://www.sciencedirect.com/science/article/B6T42-4SYD9T1-1/2/bc3c83ddd0dba408bbe5f17420dedde6)
Abstract:
Samples of whole crop wheat (WCW, n = 134) and whole crop barley (WCB, n = 16) were collected from commercial farms in the UK over a 2-year period (2003/2004 and 2004/2005). Near infrared reflectance spectroscopy (NIRS) was compared with laboratory and in vitro digestibility measures to predict digestible organic matter in the dry matter (DOMD) and metabolisable energy (ME) contents measured in vivo using sheep. Spectral models using the mean spectra of two scans were compared with those using individual spectra (duplicate spectra). Overall NIRS accurately predicted the concentration of chemical components in whole crop cereals apart from crude protein, ammonia-nitrogen, water-soluble carbohydrates, fermentation acids and solubility values. In addition, the spectral models had higher prediction power for in vivo DOMD and ME than chemical components or in vitro digestion methods. Overall there was a benefit from the use of duplicate spectra rather than mean spectra and this was especially so for predicting in vivo DOMD and ME where the sample population size was smaller. The spectral models derived deal equally well with WCW and WCB and would be of considerable practical value allowing rapid determination of nutritive value of these forages before their use in diets of productive animals.
Keywords: Whole crop wheat; Whole crop barley; In vitro digestibility; In vivo digestibility; Near infrared reflectance spectroscopy; Chemical composition

Ming-wei ZHANG, Lai-zhan LAI, Bao-jian LI, Jian-wei CHI, Ling SUN, Zhong-ming PENG, Sheng-hua WU, Rui-fen ZHANG, Zhi-hong XU, Zhen-you LU, Research and Industrial Utilization of Black Cereal and Oil Crop Germplasm Resources, Agricultural Sciences in China, Volume 8, Issue 3, March 2009, Page i, ISSN 1671-2927, DOI: 10.1016/S1671-2927(09)60035-3.
(http://www.sciencedirect.com/science/article/B82XG-4VXDRCH-1/2/54900d1618b9b8f33ae5eac316bb5f43)

Erkossa Teklu, Teklewold Hailemariam, Agronomic and Economic Efficiency of Manure and Urea Fertilizers Use on Vertisols in Ethiopian Highlands, Agricultural Sciences in China, Volume 8, Issue 3, March 2009, Pages 352-360, ISSN 1671-2927, DOI: 10.1016/S1671-2927(08)60219-9.
(http://www.sciencedirect.com/science/article/B82XG-4VXDRCH-G/2/1f3df362a4784706feb214fd8e43a410)
Abstract:
Soil fertility depletion is among the major impediments to sustained agricultural productivity especially in the less developed countries because of limited application of fertilizers. Soil fertility maintenance requires a balanced application of inorganic and organic nutrient sources. This study was conducted on a Vertisol in Ethiopia to determine the optimum farm yard manure (M) and nitrogen (N) application rates for maximum return under cereal-pulse-cereal rotation system. The main and interaction effects of M and N significantly affected biomass, grain and straw yields of wheat (Triticum durum) and tef (Eragrostis tef), but the residual effect on chickpea (Cicer arietinum) was not significant. Application of 6 t M ha-1 and 30 kg N ha-1, gave the largest grain yield of both crops but a comparable result was obtained due to 3 t M ha-1 and 30 kg N ha-1. The economic analysis revealed that 6.85 t M ha-1 and 44 kg N ha-1 for wheat, and 4.53 t M ha-1 and 37 kg N ha-1 for tef were the economic optimum rates. The additional benefit obtained due to these rates was about 450 USD ha-1. Therefore, application of the economic optimum

combination of both organic and inorganic sources of nitrogen is recommended for use on cereals in the cereal-legume-cereal rotation system.
Keywords: Ethiopia; vertisol; productivity; manure; economic optimum; rotation system

David M. Amudavi, Zeyaur R. Khan, Japhether M. Wanyama, Charles A.O. Midega, Jimmy Pittchar, Ahmed Hassanali, John A. Pickett, Evaluation of farmers' field days as a dissemination tool for push-pull technology in Western Kenya, Crop Protection, Volume 28, Issue 3, March 2009, Pages 225-235, ISSN 0261-2194, DOI: 10.1016/j.cropro.2008.10.008.
(http://www.sciencedirect.com/science/article/B6T5T-4V0VBRW-2/2/4c52659f2dd4b5ad6e92a98d93f61213)
Abstract:
Our earlier study on farmers' adoption of `Push-pull' technology (PPT) for management of cereal stemborers and Striga weed showed that field days (FDs) could be effective in technology dissemination. Hence, in an effort to utilize effective and economical dissemination strategies, we undertook a detailed study in 2007 to assess their effectiveness in PPT dissemination by interviewing 1492 participants randomly selected during participation in FDs. A majority (80%) of the respondents learnt about the biology and damage caused by stemborers and Striga, how PPT works, how to implement PPT and utilize its products, among others. Consequently, over 70% of them favoured its adoption. Participation in FDs was significantly influenced by farmer's district of residence, formal education level, disposition to seek agricultural knowledge, and intensity of Striga infestation and low soil fertility. Knowledge and skills about PPT learnt by respondents, FD facilitators' knowledge and skills, logistical organization and overall FDs effectiveness significantly correlated with the odds of enhancing farmers' ability to plant and manage maize using PPT. With improved organization, FDs can overcome information and learning-related constraints to stemborer and Striga weed control, thereby increasing cereal production.
Keywords: Field days; Stemborers; Striga; `Push-pull' technology; Kenya

Chiraz Zaied, Salwa Abid, Lazhar Zorgui, Chayma Bouaziz, Salwa Chouchane, Mohamed Jomaa, Hassen BACHA, Natural occurrence of ochratoxin A in Tunisian cereals, Food Control, Volume 20, Issue 3, March 2009, Pages 218-222, ISSN 0956-7135, DOI: 10.1016/j.foodcont.2008.05.002.
(http://www.sciencedirect.com/science/article/B6T6S-4SH0XV4-1/2/8f7ca87b83e3735dcdc29af69980c430)
Abstract:
Ochratoxin A (OTA) is a mycotoxin produced by several fungal species from Aspergillus and Penicillium genera. It is widespread in food and feed and its occurrence has been reported in cereals, cereal-derived products, dried fruits and spices. This mycotoxin was implicated in several human and animal pathologies such as the Balkan Endemic Nephropathy (BEN) and the Tunisian Chronic Interstitial Nephropathy (CIN) of unknown cause. In Tunisia, a clear correlation has been established between the consumption of OTA contaminated food and the induction of specific pathologies. Thereby, OTA was detected in human blood and tissues. The aim of our study was to investigate the presence of OTA in widely consumed cereals commercialized in Tunisia. The analytical methods used in our study involved the extraction of OTA by acidified toluene, immunoaffinity (IAC) clean-up and HPLC quantification with fluorescence detection. Levels and percentages of OTA contamination in different types of cereals, 110 wheat, 103 barley, 113 sorghum and 96 rice samples, were evaluated with incidences of 38%, 40%, 38% and 28%, respectively. The average of contamination by OTA found were 55, 96, 44 and 117 [mu]g/kg, respectively, for wheat, barley, rice and sorghum. Our results showed that contamination percentages and levels in the period from 2004 to 2005 were higher then usual norms (5.0 [mu]g OTA/kg) established by the European commission in 2002. The present report is the first one ever carried out on the natural occurrence of OTA in cereals, largely consumed by the Tunisian population.

Keywords: Ochratoxin A; Cereals; Occurrence; Tunisia

Olayide S. Lawal, Starch hydroxyalkylation: Physicochemical properties and enzymatic digestibility of native and hydroxypropylated finger millet (Eleusine coracana) starch, Food Hydrocolloids, Volume 23, Issue 2, March 2009, Pages 415-425, ISSN 0268-005X, DOI: 10.1016/j.foodhyd.2008.02.013.
(http://www.sciencedirect.com/science/article/B6VP9-4S1S6N9-1/2/6b6126724dac8aa408c8432921631148)
Abstract:
Starch was isolated from finger millet (Eleusine coracana) and it was etherified with propylene oxide to produce hydroxypropylated derivative. The specific specie used in this study is African finger millet known as jeero. The yield of starch obtained from finger millet on dry weight basis was 52.4%. Progressive increases in molar substitution (MS) were observed as the volume of propylene oxide added to the reaction medium increased. The X-ray pattern of native finger millet starch conforms to the `A' diffraction pattern characteristics of cereal starches. Prominent peaks were observed at around 2[theta]=15[degree sign], 17[degree sign], 18[degree sign] and 23[degree sign] and weaker peaks at around 2[theta]=20[degree sign] and 26[degree sign]. No pronounced differences were observed between the diffractograms of native starch and the hydroxypropyl derivatives. Hydroxypropylation improved the free swelling capacities of the native starch at all temperatures studied (30-90 [degree sign]C). Turbidity of unmodified finger millet starch paste increased progressively as the days of storage increased. Turbidity reduced remarkably after hydroxypropylation and reduction in turbidity was observed as the MS of the modified starches increased. Hydroxypropylation reduced pasting temperature, increased peak viscosity but reduced setback value. In addition, hydroxypropylation reduced percentage syneresis of the unmodified starch. Retrogradation properties monitored with differential scanning calorimetry reveals that starch retrogradation reduced reasonably after hydroxypropylation. Carbon 13 NMR spectroscopy reveals that hydroxypropylation took place predominantly on carbon 6 on the anhydroglucose unit (AGU).
Keywords: Finger millet starch; Hydroxypropylation; Functional properties; NMR spectroscopy

E. Mateos, G. Ibarra-Berastegi, A. Elias, A. Barona, J.M. Gonzalez, Modeling the removal of hemicellulose from cereal straw at lab-scale using self-organizing maps followed by multiple linear regression, Food and Bioproducts Processing, Volume 87, Issue 1, March 2009, Pages 34-39, ISSN 0960-3085, DOI: 10.1016/j.fbp.2008.03.008.
(http://www.sciencedirect.com/science/article/B8JGD-4SH1J4Y-1/2/824d09ebf9bf93aeb97c98e07c7a7762)
Abstract:
Modeling is widely accepted to be an important tool for developing reactor management and control strategies. A statistical approach based on self-organizing maps (SOMs) followed by multiple linear regression (MLR) was used in this study to model the digestion process of cereal straw. Thus, a black-box modeling strategy was followed in which the reactor was considered as a system that could be described with four input variables (W, the ratio between straw weight and the volume of NaOH solution; C, concentration of NaOH; T, operating temperature inside the reactor; H, contact time) and a single output variable (DE, the amount of degraded hemicellulose). In order to apply a classical MLR analysis, the original database of 45 cases was divided into two groups: a development data set to build the model and an independent test data set. It is important that both data sets have the same statistical properties and SOM were used for this purpose. Subsequently, a classical MLR analysis was carried out. The model included all candidate inputs (W, C, T and H) in the equation proposed to model reactor response. Nevertheless, W appeared to be the most relevant variable to explain changes in the DE, and nearly 50% of the overall variability can be attributed to its influence. The proposed model explained 86% of the overall

variability, thus making it possible to adopt decision-making strategies during reactor operation under different operating conditions.
Keywords: Alkaline treatment; Straw digestion; SOM; Multiple linear regression; Statistical modeling; Chemical engineering; Fluid mechanics

A. Gallagher, M.M. Gunther, H. Bruchhaus, Population continuity, demic diffusion and Neolithic origins in central-southern Germany: The evidence from body proportions, HOMO - Journal of Comparative Human Biology, Volume 60, Issue 2, March 2009, Pages 95-126, ISSN 0018-442X, DOI: 10.1016/j.jchb.2008.05.006.
(http://www.sciencedirect.com/science/article/B7GW4-4VRWNPJ-1/2/3f6e55e0e4ceba32b619dedc0f366116)
Abstract:
The transition to agro-pastoralism in central Europe has been framed within a dichotomy of 'regional continuity' versus exogenous 'demic diffusion'. While substantial genetic support exists for a model of demographic diffusion from an ancestral source in the Near East, archaeological data furnish weak support for the 'wave of advance' model. Nevertheless, archaeological evidence attests the widespread introduction of an exogenous 'package' comprising ceramics, cereals, pulses and domesticated animals to central Europe at 5600 cal BCE.
Body proportions are under strong climatic selection and evince remarkable stability within regional lineages. As such, they offer a viable and robust alternative to cranio-facial data in assessing hypothesised continuity and replacement with the transition to agro-pastoralism in central Europe. Humero-clavicular, brachial and crural indices in a large sample (n=75) of Linienbandkeramik (LBK), Late Neolithic and Early Bronze Age specimens from the middle Elbe-Saale-Werra valley (MESV) were compared with Eurasian and African terminal Pleistocene, European Mesolithic and geographically disparate recent human specimens.
Mesolithic Europeans display considerable variation in humero-clavicular and brachial indices yet none approach the extreme 'hyper-polar' morphology of LBK humans from the MESV. In contrast, Late Neolithic and Early Bronze Age peoples display elongated brachial and crural indices reminiscent of terminal Pleistocene and 'tropically adapted' recent humans. These marked morphological changes likely reflect exogenous immigration during the terminal Fourth millennium cal BC. Population expansion and diffusion is a function of increased mobility and settlement dispersal concomitant with significant technological and subsistence changes in later Neolithic societies during the late fourth millennium cal BCE.

Bin Zhang, Dong-Feng Wang, Hai-Yan Li, Ying Xu, Li Zhang, Preparation and properties of chitosan-soybean trypsin inhibitor blend film with anti-Aspergillus flavus activity, Industrial Crops and Products, Volume 29, Issues 2-3, March 2009, Pages 541-548, ISSN 0926-6690, DOI: 10.1016/j.indcrop.2008.10.007.
(http://www.sciencedirect.com/science/article/B6T77-4V5GCT7-2/2/2a01cb006888effca11c293898194bda)
Abstract:
The chitosan-based blend films were prepared from chitosan, soybean trypsin inhibitor extract (STI)/wild soybean trypsin inhibitor extract (WTI) and glycerol (Gly) solutions, the properties of which were also investigated, including thickness, mechanical property, water vapor transmission, optical transmittance, and solubility. In addition, the resulting films were characterized by scanning electron microscope (SEM), X-ray diffraction (XRD) and Fourier transform infrared spectroscopy (FTIR). The result of SEM images showed the surface and cross-section of chitosan-STI/WTI-Gly blend film had more smooth and dense morphology than pure chitosan film, which suggested there was a better compatibility among the three components. XRD and FTIR spectra indicated that the possible interaction force among the components might be the hydrogen bonds of NH...OC and OH...OC. Furthermore, the antifungal activity against A. flavus by the prepared blend

films had been investigated. The facts that the germination and growth of A. flavus were strongly inhibited by chitosan-STI/WTI-Gly film indicated the blend films might be useful as potential bio-control packaging against A. flavus during the peanuts and other cereals storage.
Keywords: Chitosan; Trypsin inhibitor; Blend film; A. flavus

Nuria Mateo Anson, Robin van den Berg, Rob Havenaar, Aalt Bast, Guido R.M.M. Haenen, Bioavailability of ferulic acid is determined by its bioaccessibility, Journal of Cereal Science, Volume 49, Issue 2, March 2009, Pages 296-300, ISSN 0733-5210, DOI: 10.1016/j.jcs.2008.12.001.
(http://www.sciencedirect.com/science/article/B6WHK-4V7622F-1/2/d160c04a9b5dea0734045047422a866a)
Abstract:
Epidemiological studies have linked whole grain consumption to prevention of several chronic diseases. Whole grain is a source of important phytochemicals, such as ferulic acid (FA). FA is the most abundant phenolic and major contributor to the in vitro antioxidant capacity of wheat grain. Several studies have reported highly variable results on FA bioavailability (0.4-98%). The binding of FA to polysaccharides may limit its bioavailability. Therefore, our study aimed at monitoring release features of FA during gastrointestinal (GI) transit. This was termed bioaccessibility. The bioaccessibility of FA was studied from different wheat fractions and breads with the use of a dynamic in vitro system that simulates the upper GI transit and digestion. The results showed low bioaccessibility of FA from the wheat fractions and breads (<1%). However, the bioaccessibility was high when free FA was added to flour (~60%). The bioaccessibility of FA appeared to be determined by the percentage of free FA. In wheat grain, most of FA is bound to arabinoxylans and other indigestible polysaccharides restricting its release in the small intestine. New processing developments should be considered to increase free FA in the cereal matrix in order to improve its bioavailability and systemic health effect.
Keywords: Ferulic acid (FA); Wheat fractions (Triticum aestivum L.); Bioaccessibility; Bioavailability

Romina Beleggia, Cristiano Platani, Giuseppe Spano, Massimo Monteleone, Luigi Cattivelli, Metabolic profiling and analysis of volatile composition of durum wheat semolina and pasta, Journal of Cereal Science, Volume 49, Issue 2, March 2009, Pages 301-309, ISSN 0733-5210, DOI: 10.1016/j.jcs.2008.12.002.
(http://www.sciencedirect.com/science/article/B6WHK-4VBDKF8-1/2/214fce49f2fdfe99650b933c2b260b2c)
Abstract:
Although pasta is generally not considered for its aromatic properties, some evidence proves that cereal flours release volatile compounds and they might have an effect on the aroma of the transformed products. This work reports on the characterization of the volatile components of semolina and pasta obtained from four durum wheat cultivars (Triticum durum Desf., cvs. PR22D89, Creso, Cappelli, Trinakria). Semolina samples were characterized through polar metabolite profiling and fatty acid analysis to identify potential precursors of the volatile components. The results show significant differences among the samples tested with cv. Trinakria characterized by the highest content of sugars and fatty acids. Volatile composition was investigated both in semolina and in cooked pasta using headspace solid-phase micro-extraction (HS-SPME) and identified by GC-MS. Thirty-five volatile compounds including aldehydes, ketones, alcohols, terpenes, esters, hydrocarbons and a furan were identified. Significant differences were observed between semolina and pasta samples in terms of composition and amount of the volatile compounds. During cooking an increase in aldehyde content, the appearance of ketones and a decrease in alcohol content were observed. Correlations between metabolites and volatiles demonstrate that the flavour of cooked pasta may differ significantly depending on the durum wheat cultivar employed.

Keywords: Metabolite profiling; Volatile compounds; Durum wheat; Pasta

Younju Choi, Jiyung Kim, Haeng-Shin Lee, Cho-il Kim, In Kyeong Hwang, Hye Kyung Park, Chang-Hwan Oh, Selenium content in representative Korean foods, Journal of Food Composition and Analysis, Volume 22, Issue 2, March 2009, Pages 117-122, ISSN 0889-1575, DOI: 10.1016/j.jfca.2008.11.009.
(http://www.sciencedirect.com/science/article/B6WJH-4V2NP0D-1/2/4cd568d28f7fb90401ec18706afcd600)
Abstract:
This study was conducted to create a selenium database for the representative food items in Korean diet and to estimate the dietary selenium intake of Koreans. Three samples for each food item selected based on the result of the Korea National Health and Nutrition Examination Survey II (KNHANES II) were purchased in markets with a nationwide distribution channel and some local retail stores. Each pooled sample was analyzed in triplicate by ICP-MS after thorough homogenization. The rich sources of selenium were fish, shellfish and their products (0.152-0.788 [mu]g/g), eggs (0.267 [mu]g/g), and meats and poultry (0.043-0.324 [mu]g/g). Vegetables and fruits contained trace amounts of selenium (trace-0.052 [mu]g/g). The major food sources of selenium intake were grains and cereals (34%), fish and shellfish (21%) and meats and poultry (20%). The selenium intake of the Korean population was estimated by combining the selenium contents of frequently consumed foods in KNHANES II, of which the data was collected by 24-h recall method. The estimated and mean intake values reported for Koreans were 57.5 [mu]g/person/day.
Keywords: Selenium; Database; Dietary intake; Safe and adequate level; Korean foods; Food safety; Food composition; National food database

Vural Gokmen, Francisco J. Morales, Burce Atac, Arda Serpen, Gema Arribas-Lorenzo, Multiple-stage extraction strategy for the determination of acrylamide in foods, Journal of Food Composition and Analysis, Volume 22, Issue 2, March 2009, Pages 142-147, ISSN 0889-1575, DOI: 10.1016/j.jfca.2008.09.007.
(http://www.sciencedirect.com/science/article/B6WJH-4V3541D-1/2/8f8e4b26c2cd7b6427b54acd595f9347)
Abstract:
The effects of single- and multiple-stage extraction procedures were studied on the extraction yield of acrylamide for various cereal- and potato-based thermally processed foods. In the multiple-stage procedure, extraction of ground sample was sequentially performed up to four times using 10 mM formic acid or methanol as the extraction solvents. The extraction yield of acrylamide was determined for each stage. Single-stage extraction resulted in lower acrylamide concentrations for all food matrices regardless of the type of extraction solvent, solvent-to-sample ratio, prior defatting, extraction temperature and time. The results revealed that a single-stage procedure underestimated the concentration of acrylamide in foods by a factor of up to 50% depending on the type of solvent applied during the extraction. The extractability was an exponential function which can be used to optimize the multiple extraction conditions during the analysis of foods for acrylamide. In general, the aqueous extraction using 10 mM formic acid was found to be more effective than the methanol extraction, and required lesser number of extraction steps for a complete extraction of acrylamide from food.
Keywords: Acrylamide; Extraction; Stage-wise extraction; Aqueous extraction; Methanol extraction; Potato; Cereal; Food composition; Food analysis

Victoria H. Castellanos, Melissa Ventura Marra, Paulette Johnson, Enhancement of Select Foods at Breakfast and Lunch Increases Energy Intakes of Nursing Home Residents with Low Meal

Intakes, Journal of the American Dietetic Association, Volume 109, Issue 3, March 2009, Pages 445-451, ISSN 0002-8223, DOI: 10.1016/j.jada.2008.11.035.
(http://www.sciencedirect.com/science/article/B758G-4VPG68V-N/2/4079f59bffaf6d53b02d4bd9cdb714ad)
Abstract: Objective
Nursing facilities often provide enhanced or fortified foods as part of a 'food-first' approach to increasing nutrient intakes in residents with inadequate intakes or who are experiencing weight loss. The study objective was to determine whether energy and protein enhancement of a small number of menu items would result in increased three-meal (breakfast, lunch, and supper) calorie and protein intakes in long-term care residents.Design
A randomized cross-over design was used to compare investigator-weighed food intakes under three menu conditions: control (no meals enhanced); lunch only enhanced; and both breakfast and lunch enhanced. Two breakfast foods (juice and hot cereal) and two lunch foods (soup and potato side dish) were chosen for enhancement.Subjects/setting
Participants were 33 nursing home residents from a facility in South Florida (average age=87.3 years).Statistical analysis
Repeated-measures analysis of variance was used to test the effects of the within-subjects factor (control, lunch enhanced, breakfast and lunch enhanced conditions), the between-subjects factor (smaller vs bigger eater), and the interaction on intakes (gram, kilocalories, and protein).Results
Results revealed that bigger eaters consumed considerably more calories when breakfast foods, but not lunch foods, were enhanced. Smaller eaters achieved an increase in energy intake when either breakfast or lunch was enhanced. Overall daily protein intakes were not substantially increased by food enhancement. These data suggest that for an enhanced food program to be most effective for smaller eaters, who are at greatest risk for undernutrition and weight loss, it should include several enhanced foods at more than one meal.

Oliver Keuling, Norman Stier, Mechthild Roth, Commuting, shifting or remaining?: Different spatial utilisation patterns of wild boar Sus scrofa L. in forest and field crops during summer, Mammalian Biology - Zeitschrift fur Saugetierkunde, Volume 74, Issue 2, March 2009, Pages 145-152, ISSN 1616-5047, DOI: 10.1016/j.mambio.2008.05.007.
(http://www.sciencedirect.com/science/article/B7GX2-4ST45XX-1/2/acb6d0ba21297667a2e094724268caee)
Abstract:
In a radiotelemetry study in North-East Germany, we analysed spatial utilisation of 22 female wild boar (Sus scrofa) out of 21 wild boar groups during summer (2003-2006). We compared summer season home ranges (16 May-15 August) with 'field home ranges', i.e. periods between first and last appearance within cereal fields. Wild boar appeared inside fields with beginning of grain and rapeseed flowering and vanished usually with harvest. Three types of spatial utilisation patterns were defined: 'field sows', who shifted their home range entirely into fields; 'commuters', who roamed between forest and fields; and 'forest sows', who remained in the forest. Yearlings were predominantly commuters, whilst family groups did not roam but either shifted to fields or stayed in forest.
Field sows had smaller mean field home ranges than total summer home ranges, whereas commuters and forest sows showed no differences. All three groups did not differ significantly in home range size measures but, however, showed different mean shifts from spring to summer home range. The home range sizes of sows of the different spatial patterns were similar, as all resources were permanently available all-over the study area. However, dislocations into outstanding profitable nutritional habitats (e.g. agricultural fields in summer) may enlarge annual home ranges of commuters and field sows.
Keywords: Sus scrofa; Spatial utilisation pattern; Field crops; Home range; Habitat choice

Huimei Wu, Emma Wensley, Mrinal Bhave, Identification and analysis of genes encoding a novel ER-localised Cyclophilin B in wheat potentially involved in storage protein folding, Plant Science, Volume 176, Issue 3, March 2009, Pages 420-432, ISSN 0168-9452, DOI: 10.1016/j.plantsci.2008.12.009.
(http://www.sciencedirect.com/science/article/B6TBH-4V88FJH-4/2/16bd0980a00a280032597aa67f6be1e9)
Abstract:
The storage protein deposition processes in cereal endosperm follow a strict script involving protein folding and refolding, assortment and protein body deposition by two distinct pathways. The endoplasmic reticulum-localised enzymes called peptidyl prolyl cis-trans isomerases (PPIases) are expected to play crucial `foldase' and chaperone roles in the deposition of wheat prolamins due to their proline-rich nature. The storage protein quality of wheat is important for nutritional and food technological purposes; however, little information exists on genetic control of protein sorting and deposition processes. In this study, CypB genes encoding an ER-localised cyclophilin (a PPIase) have been characterised from common wheat (Triticum aestivum L. AABBDD) and its progenitors for the first time. The full-length genes contain seven exons and six introns, the exons being significantly more conserved. The putative CypB protein contains all PPIase signature sites including the putative active site and cyclosporin-binding residues, but an atypical ER localisation signal. Using the sequence variations, the common wheat genes were localized to chromosomes 7AL, 7BL and 7DL. The promoters of wheat genes were identified by inverse-PCR and show a number of potential tissue specific regulatory elements. The wheat genes are similar in structure to rice CypB and the putative proteins are 83% identical. Further, certain QTLs related to protein quality occur at the rice and wheat CypB loci. The results support this enzyme being a strong candidate for regulating storage protein quality in wheat.
Keywords: Storage proteins; Protein folding; Cyclophilins; Peptidyl prolyl cis-trans isomerases

R. Lal, Soil quality impacts of residue removal for bioethanol production, Soil and Tillage Research, Volume 102, Issue 2, Soil Management for Sustainability, March 2009, Pages 233-241, ISSN 0167-1987, DOI: 10.1016/j.still.2008.07.003.
(http://www.sciencedirect.com/science/article/B6TC6-4TC8J0P-2/2/38dbd116247811bfe8533e2022f873dc)
Abstract:
Global energy demand of 424 EJ year-1 in 2000 is increasing at the rate of 2.2% year-1. There is a strong need to increase biofuel production because of the rising energy costs and the risks of global warming caused by fossil fuel combustion. Biofuels, being C-neutral and renewable energy sources, are an important alternative to fossil fuels. Therefore, identification of viable sources of biofuel feedstock is a high priority. Harvesting lignocellulosic crop residues, especially of cereal crops, is being considered by industry as one of the sources of biofuel feedstocks. Annual production of lignocellulosic residues of cereals is estimated at 367 million Mg year-1 (75% of the total) for the U.S., and 2800 million Mg year-1 (74.6% of the total) for the world. The energy value of the residue is 16 x 106 BTU Mg-1. However, harvesting crop residues would have strong adverse impact on soil quality. Returning crop residues to soil as amendments is essential to: (a) recycling plant nutrients (20-60 kg of N, P, K, Ca per Mg of crop residues) amounting to 118 million Mg of N, P, K in residues produced annually in the world (83.5% of world's fertilizer consumption), (b) sequestering soil C at the rate of 100-1000 kg C ha-1 year-1 depending on soil type and climate with a total potential of 0.6-1.2 Pg C year-1 in world soils, (c) improving soil structure, water retention and transmission properties, (d) enhancing activity and species diversity of soil fauna, (e) improving water infiltration rate, (f) controlling water runoff and minimizing risks of erosion by water and wind, (g) conserving water in the root zone, and (h) sustaining agronomic productivity by decreasing losses and increasing use efficiency of inputs. Thus, harvesting crop residues as biofuel feedstock would jeopardize soil and water resources which are already under

great stress. Biofuel feedstock must be produced through biofuel plantations established on specifically identified soils which do not compete with those dedicated to food crop production. Biofuel plantations, comprising of warm season grasses (e.g., switch grass), short rotation woody perennials (e.g., poplar) and herbaceous species (e.g., miscanthus) must be established on agriculturally surplus/marginal soils or degraded/desertified soils. Plantations established on such soils would restore degraded ecosystems, enhance soil/terrestrial C pool, improve water resources and produce biofuel feedstocks.
Keywords: Soil restoration; No-till farming; Bioethanol; Mulch farming; Erosion control; Energy needs; Switch grass

Tjeerd jan Stomph, Wen Jiang, Paul C. Struik, Zinc biofortification of cereals: rice differs from wheat and barley, Trends in Plant Science, Volume 14, Issue 3, March 2009, Pages 123-124, ISSN 1360-1385, DOI: 10.1016/j.tplants.2009.01.001.
(http://www.sciencedirect.com/science/article/B6TD1-4VM464W-1/2/1621728cb56d11fcce6cda18b83feda0)

Remy Manderscheid, Andreas Pacholski, Cathleen Fruhauf, Hans-Joachim Weigel, Effects of free air carbon dioxide enrichment and nitrogen supply on growth and yield of winter barley cultivated in a crop rotation, Field Crops Research, Volume 110, Issue 3, 28 February 2009, Pages 185-196, ISSN 0378-4290, DOI: 10.1016/j.fcr.2008.08.002.
(http://www.sciencedirect.com/science/article/B6T6M-4THJ6DD-1/2/3a3fd08c140f397cbb076779544dc44d)
Abstract:
The increase in atmospheric CO2 concentration [CO2] has been demonstrated to stimulate growth of C3 crops. Although barley is one of the important cereals of the world, little information exists about the effect of elevated [CO2] on grain yield of this crop, and realistic data from field experiments are lacking. Therefore, winter barley was grown within a crop rotation over two rotation cycles (2000 and 2003) at present and elevated [CO2](375 ppm and 550 ppm) and at two levels of nitrogen supply (adequate (N2): 262 kg ha-1 in 1st year and 179 kg ha-1 in 2nd year) and 50% of adequate (N1)). The experiments were carried out in a free air CO2 enrichment (FACE) system in Braunschweig, Germany. The reduction in nitrogen supply decreased seasonal radiation absorption of the green canopy under ambient [CO2] by 23%, while CO2 enrichment had a positive effect under low nitrogen (+8%). Radiation use efficiency was increased by CO2 elevation under both N levels (+12%). The CO2 effect on final above ground biomass was similar for both nitrogen treatments (N1: +16%; N2: +13%). CO2 enrichment did not affect leaf biomass, but increased ear and stem biomass. In addition, final stem dry weight was higher under low (+27%) than under high nitrogen (+13%). Similar findings were obtained for the amount of stem reserves available during grain filling. Relative CO2 response of grain yield was independent of nitrogen supply (N1: +13%; N2: +12%). The positive CO2 effect on grain yield was primarily due to a higher grain number, while changes of individual grain weight were small. This corresponds to the findings that under low nitrogen grain growth was unaffected by CO2 and that under adequate nitrogen the positive effect on grain filling rate was counterbalanced by shortening of grain filling duration.
Keywords: Elevated CO2; FACE; Green area index; Grain growth; Harvest index; Hordeum vulgare; Nitrogen supply; Radiation use efficiency; Yield

Patricio Grassini, Antonio J. Hall, Jorge L. Mercau, Benchmarking sunflower water productivity in semiarid environments, Field Crops Research, Volume 110, Issue 3, 28 February 2009, Pages 251-262, ISSN 0378-4290, DOI: 10.1016/j.fcr.2008.09.006.
(http://www.sciencedirect.com/science/article/B6T6M-4TY8W85-1/2/137655e8b183ac3bdd888ce4c3cacce8)

Abstract:
Appropriate benchmarking is essential for evaluating the efficiency with which crops use water and for identifying constraints, other than water, to crop yield. No benchmark exists for sunflower. Boundary and simulation analyses were used to quantify the water productivity of sunflower crops grown in the Western Pampas (semiarid central Argentina). The approach involved the use of a large database (n = 169) collected in farmers' fields over a period of 4 years, and the application of a crop simulation model in combination with actual weather and soil data. Using field data, an upper bound of 8 kg grain ha-1 mm-1 for water productivity, with an apparent seasonal soil evaporation of 75 mm, was defined. Seasonal water supply exceeded maximum expected seasonal crop requirements (ca. 630 mm) for many crops, and a majority of crops with <630 mm of available water during the season had water productivities considerably lower than the upper bound. The field data-based upper bound was indistinguishable from that obtained using yields for a set of 47 simulations using observed initial values for soil water and nitrogen profiles. Simulation confirmed the main features of the boundary-analysis applied to field data, and many simulated crops had yields that fell below the boundary function, even when simulated yield was plotted against simulated seasonal evapotranspiration or transpiration. Long-term (33-year) simulation analyses for two sites showed that most sunflower crops in the area are subjected to episodes of transient and unavoidable water stress after floral initiation. High levels of available soil water at sowing moderate, but in most years do not eliminate, these exposures to water stress. Yield gaps with respect to the boundary function were associated with deficient or excessive rainfall during grain filling, and other, non-water related, factors such as inadequate crop nutrition, biotic stresses, low photothermal quotients during the interval close to anthesis, and lodging. A grain yield/seasonal evapotranspiration plot for a large (n = 154) data set from experiments conducted by others in five separate environments suggests that the boundary function found for the Western Pampas is broadly applicable. Sunflower water productivity, corrected for oil-synthesis costs and seasonal vapour pressure deficit differences, approximates that of winter cereals grown in Mediterranean environments.
Keywords: Sunflower; Helianthus annuus L.; Water productivity; Yield gap analysis; Boundary function; Simulation model; Transpiration-efficiency; Soil evaporation; Semiarid environments

Craig B. Faulds, Samuel Collins, James A. Robertson, Janneke Treimo, Vincent G.H. Eijsink, Sandra W.A. Hinz, Henk A. Schols, Johanna Buchert, Keith W. Waldron, Protease-induced solubilisation of carbohydrates from brewers' spent grain, Journal of Cereal Science, In Press, Corrected Proof, Available online 12 February 2009, ISSN 0733-5210, DOI: 10.1016/j.jcs.2009.01.004.
(http://www.sciencedirect.com/science/article/B6WHK-4VKP3XG-1/2/80617999fde5ef51815691321034db6d)
Abstract:
The impact of microbial proteases on the release of carbohydrates from BSG was studied. The proteases were able to release the non-cellulosic glucose, a portion of feruloylated arabinoxylan and over 50% of the protein from brewers' spent grain (BSG) after 24 h hydrolysis. The non-cellulosic glucose was derived from residual starch-derived products persisting in BSG after mashing. The proteases did not cleave the hydroxycinnamate ester linkages present on the arabinoxylan backbone, and thus do not behave as feruloyl esterases. However, the material solubilised from spent grain by the proteases contained up to 198 [mu]g bound ferulic acid/g extract, which represented 8.6% of the total ferulic acid present in BSG. These results suggest that a portion of water-extractable feruloylated arabinoxylan and starch is trapped within the BSG matrix by a proteinaceous barrier.
Keywords: Brewers' spent grain; Starch; Arabinoxylan; Protease; Cereal by-products; Waste

Bongani Ncube, John P. Dimes, Mark T. van Wijk, Steve J. Twomlow, Ken E. Giller, Productivity and residual benefits of grain legumes to sorghum under semi-arid conditions in south-western Zimbabwe: Unravelling the effects of water and nitrogen using a simulation model, Field Crops Research, Volume 110, Issue 2, 10 February 2009, Pages 173-184, ISSN 0378-4290, DOI: 10.1016/j.fcr.2008.08.001.
(http://www.sciencedirect.com/science/article/B6T6M-4TJTTK6-1/2/24670ced51ed67cabcd7a14397d02724)
Abstract:
The APSIM model was used to assess the impact of legumes on sorghum grown in rotation in a nutrient-limited system under dry conditions in south-western Zimbabwe. An experiment was conducted at Lucydale, Matopos Research Station, between 2002 and 2005. The model was used to simulate soil and plant responses in the experiment. Sequences of cowpea (Vigna unguiculata), pigeonpea (Cajanus cajan), groundnut (Arachis hypogaea) and sorghum (Sorghum bicolor) were used in the rotations. Legumes accumulated up to 130 kg of N ha-1 which was potentially available for uptake by sorghum in the following season. The APSIM model predicted total biomass, grain and N yields of the legume phase within the experimental error and performed well in predicting sorghum yield and N supplied in the rotation after cowpea and groundnut. The model generally under-predicted sorghum total biomass and grain yield after pigeonpea. Observed patterns of crop water use, evaporative losses during the dry season and re-charge of soil profile at the start of the rainy season were generally well predicted by the model. An assessment of output on sorghum N and water stresses in the rotation indicated that the legume-cereal rotation is more driven by soil nitrogen availability than water availability even under semi-arid conditions. Further legume-cereal rotation analysis using the model will assist in the understanding of other processes in the rotations in dry environments.
Keywords: APSIM; Nitrogen uptake; N2-fixation; Stress factors

Kristin R. Freeland, G. Harvey Anderson, Thomas M.S. Wolever, Acute effects of dietary fibre and glycaemic carbohydrate on appetite and food intake in healthy males, Appetite, Volume 52, Issue 1, February 2009, Pages 58-64, ISSN 0195-6663, DOI: 10.1016/j.appet.2008.08.001.
(http://www.sciencedirect.com/science/article/B6WB2-4T5CGMY-1/2/56d823812d2e54f7edd42a19e3947188)
Abstract:
The aim of this research was to describe the effect of equal weights of insoluble fibre (wheat bran) and glycaemic carbohydrate (glucose) on appetite and food intake over 1 and 2 h in healthy men. In a crossover design, high-fibre (F; 41 g insoluble fibre) cereal, low-fibre (W; 1 g fibre) cereal, F plus glucose (FG; 41 g glucose), and W plus glucose (WG; 41 g glucose) were administered to young men after an overnight fast. Treatments had similar fat, protein, volume and weight. In the first experiment, subjective appetite was measured at 15 min intervals before an ad libitum meal at 60 min. In the second experiment, subjective appetite was measured at 15 min intervals for the first 60 and 30 min intervals for the second 60 min before an ad libitum meal at 120 min. In experiment 1, ad libitum food intake was lower after the F, WG and FG cereals compared to W (3.1, 2.98, 2.96 and 3.59 MJ, respectively). Total energy intake (cereal + ad libitum) was lower after F compared to W and WG (4.1, 4.6, and 4.7 MJ, respectively). In experiment 2, the WG cereal significantly reduced ad libitum food intake compared to W (3.90 and 4.57 MJ, respectively). These results suggest that a serving of 41 g insoluble fibre reduces food intake independent of its weight and volume and similar to an equal weight of glucose within 60 min, but this effect is not maintained after 120 min.
Keywords: Wheat bran; Glucose; Breakfast cereal; Appetite; Energy intake; Human; Male

Dalvinder P. Singh, David Backhouse, Paul Kristiansen, Interactions of temperature and water potential in displacement of Fusarium pseudograminearum from cereal residues by fungal

antagonists, Biological Control, Volume 48, Issue 2, February 2009, Pages 188-195, ISSN 1049-9644, DOI: 10.1016/j.biocontrol.2008.10.015.
(http://www.sciencedirect.com/science/article/B6WBP-4TVTJM3-2/2/0e2ed263251190a18161c0e524e2997a)
Abstract:
Fusarium pseudograminearum (Fp) is a stubble-borne fungus that causes crown rot in wheat and barley. Displacement of Fp from stubble by other fungi was explored. Fungi were isolated from field collections of stubble and identified using morphological and molecular methods. The most abundant species were Alternaria sp., Sterile sp. 1 and Fp. Representative isolates of all species were screened in dual culture with Fp to select candidates for detailed experiments on displacement. Trichoderma harzianum (Th), Alternaria infectoria (Ai), Fusarium equiseti (Fe) and Fusarium nygamai (Fn) were chosen as representing the range of interaction types found. The effects of temperature (5-35 [degree sign]C) and water potential (-0.3 to -5 MPa) on growth rates, displacement of Fp from infested barley straw and dual culture interaction with Fp were determined. Th was the strongest antagonist overall, but displaced Fp very poorly at the lowest temperatures and water potentials. It was more antagonistic than expected from effects on growth at high temperature and less antagonistic than expected at low temperature. Fe and Fn showed consistent mutual antagonism with Fp on contact in dual culture and gave moderate displacement of Fp from straw, with Fe being the most effective antagonist under cool dry conditions. Ai gave very poor displacement of Fp from straw, despite being the most common straw fungus, confirming that displacement was due to antagonism and not just the presence of other fungi. The type of interaction in dual culture was consistent with degree of displacement from straw and could be used to indicate which environmental conditions were most limiting for an antagonist. The ability to displace Fp under cool dry conditions appears to be critical.
Keywords: Fusarium pseudograminearum; Antagonism; Trichoderma harzianum; Water potential; Displacement assay; Cereal straw

Olivier Panaud, The molecular bases of cereal domestication and the history of rice, Comptes Rendus Biologies, Volume 332, Issues 2-3, La theorie de Darwin revisitee par la biologie d'aujourd'hui / Darwin's theory revisited by today's biology, February-March 2009, Pages 267-272, ISSN 1631-0691, DOI: 10.1016/j.crvi.2008.09.003.
(http://www.sciencedirect.com/science/article/B6X1F-4V2PSVY-1/2/18db6e2f889e29f9877f8a2c19fb245f)
Abstract:
In this review, we discuss the development of molecular genetics and genomics that has allowed one to identify and characterize some of the key genes involved in cereal domestication. The list is far from being complete, but the first conclusion that can be drawn from the published works is that only a few loci have been the target of human selection in the first stages of the domestication process at the late neolithic. Mutations at these few loci have led to dramatic changes in plant morphology and phenology, transforming a wild into a cultivated plant. We also show that in the case of rice, for which the complete genome sequence is available, the development of new molecular markers based on retrotransposon insertion polymorphisms helped to resolve some of the questions regarding the origin of the domestication of the crop in Asia. To cite this article: O. Panaud, C. R. Biologies 332 (2009).
Keywords: Domestication; Cereals; QTLs; Comparative genomics; Domestication; Cereales; QTLs; Genomique comparative

Jorgen E. Olesen, Margrethe Askegaard, Ilse A. Rasmussen, Winter cereal yields as affected by animal manure and green manure in organic arable farming, European Journal of Agronomy, Volume 30, Issue 2, February 2009, Pages 119-128, ISSN 1161-0301, DOI: 10.1016/j.eja.2008.08.002.

(http://www.sciencedirect.com/science/article/B6T67-4THS3NK-2/2/56df22386a17959d3a08190a57809e57)
Abstract:
The effect of nitrogen (N) supply through animal and green manures on grain yield of winter wheat and winter rye was investigated from 1997 to 2004 in an organic farming crop rotation experiment in Denmark on three different soil types varying from coarse sand to sandy loam. Two experimental factors were included in the experiment in a factorial design: (1) catch crop (with and without), and (2) manure (with and without). The four-course crop rotation was spring barley undersown with grass/clover - grass/clover - winter wheat or wheat rye - pulse crop. All cuttings of the grass-clover were left on the soil as mulch. Animal manure was applied as slurry to the cereal crops in the rotation in rates corresponding to 40% of the N demand of the cereal crops.
Application of 50 kg NH4-N ha-1 in manure increased average wheat grain yield by 0.4-0.9 Mg DM ha-1, whereas the use of catch crops did not significantly affect yield. The use of catch crops interacts with other management factors, including row spacing and weed control, and this may have contributed to the negligible effects of catch crops. There was considerable variation in the amount of N (100-600 kg N ha-1 year-1) accumulated in the mulched grass-clover cuttings prior to ploughing and sowing of the winter wheat. This was reflected in grain yield and grain N uptake. Manure application to the cereals in the rotation reduced N accumulation in grass-clover at two of the locations, and this was estimated to have reduced grain yields by 0.1-0.2 Mg DM ha-1 depending on site. Model estimations showed that the average yield reduction from weeds varied from 0.1 to 0.2 Mg DM ha-1. The weed infestation was larger in the manure treatments, and this was estimated to have reduced the yield benefit of manure application by up to 0.1 Mg DM ha-1. Adjusting for these model-estimated side-effects resulted in wheat grain yields gains from manure application of 0.7-1.1 Mg DM ha-1.
The apparent recovery efficiency of N in grains (N use efficiency, NUE) from NH4-N in applied manure varied from 23% to 44%. The NUE in the winter cereals of N accumulated in grass-clover cuttings varied from 14% to 39% with the lowest value on the coarse sandy soil, most likely due to high rates of N leaching at this location. Both NUE and grain yield benefit in the winter cereals declined with increasing amounts of N accumulated in the grass-clover cuttings. The model-estimated benefit of increasing N input in grass-clover from 100 to 500 kg N ha-1 varied from 0.8 to 2.0 Mg DM ha-1 between locations. This is a considerably smaller yield increase than obtained for manure application, and it suggests that the productivity in this system may be improved by removing the cuttings and applying the material to the cereals in the rotation, possibly after digestion in a biogas reactor.
Cereal grain protein content was increased more by the N in the grass-clover than from manure application, probably due to different timing of N availability. Green-manure crops or manures with a relatively wide C:N ratio may therefore be critical for ensuring sufficiently high protein contents in high yielding winter wheat for bread making.
Keywords: Wheat; Rye; Organic farming; Nitrogen; Weed; Grain yield; Grass-clover

Bulent Kabak, Ochratoxin A in cereal-derived products in Turkey: Occurrence and exposure assessment, Food and Chemical Toxicology, Volume 47, Issue 2, February 2009, Pages 348-352, ISSN 0278-6915, DOI: 10.1016/j.fct.2008.11.019.
(http://www.sciencedirect.com/science/article/B6T6P-4TYR08T-2/2/c1cc05d11ed5c77821f12d3324b0f049)
Abstract:
Eighty-three samples of cereal-derived products including 24 breakfast cereals, 24 cereal-based baby foods and 35 beers purchased from supermarkets and small shops of Adana in Turkey were analysed for the presence of ochratoxin A (OTA) using immunoaffinity column (IAC) clean-up and high performance liquid chromatography with fluorescence detection (HPLC-FD). The average OTA recoveries from spiked breakfast cereal and cereal-based baby food and beers samples were

in the range of 79.33-83.86%, 72.93-80.34% and 76.47-83.11%, respectively. The relative standard deviations (RSDr) of recoveries for breakfast cereals, cereal-based baby foods and beers were 1.1-3.39%, 2.56-8.37% and 5.73-13.61%, respectively.
OTA was detected in 38% of breakfast cereals, in 17% of cereal-based baby food and in 14% of beer samples. OTA levels ranged from 0.172 to 1.84, from 0.122 to 0.374 and from 0.012 to 0.045 ng ml-1, respectively. All cereal-derived products examined contained OTA at concentrations very much lower below the limit recommended by European Commission Regulation. The results of this study suggest that cereal-derived products such as breakfast cereals, cereal-based baby foods and beer consumed in Turkey presents no risk by human exposure to OTA through their consumption.
Keywords: Ochratoxin A; Occurrence; Breakfast cereals; Cereal-based baby food; Beer; Daily intake

Janice E. Maras, P.K. Newby, Peter J. Bakun, Luigi Ferrucci, Katherine L. Tucker, Whole grain intake: The Baltimore Longitudinal Study of Aging, Journal of Food Composition and Analysis, Volume 22, Issue 1, February 2009, Pages 53-58, ISSN 0889-1575, DOI: 10.1016/j.jfca.2008.10.005.
(http://www.sciencedirect.com/science/article/B6WJH-4TWV2K6-2/2/75ebc9632b4c4d2c15b4e000b6eb64d4)
Abstract:
Our objective was to identify major dietary sources of whole grains and to describe the construction of a database of whole grain content of foods. Dietary information was collected with 7-d food records from men and women in the Baltimore Longitudinal Study of Aging, mean age 62.1 +/- 16.0 years, who participated in the dietary assessment portion of the study (n = 1516), and estimates of whole grain intake were obtained from a newly developed database. The Pyramid Servings database and 1994-1996 Continuing Survey of Food Intakes by Individuals (CSFII) recipe ingredients database were then used to calculate both servings and gram weights of whole grain intakes. Mean intakes of whole grains, refined grains, and total grains, as well as frequency of intake for major whole grain food groups and whole grain content for each group, were calculated. Top contributors of whole grains were ready-to-eat breakfast cereals (made with whole grain as well as bran), hot breakfast cereals (made with whole grain), multi-grain bread, and whole wheat bread. While more research is needed to better understand the benefits of whole grains, the development of research tools, including databases to accurately assess whole grain intake, is a critical step in completing such research.
Keywords: Whole grains; Wheat; Bran; Germ; Fiber; Database; Food composition

Lucia Brindzova, Maria Mikulasova, Maria Takacsova, Silvia Mosovska, Alena Opattova, Evaluation of the mutagenicity and antimutagenicity of extracts from oat, buckwheat and wheat bran in the Salmonella/microsome assay, Journal of Food Composition and Analysis, Volume 22, Issue 1, February 2009, Pages 87-90, ISSN 0889-1575, DOI: 10.1016/j.jfca.2008.07.009.
(http://www.sciencedirect.com/science/article/B6WJH-4TCYCFM-1/2/da0159f22806755de76ef7c81ed10c96)
Abstract:
This study examined the mutagenic and antimutagenic activities of the DMSO extracts from the oat, buckwheat and wheat bran, which are good sources of polyphenols with antioxidant and anticarcinogenic properties. Extracts from buckwheat and wheat bran showed no mutagenic activity. Oat extract showed slight mutagenic effect in Salmonella typhimurium TA102. The antimutagenic activities against direct-acting (3-(5-nitro-2-furyl)acrylic acid, 2-nitrofluorene, hydrogen peroxide) and indirect-acting (aflatoxin B1) mutagens were also investigated using Ames test with S. typhimurium TA98, TA100 and TA102. Cereal extracts exhibit concentration-dependent protective antigenotoxic activity against all used mutagens. The total phenolic content

in studied cereal extracts expressed as gallic acid equivalent increases in the order: buckwheat < wheat bran < oat. Total flavonoid content expressed as rutin equivalent increases in the order: oat < wheat bran < buckwheat.
Keywords: Cereals; Pseudocereals; Antimutagenic activity; Phenolic compounds; Food composition

S.N. Al-Dobaib, M.A. Mehaia, M.H. Khalil, Effect of feeding discarded dates on milk yield and composition of Aradi goats, Small Ruminant Research, Volume 81, Issues 2-3, February 2009, Pages 167-170, ISSN 0921-4488, DOI: 10.1016/j.smallrumres.2008.11.007.
(http://www.sciencedirect.com/science/article/B6TC5-4V9RHSR-2/2/6f24e9db5e153ec4f9f2fda6af85a81c)
Abstract:
The effect of feeding discarded dates (non-edible for human consumption) on milk yield and composition of lactating Aradi does was studied in Saudi Arabia. Ten multiparous Aradi dairy does were equally divided into two groups and they were offered two diets; one as the control diet, including 35% alfalfa hay and 65% concentrate (corn grain, wheat bran, barley and molasses) and the other one as treated diet in which 30% of the total ingredients (basically from cereals) were substituted by discarded dates. Therefore, diets were isonitrogenous (18% CP) and isoenergetic. Milk yield, pH, and acidity of milk, major milk components, nitrogen distribution and minerals in milk were evaluated. No significant differences in yield and acidity of milk were observed between the two diets, while pH of milk in the control diet was higher. Milk obtained from does receiving discarded dates was significantly higher in protein and solids-not-fat contents, but the other milk constituents were not different. No significant differences were observed for non-protein nitrogen of milk (NPN). Milk obtained from does fed diet with dates had higher casein nitrogen and non-casein nitrogen than does fed the control diet. Casein number was higher for milk obtained from does fed the diet with dates. For minerals content in the milk, differences in K, Na, Mg, Ca, Fe, and Zn contents between the two dies were not significant, while Mn and Cu were reduced in milk of does receiving dates. In conclusion, feeding isonitrogenous diets including a reasonable dose of discarded dates had no negative effects on milk yield and composition of Aradi goats.
Keywords: Palm dates; Goats; Milk composition; Milk yield

Terence A. Brown, Martin K. Jones, Wayne Powell, Robin G. Allaby, The complex origins of domesticated crops in the Fertile Crescent, Trends in Ecology & Evolution, Volume 24, Issue 2, February 2009, Pages 103-109, ISSN 0169-5347, DOI: 10.1016/j.tree.2008.09.008.
(http://www.sciencedirect.com/science/article/B6VJ1-4V7BG4J-3/2/00b3fb463f87107f3f8a3ec39d486d3c)
Abstract:
A combination of genetics and archaeology is revealing the complexity of the relationships between crop plants and their wild ancestors. Archaeobotanical studies are showing that acquisition of the full set of traits observed in domesticated cereals was a protracted process, intermediate stages being seen at early farming sites throughout the Fertile Crescent. New genetic data are confirming the multiregional nature of cereal domestication, correcting a previous view that each crop was domesticated by a rapid, unique and geographically localised process. Here we review the evidence that has prompted this reevaluation of the origins of domesticated crops in the Fertile Crescent and highlight the impact that this new multiregional model is having on modern breeding programmes.

Eva K. Richter, Karem Albash Shawish, Martin R.L. Scheeder, Paolo C. Colombani, Trans fatty acid content of selected Swiss foods: The TransSwissPilot study, Journal of Food Composition and Analysis, In Press, Corrected Proof, Available online 24 January 2009, ISSN 0889-1575, DOI: 10.1016/j.jfca.2009.01.007.

(http://www.sciencedirect.com/science/article/B6WJH-4VFK7VJ-5/2/f4743a802e7a0409d06d3b06d0457401)
Abstract:
The objective of this study was to analyse the trans fatty acid (TFA) content of a selection of foods sold on the Swiss market in order to get an overview of the situation and to find indicators to assess the origins of TFA. 119 food items from different food groups were purchased in the city of Zurich and analysed for their TFA content with gas chromatography. TFA were detected in all but two samples and the content ranged from 0 to 29% of the total fat. Nearly 40% of the analysed samples had more than 2% TFA. The highest mean value was observed in the fine bakery products (6% TFA) and the lowest with the breakfast cereals (<0.4% TFA). Trans-C18:1 was the predominant TFA in all samples except for the plant oils, in which trans-C18:2 and trans-C18:3 isomers made up the bigger part of the total TFA content. An analytical distinction of the TFAs according to their origin seems possible when concomitantly considering the amounts of t11-C18:1, c9,t11-C18:2, and total TFA. The situation regarding the TFA content in Swiss food was similar to many other countries worldwide.
Keywords: Trans fatty acids; Ruminant fat; Swiss food; Origin indicators; Fat hardening; Food analysis; Food composition

K. Walsh, P. O'Kiely, H.Z. Taweel, M. McGee, A.P. Moloney, T.M. Boland, Intake, digestibility and rumen characteristics in cattle offered whole-crop wheat or barley silages of contrasting grain to straw ratios, Animal Feed Science and Technology, Volume 148, Issues 2-4, 16 January 2009, Pages 192-213, ISSN 0377-8401, DOI: 10.1016/j.anifeedsci.2008.03.013.
(http://www.sciencedirect.com/science/article/B6T42-4SDNK89-1/2/90bde9e888afb7ec91a20d2e31a0aee6)
Abstract:
The effects of varying the grain (G) to straw (S) ratio (G:S) of whole-crop wheat and barley silages on intake and digestibility and whole-crop barley silage on rumen fermentation characteristics were examined in two parallel studies. For the intake and digestibility study, eight Aberdeen Angus cross-bred steers (mean bodyweight 407 kg (S.D. 24.2)) were used in two (barley and wheat) 4 x 4 Latin Square designed experiments. The dietary treatments were four G:S ratios: 0:100, 30:70, 60:40 and 90:10. Intake of grain linearly increased ($P<0.001$) while that of straw decreased ($P<0.001$) as the ratio of G:S increased for both cereals. No effect ($P>0.05$) was observed in total dry matter (DM) intake (DMI) or in DMI per kg liveweight. There was a positive linear ($P<0.001$) effect on the digestibility of the DM and organic matter (OM) and a negative linear effect on neutral detergent fibre (aNDFom) digestibility ($P<0.01$) as the G:S ratio increased for both cereals. Both a positive linear ($P<0.05$) and quadratic ($P<0.01$) effect were observed for the G:S ratio on nitrogen (N) digestibility of barley and a corresponding positive linear increase ($P<0.01$) for wheat. A negative linear effect was found for digestibility of starch ($P<0.01$) and a positive linear effect for faecal grain content ($P<0.01$) with increasing G:S ratio. Four Holstein-Friesian steers (mean bodyweight 659 kg (S.D. 56.9)) fitted with rumen cannulae were used in the rumen study. A negative linear effect of G:S ratio was found on rumen pH ($P<0.001$) while a positive linear effect was found on rumen ammonia ($P<0.001$) and total volatile fatty acid (VFA) concentration ($P<0.01$) with increasing G:S ratio. A negative linear effect ($P<0.01$) was found on the molar proportion of acetic acid. However, this decrease was offset by linear increases in the molar proportions of iso- and n-butyric acid, iso- ($P<0.01$) and n- ($P<0.05$) valeric acid, and to a lesser extent in propionic acid ($P<0.01$). No effect of treatment was found on rumen pool sizes of DM or its constituents. A positive linear effect ($P<0.01$) was found on the effective degradability (ED) of the DM, OM, N and starch while it was found to be negative in aNDFom ($P<0.05$). No effect ($P>0.05$) was found on the fractional clearance rates of DM, OM, aNDFom or starch or on liquid passage rate. It is concluded that increasing the G:S ratio in whole-crop wheat or barley silage linearly increased the intake of digestible nutrients for both wheat and barley and increasing the G:S ratio for whole-crop barley

increased the concentration of fermentation products (total VFA, ammonia and the molar proportions of the VFAs, except acetic acid) in the rumen.
Keywords: Cattle; Digestibility; Grain to straw ratio; Intake; Rumen characteristics

Francesco Giunta, Giovanni Pruneddu, Rosella Motzo, Radiation interception and biomass and nitrogen accumulation in different cereal and grain legume species, Field Crops Research, Volume 110, Issue 1, 5 January 2009, Pages 76-84, ISSN 0378-4290, DOI: 10.1016/j.fcr.2008.07.003.
(http://www.sciencedirect.com/science/article/B6T6M-4T8333J-1/2/2f2281e902da1bbd58c3dc35e1b4606c)
Abstract:
The increasing interest in the sustainability of agricultural systems has emphasised the importance of incorporating legumes into cereal production, in spite of their lower and less reliable grain yields. The basis of the poor performance of legumes has been analyzed in a 2-year comparison between varieties of pea, faba bean, durum wheat and triticale, in terms of resource capture and use. The cereals developed a full canopy 350 [degree sign]Cd earlier than did the grain legumes, and the triticale more rapidly than the durum wheat. This difference, and the 11-day longer duration of the growing cycle of cereals allowed them to intercept more photosynthetically active radiation (PAR) than grain legumes. This, combined with their higher radiation use efficiency (2.35 +/- 0.07 vs 2.10 +/- 0.05 g MJ-1), resulted in a biomass greater, on average, by about 500 g m-2. Within the cereals, triticale accumulated 34% more biomass than durum wheat. Radiation interception and nitrogen uptake are closely tied in both cereals and grain legumes. There was no difference between cereals and legumes in the relationship between the amount of nitrogen assimilated and the fraction of intercepted PAR (FIPAR), but there were differences in the form and in the parameters of the relationship between nitrogen assimilated and PAR intercepted. Below a FIPAR of 0.8, the relationship between FIPAR and N uptake is crop independent, underlining the influence of FIPAR on N uptake. The significance of this FIPAR level is that by the time it has been achieved, the plants will have accumulated most of the N present in their biomass at maturity.
Keywords: Durum wheat; Biomass accumulation; Nitrogen accumulation; Grain legumes; Triticale; Radiation interception

Pirjo Peltonen-Sainio, Lauri Jauhiainen, Ilkka P. Laurila, Cereal yield trends in northern European conditions: Changes in yield potential and its realisation, Field Crops Research, Volume 110, Issue 1, 5 January 2009, Pages 85-90, ISSN 0378-4290, DOI: 10.1016/j.fcr.2008.07.007.
(http://www.sciencedirect.com/science/article/B6T6M-4T7443X-1/2/4d3bfd66247311bd91eaca1a89e6be06)
Abstract:
In recent decades there has been steady reduction in the rate of increase in cereal yields worldwide. This paper aims to (1) characterise the changes in yield trends of spring (barley, oat and wheat) and winter cereals (rye and wheat) grown in Finland and (2) distinguish between plant breeding achievements and other potential contributors to changes in national yield trends and differences among crops. In this work we used long-term datasets from FAO (FAOSTAT, 2007) (1960-2005) and results from multi-location MTT Official Variety Trials (1970-2005). A mixed model technique was used to divide the yield trends in variety trials into two components: genetic improvements and environmental changes. All trends were characterised using 5 years moving averages. The study period was divided into three agronomically relevant sub-periods: (1) in 1960-1980 agriculture was mechanised and improved basic agricultural practices largely introduced, (2) in 1981-1994 intensified crop management practices were increasingly applied and (3) in 1995-2005 Finland had joined the European Union, which resulted in altered agricultural policies and markets. Plant breeding has successfully increased genetic yield potential of all cereal crops without any indication of reduced rates of improvement. Since 1995 the Finnish national yield trends declined for all crops except wheat, for which the trend levelled-off. The main reasons for

this are: cereal production has become less intensive because of (1) application of an environmental programme aimed at increasing the sustainability of agriculture by reducing the environmental load it represents and (2) markedly decreased economic incentives to produce intensively as producer prices for cereals decreased and input prices remained unchanged. National yield trends did not decline because of lack of genetic improvement in yield potential. It is likely that future cereals yield trends will again respond to increasing demand for food, feed, biofuel production and global climate change.
Keywords: Barley; Oat; Rye; Wheat; Yield; Plant breeding; Yield potential; Crop management; Sustainability

Xiang-hui ZENG, Yu-ming WEI, Qian-tao JIANG, Peng-fei QI, You-liang ZHENG, SNP Analysis and Haplotype Identification in Chymotrypsin Inhibitor-2 (CI-2) Gene of Barley, Agricultural Sciences in China, Volume 8, Issue 1, January 2009, Pages 8-14, ISSN 1671-2927, DOI: 10.1016/S1671-2927(09)60003-1.
(http://www.sciencedirect.com/science/article/B82XG-4VFMC51-3/2/801e1462b426087bc3ec41fc9310f0b3)
Abstract:
Barley chymotrypsin inhibitor-2 (CI-2) was considered to be a promising candidate for enhancing the nutritional value of other cereals by increasing its concentration as it is rich in lysine than any other storage protein. Also, it was proposed that CI-2 might play an important role in the inhibition of proteolytic enzymes from pests or pathogens as CI-2 can strongly inhibit chymotrypsin and subtilisin. In this study, a total of 93 CI-2 gene sequences were isolated from wild and cultivated barley. 48 SNPs and 4 indels were detected across the entire sequences. The frequency of SNPs in the non- coding region (1 out of 9 bases) was slightly higher than that in the coding region (1 out of 10.7 bases). In all, 33.3% of the candidate cSNPs resulted in amino acid changes. As a total, the 24 cSNPs resulted in 15 amino acid changes. Ten distinguishable haplotypes were detected, among which 3 haplotypes were shared in the most barley accessions, whereas the rest of the haplotypes appeared at a lower frequency. In addition, three haplotypes (haplotype 4, 8, and 9) were unique for single accessions. These results suggested that low diversity at the CI-2 locus was detected among the cultivated and wild barley.
Keywords: barley; chymotrypsin inhibitor; SNP; haplotype

Zahid A. Qureshi, Howard Neibling, Response of two-row malting spring barley to water cutoff under sprinkler irrigation, Agricultural Water Management, Volume 96, Issue 1, January 2009, Pages 141-148, ISSN 0378-3774, DOI: 10.1016/j.agwat.2008.07.012.
(http://www.sciencedirect.com/science/article/B6T3X-4TK7X8Y-1/2/13cd67acb2b38aa107f602bb914b4bf1)
Abstract:
Agricultural production in irrigated areas is becoming more water-constrained. Scheduling the timing of the last irrigation on cereals is one effective method of reducing seasonal water use while maintaining crop yield and quality. The last irrigation application time and its impact on two-row malting barley (Hordeum distichum cv. Moravian 37) yield, quality, and economic benefits were studied in the 2000, 2001, and 2002 cropping seasons. Irrigation was stopped for the season at Milk, pre-Soft Dough, Soft Dough, and post-Soft Dough grain formation stages. The Soft Dough water cutoff treatment produced the highest grain yield of two-row spring malting barley. Water cutoff before or after Soft Dough stage reduced the grain yield significantly at $P < 0.05$, but the quality of grain for malt production was not significantly different when water was cut off at pre-Soft Dough or post-Soft Dough stages. Irrigation cutoff at Milk stage produced the lowest grain yield with the lowest quality. Decreases in grain yield and quality with the last irrigation at post-Soft Dough reduced grain value by $174 ha-1 relative to Soft Dough, while irrigation costs were higher (Fig. 6). The economic benefit due to labor and power cost reduction from earlier irrigation cutoff

does not offset the resulting loss of grain value/ha for any treatment except post-SD under current southern Idaho energy and labor cost conditions.
Keywords: Sprinkler irrigation; Malting barley; Water use efficiency; Hordeum distichum

Fiona J. Sanderson, Agnieszka Kloch, Konrad Sachanowicz, Paul F. Donald, Predicting the effects of agricultural change on farmland bird populations in Poland, Agriculture, Ecosystems & Environment, Volume 129, Issues 1-3, January 2009, Pages 37-42, ISSN 0167-8809, DOI: 10.1016/j.agee.2008.07.001.
(http://www.sciencedirect.com/science/article/B6T3Y-4T6KF78-1/2/2662f0925738cce9b45956d8a89e1edd)
Abstract:
Measures of bird species richness, and the abundance or distribution of 20 farmland species, 12 of them species of European conservation concern (SPECs), were modelled as a function of a number of habitat variables in six regions of Poland using information-theoretic methods. The strongest positive predictor of species richness of all species, of SPECs and of farmland specialists was the length of woody edge habitat. There was a curvilinear relationship between cereal cover and species richness measures, with total species richness reaching a peak at about 30% cereal cover. Species richness was therefore highest in areas of mixed farming with a high proportion of woody edge habitat. The length of woody edge habitat was also the strongest predictor of the abundance of individual species, although the direction of this relationship varied. This modelling approach generated predictions about changes in bird species richness and abundance in response to agricultural change across Poland. Mixed farming with a high proportion of grassland and woody edge habitat is likely to maintain many of Poland's important farmland bird populations, but species-specific prescriptions will be needed for those species which avoid woody edge habitat.
Keywords: Agricultural intensification; European Union; Farmland birds; Species of European conservation concern (SPECs); New member states

Filippi-Codaccioni Ondine, Clobert Jean, Julliard Romain, Effects of organic and soil conservation management on specialist bird species, Agriculture, Ecosystems & Environment, Volume 129, Issues 1-3, January 2009, Pages 140-143, ISSN 0167-8809, DOI: 10.1016/j.agee.2008.08.004.
(http://www.sciencedirect.com/science/article/B6T3Y-4TJTTFX-1/2/8ed5248e97a265f1c250d566592556e8)
Abstract:
Bird abundance was assessed on a total of 58 farms across the Seine-et-Marne department, France (12 organic, 19 conservation-tillage and 27 conventional farms). Local abundance variations among the three farming systems were related to two species traits, i.e. habitat specialisation and diet, considering both farmland and non-farmland species. It was found that organic farming favoured specialist birds, either considering the whole community or non-farmland birds only. On the opposite, specialist farmland species were found to be less abundant in conservation-tillage farms than in conventional ones. Invertebrate-feeders were found to benefit from conservation-tillage practices compared to omnivorous species but not compared to granivorous ones; an interaction between species diet and the species specialisation level was also found. Granivorous species tended to increase with the conservation-tillage duration and in particular specialist birds.
Keywords: Cereal fields; Farming practices; Breeding birds; Species specialisation index

A.A. Yusuf, R.C. Abaidoo, E.N.O. Iwuafor, O.O. Olufajo, N. Sanginga, Rotation effects of grain legumes and fallow on maize yield, microbial biomass and chemical properties of an Alfisol in the Nigerian savanna, Agriculture, Ecosystems & Environment, Volume 129, Issues 1-3, January 2009, Pages 325-331, ISSN 0167-8809, DOI: 10.1016/j.agee.2008.10.007.

(http://www.sciencedirect.com/science/article/B6T3Y-4TY8W20-3/2/242fbfbe8f0a804b71db4eeae7745b7f)

Abstract:
Understanding changes in soil chemical and biological properties is important in explaining the mechanism involved in the yield increases of cereals following legumes in rotation. Field trials were conducted between 2003 and 2005 to compare the effect of six 2-year rotations involving two genotypes each of cowpea (IT 96D-724 and SAMPEA-7) and soybean (TGx 1448-2E and SAMSOY-2), a natural bush fallow and maize on soil microbial and chemical properties and yield of subsequent maize. Changes in soil pH, total nitrogen (Ntot), organic carbon (Corg), water soluble carbon (WSC), microbial biomass carbon (Cmic) and nitrogen (Nmic) were measured under different cropping systems. Cropping sequence has no significant ($P > 0.05$) effect on soil pH and Corg, while WSC increased significantly when maize followed IT 96D-724 (100%), SAMPEA-7 (95%), TGx 1448-2E (79%) and SAMSOY-2 (106%) compared with continuous maize. On average, legume rotation caused 23% increase in Ntot relative to continuous maize. The Cmic and Nmic values were significantly affected by cropping sequence. The highest values were found in legume-maize rotation and the lowest values were found in fallow-maize and continuous maize. On average, Cmic made up to 4.8% of Corg and Nmic accounted for 4.4% of Ntot under different cropping systems. Maize grain yield increased significantly following legumes and had strong positive correlation with Cmic and Nmic suggesting that they are associated with yield increases due to other rotation effects. Negative correlation of grain yield with Cmic:Nmic and Corg:Ntot indicate that high C:N ratios contribute to nitrogen immobilization in the soil and are detrimental to crop productivity. The results showed that integration of grain legumes will reverse this process and ensure maintenance of soil quality and maize crop yield, which on average, increased by 68% and 49% following soybean and cowpea, respectively compared to continuous maize.
Keywords: Alfisol; Crop rotation; Northern Guinea savanna; Rotation effects; Soil chemical properties; Soil microbial properties

Genxing Pan, Pete Smith, Weinan Pan, The role of soil organic matter in maintaining the productivity and yield stability of cereals in China, Agriculture, Ecosystems & Environment, Volume 129, Issues 1-3, January 2009, Pages 344-348, ISSN 0167-8809, DOI: 10.1016/j.agee.2008.10.008.
(http://www.sciencedirect.com/science/article/B6T3Y-4TY8W20-2/2/840910f09e2c225ad1e755e00d5a1dfc)

Abstract:
The role of soil organic matter (SOM) in agricultural systems has been widely studied in conjunction with the potential for greenhouse gas mitigation. However, the link between SOM accumulation in croplands, crop productivity and yield stability has not yet been clearly established. In this paper, we collected data on provincial yearly crop productivity (yields, total cropland area) during 1949-1998 and the average SOM contents in croplands sampled and determined from the National Soil Survey in 1979-1982 of mainland China. The cereal productivity was assessed both with an overall mean of 1949-1998 and with the mean values for different time periods within this overall time, respectively. The yield variability within a single stabilizing stage, and between the fluctuating years, was calculated as a negative measure of yield stability. The correlation between SOM and cereal productivity was very significant for most provinces, but the relationship has become less significant as we approach the present. Moreover, the average yield variability was very significantly and negatively correlated with the cropland SOM level. The findings support our previous hypothesis from case studies, that C sequestration in China's croplands may provide win-win benefits, by enhancing crop productivity and stabilizing yield. This offers a sound basis as a greenhouse gas mitigation strategy by promoting C sequestration in croplands, and enhancing food security in China's agriculture.

Keywords: C sequestration; Cereal production; Cropland productivity; Food security of China; Soil organic matter

Mojibur R. Khan, Fiona M. Doohan, Bacterium-mediated control of Fusarium head blight disease of wheat and barley and associated mycotoxin contamination of grain, Biological Control, Volume 48, Issue 1, January 2009, Pages 42-47, ISSN 1049-9644, DOI: 10.1016/j.biocontrol.2008.08.015.
(http://www.sciencedirect.com/science/article/B6WBP-4T8YTD2-2/2/e993f3cee88d3fe95aa8c971af9b6f6f)
Abstract:
Fusarium culmorum causes Fusarium head blight (FHB) disease of cereals, resulting in yield loss and contamination of grain with the trichothecene mycotoxin, deoxynivalenol (DON). In a test for potential disease control organisms, Pseudomonas fluorescens strains MKB 158 and MKB 249 and Pseudomonas frederiksbergensis strain 202 significantly reduced both the severity of FHB disease symptoms caused by F. culmorum on wheat and barley ([greater-or-equal, slanted]23%; P [less-than-or-equals, slant] 0.050) and the disease-associated loss in 1000-grain weight ([greater-or-equal, slanted]16%; P [less-than-or-equals, slant] 0.050) under both glasshouse and field conditions when applied 24 h pre-pathogen inoculation. Glasshouse studies showed that these bacteria were more effective in controlling disease when applied 24 h pre- as opposed to 24 h post-pathogen inoculation. The most striking finding was that, in the F. culmorum-inoculated field trials, treatment with either of the two P. fluorescens strains (MKB 158 or MKB 249) also significantly reduced the DON levels in wheat and barley grain (74-78%; P [less-than-or-equals, slant] 0.050). This is the first report detailing the ability of fluorescent pseudomonad bacteria to control FHB disease and simultaneously reduce mycotoxin contamination of wheat and barley under field conditions.
Keywords: Fusarium culmorum; Pseudomonas fluorescens; Pseudomonas frederiksbergensis; Acinetobacter sp.; Chryseobacterium sp.; Deoxynivalenol; Biological control; Cereals

Mojibur R. Khan, Fiona M. Doohan, Comparison of the efficacy of chitosan with that of a fluorescent pseudomonad for the control of Fusarium head blight disease of cereals and associated mycotoxin contamination of grain, Biological Control, Volume 48, Issue 1, January 2009, Pages 48-54, ISSN 1049-9644, DOI: 10.1016/j.biocontrol.2008.08.014.
(http://www.sciencedirect.com/science/article/B6WBP-4T8YTD2-1/2/28d70ac1bdeae15627be3283047f7db4)
Abstract:
Fusarium culmorum can cause Fusarium head blight (FHB) disease of cereals, resulting in yield loss and contamination of grain with the trichothecene mycotoxin, deoxynivalenol (DON). In this study, we compared the efficacy of a biological control agent (Pseudomonas fluorescens strain MKB 158) with the biochemical chitosan (the deacetylated derivative of chitin) in controlling FHB disease of wheat and barley. Both agents were equally effective in reducing DON contamination of grain caused by F. culmorum. Under both glasshouse and field conditions, treatment with commercially available crabshell-derived chitosan reduced the severity of FHB symptom development on wheat and barley by [greater-or-equal, slanted]74% (P [less-than-or-equals, slant] 0.050). While treatment with P. fluorescens reduced the severity of FHB symptom development on these cereals by [greater-or-equal, slanted]48% (P [less-than-or-equals, slant] 0.050). Chitosan and P. fluorescens respectively prevented [greater-or-equal, slanted]58 and [greater-or-equal, slanted]35% of the FHB-associated reductions in 1000-grain weight in wheat and barley (P [less-than-or-equals, slant] 0.050). Both agents significantly reduced the DON content of wheat and barley under both glasshouse and field conditions (P [less-than-or-equals, slant] 0.050) and were equally efficacious in doing so ([greater-or-equal, slanted]74 and [greater-or-equal, slanted]79% reductions due to chitosan and P. fluorescens, respectively). Crude chitin extracts from crabshells and crude chitosan-based formulations prepared from crabshells and eggshells were also tested

under field conditions, but were not as effective as the commercial crabshell-derived preparation in controlling FHB disease. This is the first report on the use of chitosan for the control of Fusarium head blight disease and DON contamination of grain.
Keywords: Fusarium culmorum; Pseudomonas fluorescens; Crabshell chitosan; Deoxynivalenol; Biological control; Wheat; Barley

Kurt Moller, Walter Stinner, Effects of different manuring systems with and without biogas digestion on soil mineral nitrogen content and on gaseous nitrogen losses (ammonia, nitrous oxides), European Journal of Agronomy, Volume 30, Issue 1, January 2009, Pages 1-16, ISSN 1161-0301, DOI: 10.1016/j.eja.2008.06.003.
(http://www.sciencedirect.com/science/article/B6T67-4T3TR2B-1/2/afb41c4c0c9006fcc36202c8e81ce830)
Abstract:
Nitrogen (N) is the most susceptible nutrient to transformations affecting plant availability. These transformations include mineralization, immobilization, nitrification and denitrification, as well as leaching and ammonia volatilization. Use of stable wastes and other residues for biogas digestion may reduce N-losses. It is the purpose of this paper (i) to assess the effects of biogas digestion on soil mineral N (SMN) content in spring and autumn, (ii) to compare NH3 volatilization following superficial application of different manures to a cereal crop, (iii) to compare greenhouse gas emissions of differently treated liquid slurry after its application via injection into closed slots, and (iv) to compare greenhouse gas emissions of differing manuring treatments within a whole organic stockless cropping system. The SMN content in autumn was not influenced by digestion of slurry. However, if cover crops and crop residues were harvested for digestion instead of leaving it on the field, a strong decrease of the SMN content was measured. Ammonia volatilization after application from digested slurry was higher than the volatilization from undigested slurry, likely due to the effect of the higher ammonia content and higher pH. Organic manuring by application of liquid effluents of the biogas digester, by incorporation of green manures with a narrow C/N ratio or by mulching aboveground biomass of a clover/grass-ley, resulted in a strong increase in N2O emissions. The balance showed a 38% decrease in N2O emissions for a whole arable organic stockless cropping system when crop residues and the clover/grass-ley were harvested, digested, and the effluents were reallocated within the same cropping system, in comparison to mulching and incorporation of the biomass as green manure. Injection of liquid cattle slurry resulted in a strong increase of N2O emissions. The results provide some evidence that denitrification during nitrification was the driving force for the measured emission peaks. It was concluded, that biogas digestion of field residues resulted in a win-win situation, with additional energy yields, a lower nitrate leaching risk and lower nitrous oxide emissions. However, the propensity to ammonia volatilization was higher in digested manures.
Keywords: Biogas digestion; Nitrogen; Organic farming; Nitrate leaching; Ammonia volatilization; Nitrous oxide

Christa M. Hoffmann, Toon Huijbregts, Noud van Swaaij, Rudolf Jansen, Impact of different environments in Europe on yield and quality of sugar beet genotypes, European Journal of Agronomy, Volume 30, Issue 1, January 2009, Pages 17-26, ISSN 1161-0301, DOI: 10.1016/j.eja.2008.06.004.
(http://www.sciencedirect.com/science/article/B6T67-4T2J1D5-1/2/f29547c1e1bdc0de21ff154c6b7047cc)
Abstract:
Sugar beet (Beta vulgaris L.) yield and quality are determined by genotype and environment. This study aimed at analysing the relative importance of the environment for yield and quality of sugar beet genotypes and at assessing parameters which could give essential improvement for beet quality if included as additional selection criteria. For that purpose, root yield and quality (sugar, K,

Na, amino N, total soluble N, betaine, glutamine, invert sugar, raffinose) of 9 sugar beet genotypes were investigated in 52 environments (25 sites in 2003 and 27 sites in 2004) in randomised field trials across Europe.
The environment accounted for about 80% of the total variance for all parameters. Effects of the tested genotypes were larger for the content of betaine (8.5%) and sugar (7.6%) than for other parameters (1-5%). With the exception of invert sugar and amino N, the genotype by environment interaction was about 3% and thereby lower than the main effect of genotypes. Interactions resulted in an increase of the differences between genotypes which can be used to select genotypes in the most discriminating environments. The response of genotypes in sugar content was contrasting to other parameters and points to a physiological limit for sugar storage at about 20%. As no crossover interaction occurred for root yield or any quality parameter, there seemed to be no specific suitability of the tested genotypes to certain environmental stress conditions. This is probably due to the fact that the harvested beetroot is a vegetative storage organ and has no growth stages susceptible to unfavourable environmental conditions such as flowering and grain filling which are important for final yield in cereals. Invert sugar showed the largest relative differences between genotypes which were strongly enhanced in southern and some south-eastern European environments. Because of its importance during processing, considering invert sugar in breeding could improve technical quality for processing considerably for those extreme environments.
Keywords: Genotype; Environment; Interaction; Invert sugar; Quality; Sugar beet; Sugar content; Yield

Barbara Rega, Aurelie Guerard, Julien Delarue, Muriel Maire, Pierre Giampaoli, On-line dynamic HS-SPME for monitoring endogenous aroma compounds released during the baking of a model cake, Food Chemistry, Volume 112, Issue 1, 1 January 2009, Pages 9-17, ISSN 0308-8146, DOI: 10.1016/j.foodchem.2008.05.028.
(http://www.sciencedirect.com/science/article/B6T6R-4SH0Y55-N/2/368ab30d5f89b252ec912a7200976876)
Abstract:
This work shows that using a dynamic SPME device combined with an instrumented oven, it is possible to monitor the release of a large amount of volatile compounds generated during the baking process of a real cereal product (sponge cake model) by directly sampling its baking vapours. The steam assisted dynamic SPME device made it possible to extract volatile compounds with very different volatility and hydrophobicity, such as 5-hydroxymethylfurfural and 2-methyl-propanal. Time dependent analyses of baking vapours made it possible to simultaneously follow the release of several odour compounds and thermal reaction markers at different stages of their generation in the sponge cake model. The release of newly formed aroma compounds during baking significantly affected the odour quality of baking extracts as shown by odour profiles and sensory preferences evaluated by Direct-GC-Olfactometry. GC-Olfactometry analysis was carried out on the final baking fractions to gain an understanding of the compounds which could contribute to overall odour quality.
Keywords: Thermal process; Volatile compounds; Maillard reaction; Lipid oxidation; Sponge cake; Dynamic SPME; GC-Olfactometry; Direct-GC-Olfactometry; Sensory analysis

Cristina Martinez-Villaluenga, Henryk Zielinski, Juana Frias, Mariusz K. Piskula, Halina Kozlowska, Concepcion Vidal-Valverde, Antioxidant capacity and polyphenolic content of high-protein lupin products, Food Chemistry, Volume 112, Issue 1, 1 January 2009, Pages 84-88, ISSN 0308-8146, DOI: 10.1016/j.foodchem.2008.05.040.
(http://www.sciencedirect.com/science/article/B6T6R-4SJG6CS-4/2/91f710300e43807c7e44f7918ed806b6)
Abstract:

In order to produce high protein lupin products, [alpha]-galactoside extraction from Lupinus angustifolius cv. Troll and cv. Emir and Lupinus albus cv. Multolupa, and protein isolation from L. albus cv. Multolupa were carried out. Trolox equivalent antioxidant capacity (TEAC), DPPH radical-scavenging activity (DPPH-RSA), peroxyl radical-trapping capacity (PRTC), superoxide dismutase-like activity (SOD-like activity), total phenolic compounds (TPC) and total flavonoids were determined in lupin products. In L. angustifolius cv. Troll, L. angustifolius cv. Emir and L. albus cv. Multolupa [alpha]-galactoside-low flours, the TEAC and DPPH-RSA decreased (43%, 38%; 73%, 82%; 77%, 38%, respectively). PRTC decreased in L. angustifolius cv. Troll and L. albus cv. Multolupa [alpha]-galactoside-low flours (13% and 98%, respectively), while in those of L. angustifolius cv. Emir, PRTC increased (25%). SOD-like activity and TPC were also affected by [alpha]-galactoside extraction and reductions of 30-52% and 38-56%, respectively, were observed. The protein isolate of L. albus cv. Multolupa presented lower TEAC (24%), a similar level of PRTC and twice higher level of DPPH-RSA than did [alpha]-galactoside-low Multolupa flour. Moreover, the SOD-like activity of lupin protein isolate was sharply reduced but the TPC content was 24% higher. The technological procedures, [alpha]-galactoside extraction and protein isolation, provide high protein lupin products but with lower antioxidant capacity and total phenolic compounds than the raw seeds, although the levels of antioxidant capacity of these lupin products resemble those of cereals.
Keywords: Lupins; [alpha]-Galactoside extraction; Protein isolates; Antioxidant capacity; Superoxide dismutase-like activity; Total phenolic compounds; Total flavonoids

Naficeh Sadeghi, Mohammad Reza Oveisi, Behrooz Jannat, Mannan Hajimahmoodi, Hengameh Bonyani, Forouzandeh Jannat, Incidence of aflatoxin M1 in human breast milk in Tehran, Iran, Food Control, Volume 20, Issue 1, January 2009, Pages 75-78, ISSN 0956-7135, DOI: 10.1016/j.foodcont.2008.02.005.
(http://www.sciencedirect.com/science/article/B6T6S-4RY6WMF-1/2/b471bde841d61cdca766c5bcbd27ee86)
Abstract:
This study examined the exposure of infants to aflatoxin M1 (AFM1) and of lactating mothers to aflatoxin B1 (AFB1), using AFM1 in breast milk as a biomarker for exposure to AFB1. An enzyme-linked immunosorbent assay (ELISA) was modified for the analysis of AFM1 in breast milk samples from 160 women in Tehran, Iran. AFM1 was detected in 157 samples by average concentration of 8.2 +/- 5.1 ng/kg (range 0.3-26.7 ng/kg).
The concentration of AFM1 in one sample was higher than the maximum tolerance limit accepted by European Union and USA (25 ng/kg), but in 55 samples was higher than the maximum concentration recommended by Australia and Switzerland (10 ng/kg).
Logistic regression Analysis failed to show significant correlation between AFM1 and gestational age, education, postnatal age, gender, nationality, clinical condition, the number of family member, the number of children, type and amount of dairy consumption, vegetable, fruits, oil and meat. But it was significant relation to the cereal consumption, also to the height at birth.
Keywords: Aflatoxin M1; Human breast milk; Infant milk; ELISA

C.M. Rosell, E. Santos, C. Collar, Physico-chemical properties of commercial fibres from different sources: A comparative approach, Food Research International, Volume 42, Issue 1, January 2009, Pages 176-184, ISSN 0963-9969, DOI: 10.1016/j.foodres.2008.10.003.
(http://www.sciencedirect.com/science/article/B6T6V-4TRCY9P-2/2/6a674c042dc2273a5d86df702af3d5d4)
Abstract:
The lower intake of fibre and fibre-containing foods has refocused the food industry on the benefits of incorporating different fibres in the foodstuff. Nowadays, a whole range of fibres are available in the market, but sometimes a good choice becomes complicated due to their varied physico-

chemical properties. In order to give some light when selecting fibres, a comparative study regarding some physical properties of commercial fibres from different sources is presented, with a view to increasing their use in food products, namely bakery products. Commercial fibres included in this study were hydroxypropylmethylcellulose, cellulose, locust bean gum, guar gum, inulin, galactooligosaccharides, oat and wheat fibres, and fibres extracted from apple and bamboo. Particle size distribution (PSD) of the dry commercial fibres ranged from around 10 to 334 [mu]m; moreover PSD in wet (water and ethanol) form was also determined to have precise information about their behaviour when processing. Cereal fibres (oat 600 and wheat) exhibited the highest values for hydration properties (swelling, water holding and water binding capacity). Only the hydrocolloids (HPMC, locust bean gum and guar gum), with the exception of cellulose, yielded highly viscous solutions during the heating-cooling cycle; moreover oat 600 and apple fibre developed viscous solutions after cooling. HPMC, locust bean gum and guar gum significantly augmented the four SRC values, thus those hydrocolloids affected the relative contributions to water absorption of proteins, carbohydrates, damaged starch and pentosans. Fibre sources and degree of replacement significantly affected the SRC values for the four solvents in all the fibre groups, with the exception of lactic acid SRC in the case of cereal fibres. Differences in fibres effect on wheat flour quality can be easily detected by assessing solvent retention capacity, which can give information on the end use functionality of the wheat flour.
Keywords: Fibres; Physico-chemical properties; Hydration; Particle size; Viscosity

R. Saiah, P.A. Sreekumar, N. Leblanc, J.-M. Saiter, Structure and thermal stability of thermoplastic films based on wheat flour modified by monoglyceride, Industrial Crops and Products, Volume 29, Issue 1, January 2009, Pages 241-247, ISSN 0926-6690, DOI: 10.1016/j.indcrop.2008.05.006.
(http://www.sciencedirect.com/science/article/B6T77-4SWXDF2-1/2/937256e52ac0fcbc3409e15e8df9d513)
Abstract:
The effects of the incorporation of monoglyceride on the structure and thermal stability of extruded thermoplastic films based on modified wheat flour have been investigated using X-ray diffraction (XRD) and thermogravimetric method (TGA). Addition of the monoglyceride reduced the intensity and widened the peaks obtained by XRD indicating a reduction in crystal size. A significant decrease of apparent length of the crystals have been noticed when the quantity of monoglyceride increases. The thermal analysis proved that the thermal stability of the polymeric material decreases as a function of the monoglyceride content. Finally an attempt is made to correlate the thermal stability of the polymeric materials, with the degree of crystallinity.
Keywords: Cereal flours; Biodegradable material; Thermoplastics; Thermogravimetric analysis; X-ray diffraction

Valerie Guillard, Vitali Issoupov, Andreas Redl, Nathalie Gontard, Food preservative content reduction by controlling sorbic acid release from a superficial coating, Innovative Food Science & Emerging Technologies, Volume 10, Issue 1, January 2009, Pages 108-115, ISSN 1466-8564, DOI: 10.1016/j.ifset.2008.07.001.
(http://www.sciencedirect.com/science/article/B6W6D-4T00N67-1/2/b5d37d602b381e0e4e838339292bb53b)
Abstract:
In the aim to reduce the total amount of preservatives added in food, edible coating is used in the present study as surface retention of active agents to maintain a local high effective preservative concentration where microorganisms are intended to contaminate and/or grow, i.e. on coating surface. A food/anti-microbial coating system with sorbic acid as the active compound, agar gel as model food and wheat gluten (WG) or beeswax (BW) film as edible coatings was studied. A mathematical model able to describe the release kinetics of the anti-microbial agents from the edible coating into food products was developed and validated. It was used for estimating the local

surface concentration in sorbic acid of coated model food. This surface concentration is an essential value for predicting microorganism growth but cannot be evaluated by experiments. In the case of WG coating, the surface concentration drops below 10% of the initial value after 1 h whereas in the case of the BW coating, the surface concentration remains above 75% even after one week of contact. Simulation realized using the estimated surface concentration and a simplified equation for the growth inhibition kinetics of Saccharomyces cerevisiae were compared to microbiological efficacy assessment. The calculated amount of sorbic acid required to maintain a 0.2% surface concentration during 23 days was 100 times lower when introducing the additive in a beeswax thin layer than directly in the core of the high moisture food or in a hydrophilic film such as wheat gluten.Industrial relevance

The methodology presented in this study based on experimental measurements and mathematical predictions is of great interest for the rational design of anti-microbial coatings and could be used in industrial applications. Edible coatings are already used in commercial practice for their barrier properties (water barrier property for example to avoid remoistening or drying of cereal-based products, gas barrier properties for the coating of fresh fruits and vegetable, etc) or for food appearance improvement (brilliance of apples for examples could be improved using polysaccharide-based film). Edible coatings have proved to be suitable as vector of preservatives such as anti-microbial or anti-oxidants. By using such retention matrices, very small amount of additives is required since the preservative is concentrated at the product surface. The benefit of using anti-microbial edible coating for consumer health is consequently non-negligible and this aspect is more and more taken into account by food manufacturers. The use of active edible coatings at an industrial scale is expected to grow, in Europe, due to the European framework regulation (EC 2004/1935) which authorizes the concept of active packaging with intentional active agents' release.

The efficacy of anti-microbial edible coating could be assessed through time-consuming experimental tests. But most of the time, the couple edible matrix/active compound suitable for one applicable won't be anymore suitable for another food product and empirical tests should be undertaken once more by the food manufacturer. By using an integrated approach such as the one presented in this work, based on mathematical model for predicting additive release kinetics, numerous experiments may be avoided, since once the preservative diffusivity values in the coating and the food are known, the numerical tool could be used to optimize the initial quantity of preservative to add in the coating, to predict the food shelf life as a function of coating thickness or coating concentration in preservative, etc. The data shown in this paper concerning wheat gluten- and beeswax-based films could be also added in data bases of industrial relevance for further commercial applications.

The approach used in this study could be considered as an assistant and prediction tool that should (i) optimize food preservation and (ii) help manufacturers in elaboration of new food product and packaging.

Keywords: Sorbic acid release system; Mathematical modelling; Edible coatings; Anti-microbial effect

Reetta Kivela, Fred Gates, Tuula Sontag-Strohm, Degradation of cereal beta-glucan by ascorbic acid induced oxygen radicals, Journal of Cereal Science, Volume 49, Issue 1, January 2009, Pages 1-3, ISSN 0733-5210, DOI: 10.1016/j.jcs.2008.09.003.
(http://www.sciencedirect.com/science/article/B6WHK-4TTMJRV-2/2/22978e03135af20411236ed838a7a8d6)

Abstract:

Degradation of cereal beta-glucan is usually attributed to enzymes or acid hydrolysis. However, there is evidence that polysaccharides are also susceptible to OH-radical induced depolymerisation, and that these radicals can be produced in cereal food systems. The role of Fenton type oxidation was demonstrated in pure beta-glucan solution (0.6%). An addition of

ascorbic acid (10 mM) or its oxidation product, dehydroascorbic acid, in the presence of iron sulphate resulted in a significant decrease of the solution viscosity and molecular degradation of beta-glucan. The viscosity decrease was inhibited by introducing a OH-scavenger (glucose) in the solution or limiting oxygen level in the sample solution. This demonstrates the role of OH-radicals in beta-glucan scission and suggests oxidative cleavage to be a potential threat for the stability of beta-glucan in certain fibre enriched products.
Keywords: Beta-glucan; Degradation; Oxygen radicals; Ascorbic acid

F.M. Shapter, P. Eggler, L.S. Lee, R.J. Henry, Variation in Granule Bound Starch Synthase I (GBSSI) loci amongst Australian wild cereal relatives (Poaceae), Journal of Cereal Science, Volume 49, Issue 1, January 2009, Pages 4-11, ISSN 0733-5210, DOI: 10.1016/j.jcs.2008.06.013.
(http://www.sciencedirect.com/science/article/B6WHK-4TB1855-1/2/05b8f0cfd328ab548cd0fad89905ad3d)
Abstract:
A complex cascade of enzymes is responsible for the development of starch granules in grain endosperm. Granule Bound Starch Synthase I (GBSSI), encoded by the Waxy gene, is a key enzyme of starch synthesis and determines the accumulation of amylose in the starch granules. The complete genomic GBSSI sequence was ascertained for eight Australian cereal wild relatives (CWR) to determine diversity within the gene. A phylogeny derived from the coding sequence of the entire Waxy gene was compared to established phylogenetic relationships. Starch granule morphology observed in conjunction with this phylogeny suggests that small polygonal starch granules arranged as compound granules are the ancestral state, evolving subsequently to bimodal starch granules and to larger simple granules. Genomic sequence length varied within the species from 2800 to 3572 bp. Most variation occurred within the intron sequences, the largest insertion showing strong homology to a retrotransposon. One wild species was determined to have a deletion in the 3'-end of exon 1 resulting in a putatively non-functional allele. Alignment of the amino acid sequence showed strong homology throughout the central fragments of the gene but broad variation in the transit peptides. All putative functional alleles maintained the reported active sites for glycogen synthesis, though with variations in other highly conserved areas of the gene. These variations within the wild relatives of cultivated cereals may provide novel sources of genetic diversity for future cereal improvement programs.
Keywords: Australian native grasses; Starch; Crop wild relatives; Cereal; Phylogenetic

Yadahally N. Sreerama, Vadakkot B. Sashikala, Vishwas M. Pratape, Expansion properties and ultrastructure of legumes: Effect of chemical and enzyme pre-treatments, LWT - Food Science and Technology, Volume 42, Issue 1, 2009, Pages 44-49, ISSN 0023-6438, DOI: 10.1016/j.lwt.2008.07.005.
(http://www.sciencedirect.com/science/article/B6WMV-4T263BT-2/2/24b818b7b0d6a92bf75674e7050b83d6)
Abstract:
Expanded cereals and legumes are commonly used as ready-to-eat breakfast foods or as ingredients in food formulations. The use of horse gram and pigeon pea in food formulations and in legume composite flours is limited due to the presence of high levels of antinutritional factors, poor functional and expansion properties. Sodium bicarbonate and protease pre-treatments altered the cell wall structure of these legumes leading to the development of expanded grains. Expansion processing of pre-treated legumes resulted in statistically significant ($P < 0.05$) increases in grain size and expansion volume compared to control grains. Highest yield of expanded grains were obtained with sodium bicarbonate pre-treatment (80 grains/100grains in pigeon pea and 96 grains/100 grains in horse gram), whereas, protease treatment yielded 68 and 94 expanded grains per 100 grains of pigeon pea and horse gram, respectively. Pre-treated expanded grains had lower bulk densities in the range of 480-510 g/L compared to untreated

controls (about 760 g/L). Increased porosity and decreased cell wall thickness in expanded grains resulted in the collapse of cell walls and the appearance of large void spaces within the intercellular matrix. These results suggest the potential utility of under-utilized expanded pigeon pea and horse gram grains or their flours as ingredients in food processing or in legume composite flours.
Keywords: Pigeon pea; Horse gram; Expanded legumes; Ultrastructure; Composite flour

Vazquez-Ovando Alfredo, Rosado-Rubio Gabriel, Chel-Guerrero Luis, Betancur-Ancona David, Physicochemical properties of a fibrous fraction from chia (Salvia hispanica L.), LWT - Food Science and Technology, Volume 42, Issue 1, 2009, Pages 168-173, ISSN 0023-6438, DOI: 10.1016/j.lwt.2008.05.012.
(http://www.sciencedirect.com/science/article/B6WMV-4SK633F-4/2/780862f25d97b4339470ccef3b9d895d)
Abstract:
An evaluation was done of some physicochemical properties of a fiber-rich fraction (FRF) obtained by dry processing of defatted chia (Salvia hispanica) flour. The fiber-rich fraction (FRF) had 29.56 g/100 g crude fiber content and 56.46 g/100 g total dietary fiber (TDF) content, of which 53.45 g/100 g was insoluble dietary fiber (IDF) and 3.01 g/100 g was soluble dietary fiber (SDF). The FRF water-holding capacity was 15.41 g/g, its water absorption capacity 11.73 g/g, and its organic molecule absorption capacity 1.09 g/g. The FRF also had low oil-holding (2.02 g/g) and water adsorption (0.3 g/g) capacities. Emulsifying activity in this fraction was 53.26% and emulsion stability was 94.84%. Its evaluated antioxidant activity was 488.8 [mu]mol/L Trolox equivalents/g FRF, which is higher than for many cereals and similar to drinks such as wine, tea, coffee and orange juice. The chia FRF values for the evaluated properties, particularly for water-holding, oil-holding and organic molecule absorption capacity, suggest it could be a useful ingredient in dietetic products such as baked and fried foods, among others.
Keywords: Chia; Salvia hispanica; Dietary fiber; Physicochemical properties; Functional properties

Suyong Lee, George E. Inglett, Debra Palmquist, Kathleen Warner, Flavor and texture attributes of foods containing [beta]-glucan-rich hydrocolloids from oats, LWT - Food Science and Technology, Volume 42, Issue 1, 2009, Pages 350-357, ISSN 0023-6438, DOI: 10.1016/j.lwt.2008.04.004.
(http://www.sciencedirect.com/science/article/B6WMV-4SBHXCK-1/2/5862a4e85c9aeb3f49a9e63e16a8829e)
Abstract:
Sugar cookies and peanut spreads were prepared with [beta]-glucan-rich hydrocolloids from oats (Nutrim-OB (10 g [beta]-glucan/100 g) and C-Trim20 (20 g [beta]-glucan/100 g)). Products were evaluated for flavor and texture by a descriptive sensory panel. In cookies containing 10-30% Nutrim-OB, the cereal/grain flavor intensity was only significantly different than the control at the 30% level of flour replacement. Cohesiveness and moistness of the cookies increased with increasing amounts of Nutrim-OB, but no significant differences from the control were noted until 20% replacement. In cookies containing 10-30% C-Trim20, cereal/grain flavor intensity increased with increasing amounts of the hydrocolloid. Cardboard flavor also increased, but no significant differences were noted from the control until 20% replacement. Cohesiveness, density, and moistness of the cookies increased with increasing amounts of C-Trim20 with no significant differences until 20% replacement. Substituting 5% of the oil in the peanut spreads with Nutrim-OB did not significantly affect flavor of spreads. However, 9% substitution significantly decreased oily flavor and hardness increased. The use of 5-13% C-Trim20 as a replacement for oil in the spreads produced significantly more gumminess and hardness than the control. Favor of the spreads was not affected by the substitution of up to 9% C-Trim20.
Keywords: Oat; [beta]-Glucan; Hydrocolloids; Cookies; Sensory evaluation

Imran Pasha, Faqir M. Anjum, M.S. Butt, Genotypic variation of spring wheats for solvent retention capacities in relation to end-use quality, LWT - Food Science and Technology, Volume 42, Issue 1, 2009, Pages 418-423, ISSN 0023-6438, DOI: 10.1016/j.lwt.2008.03.005.
(http://www.sciencedirect.com/science/article/B6WMV-4S266BV-1/2/cd780d1e0c895605e31ed0bfc3741122)
Abstract:
The solvent retention capacity (SRC) test is useful to measure flour components contributing to end-use functionality especially where the sample number is large and grain quantities are limited. The water, sodium carbonate, lactic acid, and sucrose SRC values ranged 78.0-98.0, 95.0-127.5, 101.5-139.0, and 125.0-163.0 g/100 g, respectively in 50 spring wheat varieties. Water SRC positively correlated with cookie spread ratio (r = 0.29) while Lactic acid SRC and Sucrose SRC positively correlated with cookie thickness (r = 0.31) and (r = 0.23). Negative correlation coefficients were observed in water SRC and cookie thickness (r = -0.27). Lactic acid SRC also negatively correlated with cookie spread ratio (r = -0.34). Sodium carbonate SRC was found to be negatively correlated with cookie diameter (r = -0.19) and cookie spread ratio (r = -0.16). The SRC test is a promising method for the evaluation of soft wheat varieties on the basis of their biochemical characteristics.
Keywords: Wheat, Solvent retention capacity; Cookie quality; Cluster analysis

C. Castillo, J.L. Benedito, V. Pereira, P. Vazquez, C. Gutierrez, J. Hernandez, Acid-base status and serum l-lactate in growing/finishing bull calves fed different high-grain diets, Livestock Science, Volume 120, Issues 1-2, January 2009, Pages 66-74, ISSN 1871-1413, DOI: 10.1016/j.livsci.2008.04.011.
(http://www.sciencedirect.com/science/article/B7XNX-4SV0T24-2/2/8db7c634566a2bef89ea8ea961fc2fe3)
Abstract:
This study evaluated the influence of diet grain mix on the serum acid-base balance and productive performance of calves maintained on high-grain diets in a commercial feedlot system, monitoring progress over the entire 140-day productive cycle (i.e. both the growing and finishing periods). Thirty 14-week-old Belgian Blue bull calves were randomly allotted in equal numbers to one of three experimental groups defined by whether the cereal grain in their diet was predominantly corn (group C), predominantly barley (group B), or predominantly a mixture of corn and barley in approximately equal proportions (group CB). Blood pH, pCO2, HCO3-, base excess and serum l-lactate were determined, as were several productive performance variables. The three groups differed significantly with respect to their weights at the end of the growing period (CB > C > B), but not in final weight; group B gained significantly more weight and had a lower daily intake than either group C or group CB during the finishing period. At no time during the study period was altered ruminal function suggested by either clinical signs or blood parameters, possibly because of the relatively high crude protein (CP) contents of the feeds and the use of barley straw as forage. Nevertheless, HCO3- and base excess were significantly higher in group C than in the other groups during the growing period, suggesting that supplementation of a high-CP corn-based diet with bicarbonate could lead to alkalotic blood base values (group C was the only group to receive bicarbonate supplement in this study). Also, in group CB HCO3- and base excess were generally lower than in the other groups during both the growing and finishing periods, much of the time exhibiting a falling trend compatible with the use of blood bases to counteract overproduction of ruminal acids; this behaviour, which may have been due to the lower dietary fibre content of the CB diet, does not support claims that diets with equal proportions of rapidly and slowly digested starch sources are more beneficial than those including only one of these starch source types. Serum l-lactate levels were almost invariably higher in group B than in group C, with group CB in between, in both the growing and the finishing periods; and a significant time x group interaction during the growing period suggests that the time course of serum l-lactate was

determined mainly by the influence of diet on microbial growth rates in the rumen. Negative correlation between blood pH and pCO2 around the switch between growing and finishing regimens suggests that diet may possibly modulate the influence of breed on pCO2, but further is required to examine this hypothesis.
Keywords: Feedlot; High-grain diets; Metabolism; Acid-base balance

Gabor Galiba, Attila Vagujfalvi, Chengxia Li, Alexandra Soltesz, Jorge Dubcovsky, Regulatory genes involved in the determination of frost tolerance in temperate cereals, Plant Science, Volume 176, Issue 1, January 2009, Pages 12-19, ISSN 0168-9452, DOI: 10.1016/j.plantsci.2008.09.016.
(http://www.sciencedirect.com/science/article/B6TBH-4TPHRHG-2/2/7bca002b6c39f197c16ef4defe514dbf)
Abstract:
Recent progress in the characterization of two groups of genes responsible for natural differences in frost tolerance in wheat and barley is reviewed here. The first group includes the vernalization genes that delay flowering until the end of the winter and protect sensitive floral primordia. This process is regulated mainly by differences in the regulatory regions of VRN1 and VRN3 genes or in the coding regions of VRN2. The second group includes a set of tandemly duplicated CBF (C-repeat Binding Factors) transcription factors at the FR2 (Frost Resistance 2) locus. CBF transcription factors are known regulators of the COR genes (COld Regulated genes) which are induced by cold and confer tolerance to subsequent freezing temperatures (acclimation). Natural differences in frost tolerance in both wheat and barley have been mapped to the FR2 locus, and are associated with differences in threshold induction temperatures and/or transcript levels of several CBF genes. Higher threshold induction temperatures result in earlier up-regulation of COR genes during the fall, whereas higher induction levels by cold are associated with faster cold acclimation rates. Both processes result in longer acclimation periods and improved frost tolerance. Increases in VRN1 transcript levels in the leaves are associated with reduced responsiveness of CBF and COR genes to cold and with the end of the acclimation period. Therefore, delays in the induction of VRN1 and in the transition to the reproductive stage can extend the acclimation period and improve frost tolerance. These observations suggest that the vernalization and cold acclimation regulatory gene networks are interconnected.
Keywords: Wheat; Frost tolerance; Vernalization; CBF; VRN1; FR2

Ralf Weinekotter, Compact and efficient continuous mixing processes for production of food and pharmaceutical powders, Trends in Food Science & Technology, Volume 20, Supplement 1, EHEDG Yearbook 2009, January 2009, Pages S48-S50, ISSN 0924-2244, DOI: 10.1016/j.tifs.2009.01.037.
(http://www.sciencedirect.com/science/article/B6VHY-4VC7DW8-7/2/b1761e3225ad695a36acbcae899b455b)
Abstract:
Many food and pharmaceutical powders have traditionally been manufactured in batch processes. Especially for larger capacities (>1000 kg/h), the food industry is using continuous processing (e.g. salt mixtures, cereals, chocolate) if the number of mixture components is limited. However, even for lower capacity food and pharmaceutical production, more economical and more efficient production methods will be required in the future, particularly for blockbuster products whose patent protection has expired. The US Food and Drug Administration (FDA) has a large-scale development program that is currently testing the continuous production method. The PAT (Process Analytical Technology) Initiative requires implementation of in-process monitoring systems and controls in the mixing process. Gericke has developed continuous mixing and metering systems for this low-throughput range with the required accuracy, that also meet the highest hygienic requirements. The testing and model calculations demonstrate that the efficiency (statistically expressed as the relative standard deviation) is determined not only by the process

parameters such as the average residence time and the metering constancy, but also by the particle size distribution and the concentration range of the active substance. This active substance may be considered to be vitamins in food or active ingredients for pharmaceutical products.

Sirma Yegin, Ali Uren, Biogenic amine content of boza: A traditional cereal-based, fermented Turkish beverage, Food Chemistry, Volume 111, Issue 4, 15 December 2008, Pages 983-987, ISSN 0308-8146, DOI: 10.1016/j.foodchem.2008.05.020.
(http://www.sciencedirect.com/science/article/B6T6R-4SH0Y55-K/2/cf95b2a842ba08c52eff087d1e8f85c5)
Abstract:
Boza is a fermented beverage made from millet, maize, wheat or rice. Biogenic amine contents of 10 boza samples from different manufacturers in Turkey were analysed for the first time, using HPLC after derivatisation with benzoyl chloride. Of the 11 biogenic amines under study, putrescine, spermidine and tyramine were detected in all boza samples. Tyramine was the prevailing biogenic amine. Tyramine concentrations of boza samples were between 13 and 65 mg/kg. Total biogenic amine contents of boza samples were between 25 and 69 mg/kg. Consequently, consumption of boza might represent a health risk for patients being treated with drugs containing monoamine oxidase inhibitor (MAOI). The pH values of boza samples were in the range from 3.16 to 4.02; total dry matters were from 15.3% to 31.1% (w/w); protein contents were from 0.50% to 0.99% (w/w). No significant correlations were detected between biogenic amine concentrations and pH, protein content and total dry matter content.
Keywords: Biogenic amines; Boza

Debashis Chakraborty, Shantha Nagarajan, Pramila Aggarwal, V.K. Gupta, R.K. Tomar, R.N. Garg, R.N. Sahoo, A. Sarkar, U.K. Chopra, K.S. Sundara Sarma, N. Kalra, Effect of mulching on soil and plant water status, and the growth and yield of wheat (Triticum aestivum L.) in a semi-arid environment, Agricultural Water Management, Volume 95, Issue 12, December 2008, Pages 1323-1334, ISSN 0378-3774, DOI: 10.1016/j.agwat.2008.06.001.
(http://www.sciencedirect.com/science/article/B6T3X-4SY5WYG-2/2/f1394863263a20722182845dbcf72001)
Abstract:
Mulching is one of the important agronomic practices in conserving the soil moisture and modifying the soil physical environment. Wheat, the second most important cereal crop in India, is sensitive to soil moisture stress. Field experiments were conducted during winter seasons of 2004-2005 and 2005-2006 in a sandy loam soil to evaluate the soil and plant water status in wheat under synthetic (transparent and black polyethylene) and organic (rice husk) mulches with limited irrigation and compared with adequate irrigation with no mulch (conventional practices by the farmers). Though all the mulch treatments improved the soil moisture status, rice husk was found to be superior in maintaining optimum soil moisture condition for crop use. The residual soil moisture was also minimum, indicating effective utilization of moisture by the crop under RH. The plant water status, as evaluated by relative water content and leaf water potential were favourable under RH. Specific leaf weight, root length density and dry biomass were also greater in this treatment. Optimum soil and canopy thermal environment of wheat with limited fluctuations were observed under RH, even during dry periods. This produced comparable yield with less water use, enhancing the water use efficiency. Therefore, it may be concluded that under limited irrigation condition, RH mulching will be beneficial for wheat as it is able to maintain better soil and plant water status, leading to higher grain yield and enhanced water use efficiency.
Keywords: Mulch; Wheat; Soil temperature; Canopy air temperature difference; Root length density; Water use efficiency

James J. Gilroy, Guy Q.A. Anderson, Philip V. Grice, Juliet A. Vickery, Iain Bray, P. Nicholas Watts, William J. Sutherland, Could soil degradation contribute to farmland bird declines? Links between soil penetrability and the abundance of yellow wagtails Motacilla flava in arable fields, Biological Conservation, Volume 141, Issue 12, December 2008, Pages 3116-3126, ISSN 0006-3207, DOI: 10.1016/j.biocon.2008.09.019.
(http://www.sciencedirect.com/science/article/B6V5X-4TT1G4G-7/2/f2f66bfc46ecaf0067409018f09da287)
Abstract:
Major changes to the extent and quality of farmland habitats, brought by the intensification of agricultural practice, are thought to be the main factors driving declines in a suite of farmland bird species in Europe. Recent changes in agricultural techniques have also contributed to widespread soil degradation, arising from increased soil exposure to erosion forces, declining soil organic content and increasing soil compaction. Although soils have a fundamental influence on ecosystem properties, the implications of soil degradation for farmland biodiversity have received little attention. In this study, we measure the influence of soil conditions on the distribution of a declining insectivorous farmland bird, the yellow wagtail Motacilla flava, relative to other habitat features in arable fields. Soil penetrability was found to have a significant influence on the abundance of territorial yellow wagtails at the field scale, together with crop type. Other measured habitat features had little effect on territory abundance, including soil organic content, crop height (within preferred crop types), field boundary habitats and availability of bare ground. Monitoring of invertebrate abundance across 20 cereal fields revealed a significant influence of both soil penetrability and soil organic content on aerial invertebrate capture rates. This relationship was strongest during the latter part of the breeding season, implying that settling yellow wagtails could use soil penetrability as a predictive indicator of prey abundance during the chick-rearing period. The strong relationship between yellow wagtails and soil penetrability suggests a potential causative link between soil degradation and population decline. The role of soils in determining abundance patterns and population declines of other farmland species may have been overlooked in previous studies.
Keywords: Agriculture; Distribution modelling; Habitat associations; Soil quality; Farmland birds

Peter H. Sikkema, Christy Shropshire, Nader Soltani, Tolerance of spring barley (Hordeum vulgare L.), oats (Avena sativa L.) and wheat (Triticum aestivum L.) to saflufenacil, Crop Protection, Volume 27, Issue 12, December 2008, Pages 1495-1497, ISSN 0261-2194, DOI: 10.1016/j.cropro.2008.07.009.
(http://www.sciencedirect.com/science/article/B6T5T-4TFDXWX-1/2/48541e753bb0ea9ce811e2b85d826ba8)
Abstract:
Saflufenacil is a new herbicide being developed by BASF for pre-emergence application for broadleaved weed control in maize and other crops. Three field studies were conducted in Ontario, Canada over a 2-year period (2006 and 2007) to evaluate the tolerance of spring cereals (barley, oats, and wheat) to pre-emergence and post-emergence applications of saflufenacil at 50 and 100 g ai ha-1. Saflufenacil pre-emergence caused minimal visible injury (1% or less) at 3, 7, 14 and 28 days after emergence and had no adverse effect on plant height or yield of barley, oats, and wheat. Saflufenacil plus the surfactant Merge (1% v/v) applied post-emergence caused as much as 76, 60, 52 and 35% visible injury in spring cereals at 3, 7, 14 and 28 DAT, respectively. Injury with saflufenacil plus Merge applied post-emergence decreased over time and was generally greater as dose increased. Saflufenacil plus Merge applied post-emergence reduced plant height by as much as 16% and reduced yield of spring barley and wheat by 24 and 13%, respectively, but had no effect on the yield of spring oats. Based on these results, saflufenacil applied pre-emergence at the proposed dose can be safely used in spring planted barley, oats and wheat;

however, the post-emergence application of saflufenacil results in unacceptable injury and yield loss. These results are consistent with the proposed pre-emergence use pattern for saflufenacil.
Keywords: Barley; Height; Herbicide sensitivity; Oats; Tolerance; Yield; Wheat

Timothy S. George, Peter J. Gregory, Peter Hocking, Alan E. Richardson, Variation in root-associated phosphatase activities in wheat contributes to the utilization of organic P substrates in vitro, but does not explain differences in the P-nutrition of plants when grown in soils, Environmental and Experimental Botany, Volume 64, Issue 3, December 2008, Pages 239-249, ISSN 0098-8472, DOI: 10.1016/j.envexpbot.2008.05.002.
(http://www.sciencedirect.com/science/article/B6T66-4SG4HM8-1/2/1b900d65bd5cba35dea75e03c7ffc421)
Abstract:
To understand whether genotypic variation in root-associated phosphatase activities in wheat impacts on its ability to acquire phosphorus (P), various phosphatase activities of roots were measured in relation to the utilization of organic P substrates in agar, and the P-nutrition of plants was investigated in a range of soils. Root-associated phosphatase activities of plants grown in hydroponics were measured against different organic P substrates. Representative genotypes were then grown in both agar culture and in soils with differing organic P contents and plant biomass and P uptake were determined. Differences in the activities of both root-associated and exuded phosphodiesterase and phosphomonoesterase were observed, and were related to the P content of plants supplied with either ribonucleic acid or glucose 6-phosphate, respectively, as the sole form of P. When the cereal lines were grown in different soils, however, there was little relationship between any root-associated phosphatase activity and plant P uptake. This indicates that despite differences in phosphatase activities of cereal roots, such variability appears to play no significant role in the P-nutrition of the plant grown in soil, and that any benefit derived from the hydrolysis of soil organic P is common to all genotypes.
Keywords: Glucose-6-phosphate; myo-Inositol hexakisphosphate; RNA; Phytate; Phosphomonoester; Phosphodiester; Rhizosphere; Root exudates

Ana Laura Holguin-Acuna, Elizabeth Carvajal-Millan, Victor Santana-Rodriguez, Agustin Rascon-Chu, Jorge A. Marquez-Escalante, Nora E. Ponce de Leon-Renova, Guadalupe Gastelum-Franco, Maize bran/oat flour extruded breakfast cereal: A novel source of complex polysaccharides and an antioxidant, Food Chemistry, Volume 111, Issue 3, 1 December 2008, Pages 654-657, ISSN 0308-8146, DOI: 10.1016/j.foodchem.2008.04.034.
(http://www.sciencedirect.com/science/article/B6T6R-4SBHX92-4/2/a1becf474a4c0bc645c51118ce20d8a8)
Abstract:
A maize bran/oat flour extruded breakfast cereal was developed as a novel source of an antioxidant and complex polysaccharides. Six levels of maize bran/oat flour were formulated (0, 10, 20, 30, 40 and 50%, w/w). The breakfast cereal containing 30% maize bran was the most accepted by consumers. A 100 g serving of this cereal formulation provides 0.2 g of ferulic acid, and 8 g of complex polysaccharides, which includes 1.2 g of [beta]-glucans and 6.8 g of arabinoxylans. This cereal breakfast could be an alternative to maize bran, which is a by-product scarcely used for human consumption.
Keywords: Maize bran; Oat flour; Breakfast cereal; [beta]-Glucans; Arabinoxylans; Ferulic acid

Ali Ketabi, Sabihe Soleimanian-Zad, Mahdi Kadivar, Mahmoud Sheikh-Zeinoddin, Production of microbial exopolysaccharides in the sourdough and its effects on the rheological properties of dough, Food Research International, Volume 41, Issue 10, December 2008, Pages 948-951, ISSN 0963-9969, DOI: 10.1016/j.foodres.2008.07.009.

(http://www.sciencedirect.com/science/article/B6T6V-4T2631X-1/2/358a78089947dc973f011cb0d85568ff)
Abstract:
Exopolysaccharides (EPS) are exogenous microbial metabolites which are secreted mainly by bacteria and microalgae during growth. In addition to natural polysaccharides present in cereal grains flour and dough, microbial flora is usually involved in production of polysaccharide on sourdough fermentation. Total polysaccharides (microbial and flour) were extracted from sourdough and dough samples dehydrated and were added at the rate of 0%, 0.25%, 0.5%, 1%, 1.5%, 2% and 2.5% (w/w flour based) on the dough to investigate its effects on the rheological properties of the dough. Addition of polysaccharides to the dough increased the water absorption and decreased the dough softening after 20 min. Resistance to extension after 45, 90 and 135 min resting time was decreased by increasing the percentage of the added polysaccharides. Longer fermentation time for each level of polysaccharides led to greater stability. No significant differences were observed in the extensibility of dough. The overall effects of different levels of added polysaccharides resulted in a decrease in resistance to extension ratio of the samples. Energy input decreased in all cases. It seems therefore that addition of polysaccharides may be useful when bread is to be made with stronger flour and longer fermentation time is needed.
Keywords: Exopolysaccharides; Lactic acid bacteria; Rheological properties; Dough

Valerie Daux, Christophe Lecuyer, Marie-Anne Heran, Romain Amiot, Laurent Simon, Francois Fourel, Francois Martineau, Niels Lynnerup, Herve Reychler, Gilles Escarguel, Oxygen isotope fractionation between human phosphate and water revisited, Journal of Human Evolution, Volume 55, Issue 6, December 2008, Pages 1138-1147, ISSN 0047-2484, DOI: 10.1016/j.jhevol.2008.06.006.
(http://www.sciencedirect.com/science/article/B6WJS-4T8H377-2/2/d402b3c669c1cd21c3fcf8f881ce8c50)
Abstract:
The oxygen isotope composition of human phosphatic tissues ([delta]18OP) has great potential for reconstructing climate and population migration, but this technique has not been applied to early human evolution. To facilitate this application we analyzed [delta]18OP values of modern human teeth collected at 12 sites located at latitudes ranging from 4[degree sign]N to 70[degree sign]N together with the corresponding oxygen composition of tap waters ([delta]18OW) from these areas. In addition, the [delta]18O of some raw and boiled foods were determined and simple mass balance calculations were performed to investigate the impact of solid food consumption on the oxygen isotope composition of the total ingested water (drinking water + solid food water). The results, along with those from three, smaller published data sets, can be considered as random estimates of a unique [delta]18OW/[delta]18OP linear relationship: [delta]18OW = 1.54(+/-0.09) x [delta]18OP-33.72(+/-1.51) (R2 = 0.87: p [H0:R2 = 0] = 2 x 10-19). The [delta]18O of cooked food is higher than that of the drinking water. As a consequence, in a modern diet the [delta]18O of ingested water is +1.05 to 1.2[per mille sign] higher than that of drinking water in the area. In meat-dominated and cereal-free diets, which may have been the diets of some of our early ancestors, the shift is a little higher and the application of the regression equation would slightly overestimate [delta]18OW in these cases.
Keywords: Fractionation equation; Homo sapiens; Tooth enamel; Climate

R. Borneo, A. Aguirre, Chemical composition, cooking quality, and consumer acceptance of pasta made with dried amaranth leaves flour, LWT - Food Science and Technology, Volume 41, Issue 10, December 2008, Pages 1748-1751, ISSN 0023-6438, DOI: 10.1016/j.lwt.2008.02.011.
(http://www.sciencedirect.com/science/article/B6WMV-4S0PKTP-3/2/3b744dbe557170e13a6ddb662619713c)
Abstract:

Pasta is a staple food in many countries. Amaranth is a pseudo-cereal being re-discovered because of its nutritional properties. The main objective of this study was to evaluate the potential of the green material of the amaranth plant (leaves) as a component for pasta production and its effect on the pasta quality and consumer acceptance. Dried amaranth (Amaranthus caudatus) leaves and spinach leaves flours were prepared. Pasta samples were manufactured following a small-scale pilot procedure. Amaranth pasta samples were evaluated for its chemical composition, cooking quality, textural, and sensory/consumer acceptance. Results showed that pasta made with dried amaranth leaves had similar chemical composition (protein content: 14.18 g/100 g, Fe content: 9.1 mg/100 g), cooking quality (2.15 pasta weight increase, 4.47% residue loss), textural characteristics (firmness and adhesiveness), and sensory acceptance than green pasta made with dried spinach leaves. Since amaranth leaves have similar nutritional characteristics to spinach leaves and since this biomass in not currently used for food purposes, this study points out that amaranth leaves could be technically used for pasta production and that consumer acceptance of pasta made with amaranth green leaves flour is similar to that of pasta made with spinach.
Keywords: Amaranth; Spinach; Pasta; Quality

Z.A. Kruk, C.D.K. Bottema, J.J. Davis, B.D. Siebert, G.S. Harper, J. Di, W.S. Pitchford, Effects of vitamin A on growth performance and carcass quality in steers, Livestock Science, Volume 119, Issues 1-3, December 2008, Pages 12-21, ISSN 1871-1413, DOI: 10.1016/j.livsci.2008.02.008.
(http://www.sciencedirect.com/science/article/B7XNX-4S92XVW-1/2/b1f20e4a879daf88d61a1857fb4416c9)
Abstract:
Vitamin A plays a critical role in many essential life processes. In herbivores, it is either derived from plant [beta]-carotene or directly as a dietary supplement. In cattle, vitamin A has the potential to influence various carcass traits that are sought by specific beef markets. A group of 20 Angus steers was removed from pasture and fed a low [beta]-carotene and vitamin A cereal-based ration on a feedlot for 308 days. Ten of the steers were supplemented with vitamin A (retinyl palmitate, 60 IU of vitamin A/100 kg body weight/day) and the other ten received no supplement. The results demonstrated that restriction of vitamin A intake changed intramuscular fat deposition without changing subcutaneous fat depots. Angus steers that had been depleted of vitamin A showed increased intramuscular fat in the longissimus thoracis et lumborum (LTL) by 35% ($P < 0.026$) and seam fat area at the quartering site by 33% ($P < 0.0273$), when compared with cattle supplemented with vitamin A. There were no changes in intramuscular fat in the semitendinosus. Visually assessed marbling scores were also higher (19%; $P < 0.094$) in the non-supplemented, depleted group. There was no effect of vitamin A depletion on cattle growth and other meat traits (eye muscle area, meat colour, pH, meat cut weight), meat eating attributes (tenderness, cooking loss) or muscle fibre diameter. The only difference ($P < 0.0177$) among the meat traits was fat colour where depleted animals had whiter fat than the controls. Moreover, the fat from the vitamin A depleted group was softer with a lower melting point. We conclude that the reduced vitamin A consumption, leading to vitamin A depletion, increases intramuscular fat. On the other hand, the vitamin A depletion did not increase subcutaneous fat depth or change other meat quality traits, suggesting that marbling and these other traits are not invariably related.
Keywords: Beef cattle; Marbling; Carcass quality; Vitamin A; Retinol

Havard Steinshamn, Erling Thuen, White or red clover-grass silage in organic dairy milk production: Grassland productivity and milk production responses with different levels of concentrate, Livestock Science, Volume 119, Issues 1-3, December 2008, Pages 202-215, ISSN 1871-1413, DOI: 10.1016/j.livsci.2008.04.004.
(http://www.sciencedirect.com/science/article/B7XNX-4SJR2PP-1/2/a9179f5444ed36bc37cc1530775d2e3d)
Abstract:

Red (RC) or white (WC) clover were grown in mixture with grasses, ensiled and offered to dairy cows in early lactation over two successive years (48 cows per year) to compare grassland yield, feed intake, milk production and milk quality. The crops were ensiled in round bales and proportional mixtures of the second and third cut prepared each year were used to ensure that the silage treatments were representative of the crop. In addition to silage type, concentrate supplementation, without and with (10 kg/day), was included as a factor in a 2 x 2 factorial, continuous experiment. Total dry matter (DM) yield, silage chemical composition and total DM intake was hardly affected by silage type. There was no effect of silage type on milk yield and milk constituents either, except for higher milk protein content ($P < 0.05$) on WC and higher milk fat content of C18:3n-3 ($P < 0.001$), C18:2n-6 ($P < 0.05$) fatty acids (FAs) and sum of polyunsaturated FA ($P < 0.001$) and lower n-6/n-3 FA ratio ($P < 0.01$) on RC. Concentrate supplementation increased total DM, N and net energy intakes ($P < 0.001$), milk yield ($P < 0.001$), milk fat ($P < 0.01$) and protein ($P < 0.001$) content, decreased the milk urea content ($P < 0.001$), and increased the milk fat content of short- and medium-chained FAs (< C16, $P < 0.001$), C18:0 ($P < 0.01$) and C18:2n-6 ($P < 0.001$), decreased the content of C16:0 ($P < 0.05$), C18:1t11 ($P < 0.001$) and C18:3n-3 ($P < 0.001$), and increased the n-6/n-3 FA ratio ($P < 0.001$). The effect of concentrate supplementation was not affected by silage type, except for milk protein content where the positive effect of supplementation was stronger on WC than on RC diets ($P < 0.05$). This study illustrates that the white- and red clover-grass mixtures investigated were widely similar with regard to their effects on grassland yield, silage intake and milk production and milk constituents, except for a higher milk fat content of C18:3n-3 and C18:2n-6 and lower n-6/n-3 FA ratio on red clover diets. Our findings also show that N conversion efficiency from feed to milk on pure forage diets is more sensitive to changes in dietary protein intake than silage diets containing cereal based concentrates.

Keywords: Organic farming; Legumes; Silage; Concentrate supplementation; Milk production; Fatty acids

Nagib Ahsan, Dong-Gi Lee, Ki-Won Lee, Iftekhar Alam, Sang-Hoon Lee, Jeong Dong Bahk, Byung-Hyun Lee, Glyphosate-induced oxidative stress in rice leaves revealed by proteomic approach, Plant Physiology and Biochemistry, Volume 46, Issue 12, December 2008, Pages 1062-1070, ISSN 0981-9428, DOI: 10.1016/j.plaphy.2008.07.002.
(http://www.sciencedirect.com/science/article/B6VRD-4T193YN-3/2/1a64b0777ea38e687f665ae0aa90c39c)

Abstract:
Glyphosate is one of the most widely used herbicides in cereal-growing regions worldwide. In the present work, the protein expression profile of rice leaves exposed to glyphosate was analyzed in order to investigate the alternative effects of glyphosate on plants. Two-week-old rice leaves were subjected to glyphosate or a reactive oxygen species (ROS) inducing herbicide paraquat, and total soluble proteins were extracted and analyzed by two-dimensional gel electrophoresis (2-DE) coupled with matrix-assisted laser desorption/ionization-time of flight (MALDI-TOF) mass spectrometry (MS) analysis. A total of 25 differentially expressed proteins were identified from the glyphosate treated sample, wherein 18 proteins were up-regulated and 7 proteins were down-regulated. These proteins had shown a parallel expression pattern in response to paraquat. Results from the 2-DE analysis, combined with immunoblotting, clearly revealed that ribulose-1,5-bisphosphate carboxylase/oxygenase (Rubisco) large subunit was significantly decreased by the treatment of both herbicides. An increased accumulation of antioxidant enzymes including ascorbate peroxidase, glutathione S-transferase, thioredoxin h-type, nucleoside diphosphate kinase 1, peroxiredoxin and a superoxide dismutase [Cu-Zn] chloroplast precursor in the glyphosate-treated sample suggests that a glyphosate treatment possibly generates oxidative stress in plants. Moreover, a gene expression analysis of five antioxidant enzymes by Northern blot confirmed their mRNA levels in the rice leaves. A histo-cytochemical investigation with DAB

(3,3-diaminobenzidine) to localize H2O2 and increases of the thiobarbituric acid reactive substances (TBARS) concentration revealed that the glyphosate application generates ROS, which resulted in the peroxidation and destruction of lipids in the rice leaves.
Keywords: Antioxidant enzyme; Herbicide; Reactive oxygen species; Proteomics

Murray Unkovich, Jeff Baldock, Measurement of asymbiotic N2 fixation in Australian agriculture, Soil Biology and Biochemistry, Volume 40, Issue 12, December 2008, Pages 2915-2921, ISSN 0038-0717, DOI: 10.1016/j.soilbio.2008.08.021.
(http://www.sciencedirect.com/science/article/B6TC7-4THS06N-1/2/b35ed400c45a96ca0d0b9527d73fb162)
Abstract:
A wide range of bacteria capable of nitrogen fixation (free-living and associative) can be found in all agricultural soils across Australia, however measurement of their effectiveness in N2 fixation has proved to be problematic because rates are low compared to symbiotic systems and quantitative methodologies barely adequate. It is generally believed that associative N2 fixation rates may be greater than free-living N2 fixation rates in ecosystems where grasses (including cereals) dominate, although this has not been unequivocally proven. Conditions promoting asymbiotic N2 fixation are reduced availability of oxygen, high temperature and soil water, and large amounts of microbially available C in the soil. The most direct measure of N2 fixation, incorporation of 15N2, has rarely been used in undisturbed systems, and we can find no examples of its field application in Australia. Nitrogen balance calculations, based on long-term changes in total soil N of systems and crop N removal, have been used to infer asymbiotic N2 fixation, but do not measure it directly. Such N balance studies can thus only give an indication of potential asymbiotic N2 fixation over long periods of time, but cannot confirm it. There are no robust N balances published for Australian ecosystems. The acetylene reduction assay for nitrogenase activity has been used in Australia to study responses of both free-living and associative N2 fixation systems to regulating factors. These studies have highlighted the importance of C supply, high soil water content and temperature in increasing asymbiotic N2 fixation in soils. However significant methodological limitations do not allow field scale quantification using this assay. On balance we would concur with the authors of several earlier global reviews of this topic and conclude that (in Australia) contributions of nitrogen to crop growth from asymbiotic N2 fixation are likely to be <10 kg N ha-1 y-1 and generally not of agronomic significance under low rainfall conditions. In tropical environments where higher rainfall and temperatures coincide, rates are likely to be greater if soil mineral N is low and carbon substrates are available for N2 fixing microorganisms. If asymbiotic N2 fixation is to be encouraged or profitably managed, there is a need for more reliable field measurement and a combination of methodologies including 15N might provide more definitive quantitative indications.
Keywords: Free-living bacteria; Associative N fixation; Acetylene reduction; 15N; Diazotrophs

Elisabeth Oldenburg, Susanne Kramer, Stefan Schrader, Joachim Weinert, Impact of the earthworm Lumbricus terrestris on the degradation of Fusarium-infected and deoxynivalenol-contaminated wheat straw, Soil Biology and Biochemistry, Volume 40, Issue 12, December 2008, Pages 3049-3053, ISSN 0038-0717, DOI: 10.1016/j.soilbio.2008.09.004.
(http://www.sciencedirect.com/science/article/B6TC7-4TMYG27-1/2/f255d306c793279dadd651c25015ee4b)
Abstract:
When conservation tillage is practised in agriculture, plant residues remain on the soil surface for soil protection purposes. These residues should be widely decomposed within the following vegetation period as microbial plant pathogens surviving on plant litter may endanger the currently cultivated crop. Important soil-borne fungal pathogens that preferably infect small grain cereals belong to the genus Fusarium. These pathogens produce the mycotoxin deoxynivalenol (DON), a

cytotoxic agent, in infected cereal organs. This toxin frequently occurs in cereal residues like straw. So far it is unclear if DON degradation is affected by members of the soil food web within decomposing processes in the soil system. For this purpose, a microcosm study was conducted under controlled laboratory conditions to investigate the degradation activity of the earthworm species Lumbricus terrestris when exposed to Fusarium-infected wheat straw being contaminated with DON.
Highly Fusarium-infected and DON-contaminated straw seemed to be more attractive to L. terrestris because it was incorporated faster into the soil compared with straw infected and contaminated at low levels. This is supported by a greater body weight gain (exposure time 5 weeks) and smaller body weight loss (exposure time 11 weeks) of L. terrestris, respectively, when highly contaminated straw was offered for different time periods.
Furthermore, L. terrestris takes part in the efficient degradation of both Fusarium biomass and DON occurring in straw in close interaction with soil microorganisms. Consequently, earthworm activity contributes to the elimination of potentially infectious plant material from the soil surface.
Keywords: Degradation; Fusarium-infected straw; Deoxynivalenol; DON-contamination; Earthworm activity

Theo W. Prins, Jeroen P. van Dijk, A.M. Angeline Van Hoef, Marleen M. Voorhuijzen, Sylvia Broeders, Stefanie Trapmann, Ralf Seyfarth, Andreas Pardigol, Cor D. Schoen, Henk J.M. Aarts, Esther J. Kok, Towards a multiplex cereal traceability tool using padlock probe ligation on genomic DNA, Food Chemistry, In Press, Corrected Proof, Available online 13 November 2008, ISSN 0308-8146, DOI: 10.1016/j.foodchem.2008.10.085.
(http://www.sciencedirect.com/science/article/B6T6R-4TX799M-1/2/07f2e21c700fcc6d0b64a253ad76e313)
Abstract:
Current EU regulations on the protection of products with certain characteristics (geographical indications and designations of origin) aim to ensure fair competition for producers and increased consumers' trust. Within the European integrated research project TRACE analytical methods are being developed to allow the maintenance of specific regulations for PGIs (products of protected geographical indication) and PDOs (products of designated origin). An example within the project is the PGI wheat variety Farro della Garfagnana. The aim of the research was to develop a method to establish the purity of Farro della Garfagnana DNA in complex cereal mixtures. The combined approach of padlock probe ligation and multiplex microarray detection can identify possible admixtures. One undesired `contaminant' for Farro della Garfagnana is common bread wheat (Triticum aestivum), containing the BBAuAuDD genome. Since Farro harbours the BBAuAu genome, absence of the D-genome rules out the presence of bread wheat. The current detection limit of this multimethod is at least 2.5% bread wheat in Farro.
Keywords: Padlock probe; Cereal detection; Farro della Garfagnana; TRACE; Microarray; Ligation detection probe; Multiplex; Food authenticity

L. Jayakody, R. Hoover, Effect of annealing on the molecular structure and physicochemical properties of starches from different botanical origins - A review, Carbohydrate Polymers, Volume 74, Issue 3, 4 November 2008, Pages 691-703, ISSN 0144-8617, DOI: 10.1016/j.carbpol.2008.04.032.
(http://www.sciencedirect.com/science/article/B6TFD-4SD29RD-1/2/c153b95d06b541c66fa29a604bf9ca79)
Abstract:
Annealing is a hydrothermal treatment that changes the physicochemical properties of starches by improving crystalline perfection and by facilitating interactions between starch chains. The extent of these changes being influenced by starch composition and by the arrangement of the starch chains within the amorphous and crystalline domains of the native starch granules. During

annealing, starch granules in excess or at intermediate water content are heated for a certain length of time, at a temperature above the glass transition but below the gelatinization temperature. This review summarizes the current knowledge on the effect of annealing on the granule morphology, composition, crystallinity, X-ray pattern, granular swelling, amylose leaching, pasting properties, gelatinization parameters, and acid and [alpha]-amylase hydrolysis of starches from cereals, legumes and tubers. The physical probes used in studying the mechanism of annealing, in-vivo annealing and the application of annealing in the food industry is also reviewed. Recommendations for future research is outlined.
Keywords: Starch; Annealing; Structure; Properties

Suzanne Domel Baxter, James W. Hardin, Julie A. Royer, Caroline H. Guinn, Albert F. Smith, Children's recalls from five dietary-reporting validation studies. Intrusions in correctly reported and misreported options in school breakfast reports, Appetite, Volume 51, Issue 3, November 2008, Pages 489-500, ISSN 0195-6663, DOI: 10.1016/j.appet.2008.03.013.
(http://www.sciencedirect.com/science/article/B6WB2-4S5KX70-1/2/3ddd1d5d89109af916d8df5beff85e4e)
Abstract:
For school breakfast each day, many elementary schools offer a choice between a cold option that includes ready-to-eat (RTE) cereal and a hot option that includes a non-RTE-cereal entree such as waffles. For breakfast reports, intrusions (reports of uneaten items) in correctly reported and misreported breakfast options were examined using data from five dietary-reporting validation studies. In each study, fourth-grade children were observed eating school breakfast and school lunch and then interviewed to obtain a dietary recall. A breakfast option was correctly reported in 240 breakfast reports for 203 intrusions total, and misreported in 97 breakfast reports for 189 intrusions total. Asymmetry was evident in misreported options; specifically, children observed eating a cold option almost never misreported a hot option, but children observed eating a hot option often misreported a cold option. Proportionately more breakfast reports were intrusion-free when a breakfast option was correctly reported than misreported. Linking of intrusions (i.e., multiple intrusions from the same option in a breakfast report) was especially evident with misreported breakfast options. Methodological aspects of dietary recalls such as target period (prior 24 h; previous day), interview time (morning; afternoon; evening), and interview format (meal; open) had implications for intrusions and misreported breakfast options.
Keywords: Children; Dietary recalls; Intrusions; School breakfast; Ready-to-eat cereal; Validation; Meal observations; Accuracy

Mary Yannakoulia, Demosthenes B. Panagiotakos, Christos Pitsavos, Efi Tsetsekou, Evaggelia Fappa, Charalabos Papageorgiou, Christodoulos Stefanadis, Eating habits in relations to anxiety symptoms among apparently healthy adults. A pattern analysis from the ATTICA Study, Appetite, Volume 51, Issue 3, November 2008, Pages 519-525, ISSN 0195-6663, DOI: 10.1016/j.appet.2008.04.002.
(http://www.sciencedirect.com/science/article/B6WB2-4S7J545-2/2/abda98195bd73786fdcb57ae5ef69fc3)
Abstract:
The effect of anxiety on dietary intake of humans has been investigated through a number of laboratory, clinical and cross-sectional studies; no prior study, however, has examined potential associations between anxiety and overall dietary patterns. Aim of the present work was to describe dietary patterns in relation to anxiety trait in a nationally representative sample of Greek adults from the ATTICA Study. A sample of 453 men and 400 women were randomly selected from various areas of Attica region, Greece. Anxiety levels were assessed through Spielberger State-Trait Anxiety Inventory. Dietary habits, socio-demographic and lifestyle characteristics were recorded for all participants. Principal component analysis was used for the extraction of dietary

patterns. More anxious, compared to less anxious, men and women exhibited different dietary patterns. In particular, the 'light' dietary patterns that were emerged in the less anxious men and women did not appear as distinct patterns among men and women in the upper anxiety tertile. In women, a 'Western-type' diet explained two times greater variance of food intake of those in the upper-anxiety tertile, compared to their counterparts in the low tertile. A vegetarian pattern was found only among the less anxious women, who also exhibited the lowest consumption of red meat and sweets. Regression analysis supported and further elucidated previous results: after adjusting for potential confounders, sweets intake, as well as meat and products intake, were positively associated with anxiety score in females; in males a negative association was found with legumes/cereals intake. From a public health point of view, given the increased prevalence of anxiety and other mental disorders, these findings should be taken into account when designing and evaluating interventions for the general population.
Keywords: Anxiety; Eating patterns; Dietary patterns analysis; Sweets consumption; Alcohol intake; Coffee; High-fat foods

Terho Hyvonen, Erja Huusela-Veistola, Arable weeds as indicators of agricultural intensity - A case study from Finland, Biological Conservation, Volume 141, Issue 11, November 2008, Pages 2857-2864, ISSN 0006-3207, DOI: 10.1016/j.biocon.2008.08.022.
(http://www.sciencedirect.com/science/article/B6V5X-4TK2PJN-1/2/5f909781c42ee90ea1a2f3abbd615ec3)
Abstract:
The study aimed at developing an agro-biodiversity indicator based on trophic interactions between 25 common arable weeds and individual groups of farmland birds, pollinators (wild bees), phytophagous insects and insect pests. Each weed species was weighted based on the number of reported linkages with each animal group. Four biodiversity indices based on these weights were constructed and applied to exploring the ecological consequences of long-term changes in weed populations in Finland. Data were used from weed surveys of Finnish spring cereal fields conducted in the 1960s, 1980s and 1990s. The relative importance of weed species varied according to animal groups. Annual weed species able to produce numerous seeds were important for the farmland birds and some perennial weed species were important for the pollinators. The highest number of linkages was established between weed species and phytophagous insects. The number of harmful pest species associated with broad-leaved weeds was low for all species. The general pattern of changes in values of indices over recent decades was similar: there was a marked decline in the values between the 1960s and the 1980s, and a slight increase between the 1980s and the 1990s. These changes were regarded as being a consequence of changes in the intensity of agricultural practices. The slowest recovery of the values was for pollinators. The results suggest that the ecological consequences of changes in the intensity of agriculture can be explored with the aid of a biodiversity indicator based on species interactions. Owing to the differences in the importance of weed species for different animal groups, maintaining weed species richness is necessary to ensure ecosystem services are provided for the higher trophic levels in farmland.
Keywords: Agro-biodiversity; Farmland birds; Food web; Phytophagous insects; Pollinators; Wild bees

Serina Ahlgren, Andras Baky, Sven Bernesson, Ake Nordberg, Olle Noren, Per-Anders Hansson, Ammonium nitrate fertiliser production based on biomass - Environmental effects from a life cycle perspective, Bioresource Technology, Volume 99, Issue 17, November 2008, Pages 8034-8041, ISSN 0960-8524, DOI: 10.1016/j.biortech.2008.03.041.
(http://www.sciencedirect.com/science/article/B6V24-4SC5PJJ-5/2/74fad0e0bba012b921545a7c5ac44a9e)
Abstract:

Ammonium nitrate and calcium ammonium nitrate are the most commonly used straight nitrogen fertilisers in Europe, accounting for 43% of the total nitrogen used for fertilisers. They are both produced in a similar way; carbonate can be added as a last step to produce calcium ammonium nitrate. The environmental impact, fossil energy input and land use from using gasified biomass (cereal straw and short rotation willow (Salix) coppice) as feedstock in ammonium nitrate production were studied in a cradle-to-gate evaluation using life cycle assessment methodology. The global warming potential in the biomass systems was only 22-30% of the impact from conventional production using natural gas. The eutrophication potential was higher for the biomass systems due to nutrient leaching during cultivation, while the acidification was about the same in all systems. The primary fossil energy use was calculated to be 1.45 and 1.37 MJ/kg nitrogen for Salix and straw, respectively, compared to 35.14 MJ for natural gas. The biomass production was assumed to be self-supporting with nutrients by returning part of the ammonium nitrate produced together with the ash from the gasification. For the production of nitrogen from Salix, it was calculated that 3914 kg of nitrogen can be produced every year from 1 ha, after that 1.6% of the produced nitrogen has been returned to the Salix production. From wheat straw, 1615 kg of nitrogen can be produced annually from 1 ha, after that 0.6% of the nitrogen has been returned.
Keywords: Nitrogen fertiliser production; Biomass feedstock; Life cycle assessment; Land use; Global warming

S. Chethan, Y.N. Sreerama, N.G. Malleshi, Mode of inhibition of finger millet malt amylases by the millet phenolics, Food Chemistry, Volume 111, Issue 1, 1 November 2008, Pages 187-191, ISSN 0308-8146, DOI: 10.1016/j.foodchem.2008.03.063.
(http://www.sciencedirect.com/science/article/B6T6R-4S50K9B-5/2/1b08ae28d25a0c9267e3a8ef37ff4eac)
Abstract:
The effect of millet polyphenols on starch hydrolysis catalyzed by amylases developed during malting were investigated. The enzyme kinetic studies using Michaelis-Menten and Lineweaver-Burk equations showed the Km remained constant (0.625%) but the maximum velocity (Vmax) decreased in the presence of a crude extract of millet polyphenols, indicating mixed non-competitive inhibition. On the other hand, gallic acid, vanillic acid, quercetin and trans-cinnamic acid isolated from the polyphenol extract of the millet showed uncompetitive inhibition. Kinetic studies of amylase inhibition by phenolic compounds indicated the presence of secondary binding sites in malted finger millet amylases similar to other cereal amylases.
Keywords: Finger millet; Eleusine coracana; Polyphenols; Amylase activity; Mode of inhibition

Elena Yazynina, Madelene Johansson, Margaretha Jagerstad, Jelena Jastrebova, Low folate content in gluten-free cereal products and their main ingredients, Food Chemistry, Volume 111, Issue 1, 1 November 2008, Pages 236-242, ISSN 0308-8146, DOI: 10.1016/j.foodchem.2008.03.055.
(http://www.sciencedirect.com/science/article/B6T6R-4S43BJ2-4/2/16012de8122ca5ae950de364873bf0ad)
Abstract:
Folate content in some gluten-free cereal products and their main ingredients was determined using a validated method based on reversed-phase high performance liquid chromatography (HPLC) with fluorescence and diode array detection. The main folate forms found in gluten-free products were 5-methyl-tetrahydrofolate and tetrahydrofolate. Starches and low protein flours commonly used as main components in gluten-free products appeared to be poor folate sources with folate content [less-than-or-equals, slant]6 [mu]g/100 g fresh weight. Folate content in gluten-free breads was higher (15.1-35.9 [mu]g folate/100 g fresh weight) due to use of bakery yeast which is a rich folate source. Overall, folate content in gluten-free products was lower than in their gluten-containing counterparts. Therefore, fortification of gluten-free products with folic acid or

enrichment of these products with nutrient-dense fractions of cereals naturally free from gluten (such as buckwheat, quinoa, amaranth or millet) can be of interest.
Keywords: Folate; Gluten-free products; Fortification; HPLC; Trienzyme treatment

M.S. Izydorczyk, J.E. Dexter, Barley [beta]-glucans and arabinoxylans: Molecular structure, physicochemical properties, and uses in food products-a Review, Food Research International, Volume 41, Issue 9, Cereal Foods, November 2008, Pages 850-868, ISSN 0963-9969, DOI: 10.1016/j.foodres.2008.04.001.
(http://www.sciencedirect.com/science/article/B6T6V-4SBHX02-1/2/dfa25bb7920c4a3d97c570601e22c1ed)
Abstract:
Arabinoxylans and mixed linkage (1 --> 3)(1 --> 4)-[beta]-d-glucans are the major non-starch polysaccharides present in various tissues of barley. Depending on the genotypic or cellular origin, both polymers exhibit variations in their molecular structures. The molecular features of [beta]-glucans and arabinoxylans are important determinants of their physical properties, such as water solubility, viscosity, and gelation properties as well as of their physiological functions in the gastro-intestinal tract. Barley [beta]-glucans have been associated with lowering plasma cholesterol, reducing glycaemic index, and reducing risk of colon cancer. The potential application of [beta]-glucans as food hydrocolloids has been also proposed based on their rheological characteristics. In addition to solution viscosity enhancement, [beta]-glucans have been shown to gel under certain conditions. Arabinoxylans have been shown to significantly affect cereal-based processes such as milling, brewing, and breadmaking. Furthermore, arabinoxylans offer nutritional benefits of soluble and insoluble fibre, and, because of the presence of phenolic moieties in their molecular structures, they may also have some antioxidant properties.
Keywords: Barley; Dietary fibre; [beta]-Glucans; Arabinoxylans; Functional foods; Grain fractionation; Health; Nutrition

Thava Vasanthan, Feral Temelli, Grain fractionation technologies for cereal beta-glucan concentration, Food Research International, Volume 41, Issue 9, Cereal Foods, November 2008, Pages 876-881, ISSN 0963-9969, DOI: 10.1016/j.foodres.2008.07.022.
(http://www.sciencedirect.com/science/article/B6T6V-4T7086B-1/2/89aa202425d4ef01af35f043d61149da)
Abstract:
Mixed linkage beta-glucan is a cell wall component of cereal grains such as oat and barley. A number of nutritional studies have demonstrated a link between the regular consumption of foods containing cereal beta-glucan at physiologically effective concentrations and a reduced risk of chronic health problems. However, since beta-glucan exists in lower concentrations in grains, its incorporation into regular foods at physiologically effective levels without compromising the sensory attributes of foods has been a problem. Therefore, industry interest has been growing to produce beta-glucan concentrates. This article reviews the different types of dry and wet technologies available for concentration of cereal beta-glucan with a focus on commercial scale processing and their impact on the physicochemical properties of beta-glucan.
Keywords: Oat; Barley; Soluble fiber; Health benefits; Milling and air-classification; Aqueous process; Semi-alcoholic process; Enzymes; Thermo-mechanical

Yoshiki Tsukakoshi, Shigehiro Naito, Nobuaki Ishida, Fracture intermittency during a puncture test of cereal snacks and its relation to porous structure, Food Research International, Volume 41, Issue 9, Cereal Foods, November 2008, Pages 909-917, ISSN 0963-9969, DOI: 10.1016/j.foodres.2007.11.010.
(http://www.sciencedirect.com/science/article/B6T6V-4R9JTS3-1/2/f1ffdb606550b235a5437f9f16ab6650)

Abstract:
The puncture test is widely used to assess the quality of cereal snacks. The number of fractures, which cause sudden force reductions observed in force-distance curves obtained during the puncture test, has been proposed to be a good predictor of sensory crispness. We used a stochastic model to determine fracture occurrence in two types of porous cereal snacks: Senbei (a Japanese rice cracker) and Ebisen (a flour-based snack). We studied the frequency distribution of the number of fractures for a single test. The observed variance to mean ratio of the numbers of fractures exceeded unity. On the basis of point process theory, this observation indicated a clustering of fractures. Correspondingly, the distance between successive fracture events was approximated more accurately by a power-law distribution than by an exponential distribution. Exponential distribution was a better distribution for intervals longer than 0.5 mm for Senbei, suggesting random or quasi-periodic occurrence of clusters.
Keywords: Fracture; Porosity; Rice cracker; Flour snack; Point process

Shane R. McIntosh, Robert J. Henry, Genes of folate biosynthesis in wheat, Journal of Cereal Science, Volume 48, Issue 3, November 2008, Pages 632-638, ISSN 0733-5210, DOI: 10.1016/j.jcs.2008.02.007.
(http://www.sciencedirect.com/science/article/B6WHK-4S3S2FV-1/2/e1b3710f6af00c229f2b008a05ec28f7)
Abstract:
Micronutrient deficiency is preventing an estimated one-third of the world's population from reaching their physical and intellectual potential. This results in reduced education attainment and work productivity which negatively impacts on regional development and economies. Contributing to the aetiology of these deficiencies is the over-refining and over consumption of basic food groups (cereals and tubers) which provide limited amounts of micronutrients. Folate deficiencies result from unbalanced diets and are responsible for an estimated 250,000 birth defects annually. Engineering plants like cereals to deliver daily requirements of folates (biofortification) is an attractive approach to address malnutrition in developing countries. We have isolated key folate genes including: 6-hydroxymethyl-7,8-dihydropterin pyrophosphokinase/7,8-dihydropteroate synthase, 4-amino-4-deoxychorismate synthase and folypolyglutamate synthetase from wheat seeds. Furthermore, we have identified homologous genes in the rice genome. Characterisation of sequences identified key functional and targeting regions. Analysis of the temporal and spatial patterns of gene expression supports de novo synthesis of folates in the developing wheat seed and uniquely in the mature seed transcriptome. The seed appears to have a unique potential to replenish its own pool of required glutamated folates at all stages in its life cycle.
Keywords: Differential expression; Folate biosynthesis; Gene isolation; Wheat

A. Sanches Silva, J. M. Cruz Freire, R. Franz, P. Paseiro Losada, Mass transport studies of model migrants within dry foodstuffs, Journal of Cereal Science, Volume 48, Issue 3, November 2008, Pages 662-669, ISSN 0733-5210, DOI: 10.1016/j.jcs.2008.02.006.
(http://www.sciencedirect.com/science/article/B6WHK-4S32NM8-3/2/0a7d3132a065970a105a60130daa89a6)
Abstract:
Cereals are widely consumed foodstuffs and it is therefore important to take them into account when estimating consumer exposure to packaging-related chemicals. The mass transport of three model migrants (diphenylbutadiene, triclosan and BHT) from low-density polyethylene (LDPE) within dry foodstuffs of different particle size (rice and wheat flour) was studied because of the relationship between consumer exposure and possible harmful effects on human health. The conditions that most affect the mass transport of substances within dry foods are evaluated and discussed. The diffusion coefficients (DF) for diphenylbutadiene (DPBD) and triclosan in the studied foodstuffs were estimated. The DF values for DPBD and triclosan in wheat flour at 25

[degree sign]C were 7.1 x 10-8 cm2/s and 3.3 x 10-8 cm2/s, respectively. The DF values for DPBD and triclosan in rice at 25 [degree sign]C were 4.7 x 10-8 and 4.3 x 10-8 cm2/s, respectively. BHT displayed different behaviour and other tests were therefore carried out to elucidate the associated mass transport process.
Keywords: Dry foods; Plastic packaging; Diffusion coefficients; Triclosan; Diphenylbutadiene; BHT

S. Renzetti, J. Behr, R.F. Vogel, E.K. Arendt, Transglutaminase polymerisation of buckwheat (Fagopyrum esculentum Moench) proteins, Journal of Cereal Science, Volume 48, Issue 3, November 2008, Pages 747-754, ISSN 0733-5210, DOI: 10.1016/j.jcs.2008.04.005.
(http://www.sciencedirect.com/science/article/B6WHK-4SH6B9N-1/2/245bc11f4d16e5ef7ea105d173d16253)
Abstract:
Recently, screening of transglutaminase (TGase) treatment on several gluten-free cereals revealed significant improvements on the baking performances of buckwheat flour by promoting protein networks. In this study, the impact of TGase on the protein fractions of buckwheat flour was investigated in order to better understand the activity and specificity of the enzyme. Albumin, globulin, prolamin and glutelin fractions were extracted from the flour and incubated with TGase. Capillary electrophoresis, two dimensional (2D) gel electrophoresis and size exclusion chromatography (SEC) were performed on each fraction. Capillary electrophoresis and 2D gel electrophoresis revealed that buckwheat main storage proteins, i.e. 2S albumin, 13S and 8S globulin, were cross-linked after TGase treatment. SEC showed the presence of high molecular weight (HMW) protein polymers in the TGase-treated albumin and globulin fraction. Analysis of the amino acid composition of the fractions revealed high amounts of glutamine and lysine residues in all fractions. In conclusion, the increase in the average molecular weight of buckwheat proteins and the formation of HMW protein polymers after TGase treatment are responsible for the improved functionality of buckwheat flour in terms of breadmaking potential. The enzyme was revealed to be not fraction specific as all fractions were TGase-reactive.
Keywords: Buckwheat; Protein; Transglutaminase; Two dimensional gel electrophoresis

L. Haska, M. Nyman, R. Andersson, Distribution and characterisation of fructan in wheat milling fractions, Journal of Cereal Science, Volume 48, Issue 3, November 2008, Pages 768-774, ISSN 0733-5210, DOI: 10.1016/j.jcs.2008.05.002.
(http://www.sciencedirect.com/science/article/B6WHK-4SPC0NV-1/2/030a775ff1e7d443d440f507ad17c27f)
Abstract:
Structure and health effects of inulin-type fructans have been extensively studied, while less is known about the properties of the graminan-type fructans in wheat. Arabinoxylan (AX) is another important indigestible component in cereal grains, which may have beneficial health effects. In this study, the fructan content in milling fractions of two wheat cultivars was determined and related to ash, dietary fibre and AX contents. The molecular weight distribution of the fructans was analysed with HPAEC-PAD and MALDI-TOF MS using 1H NMR and enzymatic hydrolysis for identification of fructans. The fructan content (g/100 g) ranged from 1.5 +/- 0.2 in flour to 3.6 +/- 0.5 in shorts and 3.7 +/- 0.3 in bran. A correlation was found between fructan content and dietary fibre content ($r = 0.93$, $P < 0.001$), but with a smaller variation in fructan content between inner and outer parts of the grain. About 50% of the dietary fibre consisted of AX in all fractions. The fructans were found to have a DP of up to 19 with a similar molecular weight distribution in the different fractions.
Keywords: Fructan; Arabinoxylan; Wheat; Molecular weight

Arda Serpen, Vural Gokmen, Nicoletta Pellegrini, Vincenzo Fogliano, Direct measurement of the total antioxidant capacity of cereal products, Journal of Cereal Science, Volume 48, Issue 3, November 2008, Pages 816-820, ISSN 0733-5210, DOI: 10.1016/j.jcs.2008.06.002.

(http://www.sciencedirect.com/science/article/B6WHK-4T2S8R2-2/2/3f09b4ea772571db2548c303dbd6d403)
Abstract:
A simple and rapid procedure was developed for the direct measurement of the antioxidant capacity of cereals. It entails grinding of cereals, mixing with 2,2'-azinobis(3-ethylbenzothiazoline-6-sulfonic acid) (ABTS) reagent, centrifugation and measure of the absorbance. The ABTS reagent was dissolved in a mixture of ethanol:water (50:50, v/v), instead of 100% ethanol, in order to overcome low solubility of water-soluble antioxidant compounds of some cereals. A reaction time of 30 min allowed plateau values to be reached during the antioxidant capacity measurement of cereal samples. The accuracy of the direct procedure was confirmed by measuring, in solid state, the antioxidant activity of pure phenolic compounds.
The direct procedure gave results of total antioxidant capacities significantly higher than those determined by the traditional procedure (multiple extraction followed by alkaline hydrolysis) for most whole meal cereals, suggesting that such a procedure was not always sufficient to properly assess the antioxidant capacity of bound phenolic compounds in cereals. The proposed extraction-independent procedure for measuring antioxidant capacity of cereals will facilitate the inter-laboratory data comparison, the construction of reliable antioxidant capacity database and the screening of large sampling of cereals for their nutraceutical characteristics.
Keywords: Antioxidant capacity; Direct measurement; ABTS assay; Phenolic compounds

T.W.J.M. van Herpen, J.H.G. Cordewener, H.J. Klok, J. Freeman, A.H.P. America, D. Bosch, M.J.M. Smulders, L.J.W.J. Gilissen, P.R. Shewry, R.J. Hamer, The origin and early development of wheat glutenin particles, Journal of Cereal Science, Volume 48, Issue 3, November 2008, Pages 870-877, ISSN 0733-5210, DOI: 10.1016/j.jcs.2008.07.002.
(http://www.sciencedirect.com/science/article/B6WHK-4T5CGS6-4/2/cc754360ee2b62c3491d852882ec20ce)
Abstract:
Breadmaking quality is strongly related to the glutenin macropolymer (GMP) fraction. Don and co-workers [Don, C., Lichtendonk, W.J., Plijter, J.J., Hamer, R.J., 2003a. Glutenin macropolymer: a gel formed by particles. Journal of Cereal Science 37, 1-7] showed that GMP consists of spherical glutenin particles and suggested that these originate from the protein bodies (PBs) observed in developing grain. We have tested this hypothesis by systematically comparing SDS-soluble and SDS-insoluble protein fractions from both PBs and flour. These preparations were analysed at the molecular, oligomer, particle and microscopic levels. Comparison of PBs isolated from immature seeds with glutenin particles isolated from mature seeds revealed strong similarities in protein composition and the presence of large glutenin oligomers. However, the glutenin particles from mature wheat were significantly larger than PBs. We suggest that PBs are the building blocks for the formation of much larger glutenin particles which are formed during the desiccation phase of kernel development.
Keywords: GMP; Protein bodies; Wheat; Origin

Katherine M. Phillips, W. Craig Byrdwell, Jacob Exler, James M. Harnly, Joanne M. Holden, Michael F. Holick, Bruce W. Hollis, Ronald L. Horst, Linda E. Lemar, Kristine Y. Patterson, Maria Teresa Tarrago-Trani, Wayne R. Wolf, Development and validation of control materials for the measurement of vitamin D3 in selected US foods, Journal of Food Composition and Analysis, Volume 21, Issue 7, November 2008, Pages 527-534, ISSN 0889-1575, DOI: 10.1016/j.jfca.2008.05.003.
(http://www.sciencedirect.com/science/article/B6WJH-4SM62DV-1/2/ebb0b3b3f99d2b458e5cf1aee14bb8b2)
Abstract:

As part of the United States Department of Agriculture's (USDA) National Food and Nutrient Analysis Program (NFNAP), food composition data for vitamin D in the USDA National Nutrient Database for Standard Reference are being updated and expanded, focusing on high priority foods and validated analytical methodology. A lack of certified reference materials and analytical methods validated for these key foods required the development of five matrix-specific control composite materials (CC) (canned salmon and vitamin D3 fortified cereal, orange juice, milk, and cheese). Each of six experienced laboratories (research and commercial) analyzed vitamin D3 in five subsamples of each CC in five separate analytical batches, with one subsample of each material in each run. Research laboratories performed recovery studies, mass spectrometric analysis, and other studies to validate quantitation in each matrix. Initial results showed a wide disparity between the six laboratories (RSDs of 26-46%). Extensive collaboration resolved several problems related to calibration standards, extraction solvents and the internal standard, achieving final values with RSDs of approximately 10%, validated by mass spectrometry tests that confirmed lack of matrix interferences in these foods.
Keywords: Vitamin D; Cholecalciferol; Ergocalciferol; Control materials; Reference values; Analytical methods; Analysis; Cereal; Milk; Cheese; Fish; Orange juice; Interlaboratory variability

Graham F. Moore, Katy Tapper, Laurence Moore, Simon Murphy, Cognitive, Behavioral, and Social Factors Are Associated with Bias in Dietary Questionnaire Self-Reports by Schoolchildren Aged 9 to 11 Years, Journal of the American Dietetic Association, Volume 108, Issue 11, November 2008, Pages 1865-1873, ISSN 0002-8223, DOI: 10.1016/j.jada.2008.08.012.
(http://www.sciencedirect.com/science/article/B758G-4TT89NH-H/2/ce290951702f16f90442339a5c11aec9)
Abstract: Background
Measuring children's dietary behavior is central to evaluating interventions and identifying predictors and outcomes of dietary behaviors. Systematic biases may obscure or inflate associations with self-reported intakes.Objective
To identify cognitive, behavioral, and social correlates of bias in children's reporting of breakfast items on a self-completion questionnaire.Design
Cross-sectional survey. Children completed standardized tests of episodic memory, working memory, and attention, and a questionnaire assessing attitudes toward breakfast. Teachers completed a classroom behavior measure. Associations between measures and children's underreporting of breakfast foods (ie, cereals, bread, milk, fruits, sweet items, and potato chips) on a self-completion questionnaire relative to validated 24-hour recall were examined.Subjects and setting
Subjects were aged 9 to 11 years (n=678). Data were collected from 111 schools throughout Wales in 2005.Results
A larger percentage of less-healthful breakfast items (ie, sweet snacks and potato chips) than more healthful items (ie, fruit, cereals, bread, and milk) were omitted from questionnaire self-reports. Children from lower socioeconomic status schools omitted more items than those from wealthier schools (Kruskal-Wallis $H=12.51$, $P<0.01$), with omissions twice as high for less-healthful items than for more-healthful items within the lowest socioeconomic status schools. Those with positive attitudes ($H=23.85$, $P<0.001$), better classroom behavior ($H=6.26$, $P<0.05$), and better episodic memory ($H=8.42$, $P<0.05$) omitted fewer items than those with negative attitudes, poorer behavior, and poorer episodic memory. Children who ate more items omitted more than those who ate fewer ($H=47.65$, $P<0.001$). No differences were observed in terms of attention and working memory.Conclusions
Episodic memory, classroom behavior, attitudes, socioeconomic status, and total items consumed are associated with bias in questionnaire self reports. Such biases have implications for examination of associations between breakfast eating and cognitive and behavioral factors,

examination of effect modification by socioeconomic status in intervention trials, and for the sensitivity of measures to detect intervention effects.

Farah N. Talpur, M.I. Bhanger, S.T.H. Sherazi, Intramuscular fatty acid profile of longissimus dorsi and semitendinosus muscle from Pateri goats fed under traditional feeding system of Sindh, Pakistan, Meat Science, Volume 80, Issue 3, November 2008, Pages 819-822, ISSN 0309-1740, DOI: 10.1016/j.meatsci.2008.03.028.
(http://www.sciencedirect.com/science/article/B6T9G-4S62RSK-3/2/a1c540ec576979b0a69eee9c8cf07a24)
Abstract:
The present study was undertaken to assess the intramuscular fatty acid composition of different muscles taken from male Pateri (n = 15) goats, reared on naturally grown grasses, leaves and pods of Acacia nilotica and crushed cereal, under traditional way of feeding. Goats were slaughtered with an average weight of 68 +/- 7 kg and age 12 +/- 1 month. The samples were taken from longissimus dorsi region (between the 12th and 13th rib) and distal region of semitendinosus muscle. Results of total fat content and fatty acids composition does not show significant (P > 0.05) variation among muscles investigated. The fatty acid composition of muscles studied were primarily composed of oleic (31.50-33.38%), followed by palmitic acid (19.84-22.05%) and stearic acid (22.25-24.91%) respectively. Muscle tissue in general contained an average 51.13% of saturated fatty acids and 48.87% of unsaturated fatty acids. The mean conjugated linoleic acid was found 0.41%, 0.43% and 0.47% in ribeye and loin portion of longissimus dorsi muscle and distal region of semitendinosus muscle, respectively.
Keywords: Intramuscular fatty acid; Pateri goats; Natural grown grasses; Acacia nilotica

C. Juan, A. Pena, C. Lino, J.C. Molto, J. Manes, Levels of ochratoxin A in wheat and maize bread from the central zone of Portugal, International Journal of Food Microbiology, Volume 127, Issue 3, 31 October 2008, Pages 284-289, ISSN 0168-1605, DOI: 10.1016/j.ijfoodmicro.2008.07.018.
(http://www.sciencedirect.com/science/article/B6T7K-4T262XM-1/2/394b2187d106b97612253e90911e94b8)
Abstract:
Ochratoxigenic fungi are natural contaminants of cereal and the produced toxins are harmful to humans and animals. Ochratoxin A (OTA) is among the most important mycotoxins, and the International Agency for Research on Cancer (IARC) classifies it as possibly carcinogenic to humans (group 2B). A total of 61 samples of bread from the central zone of Portugal were analysed for OTA by liquid chromatography (LC) with fluorescence detection (FD). For confirmation two procedures were applied, methyl ester derivatization with boron trifluoride-methanol and liquid chromatography/electrospray ionization tandem mass spectrometry (LC/ESI/MS/MS). As far as we know, this is the first report where on-line LC/electrospray ionization (ESI) tandem mass spectrometry (MS/MS) was used for OTA analysis in bread.
Limits of detection (LOD) and quantification (LOQ) were 0.015 and 0.03 ng/g, using LC-FD, and 0.03 and 0.09 ng/g by LC-MS/MS.
The incidence of OTA was 12.9% and 70.0% for wheat and maize bread, respectively. The highest OTA levels were obtained for maize bread, having one sample exceeded the European maximum limit established for OTA in cereal products.
The estimate daily intake (EDI) was below the tolerable daily intake.
Keywords: Ochratoxin A; Maize bread; Wheat bread; LC-FD; LC-MS-MS

A.-K. Kuusk, A. Cassel-Lundhagen, A. Kvarnheden, B. Ekbom, Tracking aphid predation by lycosid spiders in spring-sown cereals using PCR-based gut-content analysis, Basic and Applied Ecology, Volume 9, Issue 6, 6 October 2008, Pages 718-725, ISSN 1439-1791, DOI: 10.1016/j.baae.2007.08.012.

(http://www.sciencedirect.com/science/article/B7GVS-4S044R4-1/2/253d300376bc020e2289fcb7a9f41a69)
Abstract:
Detection of prey DNA-remains in arthropod predators by polymerase chain reaction (PCR) is useful when investigating food webs. In this study we estimated how long after a feeding event it was possible to detect mitochondrial COII DNA (331 bp) from an important aphid pest, Rhopalosiphum padi (Homoptera: Aphididae), in spiders of the genus Pardosa (Araneae: Lycosidae). Following laboratory evaluations we tested spiders collected in spring-sown cereals for aphid predation during two seasons. Aphids were digested rapidly in laboratory-fed predators and the time point when prey DNA could be amplified from 50% of the spiders was estimated to be 3.7 h. A total of 372 field- collected predators were analyzed by PCR and despite low aphid densities many spiders (26% in 2004 and 19% in 2005) tested positive for R. padi, indicating consumption of at least one aphid within a few hours before capture. The percentage of spiders that tested positive for R. padi DNA varied considerably between fields and logistic regression analysis revealed that the probability of detecting aphid DNA was significantly influenced by location and year. We conclude that Pardosa spiders, under certain conditions, frequently feed on R. padi and deserve special attention in conservation biological control.
Keywords: Biological control; Generalist predators; Pardosa; Prey DNA detection success; Rhopalosiphum padi

J.M. Holland, H. Oaten, S. Southway, S. Moreby, The effectiveness of field margin enhancement for cereal aphid control by different natural enemy guilds, Biological Control, Volume 47, Issue 1, October 2008, Pages 71-76, ISSN 1049-9644, DOI: 10.1016/j.biocontrol.2008.06.010.
(http://www.sciencedirect.com/science/article/B6WBP-4SWWT4G-4/2/071abf22ff23d512516539de7bc3b893)
Abstract:
Studies demonstrating the empirical impact of natural enemies on pests and the effect of habitat manipulation are required if farmers are to be persuaded to adopt conservation biocontrol. The relative abundance of different natural enemy guilds were manipulated to investigate their impact on grain aphids (Sitobion avenae) and whether the establishment of wider field margins increased levels of control. The impact of epigeal and flying aphid predators, in isolation and together, on cereal aphids was tested in five fields with standard field margins (ca. 2 m wide) and in five fields with wide margins (ca. 6 m wide). Flying predators alone were as effective as all predators in controlling the grain aphid and reduced aphids by 90% and 93%, whereas epigeal predators alone achieved a reduction of only 40% and 18% in fields with standard and wide margins respectively. Levels of parasitism measured by counts of aphid mummies were relatively low ([less-than-or-equals, slant]12%) on all sampling occasions. There was no evidence that the wide field margins increased natural enemies within the adjacent field as measured using pitfall traps, suction sampling and sticky traps. The wide field margins were considered to have no benefit for biocontrol because flying predators capable of moving between fields were primarily responsible or the amount of uncropped land suitable for natural enemies was not a limiting factor in the landscape.
Keywords: Conservation biocontrol; Agri-environment schemes; Habitat manipulation; Generalist predators; Wheat; Agroecology

Anderson Kipruto Kipkoech, Dagmar Mithofer, Wilson K. Yabann, Henry K. Maritim, Fritz Schulthess, Assessing yield and efficiency implications of relying on parasitoids for control of cereal stemborers: The case of small-scale maize farmers in Kenya, Crop Protection, Volume 27, Issue 10, October 2008, Pages 1318-1326, ISSN 0261-2194, DOI: 10.1016/j.cropro.2008.04.005.
(http://www.sciencedirect.com/science/article/B6T5T-4SR07SJ-2/2/2df9ef4ac653abd2d72bb589932ddbef)

Abstract:
As part of a region-wide classical biological control (BC) program, the exotic larval parasitoid Cotesia flavipes was released in coastal Kenya in 1993 for the control of the invasive crambid cereal stemborers Chilo partellus. A 2-year survey of small-scale maize farmers covering the 2004 and 2005 maize production seasons was carried out in the area to compare yields and production efficiency (i.e. the capacity to obtained maximum yields with least cost input combination between farmers) who applied chemical pesticides and those who did not, thus knowingly or unknowingly relying on BC. The role of pest and parasitoid, habitat management techniques and soil fertility measures in influencing maize production was also investigated. The results revealed that average yields and technical efficiency of maize producers ranged from 1 to 1.2 ton/ha and 57.9-67.9%, respectively. Farmers could improve maize yields by up to 42% by improving production efficiency and optimal allocation of labor and use of inorganic fertilizers. Because of low average maize yields, the return to pest control was low. Farmers that had natural grassy habitats in the vicinity of maize fields, applied fertilizers or used chemical pesticides to control stemborers obtained equivalent yields. Future yield improvement efforts should promote biological control as part of a whole strategy package to improve maize yields.
Keywords: Biological control; Maize; Pesticides; Production efficiency; Stemborers

Stephanie Williamson, Andrew Ball, Jules Pretty, Trends in pesticide use and drivers for safer pest management in four African countries, Crop Protection, Volume 27, Issue 10, October 2008, Pages 1327-1334, ISSN 0261-2194, DOI: 10.1016/j.cropro.2008.04.006.
(http://www.sciencedirect.com/science/article/B6T5T-4SR07SJ-1/2/ac597f7960e3370380660c582083e63c)
Abstract:
Patterns in pesticide practice were studied among smallholder farmers in Benin, Ethiopia, Ghana and Senegal, growing cotton, vegetables, pineapple, cowpea, and mixed cereals and legumes, for export and local markets. Quantitative and qualitative methods were used to examine pesticide use and handling, costs and access and health, welfare and sustainability issues. Drivers encouraging pesticides as the dominant form of pest management include food staple varieties highly susceptible to insect attack; increased pest incidence; lack of advice on alternative methods; a growing informal market in `discount' and often unauthorised pesticides; subsidy; and poor attention to the economics of pest control. The paper contrasts the situation of food crops for African consumers with the increasing attention to food safety and pesticide restrictions in export horticulture to Europe and the growing demand for organic cotton, and discusses challenges for implementation of IPM and safer practice.
Keywords: Pesticides; Smallholder farmers; Food safety; Africa; IPM; External costs

Wang Shujun, Yu Jinglin, Yu Jiugao, Pang Jiping, Liu Hongyan, Structure characterization of C-type starch granule by acid hydrolysis, Food Hydrocolloids, Volume 22, Issue 7, October 2008, Pages 1283-1290, ISSN 0268-005X, DOI: 10.1016/j.foodhyd.2007.06.012.
(http://www.sciencedirect.com/science/article/B6VP9-4P47GNW-1/2/8c58298d7d801fdde2a088a8f3c1122b)
Abstract:
The structural changes of C-type Dioscorea rhizoma starch are evaluated by scanning electron microscope (SEM), X-ray powder diffraction (XRD) and cross polarization/magic-angle spinning (CP/MAS) 13C nuclear magic resonance (NMR) during acid hydrolysis. SEM shows that the amorphous areas are mainly located in the core part of C-type starch granules or distribute alternately in the crystalline regions. XRD analysis reveals that the B-type polymorphs present in the C-type starch granules are preferentially degraded or degraded faster than A-type polymorphs. NMR spectra confirm that the amorphous regions in the starch granules are firstly hydrolyzed and could be hydrolyzed completely as long as the hydrolysis time is enough. After 40 days of

hydrolysis, the acid-modified starch shows typical A-type characteristics whether for the X-ray diffraction pattern or for the 13C CP/MAS NMR spectra. The finding suggests that the B-type polymorphs consisting of the C-type starch granules are more unstable than the A-type polymorphs. This is not in agreement with the fact that B-type starches (potato starch) are more resistant to acid and enzyme than A-type cereal starches.
Keywords: Starch; Acid hydrolysis; Amorphous region; Polymorphs

Bernadette Videmann, Michelle Mazallon, Jonathan Tep, Sylvaine Lecoeur, Metabolism and transfer of the mycotoxin zearalenone in human intestinal Caco-2 cells, Food and Chemical Toxicology, Volume 46, Issue 10, October 2008, Pages 3279-3286, ISSN 0278-6915, DOI: 10.1016/j.fct.2008.07.011.
(http://www.sciencedirect.com/science/article/B6T6P-4T2637Y-1/2/cd57d27d5cdcde689b0bf017a8e6614f)
Abstract:
The mycotoxin zearalenone (ZEA) is found worldwide as contaminant in cereals and grains. It is implicated in reproductive disorders and hyperestrogenic syndromes in animals and humans exposed by food. We investigated metabolism and transfer of ZEA using the human Caco-2 cell line as a model of intestinal epithelial barrier. Cells exposed to 10-200 [mu]M ZEA showed efficacious metabolism of the toxin. [alpha]-zearalenol and [beta]-zearalenol were the measured preponderant metabolites (respectively 40.7 +/- 3.1% and 31.9 +/- 4.9% of total metabolites, after a 3 h exposure to 10 [mu]M ZEA), whereas ZEA-glucuronide and [alpha]-zearalenol glucuronide were less produced (respectively 8.2 +/- 0.9% and 19.1 +/- 1.3% of total metabolites, after a 3 h exposure to 10 [mu]M ZEA). Cell production of reduced metabolites was strongly inhibited by [alpha]-and [beta]-hydroxysteroid dehydrogenase inhibitors, and Caco-2 cells exhibited [alpha]-hydroxysteroid dehydrogenase type II and [beta]-hydroxysteroid dehydrogenase type I mRNA. After cell apical exposure to ZEA, [alpha]-zearalenol was preponderantly found at the basal side, whereas [beta]-zearalenol and both glucuronides were preferentially excreted at the apical side. As [alpha]-zearalenol shows the strongest estrogenic activity, the preferential production and basal transfer of this metabolite suggests that intestinal cells may contribute to the manifestation of zearalenone adverse effects.
Keywords: Mycotoxin; Zearalenone; Metabolism; Transfer; Intestinal cells

S. Jisha, G. Padmaja, S.N. Moorthy, K. Rajeshkumar, Pre-treatment effect on the nutritional and functional properties of selected cassava-based composite flours, Innovative Food Science & Emerging Technologies, Volume 9, Issue 4, October 2008, Pages 587-592, ISSN 1466-8564, DOI: 10.1016/j.ifset.2008.06.003.
(http://www.sciencedirect.com/science/article/B6W6D-4STGRW7-1/2/b32d10f8ebf498b8de295a8ad40c082e)
Abstract:
The low protein and lack of gluten in cassava (Manihot esculenta Crantz) are disadvantageous for its use for product development and is overcome through the use of composite flours incorporating cereal and/or legume flours. The functionality and nutritional attributes of cassava flour were altered in the present study by pre-treatment with termamyl and green gram amylase, pre-gelatinization and subsequent blending with cereals, legumes, bran sources etc. Malting of cassava flour with termamyl followed by pre-gelatinization reduced the starch and increased the sugar content of the mixes. Pre-gelatinization had little effect on the crude protein of the mixes; nevertheless, the fat content was higher by 0.15-1.0 units. Energy content was around 1176 and 1217 KJ/100 g for the rice bran added mixes from malted cassava, which slightly increased in the respective pre-gelatinized cassava mixes. The peak viscosity of termamyl treated cassava-based flour mixes was much lower than the respective gram amylase based mixes, indicating that the latter had much less amylolytic activity than termamyl and pre-gelatinization further reduced the

viscosity. The very low viscosity for the enzyme treated cassava-based mixes was due to the inability for retrogradation of the hydrolyzed starch. Significant improvement in in vitro starch digestibility (IVSD) (enhancement by 5.0-16.0 units in termamyl treatment vs 5.0-9.0 units in gram amylase treatment) was observed for the pre-gelatinized mixes. Lowest IVSD (25-29 units) was for the two bran based mixes, suggesting its use in the nutrition therapy for controlling obesity linked diseases.Industrial relevance
With the development in human society, the incidence of chronic diseases like diabetes, cancer, cardiovascular problems and conditions like obesity contributing to several diseases is on the increase. This has led to an increasing awareness and research efforts on the development of functional foods, pharmafoods etc, which have wide potential application in medical nutrition therapy. The present work aims at improving the nutritional and functional attributes of cassava through fortification with cereal and/ or legume flours, bran sources etc. and through pre- treatment with enzymes to improve the functionality and reduce the energy content. The study led to the development of cassava based composite flours with low starch digestibility, high protein content and low energy content which could be effectively utilized for developing designer foods for obese and diabetic people. Enhanced digestibility of pre- gelatinized malted flours from cassava finds potential application for the development of foods for geriatric and convalescent people.
Keywords: Cassava; Composite flour; Cereals; Legumes; Bran Sources; Pre-Treatment; Nutritional and functional properties

Marius Collomb, Walter Bisig, Ueli Butikofer, Robert Sieber, Mirjam Bregy, Luzi Etter, Fatty acid composition of mountain milk from Switzerland: Comparison of organic and integrated farming systems, International Dairy Journal, Volume 18, Issues 10-11, October-November 2008, Pages 976-982, ISSN 0958-6946, DOI: 10.1016/j.idairyj.2008.05.010.
(http://www.sciencedirect.com/science/article/B6T7C-4SSG4SX-1/2/3da8cd0f112e74ef8ae73dd36b7bc0d6)
Abstract:
During a 12-month study, bulk-tank milk was collected monthly from 3 dairies each of which collected both organic and conventional milks (from integrated farming) in the mountain regions of Switzerland. All milk samples were analyzed for fatty acid (FA) composition. Organic and conventional milks did not significantly differ with respect to saturated FA (SFA) nor trans FA contents, but organic milk had significantly higher contents of polyunsaturated FA (PUFA) (+5.5%; P <= 0.001), conjugated linonenic acid (CLA) (+14.9%; P <= 0.001), n-3 FA (+12.3%; P <= 0.001) and branched FA (+4.7%; P <= 0.001). Conventional milk had higher contents of monounsaturated FA (MUFA) (+2.3%; P <= 0.05) and n-6 FA (+4.2%; P <= 0.01). Significantly higher levels of grasses and lower levels of cereal concentrates in the fodder of organic farming could well explain these results. The differences in the fatty acid composition of milk between the two farming systems were nevertheless small because of low differences in the fodder composition.

Jaroslaw Korus, Mariusz Witczak, Leslaw Juszczak, Rafal Ziobro, Grass pea (Lathyrus sativus L.) starch as an alternative for cereal starches: Rheological properties and retrogradation susceptibility, Journal of Food Engineering, Volume 88, Issue 4, October 2008, Pages 528-534, ISSN 0260-8774, DOI: 10.1016/j.jfoodeng.2008.03.018.
(http://www.sciencedirect.com/science/article/B6T8J-4S49NNC-1/2/e2ff44f54d74f5d39baaff63052465ab)
Abstract:
The study compares selected rheological properties of starch isolated from two cultivars of grass pea with those of wheat and corn starch. The phase transition temperatures on pasting (TO, TP, TE) of both grass pea starches were lower in comparison to normal corn starch, but higher when compared to wheat starch. Pasting temperature of the starch slurries were significantly lower for grass pea as compared to cereals, and paste viscosity of grass pea starch was significantly higher

than of wheat starch. Grass pea starches, exhibit much higher values of storage and loss moduli during heating of starch suspensions. Higher values of shear stress as a function of shear rate obtained during the determination of flow curves for grass pea starch pastes are confirmed by high consistency coefficients in the Herschel-Bulkley model. The mechanical spectra of starch gels allow us to state, that grass pea starch gels are characterised by higher values of storage and loss moduli in comparison to cereal starches.
Keywords: Starch; Grass pea; Cereals; Rheological properties; Retrogradation

Theresa A. Nicklas, Concern over Ready-to-Eat Breakfast Cereals, Journal of the American Dietetic Association, Volume 108, Issue 10, October 2008, Pages 1616-1617, ISSN 0002-8223, DOI: 10.1016/j.jada.2008.08.024.
(http://www.sciencedirect.com/science/article/B758G-4THSSYR-C/2/62502bb12691c9483638af3dfa5eb8ee)

J.R. Olarieta, F.L. Rodriguez-Valle, E. Tello, Preserving and destroying soils, transforming landscapes: Soils and land-use changes in the Valles County (Catalunya, Spain) 1853-2004, Land Use Policy, Volume 25, Issue 4, October 2008, Pages 474-484, ISSN 0264-8377, DOI: 10.1016/j.landusepol.2007.10.005.
(http://www.sciencedirect.com/science/article/B6VB0-4RD9FK4-1/2/9397a936b477060823b970159094f829)
Abstract:
In this paper we analyse the relations between land characteristics and land use, and their evolution in the Valles county (Catalunya) since 1850. We reconstructed in digital format the 1850s cadastral maps of three villages (Caldes, Castellar, and Polinya) and those made in 1950 of five villages (the previous three plus Sentmenat and Palau-Solita). For 1999 we used the available cadastral and land-use maps and conducted field surveys. We evaluated the suitability of land for the various agricultural uses (winter cereal, alfalfa, vineyard, olive, and almond orchards) considering the different land-use systems of 1850 and 1999. Forty to sixty percent of the land was more or less suitable for each of the land uses. Whilst in 1850 land used for agriculture was 46% of the total area and 29% was used for forest, these figures turned to 28% and 53%, respectively, by 1999. Urban and industrial areas now occupy 13% of the total land area and 47% of the best agricultural land. In 1850, 34% of the vineyards and 23% of the area with cereal crops were located on non-suitable or poorly suitable land for these uses. This shows a much more strict criterion for the location of cereal fields. But it also shows how the land-owning class tried to prevent further social conflicts by leasing their least suitable land for agriculture to the landless classes. In 1850 in the village of Caldes, 85% of the cereal fields were on slopes less than 20%, but 30% of the vineyards were on slopes of more than 30%, and sometimes up to 60-70%. Slopes protected with stone terraces occupied 700 ha, 43% of the land in agriculture in 1850, and 80% of that area was used for vineyards. Building of these terraces, which were generally small, required some 120,000 work days, and was undertaken on relatively soft geological materials while they disappear on the transition to competent geological materials. These results show that land characteristics influence land-use decision making and historical landscape changes. However, the extension of agriculture to non-suitable land in 1850 reflects deeper social conflicts, and required a vast labour investment in soil conservation by the poorest rural classes. The importance of terraces within this landscape and the land-use alternatives are also discussed.
Keywords: Agrarian conflicts; Agrarian labour; GIS; Land characteristics; Land evaluation; Soil conservation; Stone terraces; Urban development

Michael G. Ganzle, Jussi Loponen, Marco Gobbetti, Proteolysis in sourdough fermentations: mechanisms and potential for improved bread quality, Trends in Food Science & Technology,

Volume 19, Issue 10, October 2008, Pages 513-521, ISSN 0924-2244, DOI: 10.1016/j.tifs.2008.04.002.
(http://www.sciencedirect.com/science/article/B6VHY-4S98TW7-1/2/a5e594ea8bebc475f87ce9d00b6f5cd1)
Abstract:
The degradation of the cereal proteins in wheat and rye sourdough fermentations strongly affects the quality of bread. Acidification and the reduction of disulfide bonds of gluten by heterofermentative lactobacilli increase the activity of cereal proteases and substrate accessibility; amino acids are accumulated by strain-specific intracellular peptidases of lactobacilli. Germinated cereals or other proteases enable an extensive degradation of proteins in sourdoughs in fermentation protocols that may be used to develop new products for individuals with gluten intolerance. The increased knowledge on proteolysis in sourdoughs enables a directed optimization of fermentation to improve bread quality.

Sofia Hjortmo, Johan Patring, Jelena Jastrebova, Thomas Andlid, Biofortification of folates in white wheat bread by selection of yeast strain and process, International Journal of Food Microbiology, Volume 127, Issues 1-2, 30 September 2008, Pages 32-36, ISSN 0168-1605, DOI: 10.1016/j.ijfoodmicro.2008.06.001.
(http://www.sciencedirect.com/science/article/B6T7K-4SPC0JM-1/2/476eebe65d270e42850c4b4a84fcbfd4)
Abstract:
We here demonstrate that folate content in yeast fermented food can be dramatically increased by using a proper (i) yeast strain and (ii) cultivation procedure for the selected strain prior to food fermentation. Folate levels were 3 to 5-fold higher in white wheat bread leavened with a Saccharomyces cerevisiae strain CBS7764, cultured in defined medium and harvested in the respiro-fermentative phase of growth prior to dough preparation (135-139 [micro sign]g/100 dry matter), compared to white wheat bread leavened with commercial Baker's yeast (27-43 [micro sign]g/100 g). The commercial Baker's yeast strain had been industrially produced, using a fed-batch process, thereafter compressed and stored in the refrigerator until bakings were initiated.
This strategy is an attractive alternative to fortification of bread with synthetically produced folic acid. By using a high folate producing strain cultured a suitable way folate levels obtained were in accordance with folic acid content in fortified cereal products.
Keywords: Folate; Baker's yeast; Saccharomyces cerevisiae; Bread; Food fermentation

Thomas G. Schmidt, Uwe Franko, Ralph Meissner, Uncertainties in large-scale analysis of agricultural land use--A case study for simulation of nitrate leaching, Ecological Modelling, Volume 217, Issues 1-2, 24 September 2008, Pages 174-180, ISSN 0304-3800, DOI: 10.1016/j.ecolmodel.2008.06.020.
(http://www.sciencedirect.com/science/article/B6VBS-4T14X73-6/2/7ddf393e3ec0299608d3b2caa86dbc6b)
Abstract:
Simulation studies play an important role in predicting the effects of agri-environmental policies. Management plans for the Water Framework Directive, for example, show how policy measures can be based on both the absolute effects and the probability of the achievement of objectives. Here, comprehensive uncertainty analysis is a valuable modern tool.
In the context of the six most important uncertainties in this study, the article explains the overall uncertainties of a nitrate leaching model for agricultural land use. Although the primary input data are `natural conditions' and `land management', there are also variances caused by model description and upscaling.
The management options in a large number of small farming systems are described as adapted in a particular region. A variance analysis of the simulated nitrate leaching-rates by means of the H-

test shows significant differences between locations, meaning that the distribution of results often allows no discrimination between two or several locations in terms of simulation objects. These locations, similar in nitrate leaching behaviour, are summarised to so-called Nitrogen Response Units (NRUs). Within these NRUs, a multiple regression analysis, with the dependent variable `nitrate leaching-rate,' and the independent variables `percentage of cereals in the crop rotation' and `livestock,' shows the regression coefficients of each NRU.
A calculation of the mean, or theoretically most probable, nitrate leaching-rate follows: all distribution patterns of livestock and cereals are combined, and the regression equations are applied for each NRU. This reveals the range of the possible nitrate leaching-rates in the area. The mean value, like the average of all possible land use patterns, of this distribution is taken as the most probable figure. The minimum and maximum values set the limits for the management distribution of the uncertainty analysis. The overall uncertainties of the results are determined by the sum of the variances that are calculated by all effects, which are classified as important. The first application of this new approach was a study region of about 1000 km2 in Germany. The nitrate leaching losses were 63 kg NO3/ha on average with a range of uncertainty of +59% and -79%.
Keywords: Agricultural land use; Large-scale analysis; Nitrate leaching; Nitrogen Response Unit (NRU); Uncertainty analysis

A.B. Leytem, B.P. Willing, P.A. Thacker, Phytate utilization and phosphorus excretion by broiler chickens fed diets containing cereal grains varying in phytate and phytase content, Animal Feed Science and Technology, Volume 146, Issues 1-2, 15 September 2008, Pages 160-168, ISSN 0377-8401, DOI: 10.1016/j.anifeedsci.2007.11.006.
(http://www.sciencedirect.com/science/article/B6T42-4RDB8XF-3/2/6bcc3e17c4732aab6b171a1ca4acbfa3)
Abstract:
Eighty, 12-day-old, male broiler chicks, were fed one of four diets to determine the effects of feeding grains varying in phytate phosphorus (P) and intrinsic phytase activity on ileal and excreta P digestibility and composition. The diets contained approximately 970.7 g grain kg-1 (maize, high fat-low lignin oat, normal barley or low-phytate barley) with the cereal supplying the sole source of dietary P. The diets were fed for a 7-day acclimation period followed by a 2 day excreta collection while ileal digesta was collected at slaughter on day 21. The coefficients of ileal apparent digestibility (CIAD) for P and phytate P ranged from 0.79 (normal barley) to 0.86 (maize and low-phytate barley) and 0.76 (low-phytate barley) to 0.89 (maize), respectively. The CIAD for phytate P was significantly greater in the maize and high fat-low lignin oat diets, while the low-phytate barley diet had the lowest coefficient (P>0.002). The coefficients of total tract apparent digestibility (CTTAD) for P and phytate P ranged from 0.25 (maize) to 0.35 (low-phytate barley) and 0.90 (maize and low-phytate barley) to 0.96 (high fat-low lignin oat), respectively, with no significant differences between diets. There was very little phytate P in excreta regardless of the type of grain fed (<0.13 of total P) with no significant differences between diets. Phytate P degradation was not related to the level of intrinsic phytase in the diet. In summary, current results indicate that, regardless of the type of grain fed, dietary phytate P is highly digestible when large amounts of calcium and P are not added into poultry diets and little phytate P is excreted.
Keywords: Endogenous phytase; Phytate degradation; Poultry; Phosphorus; NMR

Nathalie Leblanc, Redouan Saiah, Eric Beucher, Richard Gattin, Michel Castandet, Jean-Marc Saiter, Structural investigation and thermal stability of new extruded wheat flour based polymeric materials, Carbohydrate Polymers, Volume 73, Issue 4, 5 September 2008, Pages 548-557, ISSN 0144-8617, DOI: 10.1016/j.carbpol.2007.12.034.
(http://www.sciencedirect.com/science/article/B6TFD-4RP0MMB-1/2/50a305308f6092c87103e36f69d1ab98)

Abstract:
In this study, we compare physical properties of wheat starch and wheat-flour based materials. The comparison has been done using thermogravimetric, calorimetric, X-ray diffraction, mechanic and morphologic experiments conducted on a series of wheat-flour extruded materials. The wheat flour used here can be understood as a by-product of the farm-produce wheat flour. All data obtained by means of these experimental methods allow us to conclude that, basically no significant difference exists between our wheat-flour based and wheat-starch based materials. Only one clear difference occurs for the strain to break value which decreases by about 30% for wheat-flour based materials.
Keywords: Cereal flours; Biodegradable material; Thermoplastics; Extrusion; SEM; Thermogravimetry; DSC; X-ray diffraction

Audun Korsaeth, Relations between nitrogen leaching and food productivity in organic and conventional cropping systems in a long-term field study, Agriculture, Ecosystems & Environment, Volume 127, Issues 3-4, September 2008, Pages 177-188, ISSN 0167-8809, DOI: 10.1016/j.agee.2008.03.014.
(http://www.sciencedirect.com/science/article/B6T3Y-4SG017R-1/2/fadfbd846472b5edee233faeed3d56c8)
Abstract:
An ideal agricultural system should both maximize food production and minimize undesirable effects on the environment. The long-term Apelsvoll cropping system experiment, located in southeast Norway, was used in this study, to compare yields, major N flows (in particular measured leaching/runoff losses) and the N loss-to-food production ratios (LFP-ratios) in six different cropping systems over a 4-year period. The experiment included three systems with cash-cropping (CA1: conventional arable farming; CA2: arable farming practice with environmentally sound management; OA: organic arable farming with 25% of the area as green manure, and three systems with both arable and fodder crops, representing mixed dairy production (CM: conventional farming practice with 50% grass-clover ley; OM1: organic farming with 50% grass-clover ley; OM2: organic farming with 75% grass-clover ley). The forage production was assumed to be used for milk and meat production, in amounts calculated on the basis of available feed and estimated requirements for dairy cattle. All farm produce (cereals, potatoes, milk and meat) was converted into metabolizable energy for human consumption. Organic cropping gave significantly lower yields than conventional cropping, for both arable and mixed dairy systems, most likely due to sub-optimal plant nutrition and the lack of plant protection in the organic systems. The average net energy production in CA1 and CA2 was 2.4-5.3 times greater than that in the other systems, which illustrates the energy costs of taking 25% of the area out of food production to produce green manure (OA) and the energy cost of including an extra trophic level in the nutrient chain (CM, OM1 and OM2). Only CA2 and CM appeared to have a balanced N budget, whereas the other systems all had N deficits, in particular CA1 and OA. The total N losses to drainage were largest from CA1, but not significantly larger than those from OA, which had the largest N runoff of the systems, most likely due to the green manure in its rotation. The conventional system with environmentally sound management (CA2) had the lowest LFP-ratios overall. Among the arable cropping systems, the organic system with 25% green manure (OA) had the highest LFP-ratios. The mixed dairy systems had generally higher LFP-ratios than the arable systems. Including leaching/runoff N losses in the LFP-ratio, CA1, CA2, OA, CM, OM1 and OM2 appeared to lose 0.6, 0.4, 1.1, 0.9, 1.2 and 1.1 kg N, respectively, per GJ of produced metabolizable energy for human consumption.
Keywords: Arable cropping systems; Cereal yields; Human nutrition; Food production; Loss-to-production ratios; Mixed dairy systems; Net energy production; Nitrogen budgets; Yields

R. Abou Samra, D. Brienza, D. Grathwohl, H. Green, Effect of whole grain breakfast cereal on satiety and short-term food intake, Appetite, Volume 51, Issue 2, September 2008, Page 350, ISSN 0195-6663, DOI: 10.1016/j.appet.2008.04.022.
(http://www.sciencedirect.com/science/article/B6WB2-4SNHNTS-1/2/40af113b60f0601d5352a3d41c75237b)

Esteban Osorio-Cadavid, Clemencia Chaves-Lopez, Rosanna Tofalo, Antonello Paparella, Giovanna Suzzi, Detection and identification of wild yeasts in Champus, a fermented Colombian maize beverage, Food Microbiology, Volume 25, Issue 6, September 2008, Pages 771-777, ISSN 0740-0020, DOI: 10.1016/j.fm.2008.04.014.
(http://www.sciencedirect.com/science/article/B6WFP-4SFS0KY-3/2/175f4d54fc18ef557385ca3dd60c5a5d)
Abstract:
The aim of this study was to identify and characterise the predominant yeasts in Champus, a traditional Colombian cereal-based beverage with a low alcoholic content.
Samples of Champus from 20 production sites in the Cauca Valley region were analysed. A total of 235 yeast isolates were identified by conventional microbiological analyses and by polymerase chain reaction-restriction fragment length polymorphism (PCR-RFLP) of ITS1-5.8S rDNA-ITS2. The dominant species were: Saccharomyces cerevisiae, Issatchenkia orientalis, Pichia fermentans, Pichia kluyveri var. kluyveri, Zygosaccharomyces fermentati, Torulospora delbruekii, Galactomyces geotrichum and Hanseniaspora spp. Model Champus systems were inoculated with single strains of some isolated sporogenus species and the aromatic profiles were analysed by SPME. Analysis of data showed that Champus strains produced high amounts of esters. The aromatic compounds produced by Saccharomyces and non-Saccharomyces yeasts from Champus can exert a relevant influence on the sensory characteristics of the fermented beverage. The Champus strains could thus represent an important source for new yeast biotypes with potential industrial applications.
Keywords: Yeasts; Champus; 5.8S-ITS region; D1/D2 domain; Aromatic compounds

Bo B.B. Jensen, Martin Lennox, Kit Granby, Jens Adler-Nissen, Robust modelling of heat-induced reactions in an industrial food production process exemplified by acrylamide generation in breakfast cereals, Food and Bioproducts Processing, Volume 86, Issue 3, September 2008, Pages 154-162, ISSN 0960-3085, DOI: 10.1016/j.fbp.2007.10.014.
(http://www.sciencedirect.com/science/article/B8JGD-4R8M8M3-1/2/1600b7e178fb478b007fa879d31a3e0e)
Abstract:
Data from an industrial case study of breakfast cereal production indicated that the generated amounts of acrylamide are greatly dependent upon the combined effects of temperature and heating time in a roasting step process. Two approaches to obtain process models for acrylamide generation were tested. The first applied a pathway-based model. The second developed a simpler more robust model based on the integrated effects of time and temperature, where the generation of acrylamide was crudely fitted to an exponentially rising function. The development of the two models highlighted a number of difficulties in applying multi-parameter models and emphasized the advantages of 'classical' approaches to process modelling, especially for use in an industrial context. The study faced with a significant degree of variability in the data, due to fluctuations in the process, which also emphasized the importance of robustness in the developed models. The correlations obtained for predicting acrylamide generation in the case study present a useful tool for food processing industry to minimize acrylamide generation. In the present case it was possible by lowering process temperature and prolonging residence time to achieve an approximately 80% reduction in acrylamide content while maintaining the desired product quality.
Keywords: Acrylamide; Modelling; Food production; Process modelling

Roser Marti-Cid, Juan M. Llobet, Victoria Castell, Jose L. Domingo, Evolution of the dietary exposure to polycyclic aromatic hydrocarbons in Catalonia, Spain, Food and Chemical Toxicology, Volume 46, Issue 9, September 2008, Pages 3163-3171, ISSN 0278-6915, DOI: 10.1016/j.fct.2008.07.002.
(http://www.sciencedirect.com/science/article/B6T6P-4T0FF9G-1/2/6c1f5556ac10bc3bbca9f54b62d0487d)
Abstract:
The concentrations of 16 polycyclic aromatic hydrocarbons (PAHs) were determined in samples of foodstuffs widely consumed by the population of Catalonia, Spain. All samples were randomly acquired in 12 cities of Catalonia between March and June of 2006, and analyzed by gas chromatography-mass spectrometry. The dietary intake of total and carcinogenic PAHs was estimated for various age/gender groups of population. In order to determine the temporal trend on the dietary exposure to PAHs, the current results were compared with those of a previous survey (2000). The highest individual PAH levels corresponded to phenanthrene (29.66 [mu]g/kg), naphthalene (25.87 [mu]g/kg) and fluoroanthene (13.66 [mu]g/kg), while the lowest levels were benzo[a]pyrene (1.28 [mu]g/kg), benzo[k]fluoranthene (1.31 [mu]g/kg) and indeno[1,2,3-c,d]pyrene (1.44 [mu]g/kg). According to food groups, the highest levels of total PAHs were detected in meat and meat products (25.56 [mu]g/kg), oils and fats (23.48 [mu]g/kg), and cereals (20.44 [mu]g/kg). For an average male adult (70-kg body weight), the current dietary intake of the sum of PAHs was higher (12.0 [mu]g/day) than that found in our 2000 survey (8.4 [mu]g/day).
Keywords: Polycyclic aromatic hydrocarbons (PAHs); Foodstuffs; Dietary intake; Health risks; Catalonia (Spain)

Byung-Kee Baik, Steven E. Ullrich, Barley for food: Characteristics, improvement, and renewed interest, Journal of Cereal Science, Volume 48, Issue 2, September 2008, Pages 233-242, ISSN 0733-5210, DOI: 10.1016/j.jcs.2008.02.002.
(http://www.sciencedirect.com/science/article/B6WHK-4RY8SMY-1/2/727dd161e72d535b564ba5239e98bf46)
Abstract:
Barley (Hordeum vulgare vulgare L.) is an ancient cereal grain, which upon domestication has evolved from largely a food grain to a feed and malting grain. However, barley food use today remains important in some cultures around the world, particularly in Asia and northern Africa, and there is renewed interest throughout the world in barley food because of its nutritional value. This review covers basic and general information on barley food use and barley grain processing for food use, as well as an in-depth look at several major aspects/traits of interest for barley food use including kernel hardness and colour, grain starch, and [beta]-glucan contents. These traits are described in terms of their effects on processing and nutrition, as well as their inheritance and the prospects for barley improvement through breeding. Whereas, the aspects listed above have been studied relatively extensively in barley in terms of content, form, genetics, physiology, and in some cases nutritional quality, little is know about functional properties for processing and food product development. Renewed interest in barley for food uses largely centres around the effects of [beta]-glucans on lowering blood cholesterol levels and glycemic index. Wholegrain barley foods also appear to be associated with increased satiety and weight loss. There is great potential to utilise barley in a large number of cereal-based food products as a substitute partially or wholly for currently used cereal grains such as wheat (Triticum aestivum), oat (Avena sativa), rice (Oryza sativa), and maize (Zea mays).
Keywords: Barley; Hordeum vulgare; Food quality traits; Health benefits; Grain processing; Trait genetics; [beta]-glucans; Grain hardness; Grain colour

K. Dewettinck, F. Van Bockstaele, B. Kuhne, D. Van de Walle, T.M. Courtens, X. Gellynck, Nutritional value of bread: Influence of processing, food interaction and consumer perception, Journal of Cereal Science, Volume 48, Issue 2, September 2008, Pages 243-257, ISSN 0733-5210, DOI: 10.1016/j.jcs.2008.01.003.
(http://www.sciencedirect.com/science/article/B6WHK-4RVG3JR-1/2/a4506d6b17c3532d87e31aa1dcc014cb)
Abstract:
The nearly ubiquitous consumption of cereals all over the world gives cereals an important position in international nutrition. Besides the high starch content as energy source, cereals provide dietary fibre, nutritious protein and lipids rich in essential fatty acids. Important micronutrients present in cereals are vitamins, especially many B vitamins, minerals, antioxidants and phytochemicals. In general, cereals provide important amounts of most nutrients. However, processing may decrease or increase the levels of the bioactive components in grains and also modify the bioavailability of these components. In addition, interactions between bread and companion foods have effects on the nutritional quality. The aim of this paper is to review the existing literature on the effects of processing techniques and interactions with other food components in a mixed meal on the nutritional quality of bread. Furthermore, research findings on the consumer perception of bread in Belgium are included. This information can help health professionals and policy-makers to give clear and targeted advice about the positive effects of bread in the human nutrition during consultations and information campaigns.
Keywords: Bread; Nutritional value; Processing; Consumer perception

Anthony Fardet, Edmond Rock, Christian Remesy, Is the in vitro antioxidant potential of whole-grain cereals and cereal products well reflected in vivo?, Journal of Cereal Science, Volume 48, Issue 2, September 2008, Pages 258-276, ISSN 0733-5210, DOI: 10.1016/j.jcs.2008.01.002.
(http://www.sciencedirect.com/science/article/B6WHK-4RSBY3J-2/2/f9fb701f3552519c2d2eea0cbf0e5165)
Abstract:
There is strong epidemiological evidence that whole-grain cereals protect the body against age-related diseases such as diabetes, cardiovascular diseases and some cancers. This may be due to the fibre and micronutrients in the outer layer and germ fractions of the grain acting together to combat oxidative stress, inflammation, hyperglycaemia and carcinogenesis. Oxidative stress is associated with these metabolic diseases. Whole-grain cereals are a good source of vitamin E, folates, phenolic acids, zinc, iron, selenium, copper, manganese, carotenoids, phytic acid, lignins, lignans, and alkylresorcinols, all of which have significant antioxidant potential in vitro. Phenolic acids such as ferulic acid are characteristic of cereals. They may scavenge free-radical oxygen species both in vitro and in vivo. Phenolics may also act in vivo by triggering gene induction/repression via cell signalling through transcription factors. Whole-grain cereals are also a good source of betaine, choline and sulphur amino acids that can improve antioxidant status. Betaine, which accounts for about 1% (w/w) of the bran fraction in wheat, acts as a methyl donor that may decrease hyperhomocysteinaemia, a cardiovascular risk factor, but it has been neglected. Cereals and cereal products are antioxidative in vitro, as are most fruits and vegetables. The in vitro antioxidant capacity of cereals and their constituent fractions is significantly correlated with their polyphenol content, except for maize. However, the in vitro antioxidant capacity of cereals is only an approximate reflection of their in vivo antioxidant effect due to differences in antioxidant solubility/bioavailability within the digestive tract and the metabolism/conjugation of compounds such as polyphenols. During digestion, the antioxidant capacity of cereals is increased and is likely to provide a favourable antioxidative environment for the epithelium tract, notably in the large intestine. Most of the studies performed on animals have been concerned with the antioxidant property of coloured rice, especially black rice and its anthocyanin fraction, showing a positive effect on some antioxidant biomarkers. Those very few

studies that have been done on humans have shown that wheat bran and rye product supplements have no effect on antioxidant status, while a black rice pigment fraction and an avenanthramide-enriched mixture extracted from hulled oats have a positive effect. In vivo studies are therefore needed to further explore the real antioxidant potential of cereals.
Keywords: Whole-grain cereals; Micronutrients; In vitro Antioxidant potential; In vivo studies

Craig F. Morris, Mrinal Bhave, Reconciliation of D-genome puroindoline allele designations with current DNA sequence data, Journal of Cereal Science, Volume 48, Issue 2, September 2008, Pages 277-287, ISSN 0733-5210, DOI: 10.1016/j.jcs.2007.09.012.
(http://www.sciencedirect.com/science/article/B6WHK-4R68NC1-9/2/f38ea986ab7c02f2af18c40dbafab9d9)
Abstract:
Kernel texture is an important trait in cereals, especially wheat (Triticum spp.). Throughout the Triticeae, the puroindoline genes act to soften kernel endosperm. Absence or mutation of either or both of the two puroindolines, `a' and `b', in Triticum aestivum results in harder grain texture. Apparently only one puroindoline haplotype was contributed by the Aegilops tauschii variety that contributed the D-genome during allopolyploidization. Yet, world collections of Ae. tauschii exhibit a range of puroindoline sequence polymorphisms. Consequently, these genes, through synthetic hexaploids (x Aegilotriticum) can enrich the wheat gene pool. Lastly, the puroindolines represent a useful tool for phylogenetic analyses. Here we review original sequence data published and/or available in public databases to reconcile the known gene sequence polymorphisms with a systematic approach to the designating of puroindoline gene and allele symbols in T. aestivum, Ae. tauschii, and x Aegilotriticum. This system follows the recommendations adopted by the International Wheat Genetics Symposium and described in the Catalogue of Gene Symbols for Wheat. Errors, discrepancies and ambiguities in the puroindolines are reviewed; a reconciliation of all existing data is outlined.
Keywords: Wheat; Puroindolines; Grain hardness; Genes

Bao-Lam Huynh, Lachlan Palmer, Diane E. Mather, Hugh Wallwork, Robin D. Graham, Ross M. Welch, James C.R. Stangoulis, Genotypic variation in wheat grain fructan content revealed by a simplified HPLC method, Journal of Cereal Science, Volume 48, Issue 2, September 2008, Pages 369-378, ISSN 0733-5210, DOI: 10.1016/j.jcs.2007.10.004.
(http://www.sciencedirect.com/science/article/B6WHK-4R68NC1-6/2/74353c8351124387998f71e31df9986a)
Abstract:
Fructans are prebiotics, with potentially beneficial effects on human health. This study aimed to examine genetic variation in wheat grain fructan content using a simplified analytical method. The method involves extracting fructans from wheat grain followed by enzymatic hydrolysis to break down fructans into monosaccharides that can then be quantitatively measured by anion-exchange liquid chromatography coupled with pulsed amperometric detection. The modified procedure is reliable and allows the handling of large numbers of flour samples at a low cost, and could therefore be useful for assessing large numbers of wheat breeding lines. Using this method, grain samples taken from 19 bread wheat cultivars and breeding lines grown in both glasshouse and the field were analysed for grain fructan content. In addition, grain samples of 29 international wheat landraces and 14 new wheat breeding lines from the International Maize and Wheat Improvement Center (CIMMYT) were surveyed for their fructan contents. There was significant genotypic variation among these materials, with grain fructan content ranging from 0.7 to 2.9% of grain dry weight. There was no evidence of strong genotype-by-environment interaction; the fructan contents of field-grown grain samples were positively correlated (r = 0.83) with those of glasshouse-grown samples of the same cultivars. It should therefore be possible to investigate the

genetic control of variation for this trait using the simplified HPLC method and to select effectively for increased grain fructan content in wheat breeding.
Keywords: Cereal grains; Fructans; HPLC; Prebiotics; Raffinose; Wheat

Rikard Landberg, Afaf Kamal-Eldin, Marjatta Salmenkallio-Marttila, Xavier Rouau, Per Aman, Localization of alkylresorcinols in wheat, rye and barley kernels, Journal of Cereal Science, Volume 48, Issue 2, September 2008, Pages 401-406, ISSN 0733-5210, DOI: 10.1016/j.jcs.2007.09.013.
(http://www.sciencedirect.com/science/article/B6WHK-4R6B2JP-2/2/ce01cb0fae4641555729661a20f26bb0)
Abstract:
Cereal alkylresorcinols (AR), a group of phenolic lipids mainly found in the outer parts of wheat and rye kernels, are currently being studied for the possibility to use them as biomarkers for the intake of whole grain wheat and rye foods. In this work, AR were localised in grains by using light microscopy and gas chromatographic analysis of hand-dissected botanical and pearling fractions. GC-analysis of hand-dissected fractions showed that more than 99% of the total AR content was located in an intermediate layer of the caryopsis, including the hyaline layer, testa and inner pericarp. Microscopic examination showed that the outer cuticle of testa/inner cuticle of pericarp was the exact location, and that no AR were found in the endosperm or in the germ, suggesting that AR could be used as a selective marker of testa.
Keywords: Alkylresorcinols; Wheat; Rye; Barley; Whole grain; Biomarker

Shane R. McIntosh, Don Brushett, Robert J. Henry, GTP cyclohydrolase 1 expression and folate accumulation in the developing wheat seed, Journal of Cereal Science, Volume 48, Issue 2, September 2008, Pages 503-512, ISSN 0733-5210, DOI: 10.1016/j.jcs.2007.11.008.
(http://www.sciencedirect.com/science/article/B6WHK-4RSRDG5-2/2/d5ba882a4d78a0b9142218d7392a3af7)
Abstract:
Folates are essential cofactors required by most living organisms yet only plants and microorganisms have retained the ability of de novo synthesis. Human deficiencies remain prevalent due to inadequate dietary intake. Cereals are the most widely consumed plant product yet fail to supply sufficient levels of folates, however an active folate pathway in seeds identifies cereals as a potential target for biofortification. GTP cyclohydrolase 1 mRNAs were isolated from developing wheat seed tissues, leaves and roots suggesting de novo folate synthesis is occurring throughout the wheat plant. A homologous gene was identified in the rice genome sequence revealing both wheat and rice GCH1 transcripts have conserved features identified in other plant GCH1 genes. Wheat seed transcripts produced functional recombinant proteins which catalysed the formation of dihydroneopterin triphosphate from GTP. A differential expression profile of GCH1 transcripts occurred throughout seed development whereas folate accumulation decreased. Interestingly, the mature seed has retained GCH1 activity only in the embryo and maternal layers which explains the apparent partitioning of folate accumulation in the mature seed. The wheat seed has a continually active folate biosynthetic pathway through development and by inference the capacity to produce folate continues as long as the seed remains viable.
Keywords: GCH1; Folate; Wheat seeds; Gene expression

R.A. King, M. Noakes, A.R. Bird, M.K. Morell, D.L. Topping, An extruded breakfast cereal made from a high amylose barley cultivar has a low glycemic index and lower plasma insulin response than one made from a standard barley, Journal of Cereal Science, Volume 48, Issue 2, September 2008, Pages 526-530, ISSN 0733-5210, DOI: 10.1016/j.jcs.2007.11.009.
(http://www.sciencedirect.com/science/article/B6WHK-4RVG3JR-2/2/2ea4f915c5add618006011d85acc32c9)

Abstract:
Himalaya 292 is a novel hull-less barley cultivar with lower total starch content, a higher proportion of amylose and a substantially higher content of soluble and insoluble fibre. The high fibre content suggests that the grain may have potential as an ingredient in health promoting foods. In this study, 29 healthy volunteers consumed extruded whole grain breakfast cereal made from Himalaya 292 (123 g) or a commercial hull-less barley (cv Torrens) (76 g) each supplying 50 g carbohydrate. Glycemic indices were 77 +/- 13 (SEM) and 50 +/- 9 for Torrens and Himalaya 292 breakfast cereals respectively (P = 0.004). On this basis, the Himalaya 292 cereal is a low glycemic index food. The glycemic load (the product of glycemic index and the available carbohydrate content of a 60 g serve divided by 100) of the new cultivar was 10.1 +/- 1.8 compared to 25.3 +/- 4.3 for the Torrens breakfast cereal (P < 0.001). The plasma insulin response to the test meal was 26% lower for Himalaya 292 than for Torrens (P = 0.023). The data confirm that Himalaya 292 may be of value in foods designed to assist in the prevention and management of diabetes.
Keywords: Barley; Glycemic index; Glycemic load; Humans; Insulin; Starch

Stephanie Hartmann, Peter Koehler, Fractionation of cereal flour by sedimentation in non-aqueous systems. II. Rheological characterisation and baking performance of the protein fraction, Journal of Cereal Science, Volume 48, Issue 2, September 2008, Pages 548-555, ISSN 0733-5210, DOI: 10.1016/j.jcs.2007.12.005.
(http://www.sciencedirect.com/science/article/B6WHK-4RYNMFH-1/2/dd85560c8844b8591865e884764d73c4)
Abstract:
A previously described method for the non-aqueous fractionation of cereal flours by sedimentation in non-aqueous solvents was carried out using flours of three wheat cultivars differing in baking performance, as well as one rye and one barley flour. The method was based on differences in the densities of starch (higher) and protein (lower). Thus, suspending finely milled flour in an inert solvent mixture with a density in between the densities of starch and protein yielded a sedimented starch fraction and a protein-rich fraction at the surface of the solvent. Further purification of this upper fraction provided a protein fraction, a middle fraction, and a lipid fraction. The protein fractions were examined by means of rheological methods such as micro-extension tests and creep-recovery tests. They also were reconstituted to standard flour with a protein content of 13.5%, which was used for micro-scale baking tests. Compared to aqueous isolated gluten, the hydrated protein fractions from wheat were much more extensible and had a lower resistance to extension. The baking performance of the wheat protein fractions was superior to gluten and comparable to the native wheat flours. The protein fraction from rye gave a wheat-like bread crumb, whereas the barley protein was not suited for bread making.
Keywords: Non-aqueous fractionation; Cereals; Flour; Reconstitution; Rheology; Micro-scale baking test

Anjani M. Karunaratne, P.H. Amerasinghe, V.M. Sadagopa Ramanujam, H.H. Sandstead, P.A.J. Perera, Zinc, iron and phytic acid levels of some popular foods consumed by rural children in Sri Lanka, Journal of Food Composition and Analysis, Volume 21, Issue 6, September 2008, Pages 481-488, ISSN 0889-1575, DOI: 10.1016/j.jfca.2008.02.006.
(http://www.sciencedirect.com/science/article/B6WJH-4SDPX6D-3/2/9b4b6c1e235c26ccdc12b701cb210b2c)
Abstract:
Zinc (Zn) and iron (Fe) deficiencies may prevail in populations dependent on cereal-based diets containing few animal products. The contribution of Zn and Fe from foods of preschool children of a hill country village in Sri Lanka, is discussed as it is known that the presence of phytic acid (PA) in the diet limits bioavailability of micronutrients. The Zn, Fe and PA contents of cereal-based (rice

or wheat flour) composite meals (n=12), wheat flour-based products (n=5), pulses used as staples, snacks or accompaniments (n=6) and other miscellaneous accompaniments (n=4) were determined. Additionally, 20 rice and 3 paddy varieties consumed were also analysed. Although the Zn and Fe levels were reasonable in the composite meals, the PA to Zn molar ratios (5-43) were relatively high, in a majority of meals. Composite meals containing wheat flour (refined) had lower PA levels (<6 mg/100 g) in the absence of pulses and scraped coconut, than rice meals. All rice varieties were partially polished but the PA to Zn molar ratios varied. The major contributors of PA appeared to be soy-textured vegetable protein, all types of jak fruit and scraped coconut kernel. Potable water was a poor source of Zn and Fe. These diets could potentially lead to marginal Zn and Fe deficiencies, and dietary diversification and counselling would be beneficial.
Keywords: Zinc; Iron; Phytic acid; Bioavailability

C. O'Neil, T.A. Nicklas, S.S. Cho, D. Hasza, The Association of Pre-Sweetened or Non-Presweetened Ready to Eat Cereal or Other Breakfast with Nutrient Intake, Diet Quality, and Body Weight of Children Aged 1 to 8 Years: NHANES 1999-2002, Journal of the American Dietetic Association, Volume 108, Issue 9, Supplement 1, ADA 2008 Food & Nutrition Conference & Expo, ADA 2008 Food & Nutrition Conference & Expo, September 2008, Page A112, ISSN 0002-8223, DOI: 10.1016/j.jada.2008.06.336.
(http://www.sciencedirect.com/science/article/B758G-4T8SD0X-FC/2/dd7d5f28ba7fab6e602021991085d3d9)

E. Solanas, C. Castrillo, M. Fondevila, Q.O. Ruiz Narvaez, J.A Guada, Effects of cereals and/or protein supplement extrusion on diet utilisation and performance of intensively reared cattle, Livestock Science, Volume 117, Issues 2-3, September 2008, Pages 203-214, ISSN 1871-1413, DOI: 10.1016/j.livsci.2007.12.014.
(http://www.sciencedirect.com/science/article/B7XNX-4RM89H7-2/2/f9f17e98b214b920aae45b747bbed169)
Abstract:
The effect of extruding the cereal and/or the protein supplement of a compound feed on its nutritive value and on the performance of intensively reared male calves was studied. The compound feed was formulated with 0.65 of a cereal blend (60:40 maize:barley), 0.25 of a protein blend (1/3:1/3:1/3 raw soybeans:peas:lupins), and 0.08 of urea to contain 0.17 of crude protein. It was tested without extruding (NE) and with the cereal blend (CE), the protein blend (PE) or both (CPE) extruded. Another non-extruded compound feed with mainly soybean meal as the protein supplement (NE-SBM) also was studied. The five experimental compound feeds together with barley straw were offered ad libitum to 50 male Friesian calves (112 kg initial live weight) for 13 weeks, recording individual feed intake and live weight gain. Crude protein (CP) solubility and in vitro and in situ CP degradation of experimental compounds, and in vitro gas production kinetics, in vivo digestibility and urinary allantoin excretion of diets were determined. Cereal extrusion promoted a greater gas production at all incubation times ($p < 0.001$), associated to the increase in starch gelatinisation. PE and NE-SBM compounds showed lower in vitro ($p < 0.01$) and in situ ($p < 0.001$) CP degradability than the other feeds. Ingredient extrusion did not affect apparent DM, OM and CP digestibilities, but diet CPE showed a lower NDF digestibility ($p < 0.05$) than the others (0.293 vs. 0.420, 0.387, 0.390 and 0.407 with CPE vs. NE, CE, PE and NE-SBM, respectively). The apparent EE digestibility increased ($p = 0.053$) with the inclusion of extruded ingredients, (0.799, 0.749 and 0.794 vs. 0.719 and 0.702 with CE, PE and CPE vs. NE and NE-SBM, respectively). Daily allantoin excretion was lower ($p < 0.01$) in calves receiving the CPE diet than in those receiving the NE, PE and NE-SBM diets. Treatments did not affect the average daily gains (1.61 +/- 0.022 kg d- 1), however calves on the CPE diet showed a lower ($p < 0.01$) concentrate and total conversion ratios than those fed NE, PE and NE-SBM (2.60 vs. 2.79, 2.85 and 2.98 kg concentrate DM kg- 1 daily gain and 2.93 vs. 3.09, 3.13 and 3.26 kg total DM kg- 1

daily gain, respectively). The CE diet resulted in numerically higher ($p > 0.05$) concentrate and total DM conversion ratios (2.72 and 3.02) than CPE and lower ($p < 0.05$) than NE-SBM. Improvement in feed conversion ratio after extrusion would be related to a better starch utilisation and not to changes in microbial or dietary protein flow to the duodenum, although a better utilisation of fat energy cannot be disregarded.
Keywords: Beef cattle; Extrusion; Digestibility; Growth

Min Wang, Yuan Hu, Zhiliang Tan, Shaoxun Tang, Zhihong Sun, Xuefeng Han, In situ ruminal phosphorus degradation of selected three classes of feedstuffs in goats, Livestock Science, Volume 117, Issues 2-3, September 2008, Pages 233-237, ISSN 1871-1413, DOI: 10.1016/j.livsci.2007.12.016.
(http://www.sciencedirect.com/science/article/B7XNX-4RJ4KW1-1/2/ce965cdeb24f7c8072b815d75491a542)
Abstract:
Three 4-month-old growing wether goats were used to determine the ruminal P degradability of three classes of feedstuffs with in situ nylon bag technique. Three classes of feedstuffs were cereal (maize, wheat, barley, buckwheat, rice, millet, and sorghum), legume (horsebean, soybean, pea, mungbean, and jequirity) and tuber (potato, sweat potato, and cassava). The experiment consisted of 15 periods. During each period, the ruminal P disappearance of each one of these feedstuffs was measured at 0, 2, 4, 8, 12, 24 and 36 h, respectively. The exponential model of Orskov and McDonald was employed to estimate degradation kinetics. Results showed that the degradability of feed P ranged from 805 to 986 g/kg P. Effective degradability of P generally exceeded 830 g/kg P, except for rice and millet. This updates the feed database of in situ P degradability in China, which would play an important role in improving biological P efficiency for modern ruminant production system.
Keywords: Feedstuffs; In situ ruminal degradability; Phosphorus; Goat

Jinxin Liu, Lili Han, Fanjun Chen, Juan Bao, Fusuo Zhang, Guohua Mi, Microarray analysis reveals early responsive genes possibly involved in localized nitrate stimulation of lateral root development in maize (Zea mays L.), Plant Science, Volume 175, Issue 3, September 2008, Pages 272-282, ISSN 0168-9452, DOI: 10.1016/j.plantsci.2008.04.009.
(http://www.sciencedirect.com/science/article/B6TBH-4SDPX45-1/2/e8164c6dfb43bf4fcf4cd435ba062d2a)
Abstract:
Arable soils are extremely heterogeneous in spatial nutrient distribution. It is well documented that lateral roots (LRs) proliferate in nitrate-rich patch. Yet less information is available as to which genes are involved in this process, in particular in cereals. To understand the molecular mechanism for local nitrate-induced LR growth in maize (Zea mays L.), we analyzed the gene expression profiling in maize root in early response (1 h) to local nitrate stimulation by using Maize Oligonucleotide Array (http://www.maizearray.org) and a split-root system. Selected differentially expressed genes were further confirmed by semi-quantitative RT-PCR. The results showed that reception and/or transduction of local NO3- signal involve some important protein kinases and protein phosphatases (histidine kinases, serine/threonine kinases, protein phosphatase 2A, etc.) and transcription factors (F-box, Zinc finger, Myb and bZIP transcription factors and response regulator). Increasing expression of genes encoding auxin response factor 7b, ethylene receptor, and cytokinin oxidase suggests strong interaction among hormonal pathways and local NO3- signaling pathways. Genes involving NO3- uptake and assimilation (NRT2.1, NR, etc.), sugar transport (a sugar transporter) and utilization (a sucrose synthase) were enhanced in the N-fed root. Furthermore, local NO3- induces rapid expression of genes related to cell division and expansion such as [alpha]-expansin, cellulose synthase, kinesin, plasma membrane and tonoplast aquaporins. Based on the differentially expressed genes, a putative model which combines both

the 'NO3- signal' and 'metabolic sink' theories is proposed to explain the molecular mechanism controlling local nitrate-induced LR elongation in maize.
Keywords: Nitrate; Lateral root (LR); Microarray; Gene expression; Maize (Zea mays L.)

Roberta Roberti, AnnaRita Veronesi, Augusto Cesari, Annunziata Cascone, Iris Di Berardino, Laura Bertini, Carla Caruso, Induction of PR proteins and resistance by the biocontrol agent Clonostachys rosea in wheat plants infected with Fusarium culmorum, Plant Science, Volume 175, Issue 3, September 2008, Pages 339-347, ISSN 0168-9452, DOI: 10.1016/j.plantsci.2008.05.003.
(http://www.sciencedirect.com/science/article/B6TBH-4SJ2WPS-1/2/fec44d41ae79a41fd94ab98c909d9f1a)
Abstract:
Clonostachys rosea (CR) is a common worldwide saprophyte with destructive effect against several plant pathogenic fungi showing antagonistic features against a wide variety of pathogens. We recently isolated a strain of C. rosea, named CR47, from wheat crown infected with Fusarium culmorum (FC); this strain proved to be effective against Fusarium seed borne diseases of cereals under field condition. In this paper the function of C. rosea applied as seed treatment on wheat seedling growth was investigated. In addition, we investigated the expression pattern of peroxidases and chitinases as well as PR4 proteins following both CR treatments of seeds and FC infection and also in the three-component system pathogen-antagonist-wheat. Several chitinase isoforms were induced by CR-treatment both in coleoptiles and roots, whereas some peroxidase isoforms were induced only in the presence of both antagonist and pathogen. In the latter case, it seems that CR-treatment by itself promotes plant growth and reduces the peroxidase expression, while enhances some chitinase isoforms probably involved in cell wall disruption. Moreover, both the antagonist and the pathogen studied induced PR4 protein expression, which probably exerts its role on the invading microorganisms by a translation-inhibitory process that could be ascribed to their ribonuclease activity.
Keywords: Biocontrol agent; Clonostachys rosea; Fusarium culmorum; Phytopathogen; PR proteins; Resistance induction

Heinz-Josef Koch, Henning Heuer, Olga Tomanova, Bernward Marlander, Cumulative effect of annually repeated passes of heavy agricultural machinery on soil structural properties and sugar beet yield under two tillage systems, Soil and Tillage Research, Volume 101, Issues 1-2, September-October 2008, Pages 69-77, ISSN 0167-1987, DOI: 10.1016/j.still.2008.07.008.
(http://www.sciencedirect.com/science/article/B6TC6-4T9TC01-2/2/ed005a843dd56ddf2e51cd5516a6c9bf)
Abstract:
The aim of this study was to determine potential cumulative effects of repeated passes with current heavy agricultural machinery on topsoil (0-0.3 m) and subsoil (below 0.3 m) physical properties of a Luvisol as affected by long-term tillage (annual mouldboard ploughing to 0.3 m depth (MP), shallow-mixing conservation tillage to 0.1 m depth (SM) with a wing-bladed rigid tine cultivator). Moreover, sugar beet yield was determined. Wheeling was conducted with a six-row self-propelled sugar beet harvester representing contemporary heavy agricultural machinery (wheel load 7.8-11.7 Mg, average ground contact pressure 100-145 kPa). Wheeling was applied once per year over three consecutive years after harvest of sugar beet, cereal and cereal, and moreover, independent from regular plot management with light experimental machinery. Soil moisture at wheeling (0-0.6 m depth) was around 100% field capacity in most years, which was secured by irrigation before wheeling if necessary.
Repeated wheeling negatively affected penetration resistance, macropore volume (equivalent diameter >50 [mu]m) and air permeability of topsoil (0.05-0.1 m, 0.18-0.23 m) and subsoil (0.4-0.45 m) layers, while biopore number and surface water infiltration remained unaffected. SM compared to MP tillage increased penetration resistance while decreasing macropore volume and

air permeability in the 0.18-0.23 m layer, whereas reverse effects occurred in 0.4-0.45 m depth. Sugar beet yield was decreased by wheeling and SM tillage compared to the control treatments. No significant interactions between wheeling and tillage occurred in any parameter investigated.
Conclusively, SM tillage did not provide better subsoil resistance against compaction compared to MP treatment under wheeling and soil conditions prevalent in our experiment. Repeated wheeling with heavy agricultural harvest machinery is obviously at risk to exceed the bearing capacity of susceptible soils. Although (i) under regular harvest conditions just small parts of arable fields (except headlands) are wheeled with high loads, (ii) harvest is by far not every year conducted under high soil moisture, and (iii) effects in the subsoil were small, such risks have to be taken into account. Reduction of tillage depth to <0.1 m is not recommended for high yielding sugar beet crops grown on loessial soils.
Keywords: Conservation tillage; Soil compaction; Penetration resistance; Macropores; Air permeability; Water infiltration; Yield

Paola Vitaglione, Aurora Napolitano, Vincenzo Fogliano, Cereal dietary fibre: a natural functional ingredient to deliver phenolic compounds into the gut, Trends in Food Science & Technology, Volume 19, Issue 9, September 2008, Pages 451-463, ISSN 0924-2244, DOI: 10.1016/j.tifs.2008.02.005.
(http://www.sciencedirect.com/science/article/B6VHY-4S08JTN-1/2/307e500be34d2cb4e36289513a1d36f0)
Abstract:
Epidemiological studies associate whole grain consumption with a reduced risk of many diseases. This paper focuses on the antioxidant component of cereal dietary fibre starting from its chemical structure, bioavailability and biological meaning. By the critical assessment of the intervention studies performed using cereal bran and whole grains, the hypothesis that the slow and continuous release in the gut of the dietary fibre bound antioxidants determines the health benefits, is illustrated. In the last part of the work, new perspectives and technological possibilities to enhance the health potential of this cereal component are also highlighted.

Michael G. Palmgren, Stephan Clemens, Lorraine E. Williams, Ute Kramer, Soren Borg, Jan K. Schjorring, Dale Sanders, Zinc biofortification of cereals: problems and solutions, Trends in Plant Science, Volume 13, Issue 9, September 2008, Pages 464-473, ISSN 1360-1385, DOI: 10.1016/j.tplants.2008.06.005.
(http://www.sciencedirect.com/science/article/B6TD1-4T6BDVT-1/2/bc10ea4badd981c1acf877ac1cad7238)
Abstract:
The goal of biofortification is to develop plants that have an increased content of bioavailable nutrients in their edible parts. Cereals serve as the main staple food for a large proportion of the world population but have the shortcoming, from a nutrition perspective, of being low in zinc and other essential nutrients. Major bottlenecks in plant biofortification appear to be the root-shoot barrier and - in cereals - the process of grain filling. New findings demonstrate that the root-shoot distribution of zinc is controlled mainly by heavy metal transporting P1B-ATPases and the metal tolerance protein (MTP) family. A greater understanding of zinc transport is important to improve crop quality and also to help alleviate accumulation of any toxic metals.

Zhaohui Zhao, Mohammed H. Moghadasian, Chemistry, natural sources, dietary intake and pharmacokinetic properties of ferulic acid: A review, Food Chemistry, Volume 109, Issue 4, 15 August 2008, Pages 691-702, ISSN 0308-8146, DOI: 10.1016/j.foodchem.2008.02.039.
(http://www.sciencedirect.com/science/article/B6T6R-4RWBT2K-5/2/3f67e56319118e866c68cc46034d17b1)
Abstract:

Ferulic acid (FA) is an abundant dietary antioxidant which may offer beneficial effects against cancer, cardiovascular disease, diabetes and Alzheimer's disease. The impact of FA on health depends on its intake and pharmacokinetic properties. In this article, the literature pertaining to chemistry, natural sources, dietary intake and pharmacokinetic properties of FA is critically reviewed. High levels of FA are found in both free and bound forms in vegetables, fruits, cereals, and coffee. We have estimated that consumption of these foods may result in approximately 150-250 mg/day of FA intake. FA can be absorbed along the entire gastrointestinal tract and metabolized mainly by the liver. The absorption and metabolism of FA seem to be dose dependent at least in experimental settings. Further pharmacokinetic and pharmacodynamic studies are required to characterize the impact of FA on human health.
Keywords: Ferulic acid; Phenolic acids; Pharmacokinetics; Dietary intake; Absorption; Metabolism; Bioavailability; Antioxidant

Farah S. Hosseinian, Wende Li, Trust Beta, Measurement of anthocyanins and other phytochemicals in purple wheat, Food Chemistry, Volume 109, Issue 4, 15 August 2008, Pages 916-924, ISSN 0308-8146, DOI: 10.1016/j.foodchem.2007.12.083.
(http://www.sciencedirect.com/science/article/B6T6R-4RP0MTK-3/2/a7c9f9eb979f5fa8653fd72cfd9c82db)
Abstract:
The major anthocyanin composition of normal purple wheat and heat stressed purple wheat were measured using HPLC, LC-MS/MS and the pH differential method. The lignan secoisolariciresinol diglucoside (SDG) and melatonin content were also measured. Total anthocyanin profile of normal purple wheat (491.3 mg/kg) was significantly ($P < 0.05$) lower than that of the heat stressed purple wheat (522.7 mg/kg). Thirteen major anthocyanins were isolated and cyanidin 3-glucoside was the predominant anthocyanin in purple wheat. Using the pH differential method, the total anthocyanin content of normal (500.6 mg/kg) and heat stressed (526.0 mg/kg) purple wheat were similar to those observed using HPLC. The SDG content of normal and heat stressed purple wheat were 770 and 520 [mu]g/kg, while melatonin content was 4 and 2 [mu]g/kg, respectively. The presence of SDG and melatonin in addition to anthocyanins may contribute to the health benefits associated with consumption of coloured cereal grains.
Keywords: Purple wheat; Phytochemicals; Anthocyanins; Secoisolariciresinol diglucoside; SDG; Melatonin; HPLC; LC-MS/MS

M.R. Bragulat, E. Martinez, G. Castella, F.J. Cabanes, Ochratoxin A and citrinin producing species of the genus Penicillium from feedstuffs, International Journal of Food Microbiology, Volume 126, Issues 1-2, 15 August 2008, Pages 43-48, ISSN 0168-1605, DOI: 10.1016/j.ijfoodmicro.2008.04.034.
(http://www.sciencedirect.com/science/article/B6T7K-4SG4HG6-1/2/3ad8273ed4b07f001df0128d92e1dc36)
Abstract:
In Spain, low ochratoxin A (OTA) levels have been detected in several pork products but there is no information published about the fungi involved in this OTA contamination. It is well known that P. verrucosum is much more frequently found on cereals in countries where they occasionally have OTA problems as in North European countries compared with South Europe where levels of OTA generally seem to be lower or not detected. Much less information is available about citrinin (CIT) and CIT producing species in cereals and their by products. The aim of this study was to determine, identify and characterize the occurrence of potential OTA and CIT producing Penicillium spp. from mixed feeds and raw materials purchased in the Spanish market and used as feedstuffs. A total of 155 Penicillium spp. isolates belonging to 34 species were analyzed in order to know if they are able to produce OTA and/or CIT. From these isolates, 11 P. verrucosum which were characterized by RAPD analyses, produced OTA. Fourteen isolates were CIT

producers, 10 isolates of P. verrucosum and 4 of P. citrinum. Although the occurrence and abundance of OTA and CIT Penicillium producing species have been low in our study, our results confirm the potential risk of OTA and CIT production in feeds if stored improperly. Our results also confirm the occurrence of P. verrucosum in South European countries and that it is the only OTA producing Penicillium species in these substrates.
Keywords: Cereals; Citrinin; Feedstuffs; Ochratoxin A; Penicillium verrucosum

C. Juan, A. Zinedine, L. Idrissi, J. Manes, Ochratoxin A in rice on the Moroccan retail market, International Journal of Food Microbiology, Volume 126, Issues 1-2, 15 August 2008, Pages 83-85, ISSN 0168-1605, DOI: 10.1016/j.ijfoodmicro.2008.05.005.
(http://www.sciencedirect.com/science/article/B6T7K-4SHF4B3-1/2/67e7b848ec5855b4c8367ed33b43e427)
Abstract:
One hundred (100) samples of rice purchased from retail markets in five different cities (Rabat, Temara, Sale, Casablanca and Meknes) in Morocco from January to October 2006 were surveyed for the presence of ochratoxin A (OTA) using Accelerated Solvent Extraction (ASE) coupled to liquid chromatography with fluorescence detection. The identification of OTA in positive rice samples was confirmed by methyl ester derivatization. Analytical results showed a frequency of contamination of 26% of total analyzed rice samples. The percentage of contamination of samples was 24, 26.6, 16.6, 27.7 and 30% in Rabat, Temara, Meknes, Sale and Casablanca respectively. Levels of OTA in positive samples ranged between 0.08 and 47 ng/g. The average contamination of all analyzed samples was 3.5 ng/g. The highest frequency of positive samples (30%) and the most contaminated sample (47 ng/g) was found in a sample from Casablanca city. 14 out of 100 total samples exceeded the maximum level of 5 ng/g set by European regulations for OTA in cereals. Based in the results presented in this study, the estimated daily intake of OTA in rice was 0.32 ng/kg bw/day for Moroccan consumers.
Keywords: Ochratoxin A; Rice; Occurrence; Daily intake; Morocco

Juliusz Perkowski, Maciej Busko, Jaroslaw Chmielewski, Tomasz Goral, Bozena Tyrakowska, Content of trichodiene and analysis of fungal volatiles (electronic nose) in wheat and triticale grain naturally infected and inoculated with Fusarium culmorum, International Journal of Food Microbiology, Volume 126, Issues 1-2, 15 August 2008, Pages 127-134, ISSN 0168-1605, DOI: 10.1016/j.ijfoodmicro.2008.05.028.
(http://www.sciencedirect.com/science/article/B6T7K-4SM6294-1/2/e626063409c21b53eee1457249bfaed4)
Abstract:
Four groups of cereal kernels were analyzed in terms of their volatile metabolite contents using GC/MS and the electronic nose. Analyses were conducted on 36 triticale breeding lines and 22 wheat breeding lines. Grain came from field samples inoculated with Fusarium culmorum and simultaneous non-inoculated samples--controls. All sample groups contained significantly varied levels of trichodiene (TRICH), a precursor for the formation of fusarium metabolites, with approx. two times higher concentration recorded in triticale. In inoculated samples TRICH concentration for wheat was on average six times higher and for triticale eight times higher than in non-inoculated samples. In the course of analysis using the electronic nose in tested groups of grain differences were observed in the profiles of detected volatile compounds. This resulted in a statistically significant distribution of investigated samples into four objects.
Keywords: Fungal volatiles; Trichodiene; Fusarium culmorum; GC/MS; Electronic nose; Wheat; Triticale

R. Cabanas, M.R. Bragulat, M.L. Abarca, G. Castella, F.J. Cabanes, Occurrence of Penicillium verrucosum in retail wheat flours from the Spanish market, Food Microbiology, Volume 25, Issue 5, August 2008, Pages 642-647, ISSN 0740-0020, DOI: 10.1016/j.fm.2008.04.003.
(http://www.sciencedirect.com/science/article/B6WFP-4S9G93M-2/2/8de695eb14168b9930fc6e15aab91175)
Abstract:
In Spain, low ochratoxin A (OTA) levels have been detected in wheat and different wheat products but no information has been published about the fungi involved in this OTA contamination. Some species of the genera Penicillium and Aspergillus are known to form OTA but few of them are known to contaminate foods with this mycotoxin. Penicillium verrucosum, an important OTA producer typical of temperate and cold climates, is much more frequently found on cereals in countries where they occasionally have OTA problems as in North European countries compared with South Europe, where levels of OTA generally seem to be lower or is not detected. The aim of this study was to determine, identify and characterize the occurrence of potential OTA-producing Aspergillus spp. and Penicillium spp. from retail wheat flours purchased in the Spanish market and used for human consumption. A total of 105 Aspergillus isolates were analyzed in order to know whether they are able to produce OTA and/or citrinin (CIT). None of these isolates were able to produce these mycotoxins. However, 17 suspected P. verrucosum isolates were recovered and confirmed by RAPD analyses. Eleven isolates were OTA producers and 14 isolates produced CIT. Our results confirm the potential risk of OTA and CIT production in wheat flours if stored improperly and the occurrence of P. verrucosum in South European countries. This was the only species able to produce these mycotoxins.
Keywords: Aspergillus; Citrinin; DYSG (dichloran yeast extract sucrose glycerol agar); Wheat flour; Flour; Ochratoxin; Penicillium verrucosum; RAPD typing; Wheat

Christopher B. Barrett, Smallholder market participation: Concepts and evidence from eastern and southern Africa, Food Policy, Volume 33, Issue 4, August 2008, Pages 299-317, ISSN 0306-9192, DOI: 10.1016/j.foodpol.2007.10.005.
(http://www.sciencedirect.com/science/article/B6VCB-4RWHXGP-1/2/5eb4b5df7487aef4bef1a191fe7a08c4)
Abstract:
This paper reviews the evidence on smallholder market participation, with a focus on staple foodgrains (i.e., cereals) in eastern and southern Africa, in an effort to help better identify what interventions are most likely to break smallholders out of the semi-subsistence poverty trap that appears to ensnare much of rural Africa. The conceptual and empirical evidence suggests that interventions aimed at facilitating smallholder organization, at reducing the costs of intermarket commerce, and, perhaps especially, at improving poorer households' access to improved technologies and productive assets are central to stimulating smallholder market participation and escape from semi-subsistence poverty traps. Macroeconomic and trade policy tools appear less useful in inducing market participation by poor smallholders in the region.
Keywords: Food security; Market participation; Poverty traps; Price policy; Trade policy; Transactions costs

James J. Pestka, Chidozie J. Amuzie, Tissue distribution and proinflammatory cytokine gene expression following acute oral exposure to deoxynivalenol: Comparison of weanling and adult mice, Food and Chemical Toxicology, Volume 46, Issue 8, August 2008, Pages 2826-2831, ISSN 0278-6915, DOI: 10.1016/j.fct.2008.05.016.
(http://www.sciencedirect.com/science/article/B6T6P-4SMWFJV-1/2/30471582227a2289b743822b7bb9da93)
Abstract:

The frequent presence of deoxynivalenol (DON) in cereal-based foods and the high intake of these foods by children raises particular concerns about the relative susceptibility of this subpopulation to adverse effects evoked by this mycotoxin. We tested the hypothesis that both toxicokinetics and proinflammatory cytokine gene expression following a oral DON exposure at 5 mg/kg bw differ between weanling (3-4 wk) and young adult (8-10 wk) female mice. DON was rapidly taken up with maximum plasma concentrations reaching 1.0 [mu]g/ml in adult mice at 15 min, whereas DON levels were approximately twice as much in weanling mice at these times. DON was rapidly cleared in both weanling and adult mice with concentrations being reduced by 78% and 81% of the peak levels, respectively, after 2 h. DON accumulation and clearance in spleen, liver, lung and kidney followed similar kinetics to that of plasma with tissue burdens also reaching twice that of adult mice. When TNF-[alpha], IL-1[beta] and IL-6 mRNAs in spleens (a primary source of systemic proinflammatory cytokines) were used as biomarkers of the DON's effects, expression of these mRNAs was two to three times greater in weanling than adult mouse. However, differences in proinflammatory cytokine expression were less robust or not apparent in the liver or lung. Taken together, these data suggest that young mice are modestly more susceptible than adult mice to the adverse effects of DON and that this might result from a greater toxin tissue burden.
Keywords: Deoxynivalenol; Trichothecene; Mycotoxin; Age; Toxicokinetics; Cytokine

Maria-Angeles Castillo, Rosa Montes, Adriana Navarro, Ramon Segarra, Gonzalo Cuesta, Enrique Hernandez, Occurrence of deoxynivalenol and nivalenol in Spanish corn-based food products, Journal of Food Composition and Analysis, Volume 21, Issue 5, August 2008, Pages 423-427, ISSN 0889-1575, DOI: 10.1016/j.jfca.2008.03.009.
(http://www.sciencedirect.com/science/article/B6WJH-4SD6SJ1-1/2/e9f994f3825a91db9c0c010ccf44d847)
Abstract:
The aim of the present work was to evaluate the occurrence of trichothecenes toxins, deoxynivalenol (DON) and nivalenol (NIV) in samples of corn-based foods (breakfast cereals and snacks) consumed by the Spanish population. A total of 175 commercially available samples were randomly collected during 2005. Trichothecenes were determined by a gas chromatography-electron capture detector. The estimated limit of quantification was 25.4 [mu]g/kg for DON and 15.9 [mu]g/kg for NIV. DON was detected in 22 of the 55 samples of breakfast cereals, in 13 of the 57 samples of baked corn snacks and in 12 of the 63 samples of fried corn snacks. NIV was detected in 6 samples of breakfast cereals and 1 sample of snacks. The median concentrations of DON and NIV found in all samples were 53.9 and 60.2 [mu]g/kg, respectively. The influence of different factors, such as the presence of additional ingredients and the type of commercial brand, on the toxin incidence and content levels were also studied. The values of both mycotoxin intake found in this study are lower than the proposed tolerable daily intake for the respective toxin (1 and 0.7 [mu]g/kg bw/day for DON and NIV, respectively).
Keywords: Deoxynivalenol; Nivalenol; Trichothecenes; Breakfast cereals; Snacks

Agata Gajda, Mariola Kulawinek, Arkadiusz Kozubek, An improved colorimetric method for the determination of alkylresorcinols in cereals and whole-grain cereal products, Journal of Food Composition and Analysis, Volume 21, Issue 5, August 2008, Pages 428-434, ISSN 0889-1575, DOI: 10.1016/j.jfca.2008.04.002.
(http://www.sciencedirect.com/science/article/B6WJH-4SDPX6D-5/2/c8353c1a8dd23cfe03220b714f472c53)
Abstract:
A rapid analytical method was developed to study the content of alkylresorcinols (ARs) in cereal grain material and the effects of processing on their amount in food. This method is based on the fact that ARs coupled with diazotized Fast Blue B Zn salt form colored derivatives in acidified methanol that can be quantified colorimetrically. The presented method is simple, sensitive (>0.1

[mu]g), fast, accessible, and inexpensive. The standard calibration curve of the assay showed acceptable linearity in the range of 0.1-7 [mu]g of homologue C15:0 (equivalent to 0.3-20 nmols) with a correlation coefficient of 0.999. The stability of the reagent used in the procedure was improved (to 4 days). The stability of the products of the reaction between the ARs and Fast Blue B Zn salt after 1 h of incubation was lengthened (to 3 h). This is an important aspect, especially when we analyze numerous cereal grain samples or carry out long-term experiments in which the use of a constant experimental environment (e.g. equipment, reagents, etc.) is crucial. The modified procedure presented here appears promising for the analysis of 1,3-dihydroxybenzene derivatives in biological samples, especially when screening numerous samples in plant breeding and food analyses.
Keywords: Alkylresorcinols; Whole-grains; Diazonium salts; Quantitative determination

Valentina Stojceska, Paul Ainsworth, Andrew Plunkett, Esra Ibanoglu, Senol Ibanoglu, Cauliflower by-products as a new source of dietary fibre, antioxidants and proteins in cereal based ready-to-eat expanded snacks, Journal of Food Engineering, Volume 87, Issue 4, August 2008, Pages 554-563, ISSN 0260-8774, DOI: 10.1016/j.jfoodeng.2008.01.009.
(http://www.sciencedirect.com/science/article/B6T8J-4RP0MD1-1/2/5a3ca8b1b803aaf4bab7c02124ce9b52)
Abstract:
Cauliflower is a vegetable rich in nutrients but has a highest waste index. The incorporation of cauliflower trimmings into ready-to-eat expanded products and their effect on the textural and functional properties of extrudates have been studied. Dried and milled cauliflower at levels of 5-20% was added to the formulation mix. The results obtained from the analysis of the extrudates are discussed in terms of the effect of cauliflower co-products on nutritional and textural characteristics, and the effects of processing conditions. The samples were processed in a twin-screw extruder with a combination of parameters including: solid feed rate of 20-25 kg/h, water feed adjusted to 9-11%, screw speed of 250-350 rpm and process temperatures 80-120 [degree sign]C. Pressure, torque and material temperature during extrusion were recorded. It was found that addition of cauliflower significantly increased the dietary fibre (r2 = 0.9***) and levels of proteins. Extrusion cooking significantly (P < 0.0001) increased the level of phenolic compounds and antioxidants but significantly (P < 0.001) decreased protein in vitro digestibility and fibre content in the extruded products. The expansion indices, total cell area of the products, wall thickness showed negative correlation to the level of cauliflower. Sensory test panel indicated that cauliflower could be incorporated into ready-to-eat expanded products up to the level of 10%.
Keywords: Cauliflower by-products; Extrusion technology; Ready-to eat snacks

Suzanne Domel Baxter, James W. Hardin, Julie A. Royer, Caroline H. Guinn, Albert F. Smith, Insight into the Origins of Intrusions (Reports of Uneaten Food Items) in Children's Dietary Recalls, Based on Data from a Validation Study of Reporting Accuracy over Multiple Recalls and School Foodservice Production Records, Journal of the American Dietetic Association, Volume 108, Issue 8, August 2008, Pages 1305-1314, ISSN 0002-8223, DOI: 10.1016/j.jada.2008.05.012.
(http://www.sciencedirect.com/science/article/B758G-4T25TH5-8/2/f6eb2c2d15c48a5dfaa5a6d636f1ba7d)
Abstract: Background
Intrusions in dietary recalls may originate in confusion of episodic memories manifested as temporal dating errors.Objective
Data from a validation study (concerning reporting accuracy over multiple recalls) and school foodservice production records were used to investigate origins of intrusions in school meals in children's 24-hour recalls.Design/subjects/setting

During the 1999-2000 school year, 104 fourth-grade children were observed eating school meals on 1 to 3 nonconsecutive days separated by >=25 days, and interviewed about the previous day's intake in the morning on the day after each observation day.Statistical analyses performed
For breakfast and lunch separately, logistic regression was used to investigate the effect of time (ie, days) before the interview day on the probability that intrusions referred to items available in the school foodservice environment. Exploratory analyses were conducted for breakfast options observed and/or reported eaten.Results
For interviews in which reported meals met criteria to be considered school meals and that contained intrusions, of 634 and 699 items reported eaten at breakfast and lunch, respectively, 394 and 331 were intrusions. Availability in the school foodservice environment of items referred to by intrusions in reports of lunch, but not breakfast, decreased as days increased before the interview day (P=0.031 and P=0.285, respectively). Concerning breakfast, children observed eating a cold option (ie, ready-to-eat cereal, milk, juice, crackers [graham or animal]) almost always reported a cold option, whereas children observed eating a hot option (ie, non-ready-to-eat cereal entree [eg, sausage biscuit], milk, and fruit or juice) reported a cold option in approximately 50% of interviews.Conclusions
In children's 24-hour recalls, confusion of episodic memories contributes to intrusions in school lunch, and generic dietary information (eg, cold option items available daily) or confusion of episodic memories may contribute to intrusions in school breakfast. Understanding the origins of intrusions may help in developing interview methods to decrease the occurrence of intrusions.

K. Walsh, P. O'Kiely, A.P. Moloney, T.M. Boland, Intake, digestibility, rumen fermentation and performance of beef cattle fed diets based on whole-crop wheat or barley harvested at two cutting heights relative to maize silage or ad libitum concentrates, Animal Feed Science and Technology, Volume 144, Issues 3-4, 15 July 2008, Pages 257-278, ISSN 0377-8401, DOI: 10.1016/j.anifeedsci.2007.10.018.
(http://www.sciencedirect.com/science/article/B6T42-4RB5BJ3-2/2/24988d07cdadf3dc38b701458707f2ff)
Abstract:
This experiment aimed to quantify the relative intake, digestibility, rumen fermentation, performance and carcass characteristics of beef cattle fed diets based on good quality whole-crop wheat and barley silages, each harvested at two cutting heights, and to rank these relative to good quality maize silage and an ad libitum concentrates-based diet. Ninety beef steers, initial live-weight 438 +/- 31.0 kg, were allocated to one of the following dietary treatments in a randomised complete block design: maize silage (MS), whole-crop wheat harvested at a normal cutting height (WCW) (stubble height 0.12 m) or an elevated cutting height (HCW) (stubble height 0.29 m), whole-crop barley harvested at a normal cutting height (WCB) (stubble height 0.13 m) or an elevated cutting height (HCB) (stubble height 0.30 m), each being supplemented with 3 kg concentrates/head/day, and ad libitum concentrates (ALC) supplemented with 5 kg grass silage/head/day for the duration of the 160-day study. Mean dry matter (DM) of the maize silage, whole-crop wheat, head-cut wheat, whole-crop barley and head-cut barley was 301, 488, 520, 491 and 499 g/kg, respectively. There were no differences in total DM intake among treatments, or in rumen fermentation characteristics (except ammonia), or in DM digestibility among the forage-based treatments. Neutral detergent fibre digestibility was lower (P<0.05) for whole-crop wheat than head-cut barley, and starch digestibility was lower (P<0.05) for whole-crop barley and head-cut barley than maize silage. Steers fed ALC had a higher carcass gain (P<0.001) and carcass weight (P<0.05) than all other treatments, but there were no differences between any of the forage-based treatments. Steers fed MS had a better feed conversion efficiency (FCE) than those on WCW or WCB (P<0.05) but were similar to HCW and HCB. The FCE was better for ALC versus any of the other treatments, particularly compared to WCW or WCB (P<0.001). Subcutaneous fat from steers fed ALC was more yellow (P<0.01) than that from steers fed the

other treatments. Neither intake nor performance were altered by raising the cutting height of cereals or by replacing whole-crop wheat by barley. However, head-cut cereals numerically favoured DM intake, carcass gain and feed conversion efficiency values nearer to that of maize than whole-crop cereal silages. Ad libitum concentrates supported superior levels of growth by steers compared to all other treatments.
Keywords: Maize; Whole-crop wheat; Whole-crop barley; Cutting height; Ad libitum concentrates

Umran Uygun, Berrin Senoz, Hamit Koksel, Dissipation of organophosphorus pesticides in wheat during pasta processing, Food Chemistry, Volume 109, Issue 2, 15 July 2008, Pages 355-360, ISSN 0308-8146, DOI: 10.1016/j.foodchem.2007.12.048.
(http://www.sciencedirect.com/science/article/B6T6R-4RF45D6-F/2/eade5e4b91cd7fef988a5593b95bc175)
Abstract:
For investigating the carryover of some organophosphorus pesticide residues in the cereal food chain from grain to consumer, a study was set up on durum wheat, semolina and pasta. Pesticide-free durum wheat was placed into a small-scale model of a commercial storage vessel and treated with pesticides (malathion, fenitrothion, chlorpyrifos methyl, and pirimiphos methyl) according to the raw material legislation of Turkey. The residue levels of insecticides were determined in wheat, semolina, and spaghetti produced from stored wheat at various time intervals during five months of storage. A multiresidue analysis was performed using GC equipped with an NPD. The confirmation was performed by GC-MS. The residue levels of insecticides in wheat exceeded the maximum residue limits (MRLs) for wheat. The storage period was generally not effective enough to reduce the residues in wheat to levels below the MRLs. Although a considerable amount of the insecticides remained in the semolina, spaghetti processing significantly reduced residue concentrations in general. Pirimiphos methyl was the most persistent of the insecticides and comparatively less substantial loss occurred during milling and spaghetti processing due to its physicochemical properties.
Keywords: Malathion; Fenitrothion; Chlorpyrifos methyl; Pirimiphos methyl; Wheat; Semolina; Spaghetti

Constanze Sproll, Winfried Ruge, Claudia Andlauer, Rolf Godelmann, Dirk W. Lachenmeier, HPLC analysis and safety assessment of coumarin in foods, Food Chemistry, Volume 109, Issue 2, 15 July 2008, Pages 462-469, ISSN 0308-8146, DOI: 10.1016/j.foodchem.2007.12.068.
(http://www.sciencedirect.com/science/article/B6T6R-4RJYVBV-8/2/fd2e015805a16cf9532852f35b66daca)
Abstract:
Coumarin is a component of natural flavourings including cassia, which is widely used in foods and pastries. The toxicity of coumarin has raised some concerns and food safety authorities have set a maximum limit of 2 mg/kg for foods and beverages in general, and a maximum level of 10 mg/l for alcoholic beverages. An efficient method for routine analysis of coumarin is liquid chromatography with diode array detection. The optimal sample preparation for foods containing cinnamon was investigated and found to be cold extraction of 15 g sample with 50 mL of methanol (80%, v/v) for 30 min using magnetic stirring.
In the foods under investigation, appreciable amounts of coumarin were found in bakery products and breakfast cereals (mean 9 mg/kg) with the highest concentrations up to 88 mg/kg in certain cookies flavoured with cinnamon. Other foods such as liqueurs, vodka, mulled wine, and milk products did not have coumarin concentrations above the maximum level.
The safety assessment of coumarin containing foods, in the context of governmental food controls, is complicated as a toxicological basis for the maximum limits appears to be missing. The limits were derived at a time when a genotoxic mechanism was assumed. However, this has since been disproven in more recent studies. Our exposure data on coumarin in bakery products show that

there is still a need for a continued regulation of coumarin in foods. A toxicological re-evaluation of coumarin with the aim to derive scientifically founded maximum limits should be conducted with priority.
Keywords: Cassia; Cinnamon; Coumarin; Flavourings; High-performance liquid chromatography (HPLC)

Lewis H. Ziska, Three-year field evaluation of early and late 20th century spring wheat cultivars to projected increases in atmospheric carbon dioxide, Field Crops Research, Volume 108, Issue 1, 11 July 2008, Pages 54-59, ISSN 0378-4290, DOI: 10.1016/j.fcr.2008.03.006.
(http://www.sciencedirect.com/science/article/B6T6M-4SK4X98-1/2/271922d65e6052062742403d58b105bc)
Abstract:
Carbon dioxide (CO2), along with light, water and nutrients, represents an essential resource needed for plant growth and reproduction. Projected and recent increases in atmospheric carbon dioxide may allow breeders and agronomists to begin intra-specific selection for yield traits associated with CO2 sensitivity. However, selection for maximum yield, particularly for cereals, is continuous, and it is possible that modern cereal cultivars are, in fact, the most CO2 sensitive. To test CO2 responsiveness, we examined two contrasting spring wheat cultivars, Marquis and Oxen, over a 3-year period under field conditions at two different planting densities. Marquis was introduced into North America in 1903, and is taller, with greater tiller plasticity (i.e. greater variation in tiller production), smaller seed and lower harvest index relative to modern wheat cultivars. Oxen, a modern cultivar released in 1996, produces fewer tillers, and has larger seed with a higher harvest index relative to Marquis. As would be expected, under ambient CO2 conditions, Oxen produced more seed than Marquis for all 3 years. However, at a CO2 concentration 250 [mu]mol mol-1 above ambient (a concentration anticipated in the next 50-100 years), no differences were observed in seed yield between the two cultivars, and vegetative above ground biomass (e.g. tillers), was significantly higher for Marquis relative to Oxen in 2006 and 2007. Significant CO2 by cultivar interaction was observed as a result of greater tiller production and an increased percentage of tillers bearing panicles for the Marquis relative to the Oxen cultivar at elevated carbon dioxide. This greater increase in tiller bearing panicles also resulted in a significant increase in harvest index for the Marquis cultivar as CO2 increased. While preliminary, these results intimate that newer cultivars are not intrinsically more CO2 responsive; rather, that yield sensitivity may be dependent on the availability of reproductive sinks to assimilate additional carbon. Overall, understanding and characterizing vegetative vs. reproductive sink capacity between cultivars may offer new opportunities for breeders to exploit and adapt varieties of wheat to projected increases in atmospheric carbon dioxide concentration.
Keywords: Breeding; Carbon dioxide; Wheat

Steven Kragten, Krijn B. Trimbos, Geert R. de Snoo, Breeding skylarks (Alauda arvensis) on organic and conventional arable farms in The Netherlands, Agriculture, Ecosystems & Environment, Volume 126, Issues 3-4, July 2008, Pages 163-167, ISSN 0167-8809, DOI: 10.1016/j.agee.2008.01.021.
(http://www.sciencedirect.com/science/article/B6T3Y-4S1BWV9-2/2/96728416c57bf0116f38baf9c675e4f7)
Abstract:
The aim of this study was to analyse the effects of differences in cropping pattern between organic and conventional arable farms on the breeding activity of skylarks and to assess the effects of arable crop management on skylark nest survival. Skylark nest density was seven times higher on organic farms than on conventional farms (0.63 vs. 0.09 nest per 10 ha). Skylarks showed a strong preference for spring cereals, lucerne and grass leys, all of which were mainly or exclusively grown on organic farms. On organic farms nests were initiated during the entire breeding season,

but on conventional farms no nesting activity was found during the peak of the season (early May to early June). On organic farms 27% of all nests was successful. Increasing the availability of suitable breeding habitat during the peak of the breeding season on conventional farms might provide one means of enhancing breeding skylark populations. On organic farms, crop management should focus on reducing nest loss due to farming operations.
Keywords: Organic farming; Alauda arvensis; Habitat preference; Arable crops; Reproductive success; Mechanical weeding

Allan J. Perkins, Hywel E. Maggs, Jeremy D. Wilson, Winter bird use of seed-rich habitats in agri-environment schemes, Agriculture, Ecosystems & Environment, Volume 126, Issues 3-4, July 2008, Pages 189-194, ISSN 0167-8809, DOI: 10.1016/j.agee.2008.01.022.
(http://www.sciencedirect.com/science/article/B6T3Y-4S1JJWD-3/2/6fde8a126c608f78183b2a232dda36c2)
Abstract:
To assess the effectiveness of over-winter seed provision by agri-environment schemes, bird use of patches of seed-bearing crops was compared with that of other seed-rich habitats on 53 farms in eastern Scotland over three winters. Seed-bearing crops were the most frequently selected habitat, and held 28% of birds of the 10 species recorded. Outside schemes, cereal stubble was the most selected habitat and held 44% of birds. For nine species, seed-bearing crops were used by more birds than expected from the area of crop available in at least one winter, and five species were more likely to occur in first-winter patches, reflecting a greater abundance of cereal grain than in second-winter patches. For cereal grain specialists such as buntings, sowing cereal-based crops annually would ensure that grain is available in each winter, whilst either a 1-year or a 2-year crop would be appropriate for finches that favour oilseeds, and species with a more generalist diet.
Keywords: Agriculture; Stubble; Plant cover; Wintering birds

Tony (A.D.) Fox, Henning Heldbjerg, Which regional features of Danish agriculture favour the corn bunting in the contemporary farming landscape?, Agriculture, Ecosystems & Environment, Volume 126, Issues 3-4, July 2008, Pages 261-269, ISSN 0167-8809, DOI: 10.1016/j.agee.2008.02.010.
(http://www.sciencedirect.com/science/article/B6T3Y-4S7HWDW-1/2/18471fe023e0e99125fd7a6e9aed96da)
Abstract:
Corn buntings Miliaria calandra were abundant throughout arable agricultural landscapes in Europe, but have catastrophically declined since the mid 1970s with changes in farming practice and now give serious conservation cause for concern. Corn buntings declined in Denmark during 1976-1993, but (almost unique in Europe) have since increased (by up to 11% per annum) in some areas without specific conservation recovery actions. Based on breeding bird surveys in the mid 1990s, highest corn bunting densities occurred on mixed agriculture in west Denmark (Jylland); the species was rarer or absent in regions of highest arable land cover. Corn bunting density and extent of rotational and permanent grassland were correlated, but not with spring sown barley (all known to constitute important corn bunting winter habitat). The extent of spring barley rapidly declined in Denmark during the 1980s, but since 1990, most counties have since shown 2-3% annual increases in this crop, except in Nordjylland, where high densities of corn buntings have remained stable. Elsewhere in Jylland, corn buntings have increased in counties supporting highest densities during the mid 1990s, contrasting stable or declining trends in south and east Denmark where densities were originally lower. After dramatic decreases everywhere in Denmark, corn buntings retain highest breeding densities associated with mixed agriculture, especially where grassland and spring sown barley remained in greatest extent. Although purely based on land use correlation and bird surveillance, these results show an association between mixed farming and favourable conservation status of a species now red-listed throughout much of

Europe. Further investigations of habitat use at small spatial scales and throughout the annual cycle are urgently required to better enlighten specific recommendations for wider applicability of guidelines for corn bunting recovery actions elsewhere.
Keywords: Cereals; Farmland birds; Spring barley; Winter stubble; Grassland; Population change

Ines M.G. Vollhardt, Teja Tscharntke, Felix L. Wackers, Felix J.J.A. Bianchi, Carsten Thies, Diversity of cereal aphid parasitoids in simple and complex landscapes, Agriculture, Ecosystems & Environment, Volume 126, Issues 3-4, July 2008, Pages 289-292, ISSN 0167-8809, DOI: 10.1016/j.agee.2008.01.024.
(http://www.sciencedirect.com/science/article/B6T3Y-4S1JJWD-2/2/e3084008c425be7a49412ef38202272b)
Abstract:
Structurally complex landscapes may enhance local species richness and interactions, which is possibly due to a higher species pool in complex landscapes. This hypothesis was tested using cereal aphid parasitoids (Hymenoptera, Aphidiidae) by comparing 12 winter wheat fields in structurally complex landscapes (>50% semi-natural habitats; n = 6) and structurally simple landscapes dominated by agricultural lands (>80% arable land; n = 6). Surprisingly, landscape structural complexity had no effect on aphid parasitoid species diversity. In complex landscapes 12 and in simple landscapes 11 species were found; 9 species occurred in both landscape types. Hence, arable fields in high-intensity agricultural landscapes with little non-crop area can support a similar diversity of cereal aphid parasitoids as structurally complex landscapes. This finding suggests that cereal aphid parasitoids may find necessary resources even in simple landscapes, making generalisations concerning the relationship between landscape composition and biodiversity in arable fields difficult.
Keywords: Biodiversity; Parasitoids; Winter wheat; Biological control; Species richness; Landscape composition

Gary M. Banowetz, Akwasi Boateng, Jeffrey J. Steiner, Stephen M. Griffith, Vijay Sethi, Hossien El-Nashaar, Assessment of straw biomass feedstock resources in the Pacific Northwest, Biomass and Bioenergy, Volume 32, Issue 7, July 2008, Pages 629-634, ISSN 0961-9534, DOI: 10.1016/j.biombioe.2007.12.014.
(http://www.sciencedirect.com/science/article/B6V22-4RSRPX2-2/2/ddde536758665e19352c1be07b271fc1)
Abstract:
Straw that is produced as a coproduct of cereal grain and grass seed production on 24,000 km2 in the Pacific Northwest states of Idaho (ID), Oregon (OR) and Washington (WA) has potential as a bioenergy feedstock. Previous attempts to develop approaches to convert straw to energy based on transporting straw to a conversion facility were uneconomical. Rising energy prices and the availability of new technologies have renewed interest in converting these lignocellulosic residues to energy products, especially liquid fuels [Perlack RD, Wright LL, Turhollow AF, Graham RL, Stokes BJ, Erbach DC. Biomass as feedstock for a bioenergy and bioproducts industry: the technical feasibility of a billion-ton annual supply, 2005. http://feedstockreview.ornl.gov/pdf/billion_ton_vision.pdf (website accessed December 2007). [1]], but information on the distribution of these resources is lacking. Development of an economic approach to convert this straw to energy will require an assessment of the regional distribution of available straw to identify an appropriate scale of conversion technology that optimally reduces straw collection and transportation costs. We utilized county-scale US Department of Agriculture (USDA) National Agricultural Statistical Service (NASS) data to quantify total grass seed and cereal straw production in each county of ID, OR and WA, subtracted the county-specific quantity of field residue for each crop, and developed an estimate of available straw, that remaining after sufficient straw is returned to the soil for conservation. At current straw yields, over 6.5 Mt of straw

in excess of that required for conservation purposes are available in the region. This straw is distributed across the landscape at an average density of 2.4 Mg ha-1 and in many locations will require small- or local-scale technology to enable economical conversion of the feedstock to energy.
Keywords: Grass straw; Wheat; Biomass resources

G. Mandalari, G. Bisignano, R.B. Lo Curto, K.W. Waldron, C.B. Faulds, Production of feruloyl esterases and xylanases by Talaromyces stipitatus and Humicola grisea var. thermoidea on industrial food processing by-products, Bioresource Technology, Volume 99, Issue 11, Exploring Horizons in Biotechnology: A Global Venture, July 2008, Pages 5130-5133, ISSN 0960-8524, DOI: 10.1016/j.biortech.2007.09.022.
(http://www.sciencedirect.com/science/article/B6V24-4PYYG2G-6/2/6e94c1c7e45d9bce622096006df66211)
Abstract:
Feruloyl esterase (FAE) and xylanase activities were detected in culture supernatants from Humicola grisea var. thermoidea and Talaromyces stipitatus grown on brewers' spent grain (BSG) and wheat bran (WB), two agro-industrial by-products. Maximum activities were detected from cultures of H. grisea grown at 150 rpm, with 16.9 U/ml and 9.1 U/ml of xylanase activity on BSG and WB, respectively. Maximum FAE activity was 0.47 U/ml and 0.33 U/ml on BSG and WB, respectively. Analysis of residual cell wall material after microbial growth shows the preferential solubilisation of arabinoxylan and cellulose, two main polysaccharides present in BSG and WB. The production of low-cost cell-wall-deconstructing enzymes on agro-industrial by-products could lead to the production of low-cost enzymes for use in the valorisation of food processing wastes.
Keywords: Xylanases; Feruloyl esterases; By-products; Cereals; Fungal utilization

Zeyaur R. Khan, Charles A.O. Midega, Esther M. Njuguna, David M. Amudavi, Japhether M. Wanyama, John A. Pickett, Economic performance of the `push-pull' technology for stemborer and Striga control in smallholder farming systems in western Kenya, Crop Protection, Volume 27, Issue 7, July 2008, Pages 1084-1097, ISSN 0261-2194, DOI: 10.1016/j.cropro.2008.01.005.
(http://www.sciencedirect.com/science/article/B6T5T-4S027X4-1/2/f61fed607c5ac36a14193c14cc753daf)
Abstract:
The `push-pull' technology (PPT), developed in Africa, offers effective control of cereal stemborers and Striga weed in maize-based cropping systems. It involves intercropping maize with desmodium, Desmodium uncinatum, with Napier grass, Pennisetum purpureum, planted as border around this intercrop. Desmodium repels the stemborer moths (push) that are subsequently attracted to the Napier grass (pull). Desmodium also suppresses and eliminates Striga. We assessed economic performance of this technology compared to the conventional maize mono- and maize-bean intercropping systems in six districts in western Kenya over 4-7 years. Ten farmers were randomly recruited in each district and each planted three plots representing the three cropping systems. The cost-benefit analyses were carried out, together with the systems' net returns to land and labour and their discounted net present values (NPV). Maize grain yields and associated gross margins from the PPT system were significantly higher than those in the other two systems. Although the production costs were significantly higher in the PPT than in the two cropping systems in the first cropping year, these reduced to either the same level or significantly lower than in the maize-bean intercrop from the second year onwards in most of the districts. Similarly, the net returns to land and labour with the PPT were significantly higher than with the other two systems. The PPT consistently produced positive NPV when the incremental flows of its benefits compared to those of the two conventional systems were discounted at 10-30%, indicating that PPT is more profitable than the other two systems under realistic production assumptions. PPT is thus a viable option for enhancing productivity and diversification for

smallholder farmers who largely depend on limited land resource. Hence, enhancing farmers' access to less costly planting materials and promoting quality education and training in the use of this knowledge-intensive technology could stimulate its successful adoption.
Keywords: Stemborer; Striga; Push-pull; Gross margins; Kenya

Loretta Triberti, Anna Nastri, Gianni Giordani, Franca Comellini, Guido Baldoni, Giovanni Toderi, Can mineral and organic fertilization help sequestrate carbon dioxide in cropland?, European Journal of Agronomy, Volume 29, Issue 1, July 2008, Pages 13-20, ISSN 1161-0301, DOI: 10.1016/j.eja.2008.01.009.
(http://www.sciencedirect.com/science/article/B6T67-4S4S5TB-2/2/2813c93321622581dd32ca9eb761814b)
Abstract:
The soil organic matter content represents a huge reservoir of plant nutrients and an effective safeguard against pollution; beside it can sequestrate atmospheric CO2. Since 1966 up to now in the Southeast Po valley (Italy), the soil organic C (SOC) and total N (TN) dynamics in the 0-0.40 m soil layer under a maize-wheat rainfed rotation are studied as influenced by organic and mineral N fertilizations. Every year in the same plots cattle manure, cattle slurry, and crop residues (i.e. wheat straw and maize stalk) are ploughed under to 0.40 m depth at a same dry matter rate (6.0 and 7.5 t DM ha-1 year-1 after wheat and maize, respectively) and are compared to an unamended control. Each plot is splitted to receive four rates of mineral fertilizer (0-100-200-300 kg N ha-1). In the whole experiment, in 2000 SOC concentration was lower than in 1966 (6.77 and 7.72 g kg-1, respectively), likely for the deeper tillage that diluted SOC and favoured mineralization in deeper soil layer. From 1972 to 2000 SOC stock did not change in the control and N fertilized plots, while it increased at mean rates of 0.16, 0.18, and 0.26 t ha-1 year-1 with the incorporation of residues, slurry and manure, corresponding to sequestration efficiencies of 3.7, 3.8 and 8.1% of added C with the various materials. TN followed the same SOC dynamic, demonstrating how it depends on the soil organic matter. Manure thus confirmed its efficacy in increasing both SOC content and soil fertility on the long-term. In developed countries, however, this material has become scarcely available; slurry management is expensive and implies high environmental risks. Moreover, in a C balance at a farm (or regional) scale, the CO2 lost during manure and slurry stocking should be considered. For these reasons, the incorporation of cereal residues, even if only a little of their C content was found capable of soil accumulation, appears the best way to obtain a significant CO2 sequestration in developed countries. Our long-term experiment clearly shows how difficult it is to modify SOC content. Moreover, because climate and soil type can greatly influence SOC dynamic, to increase CO2 sequestration in cropland, it is important to optimize the fertilization within an agricultural management that includes all the agronomic practices (e.g. tillage, water management, cover crops, etc.) favouring the organic matter build up in the soil.
Keywords: Long-term experiment; Organic fertilization; Mineral fertilization; Soil fertility; C sequestration

R. Maarit Niemi, Milja Vepsalainen, Kaisa Wallenius, Kirsti Erkomaa, Sanna Kukkonen, Ansa Palojarvi, Mauritz Vestberg, Conventional versus organic cropping and peat amendment: Impacts on soil microbiota and their activities, European Journal of Soil Biology, Volume 44, Issue 4, July-August 2008, Pages 419-428, ISSN 1164-5563, DOI: 10.1016/j.ejsobi.2008.06.001.
(http://www.sciencedirect.com/science/article/B6VR7-4SWXV59-1/2/f49e6561af7c6db35afbdf0969a42f4f)
Abstract:
We measured soil microbiota and enzyme activities in order to compare conventional (CCS: chemical fertilisers, plant rotation with cereals dominating) and organic (OCS: green and farmyard manure, plant rotation including leguminous plants) cropping systems in a long-term field

experiment. During the 3-year study period, strawberry was grown on the whole area and peat amendment was applied to a set of plots. Activities of 12 different enzymes, phospholipid fatty acids (PLFA) and microbial biomass (Cmic and Nmic) were measured twice each year. Dry weight (dw), water holding capacity (WHC) and pH were also measured. The enzyme activities were generally higher, arylsulphatase, phosphomonoesterase (PME) and esterase activities consistently, in the OCS than in the CCS. Other enzyme activities displayed higher activities either during 1 or 2 years or seasonally. Peat amendment increased PME, phosphodiesterase (PDE), leucine aminopeptidase (AP), chitinase, cellobiosidase, [alpha]-glucosidase and esterase activities but decreased arylsulphatase and initially alanine AP activities, whereas [beta]-glucosidase and [beta]-xylosidase activities were increased only during the 3rd year. Microbial biomass was higher in the OCS than in the CCS but peat addition decreased Cmic and Nmic at least initially. Both the OCS and peat addition increased soil PLFA content. Peat treatment also affected soil microbial structure as revealed by PLFA patterns, whereas the cropping system had no impact.
Keywords: Soil enzyme activities; Phospholipid fatty acids; Microbial biomass; Conventional cropping system; Organic cropping system; Peat amendment

Sebastiana Melero, Karl Vanderlinden, Juan Carlos Ruiz, Engracia Madejon, Long-term effect on soil biochemical status of a Vertisol under conservation tillage system in semi-arid Mediterranean conditions, European Journal of Soil Biology, Volume 44, Issue 4, July-August 2008, Pages 437-442, ISSN 1164-5563, DOI: 10.1016/j.ejsobi.2008.06.003.
(http://www.sciencedirect.com/science/article/B6VR7-4SY6T2D-2/2/127280f64a43e8cf6a0630114976af1e)
Abstract:
Long-term field experiments are expected to provide important information regarding soil properties affected by conservation management practices. Several studies have shown that soil enzyme activities are sensitive in discriminating among soil management effects. In this study we evaluated the long-term effect of direct drilling (DD) under a crop rotation system (cereals-sunflower-legumes), on the stratification of soil organic matter content and on biochemical properties in a dryland in southwest Spain. The results were compared to those obtained under conventional tillage (CT). Soil biochemical status was evaluated by measuring the enzymatic activities (dehydrogenase, [beta]-glucosidase, alkaline phosphatase and arylsulphatase) during the flowering period of a pea crop. Soil samples were collected in May 2007 at three depths (0-5, 5-10 and 10-20 cm).
Total organic carbon (TOC) contents and values of soil enzyme activities were higher in soils subjected to DD than to CT, specifically at 0-5 cm depth. Although a slight decrease of TOC and enzymatic activities with increasing soil depth was observed, no significant differences were found among different depths of the same treatment. This could be related to the high clay content of the soil, a Vertisol. Enzyme activities values showed high correlation coefficients (from $r = 0.799$ to $r = 0.870$, $p < 0.01$) with TOC. Values of activity of the different enzymes were also correlated ($p < 0.01$).
Values of stratification ratios did not show significant differences between tillage practices. The high clay content of the soil is responsible for this lack of differences because of the protection by clay mineral of TOC and soil enzymes activities.
Long-term soil conservation management by direct drilling in a dryland farming system improved the quality of a clay soil, especially at the surface, by enhancing its organic matter content and its biological status.
Keywords: Clay content; Direct drilling; Dryland; Enzymatic activities; Sustainable agriculture; Total organic carbon

Monika Bronkowska, Danuta Figurska-Ciura, Dagmara Orzel, Marzena Styczynska, Joanna Wyka, Karolina Lozna, Alicja Zechalko-Czajkowska, Jadwiga Biernat, Evaluation of plant products from

the Legnicko-Glogowski region for their contamination with arsenic, Food Chemistry, Volume 109, Issue 1, 1 July 2008, Pages 4-7, ISSN 0308-8146, DOI: 10.1016/j.foodchem.2007.12.004.
(http://www.sciencedirect.com/science/article/B6T6R-4R9Y786-2/2/7f8a81ab7ed52afd8e1d5bf956f8fbbf)
Abstract:
Contents of arsenic were determined in plant products originating from the region of two copperworks, Glogow and Legnica. Analyses were carried out by means of atomic absorption spectrometry, using an MHS-10 unit for hydride generation (acetylene/argon), after wet mineralisation of samples.
The maximum permissible level of arsenic was not exceeded in any of the examined samples of cereals, potatoes, carrots, beetroots, cabbages, tomatoes, apples and pears, originating from the regions under scrutiny.
Keywords: Plant products; Arsenic; AAS

Carlos Velasco-Ryenold, Miguel Navarro-Alarcon, Herminia Lopez-G De La Serrana, Vidal Perez-Valero, Maria C. Lopez-Martinez, Total and dialyzable levels of manganese from duplicate meals and influence of other nutrients: Estimation of daily dietary intake, Food Chemistry, Volume 109, Issue 1, 1 July 2008, Pages 113-121, ISSN 0308-8146, DOI: 10.1016/j.foodchem.2007.12.025.
(http://www.sciencedirect.com/science/article/B6T6R-4RDS474-4/2/189f5f6eaefb8c15ab81b179cbffef36)
Abstract:
Both total and dialyzable Mn levels were determined in 108 duplicate meals during 36 consecutive days. Both mineral fractions were measured by a graphite furnace atomic absorption spectrometry (GFAAS) method previously optimized. A total mean Mn fraction of 1.03 +/- 0.49 mg was found in the meals. The Mn supplied by the meals is directly and significantly ($p < 0.001$) correlated with macronutrient content (carbohydrates, fibre and protein). The mean Mn fraction dialyzed through the dialysis membrane was 0.23 +/- 0.17 mg (22.0 +/- 8.93% as bioaccessible fraction). The total and dialyzable Mn fractions found for breakfasts were significantly lower ($p < 0.001$). Nevertheless, the Mn bioavailabilities expressed as the percentage of dialyzable element, were not significantly different among the three primary meals (breakfast, lunch and dinner). A significant correlation between the total and the dialyzable fraction of Mn in meals was found ($p < 0.001$, $r = 0.78$, $r2 = 0.61$). The dialyzed element fractions present in meals were significantly correlated mainly with carbohydrates, protein and several amino acid levels ($p < 0.01$). Foods with higher carbohydrate and therefore energy contents, e.g. cereals, legumes, vegetables and fruits, would be primary sources of bioaccessible Mn in the diet. The bioaccessibility of Mn was only significant influenced by energy, carbohydrates and Se levels present in meals. The mean Mn daily dietary intake (DDI) was 3.05 +/- 0.61 mg day-1.
Keywords: Mn; GFAAS; Daily dietary intake; Duplicate diet method; In vitro availability

H. Marina Martins, I. Almeida, M.F. Marques, M.M. Guerra, Fumonisins and deoxynivalenol in corn-based food products in Portugal, Food and Chemical Toxicology, Volume 46, Issue 7, July 2008, Pages 2585-2587, ISSN 0278-6915, DOI: 10.1016/j.fct.2008.03.030.
(http://www.sciencedirect.com/science/article/B6T6P-4S73RGS-2/2/9f6a72295e418370ac665adbc9c7cf0c)
Abstract:
A great diversity of crops is vulnerable to fungal attack and might be contaminated with mycotoxins. Currently it is estimated that 25% of the world's harvest production is contaminated to some level with these toxins. The presence of fumonisins and deoxynivalenol in corn-based foods, available in Portugal, was analyzed in order to produce some data that may be useful for hazard characterization. A total of 105 samples were screened, including, corn meal (41), sweet corn (49) and corn flakes (15). None of the 15 samples of corn flakes contained some detectable amount of

fumonisins. However, fumonisin B1 (FB1) and fumonisin B2 (FB2) contamination was found in 100.0% and 70.7% of the corn meal samples, respectively. Sweet corn samples were positive in 73.4% for FB1, although no FB2 was detected. The highest levels of fumonisin were found in corn meal (maximum: 1300 [mu]g FB1/kg and 450 [mu]g FB2/kg). The presence of deoxynivalenol was not detected in any of the analyzed samples. Nevertheless these results indicate the need to establish, by corn products manufacturers, a continuous monitoring program to prevent and manage the occurrence of these contaminants.
Keywords: Cereals; Corn; Deoxynivalenol; Fumonisins

Peter Biely, Timothy D. Leathers, Maria Cziszarova, Maria Vrsanska, Michael A. Cotta, Endo-[beta]-1,4-xylanase inhibitors in leaves and roots of germinated maize, Journal of Cereal Science, Volume 48, Issue 1, July 2008, Pages 27-32, ISSN 0733-5210, DOI: 10.1016/j.jcs.2007.07.009.
(http://www.sciencedirect.com/science/article/B6WHK-4PC3SDN-1/2/ea508ce1f1e02c92b42730869b1418f8)
Abstract:
Extracts of both leaves and roots of germinated maize were found to contain endo-[beta]-1,4-xylanase inhibitors, previously reported only from whole maize meal. The inhibitors seem to be of the xylanase inhibitor protein (XIP) type, since they inhibit endoxylanases of families 10 and 11 and also show some other characteristics similar to XIP inhibitors described in other cereals. Inhibitors from leaves and roots appeared to be similar. A novel property of the inhibitors described in this work is their unusual thermostability. The half-life of inhibitors at pH 4.5 and 100 [degree sign]C is greater than 10 h. However, the inhibitors are less thermostable at higher pH levels. Because they did not inhibit a plant endoxylanase, the inhibitors may play a role in maize defense against phytopathogens.
Keywords: Germination; Maize; Xylan; Xylanase Inhibitor; Zea mays

Stefano Renzetti, Fabio Dal Bello, Elke K. Arendt, Microstructure, fundamental rheology and baking characteristics of batters and breads from different gluten-free flours treated with a microbial transglutaminase, Journal of Cereal Science, Volume 48, Issue 1, July 2008, Pages 33-45, ISSN 0733-5210, DOI: 10.1016/j.jcs.2007.07.011.
(http://www.sciencedirect.com/science/article/B6WHK-4PCXGFW-1/2/417866929eb3742ccba7e77598f90016)
Abstract:
Gluten is a fundamental component for the overall quality and structure of breads. The replacement of the gluten network in the development of gluten-free cereal products is a challenging task for the cereal technologist. The functionality of proteins from gluten-free flours could be modified in order to improve their baking characteristics by promoting protein networks. Transglutaminase (TGase) has been successfully used in food systems to promote protein cross-linking. In this study, TGase was investigated for network forming potential on flours from six different gluten-free cereals (brown rice, buckwheat, corn, oat, sorghum and teff) used in breadmaking. TGase was added at 0, 1 or 10 U/g of proteins present in the recipe. The effect of TGase on batters and breads was evaluated by fundamental rheological tests, Texture Profile Analysis and standard baking tests. Three-dimensional elaborations of Confocal Laser Scanning Microscopy (CLSM) images were performed on both batters and breads to evaluate the influence of TGase on microstructure. Fundamental rheological tests showed a significant increase in the pseudoplastic behaviour of buckwheat and brown rice batters when 10 U of TGase were used. The resulting buckwheat and brown rice breads showed improved baking characteristics as well as overall macroscopic appearance. Three-dimensional CLSM image elaborations confirmed the formation of protein complexes by TGase action. On the other side, TGase showed negative effects on corn flour as its application was detrimental for the elastic properties of the batters. Nevertheless, the resulting breads showed significant improvements in terms of increased specific

volume and decreased crumb hardness and chewiness. Under the conditions of this study, no effects of TGase could be observed on breads from oat, sorghum or teff. Overall, the results of this study show that TGase can be successfully applied to gluten-free flours to improve their breadmaking potentials by promoting network formation. However, the protein source is a key element determining the impact of the enzyme.
Keywords: Transglutaminase; Gluten-free; Microstructure; Rheology; Bread

Piotr Zapotoczny, Magdalena Zielinska, Zygmunt Nita, Application of image analysis for the varietal classification of barley:: Morphological features, Journal of Cereal Science, Volume 48, Issue 1, July 2008, Pages 104-110, ISSN 0733-5210, DOI: 10.1016/j.jcs.2007.08.006.
(http://www.sciencedirect.com/science/article/B6WHK-4PJ04WD-1/2/57f9d549dd8b1a5efc3fa6c650d0c56e)
Abstract:
This paper presents an exploratory investigation of the application of morphological features in image analysis for varietal classification of Polish spring barley. The objective of this study was to determine the utility of morphological features for classifying individual kernels of five varieties of barley. Furthermore, this study was performed to find the best method to classify kernels of barley with the lowest error of classification. Image processing consisted of several steps: image acquisition, segmentation, external and internal image feature extraction, classification and interpretation. Each barley kernel was described using 74 morphological features. The selection was carried out using three methods based on: Fisher's coefficient, probability of error and average correlation coefficient and mutual information. Principle component analysis (PCA), linear discriminant analysis (LDA), and non-linear discriminant analysis (NDA) were used throughout this paper as the classification methods. The results confirmed that the method using morphological features may be successfully employed in image analysis for preliminary varietal identification of barley kernels. Furthermore, LDA was found to be the method which best separated different varieties of objects.
Keywords: Morphological features; Cereal grain classification; Barley; Digital image analysis

Bharti K. Iyer, Laxmi Ananthanarayan, Effect of [alpha]-amylase addition on fermentation of idli--A popular south Indian cereal--Legume-based snack food, LWT - Food Science and Technology, Volume 41, Issue 6, July 2008, Pages 1053-1059, ISSN 0023-6438, DOI: 10.1016/j.lwt.2007.07.004.
(http://www.sciencedirect.com/science/article/B6WMV-4P7FSNB-2/2/2a8e093574642dca6796df6cb4552139)
Abstract:
Idli is a fermented breakfast food widely consumed in Southern India. It is liked by people mainly due to its sensory attributes such as mouthfeel, appearance, taste and aroma. Fermentation time of the batter varies from 14 to 24 h with overnight fermentation being the most frequent time interval. Reduction in the fermentation time of the idli batter is of great commercial significance for large-scale idli production and this can be potentially achieved by addition of enzymes externally. The present study was undertaken to explore the possibility of expediting the idli batter fermentation process by adding an exogenous source of [alpha]-amylase enzyme. 5, 15 and 25 U per 100 g batter of amylase were added to the idli batter which was allowed to ferment. Different parameters were monitored and sensory attributes were also studied and compared with that of the control set. The fermentation time was reduced from a conventional 14 h to 8 h and the sensory attributes of the final product were also successfully maintained.
Keywords: Idli; Traditional fermented food; Fermentation time; Accelerated fermentation; [alpha]-Amylase

C.R. Stockdale, Effects of body condition score at calving and feeding various types of concentrate supplements to grazing dairy cows on early lactation performance, Livestock Science, Volume 116, Issues 1-3, July 2008, Pages 191-202, ISSN 1871-1413, DOI: 10.1016/j.livsci.2007.10.003.
(http://www.sciencedirect.com/science/article/B7XNX-4R2HM0C-2/2/5bed25538e93e5fb01c3e9485e4ea203)
Abstract:
The objective of the experiment reported here was to establish the effect of canola meal supplements of different protein degradability on the performance of grazing dairy cows with different body condition scores (BCS) in early lactation, and to compare this with feeding a cereal grain supplement instead. The experiment included a total of 72 cows in six treatments in a 2 * 3 factorial design, incorporating two BCS at calving (4.1 and 5.6 units on an 8-point scale), and three early lactation pelleted supplements. The three pelleted supplements were 100% wheat (wheat supplement), 50% wheat and 50% untreated mechanically extracted canola meal (a rumen degradable protein supplement), and 50% wheat and 50% canola meal that had been subjected to additional heat and pressure (a rumen undegradable protein supplement). It was hypothesised that fat cows would perform best with the treated canola meal supplement, which provided most rumen undegradable protein, whereas the type of protein would not be important for thin cows, and neither would the type of supplemental energy. Cows grazed pasture after calving at a daily pasture allowance of 35-40 kg DM/cow and were offered 6 kg concentrates each day. Cows were fed these diets for 92 days on average, from calving until three weeks into the mating period. Both canola meal-based supplements resulted in higher ($P < 0.05$) daily milk production than the wheat supplement (33.3 and 34.0 v. 30.5 kg/cow) in both thin and fat cows. Body condition score at calving positively ($P < 0.05$) affected average milk yield (31.6 v. 33.7 kg/cow), however, there was a time x BCS x supplement interaction whereby the fatter cows benefited from the use of either of the canola meal supplements for a longer period than did the thin cows. Average milk fat concentrations were greater ($P < 0.05$) where the canola meal supplements were fed (39.3 and 39.6 v. 35.6 g/kg), and in fat cows relative to thin cows (40.0 v. 36.3 g/kg). Serum urea concentrations were significantly ($P < 0.05$) lower in cows fed wheat than in those fed either of the canola meal supplements (3.1 v. 4.3 and 4.2 mmol/L). Serum [beta]-hydroxybutyrate concentrations were lowest ($P < 0.05$) where wheat pellets were fed, and highest ($P < 0.05$) where treated canola meal pellets were fed, and plasma glucose concentrations were highest with wheat and lowest with the treated canola meal pellets. Thus, the hypothesis was not supported by the results of this experiment.
Keywords: Body condition; Grazing dairy cow; Early lactation performance; Canola meal; Wheat

H. Ben Salem, T. Smith, Feeding strategies to increase small ruminant production in dry environments, Small Ruminant Research, Volume 77, Issues 2-3, Sheep and Goat Farming: grazing systems of production and development, July 2008, Pages 174-194, ISSN 0921-4488, DOI: 10.1016/j.smallrumres.2008.03.008.
(http://www.sciencedirect.com/science/article/B6TC5-4SFHK71-2/2/2fb1ba6296c5d4a3a8e60205a128836a)
Abstract:
In the low-rainfall areas of much of Africa and Asia, small ruminants represent the principal economic output, contributing a large share of the income of farmers. Animal numbers have increased over the last two decades, driven by a rising demand for animal products and subsidized feed price (e.g. barley, maize). Side effects of this and changing climatic patterns are increasing desertification, resulting in a decline in rangeland resources, which are often insufficient to meet current demand, coupled with a fall in total feed resources due to overgrazing, ploughing of marginal land and soil erosion. Consequently, goats and sheep are facing serious nutrient shortages. These animals often depend on low quality crop residues (e.g. straws, stubbles) and expensive feed supplements. Technical solutions to some of these problems are available, for

example the advantageous use of fodder trees, shrubs and cactus has been demonstrated. Conservation through ensiling and the use of feed blocks (FB) gives greater efficiency of use of a wide range of agro-industrial by-products (AGIBPs). But their adoption has been slow, often because of lack of knowledge of the farmers' problems and expectations. Adaptive research of technologies and management practices are needed, to provide the policy and institutional support for wider adoption of improved production and resource management practices. Some research-development projects based on the farmer participatory approach have resulted in improved crop and livestock technologies being introduced. On-farm surveys and in-depth economic analyses have shown that these pioneer projects have contributed significantly to the welfare of farmers in dry areas. The lesson learned from these projects is that 'by working hand-in-hand with rural communities, agricultural researchers and extension specialists, it should be possible to refine and promote technologies and policies that might help ensure sustainable livelihoods and enhance the productive capacity of drylands everywhere'. Success stories of technology transfer projects include the Mashreq and Maghreb project (International Center for Agricultural Research in the Dry Areas [ICARDA]-coordinated project).
Keywords: Small ruminants; Feeding strategies; Cereal crop residues; Agro-industrial by-products; Fodder shrubs; Dry environment; Technology adoption

M.R. Fernandez, D. Huber, P. Basnyat, R.P. Zentner, Impact of agronomic practices on populations of Fusarium and other fungi in cereal and noncereal crop residues on the Canadian Prairies, Soil and Tillage Research, Volume 100, Issues 1-2, July-August 2008, Pages 60-71, ISSN 0167-1987, DOI: 10.1016/j.still.2008.04.008.
(http://www.sciencedirect.com/science/article/B6TC6-4SRM827-1/2/0e11cd2ac22546a8e30b6c6c3c631532)
Abstract:
Fusarium head blight (FHB) is an important disease which has been causing damage to wheat and barley crops in western Canada. Because crop residues are an important source of inoculum, it is important to know the ability of Fusarium spp. to colonize and survive in different residue types, and how their populations might be affected by agronomic practices. Sampling of residue types on producers' fields for quantification of Fusarium and other fungi was conducted in 2000-2001 in eastern Saskatchewan. Fusarium spp. were isolated from most fields, whereas their mean percentage isolation (MPI) was over 50% for cereal and pulse residues, and under 30% for oilseed residues. The most common Fusarium, F. avenaceum, had a higher MPI in pulse and flax (45-48%) than in cereal or canola (10-22%) residues. This was followed by F. equiseti, F. acuminatum, F. graminearum, F. culmorum and F. poae which were isolated from all, or most, residue types. Factors affecting Fusarium abundance in residues included the current crop, cropping history, and tillage system. In cereal residues, the MPI of F. avenaceum was higher when the current crop was another cereal (24%) versus a noncereal (4-8%). When the current crop was another cereal, the lowest MPI of F. avenaceum and F. culmorum occurred when the field had been in summerfallow (SF) two years previous (F. avenaceum: 17% for SF, 28% for a crop; F. culmorum: 1% for SF, 4% for a crop); in contrast, F. equiseti and Cochliobolus sativus were most common in residues of cereal crops preceded by SF (F. equiseti: 16% for SF, 10% for a crop; C. sativus: 22% for SF, 13% for a crop). The MPI of F. graminearum was higher when the crop two years previous was an oilseed (7%) versus a cereal (4%). In regards to tillage effects, when the current crop was a cereal, the MPI of F. avenaceum was higher under minimum (MT) and zero tillage (ZT) (22-37%) than conventional tillage (CT) (15%), that of F. graminearum was lowest under ZT (3% for ZT, 7-11% for CT-MT), whereas that of C. sativus was highest under CT (27% for CT, 6-11% for MT-ZT). Under ZT, previous glyphosate applications were correlated positively with F. avenaceum and negatively with F. equiseti and C. sativus. These observations generally agreed with results from previous FHB and root rot studies of wheat and barley in the same region. Percentage isolation of F. avenaceum from noncereal and of F. graminearum from cereal residues were positively

correlated with FHB severity and percentage Fusarium-damaged kernels of barley and wheat caused by the same fungi.
Keywords: Crop residues; Wheat; Durum; Barley; Oat; Oilseed; Pulse; Canola; Flax; Lentil; Pea; Fusarium; F. avenaceum; F. graminearum; Cochliobolus sativus; Crop rotation; Tillage; Glyphosate

A.N. Hristov, J.K. Ropp, S. Zaman, A. Melgar, Effects of essential oils on in vitro ruminal fermentation and ammonia release, Animal Feed Science and Technology, Volume 144, Issues 1-2, 23 June 2008, Pages 55-64, ISSN 0377-8401, DOI: 10.1016/j.anifeedsci.2007.09.034.
(http://www.sciencedirect.com/science/article/B6T42-4R2GX1V-1/2/3c9fc1e2e60c35ffbbb2c362f59db64d)
Abstract:
Ruminal inoculum enriched with particle-associated microorganisms was collected from two lactating dairy cows fed an alfalfa hay/cereal silage/concentrate diet 1 h before feeding and used to evaluate effects of essential oils (EO) on ruminal fermentation in short-term in vitro incubations. Ruminal ammonia N was labeled with 15N and native and hydrolyzed casein were provided as sources of amino acids. Forty EO were tested at 10 and 100 mg/l final medium concentration. Monensin-Na, and sodium laurate were also incubated at 5 and 2000 mg/l, respectively. Compared with blanks (i.e., no addition of EO), sodium laurate increased medium pH and a number of EO reduced medium pH. Both sodium laurate and monensin reduced ammonia concentrations compared to the blank. Only one of the tested EO (i.e., Caraway) slightly reduced ammonia concentration, by 8%, compared with the blank. Monensin and sodium laurate resulted in higher (i.e., 9-34%, monensin, and 29-47%, sodium laurate) 15N enrichment of ammonia N, an indication of reduced deamination of amino acids in these treatments versus the blank. Several EO (i.e., FrankMyrrh, Gardenia, Hibiscus, Eucaliptus, and Peppermint) had similar effects, but of a smaller magnitude (i.e., 5-12%). Some EO increased medium total VFA concentration, primarily through an increase in acetate concentration. Overall, effects of EO on fermentation were subtle, and it is unlikely that these moderate in vitro effects would correspond to any substantive impact on ruminal fermentation in vivo.
Keywords: Essential oil; Rumen fermentation; Ammonia

K. Lyberg, M. Olstorpe, V. Passoth, J. Schnurer, J.E. Lindberg, Biochemical and microbiological properties of a cereal mix fermented with whey, wet wheat distillers' grain or water at different temperatures, Animal Feed Science and Technology, Volume 144, Issues 1-2, 23 June 2008, Pages 137-148, ISSN 0377-8401, DOI: 10.1016/j.anifeedsci.2007.09.028.
(http://www.sciencedirect.com/science/article/B6T42-4R2GX1V-3/2/b45785be9419fb997b1c386ce9263276)
Abstract:
Microbiological and biochemical properties of three different liquid diets fermented at 10, 15 or 20 [degree sign]C were studied. The liquid diets consisted of a cereal grain mix of wheat, barley and triticale, blended with whey (diet WH), wet wheat distillers' grain (diet WDG) or water (diet WAT). The diets were fermented for 5 days without disturbance, followed by 14 days of daily feed replacements, where 4/5 of the contents were replaced with fresh feed mixtures. Starting pH values were 5.1, 3.9 and 6.3 in WH, WDG and WAT, respectively. For most diets, the pH decreased to approximately 4.0 by day 5. However, the WAT diet fermented at 10 [degree sign]C required 7 days to reach a pH of 4.0. A higher ($P<0.001$) pH was seen in the WH diet fermented at 10 [degree sign]C than in the other diets. Composition of the diets was determined during day 17-19 of fermentation to allow the microbial populations to stabilise and to reflect conditions in practice. Lactic acid bacteria (LAB) grew in all diets during fermentation and the growth was affected by temperature and type of diet ($P<0.001$), and the interaction between these two factors ($P<0.001$). The highest LAB counts were found at higher temperatures in the WAT and WH diets

and the lowest counts were found in diet WDG. The highest levels of acetic, succinic and propionic acids were found in diet WDG (P<0.001). Lactic acid concentrations increased with temperature (P<0.001) and were highest in the WAT and WH diets. In vitro digestibility of organic matter was highest for diet WH and lowest for diet WDG (P<0.001). Inositol hexaphosphate-bound phosphorus (P) and total P in the cereal grain mix were 2.2 and 3.7 g kg-1 dry matter, respectively. No inositol phosphate-bound P was found in any of the diets after fermentation. Some moulds, probably originating from spores in the cereal grain mix, were detected in the fermented diets, but total numbers did not increase with time. Enterobacteriaceae detected in diet WH, probably originated from the cereal grain mix and the whey. Yeasts were present in all diet ingredients. In conclusion, fermentation processes and biochemical properties differed greatly due to temperature, type of diet and the interaction of these two factors. Dietary inositol hexaphosphate was completely degraded in all fermented diets.
Keywords: Pigs; Liquid diets; Fermentation; In vitro digestibility; Feed microbiology

Christopher N. Rhodes, Janice H. Lofthouse, Simon Hird, Paul Rose, Paul Reece, Julie Christy, Roy Macarthur, Paul A. Brereton, The use of stable carbon isotopes to authenticate claims that poultry have been corn-fed, Food Chemistry, In Press, Corrected Proof, Available online 14 June 2008, ISSN 0308-8146, DOI: 10.1016/j.foodchem.2008.05.113.
(http://www.sciencedirect.com/science/article/B6T6R-4SRW17R-3/2/de7aebb3e93bb31130b9665bbfc3bc2d)
Abstract:
In order to comply with EU legislation governing the marketing of poultry labelled as corn-fed, chicken must be fed a diet containing at least 50% (w/w) corn for the greater part of the fattening period; however, there are currently no reliable methods to authenticate this dietary claim for poultry. The procedure reported exploits the differences in the photosynthetic pathways between maize and other cereals such as wheat, rye, barley and oats and in their differing enrichments of the 13C stable isotope from atmospheric CO2. Resulting differences in 13C and 12C are measured by Stable Isotope Ratio Mass Spectrometry.
A series of controlled feeding experiments have been carried out on two breeds of chickens, and the results showed that both the fat and protein contents of the bird changed consistently in line with both the quantity and duration of corn consumption. Blind testing of the method and examination of commercially grown corn-fed chicken showed that the 13C content of the protein was a reliable marker of the dietary status of the chickens.
Keywords: Authentication; Stable isotope; Carbon; Corn-fed; Poultry; Maize

Li-Fang ZHUANG, Li-Xiao SONG, Yi-Gao FENG, Bao-Li QIAN, Hai-Bin XU, Zi-You PEI, Zeng-Jun QI, Development and Chromosome Mapping of New Wheat EST-SSR Markers and Application for Characterizing Rye Chromosomes Added in Wheat, Acta Agronomica Sinica, Volume 34, Issue 6, June 2008, Pages 926-933, ISSN 1875-2780, DOI: 10.1016/S1875-2780(08)60033-4.
(http://www.sciencedirect.com/science/article/B94TW-4TJT5JS-2/2/8befa6ebd366a26b108fb6a61c083dde)
Abstract:
On the basis of the reported expressed sequence tags (ESTs) that are related to salinity stress and stem in wheat (Triticum aestivum L.), 81 new EST-derived simple sequence repeat (eSSR) markers were developed. Among these markers, 67, 46, 18, and 61 eSSRs produced 124, 72, 26, and 124 stable amplicons in the genomes of wheat, rye (Secale cereals L.), Haynaldia villosa L. Schur., and barley (Hordeum vulgare L.), respectively, indicating their high transferability. Totally, 81 loci amplified by 43 markers were mapped on 18 wheat chromosomes. Eight eSSRs from the 30 markers, which produced specific loci in rye, were mapped on chromosomes 1R, 4R, 5R, and R7 of rye, and 7 eSSRs were located on more than 1 chromosome. The remaining 15 eSSRs might be used to trace chromosomes that are not involved in this study.

Keywords: wheat; EST-SSR (eSSR); chromosome mapping; Secale cereale L.; specific marker

M. Weih, U.M.E. Didon, A.-C. Ronnberg-Wastljung, C. Bjorkman, Integrated agricultural research and crop breeding: Allelopathic weed control in cereals and long-term productivity in perennial biomass crops, Agricultural Systems, Volume 97, Issue 3, June 2008, Pages 99-107, ISSN 0308-521X, DOI: 10.1016/j.agsy.2008.02.009.
(http://www.sciencedirect.com/science/article/B6T3W-4S9FH9K-1/2/6d58ed18c78a0de1f78e87631302dc5f)
Abstract:
Future agricultural research will need to increasingly integrate ecological, physiological and molecular methods, in order to understand agricultural crops in situ and their interaction with the environment as well as organisms impacting on their long-term health and productivity (`agricultural eco-genomics'). The need for integration will increasingly implicate on crop breeding strategies for most agricultural systems. In this paper, implications are highlighted for two contrasting areas of agricultural research related to sustainable crop production: first, the possibilities to utilize crop allelopathic activity to suppress weeds as an alternative to chemical weed control; and second the increasing interest to environmentally friendly and sustainable produce perennial energy crops on agricultural land. `Sustainability' in agriculture is difficult to define unequivocally, but frequently implies the increased utilization of ecological processes. Breeding strategies towards increased utilization of allelopathic crops require initially the integration and verification of allelopathic processes in various agricultural contexts, because there is currently great uncertainty about the predictable operation of allelopathic activity in different ecological contexts. Breeding programs for future biomass crops, most promising are perennials such as Salix, would greatly benefit from the integration of ecological information affecting long-term productivity, e.g., eco-physiological growth determinants at stand level and the biological control of pests. Agricultural eco-genomics could facilitate a compromise between intensive agriculture and the frequently expressed demand for greater sustainability in agriculture.
Keywords: Allelopathy; Crop breeding; Energy crops; Quantitative trait loci (QTL); Weed control; Biological control; Salix; Insect pests

D.F. Chapman, S.N. Kenny, D. Beca, I.R. Johnson, Pasture and forage crop systems for non-irrigated dairy farms in southern Australia. 1. Physical production and economic performance, Agricultural Systems, Volume 97, Issue 3, June 2008, Pages 108-125, ISSN 0308-521X, DOI: 10.1016/j.agsy.2008.02.001.
(http://www.sciencedirect.com/science/article/B6T3W-4S6GRWX-1/2/9c4b568d6e9d39dd0a24fc6d078dde18)
Abstract:
The dairy industry in southern Australia relies on perennial ryegrass pasture to supply 60-70% of the diet of lactating cows. Improvements in the amount and quality of home-grown forage used for dairy cow feeding are critical for further productivity gains in the industry. A modeling approach was used to estimate the effects of changing the forage system on farm business profit. Base models (using 100% of farm area in perennial ryegrass pasture) were constructed for above-average (Top 40%) and high performing (Top 10%) farm types typical of two locations: Terang in southwest Victoria and Ellinbank in Gippsland, eastern Victoria. These models were then re-simulated using different forage base options such as: oversowing annual ryegrass, winter crops (annual ryegrass monoculture, winter cereal grown for whole crop silage), summer crops (grazing brassicas, maize), combinations of these (double cropping), or summer shoulder pasture (notionally based on tall fescue) on between 10% and 100% of farm area.
Estimated total home-grown forage consumption ranged between 6.7 and 10.2 t DM/ha/year for Terang and 7.8 and 11.9 t DM/ha/year for Ellinbank. Within farm types at Terang, the amount of home-grown forage consumed explained between 30% and 45% of the variation in operating

profit. The models predicted that profit improvements of $70-$100 per hectare per additional tonne of home-grown forage consumed are possible from changing the forage base. Oversowing annual ryegrass led to greater forage supply, but only at times when pasture availability was largely adequate to meet current herd requirements therefore additional feed was not used as cost-effectively as other options. By contrast, the summer shoulder pasture type shifted the seasonal distribution of forage supply further into summer compared to perennial ryegrass, and led to higher amounts of pasture in the diet and greater profitability. Double cropping systems also appeared capable of increasing operating profit and total home-grown forage consumption.
Increasing home-grown forage consumption and profit by using some of the alternative pastures and forage crops investigated here requires better information on crop/pasture agronomy, management and feeding, and greater decision-making and management input compared to current systems.
Keywords: Dairy systems; Forage; Pasture; Simulation modeling; Milk production; Profitability

D.F. Chapman, S.N. Kenny, D. Beca, I.R. Johnson, Pasture and forage crop systems for non-irrigated dairy farms in southern Australia. 2. Inter-annual variation in forage supply, and business risk, Agricultural Systems, Volume 97, Issue 3, June 2008, Pages 126-138, ISSN 0308-521X, DOI: 10.1016/j.agsy.2008.02.002.
(http://www.sciencedirect.com/science/article/B6T3W-4S6GRWX-2/2/a8bd126f5b28e46f3c7af0a7f53db2ed)
Abstract:
Inter-annual climatic variability poses a substantial management and profitability challenge for pasture-based dairy producers in southern Australia. The effects of a range of seasonal scenarios on the production and profit of non-irrigated dairy farm systems using several different forage bases were investigated for two regions in southeast Australia using a systems modeling approach. For the Terang district, seasonal scenarios were constructed around combinations of early, average or late autumn rains, and short, average or long spring flushes. For the higher-rainfall Ellinbank district, scenarios were constructed around either above- or below-average summer-autumns or winter-springs.
Compared to the `Base' system where 100% of the grazing area was in perennial ryegrass (Lolium perenne), alternative systems such as double cropping and use of a summer shoulder (more summer-active) pasture based on tall fescue (Festuca arundinacea) returned similar or higher profit for most of the seasonal scenarios investigated. Only at Terang when the autumn rains were early and the spring was extended within the same year did the alternatives lose out to perennial ryegrass in predicted profit, reflecting the well-known excellent performance of perennial ryegrass in environments with a long growing season. Within each of the forage systems simulated, the profit outcomes were generally more consistent in the face of seasonal perturbations for the double cropping and summer shoulder pasture forage options than for those based on ryegrass. This suggests they are less prone to business risk. It reflects the apparent consistency across years of the yield of winter cereal during the period April-October when there is generally only small departure from `average' conditions for plant growth between years. It also reflects the deeper effective rooting habit of tall fescue, and its ability to access more stored water in the soil profile compared to perennial ryegrass and thus greater capacity to `ride out' periods of variability.
Pasture growth analyses using climate data from 1900 to 1999 inclusive showed that above- or below-average conditions for plant growth in autumn and spring occur at frequencies between two and four years out of 10. Thus, all combinations of poorer than average or better than average seasons can be expected in any decade. This investigation suggests that diversification of the forage base will help smooth out between-year variability in profit provided the right forage types are selected, managed to a very high level, and effectively integrated within year-round feeding systems to achieve high milk production.
Keywords: Dairy systems; Forage; Pasture; Climate variability; Simulation modeling; Profitability

E. Playan, O. Perez-Coveta, A. Martinez-Cob, J. Herrero, P. Garcia-Navarro, B. Latorre, P. Brufau, J. Garces, Overland water and salt flows in a set of rice paddies, Agricultural Water Management, Volume 95, Issue 6, June 2008, Pages 645-658, ISSN 0378-3774, DOI: 10.1016/j.agwat.2008.01.012.
(http://www.sciencedirect.com/science/article/B6T3X-4S1SJKN-1/2/9af382df871308ab5b918c5eb1f2be8a)
Abstract:
Cultivation of paddy rice in semiarid areas of the world faces problems related to water scarcity. This paper aims at characterizing water use in a set of paddies located in the central Ebro basin of Spain using experimentation and computer simulation. A commercial field with six interconnected paddies, with a total area of 5.31 ha, was instrumented to measure discharge and water quality at the inflow and at the runoff outlet. The soil was classified as a Typic Calcixerept, and was characterized by a mild salinity (2.5 dS m-1) and an infiltration rate of 5.8 mm day-1. The evolution of flow depth at all paddies was recorded. Data from the 2002 rice-growing season was elaborated using a mass balance approach to estimate the infiltration rate and the evolution of discharge between paddies. Seasonal crop evapotranspiration, estimated with the surface renewal method, was 731 mm (5.1 mm day-1), very similar to that of other summer cereals grown in the area, like corn. The irrigation input was 1874 mm, deep percolation was 830 mm and surface runoff was 372 mm. Irrigation efficiency was estimated as 41%. The quality of surface runoff water was slightly degraded due to evapoconcentration and to the contact with the soil. During the period 2001-2003, the electrical conductivity of surface runoff water was 54% higher than that of irrigation water. However, the runoff water was suitable for irrigation. A mechanistic mass balance model of inter-paddy water flow permitted to conclude that improvements in irrigation efficiency cannot be easily obtained in the experimental conditions. Since deep percolation losses more than double surface runoff losses, a reduction in irrigation discharge would not have much room for efficiency improvement. Simulations also showed that rice irrigation performance was not negatively affected by the fluctuating inflow hydrograph. These hydrographs are typical of turnouts located at the tail end of tertiary irrigation ditches. In fact, these are the sites where rice has been historically cultivated in the study area, since local soils are often saline-sodic and can only grow paddy rice taking advantage of the low salinity of the irrigation water. The low infiltration rate characteristic of these saline-sodic soils (an experimental value of 3.2 mm day-1 was obtained) combined with a reduced irrigation discharge resulted in a simulated irrigation efficiency of 60%. Paddy rice irrigation efficiency can attain reasonable values in the local saline-sodic soils, where the infiltration rate is clearly smaller than the average daily rice evapotranspiration.
Keywords: Ebro; Aragon; Spain; Efficiency; Simulation; Saline-sodic; Salinity; Infiltration; Runoff; Percolation

R.J. Thomas, Opportunities to reduce the vulnerability of dryland farmers in Central and West Asia and North Africa to climate change, Agriculture, Ecosystems & Environment, Volume 126, Issues 1-2, International Agricultural Research and Climate Change: A Focus on Tropical Systems, June 2008, Pages 36-45, ISSN 0167-8809, DOI: 10.1016/j.agee.2008.01.011.
(http://www.sciencedirect.com/science/article/B6T3Y-4S02D32-1/2/1bdba0e8ab0158184ca5871743f1c659)
Abstract:
The world's drylands will face not only increasing temperatures with climate change but more importantly also disruptions to their hydrological cycles resulting in less and more erratic rainfall that will exacerbate the already critical state of water scarcity and conflicts over water allocation.
The rural poor in dry areas will suffer the most from these changes and will require a range of coping strategies to help them adapt to changing climates. Strategies will include changing of cropping systems and patterns, switching from cereal-based systems to cereal-legumes and

diversifying production systems into higher value and greater water use efficient options. The latter include judicious use of water using supplementary irrigation systems, more efficient irrigation practices and the adaptation and adoption of existing and new water harvesting technologies. Scope for the application of conservation agriculture in dry areas is thought to be limited by low biomass production but current evidence suggests that even small amounts of residue retention can significantly decrease soil erosion losses. These options will be supplemented by the development of more drought and heat tolerant germplasm using traditional and participatory plant breeding methodologies and better predictions of extreme climatic events.
The majority of drylands are occupied by rangelands with some 828 Mha in West Asia and North Africa alone. These vast areas provide environmental services such as the regulation of water quantity and quality, biodiversity and carbon sequestration. Rangelands have been neglected in the past partly because of problems of ownership, access and governmental policies that discourage investments in rangelands. The idea of payment for environmental services in rangelands is in its infancy but is discussed here as a potential option for better use and management of rangelands and as a safety net to reduce the vulnerability of rangeland inhabitants to climate change.
In addition to the promising technological options to reduce vulnerability to climate change a brief discussion is included on the institutional and policy options needed to create a better enabling environment for increased adaptation and ecosystem resilience.
Keywords: Drylands; Climate change; Adaptation strategies

Xiong Zhao He, Qiao Wang, Reproductive strategies of Aphidius ervi Haliday (Hymenoptera: Aphidiidae), Biological Control, Volume 45, Issue 3, June 2008, Pages 281-287, ISSN 1049-9644, DOI: 10.1016/j.biocontrol.2008.03.003.
(http://www.sciencedirect.com/science/article/B6WBP-4S19RH6-3/2/6cdfd3ee810fbd5e482c874691038c41)
Abstract:
Hymenopteran parasitoids are usually arrhenotokous parthenogenetic, where females arise from fertilized and males from unfertilized eggs. Therefore, the reproductive fitness of females is a function of egg production and furthermore affected by mating, whereas that of males is mainly determined by the number of daughters they father. Aphidius ervi Haliday is a quasi-gregarious parasitoid of a number of aphid pests on economically important crops such as legumes and cereals. Females are monandrous whereas males are polygynous. Here, we tested how parental age at mating and male mating history affected mating success, fecundity and daughter production in this species. Once-mated males perform significantly better than naive males with regard to mating success, suggesting that males learn from previous matings. The fecundity of virgin females is not significantly different from that of mated females regardless of parental age at mating and male mating history, indicating that mating does not stimulate egg production or contribute to female nutrient supply. Males can replenish sperm supply after mating, implying that they are at least moderately synspermatogenic. Preference for young over old mates for mating by both sexes may be explained by the fact that aging of both sexes contributes to the reduction of daughter production. Rather than sperm depletion, the reduced daughter production may be attributed to diminishing sperm viability and mobility in aging males and increasing constraints in fertilization process in aging females. Our results also show that female age has a stronger impact on the production of daughters, suggesting that fertilization process in females is more sensitive to aging than sperm vigor in males.
Keywords: Aphidius ervi; Aging; Mating history; Fecundity; Sperm replenishment; Daughter production

Zeyaur R. Khan, David M. Amudavi, Charles A.O. Midega, Japhether M. Wanyama, John A. Pickett, Farmers' perceptions of a `push-pull' technology for control of cereal stemborers and

Striga weed in western Kenya, Crop Protection, Volume 27, Issue 6, June 2008, Pages 976-987, ISSN 0261-2194, DOI: 10.1016/j.cropro.2007.12.001.
(http://www.sciencedirect.com/science/article/B6T5T-4RKDHHB-2/2/4ac0edcedf8407afcb685cb14af1a3af)
Abstract:
Striga and cereal stemborers are major constraints to cereal production in sub-Saharan Africa causing serious food security concerns. The International Centre of Insect Physiology and Ecology (ICIPE) and partners have developed a novel integrated management system called the `push-pull' technology (PPT) in mitigation. This involves inter-cropping maize with a stemborer moth-repellent forage legume, silverleaf desmodium (push), and planting an attractive trap crop, Napier grass (pull), around the intercrop. Additionally, chemicals produced from desmodium roots inhibit Striga. We evaluated farmers' perceptions of the pests, PPT attributes and factors influencing the likelihood of its adoption in 15 districts in western Kenya. A random sample of 923 farmers, with 478 having adopted the technology (practicing) and 445 not yet adopted but attending PPT field days (visiting) were interviewed. The practicing farmers cited both Striga and stemborers as major maize production constraints, alongside other constraints, as the main motivations for adoption of PPT. Reduced infestation by the pests, improvement in soil fertility, increase in maize grain yields, improved fodder and milk productivity were cited as main benefits of PPT. Similarly, the field day visiting farmers rated PPT as a more superior technology compared to their own maize production practices. Farmer's age, household headship by female farmers, technology attributes and exposure to a variety of extension methods significantly influenced likelihood of PPT adoption. Effective dissemination pathways are needed to provide farmers with appropriate information for evaluating potential benefits and tradeoffs of such a management-intensive technology. Further research is needed to understand how PPT contributes to farmers' livelihood improvement and how the efficacy of different dissemination pathways in PPT technology transfer influences its adoption.
Keywords: Farmer perceptions; Striga; Stemborers; `Push-pull' technology; Kenya

P.C. Turner, Q.K. Wu, S. Piekkola, S. Gratz, H. Mykkanen, H. El-Nezami, Lactobacillus rhamnosus strain GG restores alkaline phosphatase activity in differentiating Caco-2 cells dosed with the potent mycotoxin deoxynivalenol, Food and Chemical Toxicology, Volume 46, Issue 6, June 2008, Pages 2118-2123, ISSN 0278-6915, DOI: 10.1016/j.fct.2008.02.004.
(http://www.sciencedirect.com/science/article/B6T6P-4RSYCD9-2/2/73cfba327a46e92dc24b644a0914c1cf)
Abstract:
Deoxynivalenol (DON) contamination of cereal crops occurs frequently, and may cause acute exposure at high levels or chronic more moderate exposure. DON has proven toxicity including restriction of enterocyte differentiation, which may play a part in DON induced gastroenteritis. The probiotic bacteria Lactobacillus rhamnosus strain GG (GG) can bind DON, and therefore potentially restrict bioavailability of this toxin. Binding efficacy is not significantly altered by heat treatment, and therefore this in vitro study evaluated whether heat inactivated GG could restore the differentiation process in Caco-2 cells, using alkaline phosphatase (ALP) activity as a marker of differentiation. DON (200 ng/mL) caused a significant ($p < 0.001$) 36% reduction in ALP activity (1598 +/- 137 U/mg protein) compared to untreated cells (2502 +/- 80 U/mg). A dose dependant restoration of ALP activity was observed where DON treated cells were co-incubated with heat inactivated GG (1719 +/- 84; 2007 +/- 142; 2272 +/- 160 U/mg for GG at 1 x 104 ($p > 0.9$), 1 x 107 ($p < 0.001$), and 1 x 1010 CFU/mL ($p < 0.001$), respectively). Co-incubation of the non-binding strain, LC-705 (1 x 1010 CFU/mL), with DON did not significantly restore the ALP (1841 +/- 97 U/mg, $p < 0.077$) compared to DON only treated cells. When viable GG were co-incubated with DON a similar restoration of ALP activity was observed as seen for heat inactivated GG. These combined data suggest that the major effect of GG on restoring ALP activity, and therefore Caco-2

cell differentiation, was due to specific binding of DON, with possibly a more minor role of non-specific bacterial interference.
Keywords: Lactobacillus; Probiotic; Deoxynivalenol; Caco-2; Intestine

C. Frontela, F.J. Garcia-Alonso, G. Ros, C. Martinez, Phytic acid and inositol phosphates in raw flours and infant cereals: The effect of processing, Journal of Food Composition and Analysis, Volume 21, Issue 4, June 2008, Pages 343-350, ISSN 0889-1575, DOI: 10.1016/j.jfca.2008.02.003.
(http://www.sciencedirect.com/science/article/B6WJH-4S03RF1-2/2/b250da08958c19e364181292bfb16aaa)
Abstract:
Inositol phosphate modification in infant cereals was examined during industrial processing which included roasting and alpha-amylase treatment. A considerable ($p<0.05$) decrease in phytate content was observed after both treatments in all the samples analysed. However, the industrial processing observed was not sufficient to cause degradation of the phytate to achieve phytate mineral ratios optimal for mineral absorption in infant cereals. All samples analysed had a phytate/iron molar ratio >1.3, and of the 6 samples, 5 had a phytate/zinc molar ratio >14. The bioavailability of minerals is particularly important during weaning when minerals stores in infants are naturally low. Further studies are needed to evaluate the efficacy and effectiveness of phytase treatment to increase mineral bioavailability in infant foods.
Keywords: Infant flour; Infant cereal; Infant nutrition; Industrial processing; Roasting; Alpha-amylase; Phytate; Bioavailability; Iron; Calcium; Zinc

V.K. Modi, Maya Prakash, Quick and reliable screening of compatible ingredients for the formulation of extended meat cubes using Plackett-Burman design, LWT - Food Science and Technology, Volume 41, Issue 5, June 2008, Pages 878-882, ISSN 0023-6438, DOI: 10.1016/j.lwt.2007.06.002.
(http://www.sciencedirect.com/science/article/B6WMV-4P008B9-2/2/400c69c7f069e2b0a76972412dc22daa)
Abstract:
'Extended meat products' is an important concept which involves judicious utilization of other agricultural/animal produce as well as providing meat-like products. Selection of compatible ingredients from among numerous alternates is a daunting task. Of the several methods available, Plackett-Burman design was used to screen 11 potential ingredients to formulate extended meat cubes. Twelve formulations were evolved and their evaluation as rehydrated and stewed meat cubes were carried out by a sensory panel. The attributes of firmness, juiciness, meaty aroma and overall quality were rated by an intensity ranking test followed by appropriate statistical analysis provided regression coefficients for individual ingredients for each attribute. Based on the direction of change (increase or decrease over control) for each attribute and its relation to the overall acceptability of the ingredients for their compatibility in formulating the product was provided. The overall rank sums for each ingredient and the attributes provided a reliable means to select the most compatible ingredients for further optimization work.
Keywords: Meat cubes; Extenders; Binders; Cereals; Millets; Vegetables

Lisbeth Mogensen, Peter Lund, Troels Kristensen, Martin Riis Weisbjerg, Effects of toasting blue lupins, soybeans or barley as supplement for high-yielding, organic dairy cows fed grass-clover silage ad libitum, Livestock Science, Volume 115, Issues 2-3, June 2008, Pages 249-257, ISSN 1871-1413, DOI: 10.1016/j.livsci.2007.08.011.
(http://www.sciencedirect.com/science/article/B7XNX-4PP291X-1/2/3f7bf10613ee1dfe5ec4f94805899bfd)
Abstract:

The effect of toasted supplement on milk production was examined in three experiments on an organic study farm during the winter 2004/2005. Three types of iso-energetic supplement feed, toasted or untreated, were examined in each experiment, with an untreated cereal mixture as control. The supplement under investigation was: lupins in experiment 1, barley in experiment 2 and soybeans in experiment 3. The same forage mixture of grass-clover silage (84% of DM), grass pellets (11% of DM) and straw (5% of DM) was fed ad libitum in all the experiments.
Toasting decreased effective rumen protein degradability determined in situ for all three supplements. Compared to untreated lupins toasting of lupins tended (P = 0.10) to increase milk yield, whereas toasting of soybeans did not affect milk yield. Toasting of lupins decreased (P = 0.03) milk protein content (32.2 versus 32.7 g/kg), whereas toasting of soybeans did not affect milk protein content. ECM yield was significantly higher (P = 0.002) for cows fed toasted soybeans than for cows fed untreated soybeans (28.1 versus 26.4 kg ECM) whereas there was no significant effect on ECM yield from toasting lupins or barley. It can be concluded that the potential of toasting to increase the supply of metabolisable protein under organic feeding conditions is variable between feeds.
Keywords: Milk production; Organically grown feed; Protein supplement; Production experiment

Richard C. Sicher, Effects of CO2 enrichment on soluble amino acids and organic acids in barley primary leaves as a function of age, photoperiod and chlorosis, Plant Science, Volume 174, Issue 6, June 2008, Pages 576-582, ISSN 0168-9452, DOI: 10.1016/j.plantsci.2008.03.001.
(http://www.sciencedirect.com/science/article/B6TBH-4S26HBC-1/2/ef7b8a7ea99cdf9aa6305786ca9f0229)
Abstract:
Responses of soluble amino acids and organic acids to either ambient (36 Pa) or elevated (100 Pa) CO2 treatments were determined using barley primary leaves (Hordeum vulgare L. cv. Brant). Total soluble amino acids were increased 33% by CO2 enrichment 9 days after sowing (DAS), but a decrease relative to the ambient CO2 treatment was observed with increasing leaf age. Marked declines of glutamine and asparagine were observed under CO2 enrichment, both diurnally and with advancing leaf age. Consequently, total soluble amino acids were 59% lower in the elevated compared to the ambient CO2 treatment 17 DAS. It was likely that chlorosis in response to CO2 enrichment negatively impacted soluble amino acid levels in older barley primary leaves. In contrast to the ambient CO2 treatment, glutamine and most other soluble amino acids decreased as much as 60% during the latter half of a 12 h photoperiod in primary leaves of 13-day-old seedlings grown under enhanced CO2. Malate was decreased about 9 percent by CO2 enrichment and citrate and succinate were increased by similar amounts when measured 9 and 13 DAS. Malate accumulation was also decreased about 20% by CO2 enrichment on a diurnal basis. The onset of CO2-dependent leaf yellowing had much less of an effect on organic acids than on soluble amino acids. This above results emphasized the sensitivity of N metabolism to CO2 enrichment in barley. Increased levels of citrate and succinate in response to CO2 enrichment suggested that the tricarboxylic acid cycle was upregulated in barley by CO2 enrichment. In summary, organic and amino acid levels in barley primary leaves were dynamic and were altered by age, diurnally and in response to CO2 enrichment.
Keywords: Assimilate partitioning; Elevated CO2; Leaf yellowing; N assimilation; Small grain cereals; Controlled environments

Julie C. Dawson, David R. Huggins, Stephen S. Jones, Characterizing nitrogen use efficiency in natural and agricultural ecosystems to improve the performance of cereal crops in low-input and organic agricultural systems, Field Crops Research, Volume 107, Issue 2, 10 May 2008, Pages 89-101, ISSN 0378-4290, DOI: 10.1016/j.fcr.2008.01.001.
(http://www.sciencedirect.com/science/article/B6T6M-4S02JX7-1/2/b5adf80a93831e9356bcfa74a456aa90)

Abstract:
Low-input and organic farming systems have notable differences in nitrogen (N) sources, cycling and management strategies compared to conventional systems with high inputs of synthetic N fertilizer. In low-input and organic systems, there is greater reliance on complex rotations including annual and perennial crops, organic N sources, and internal N cycling that more closely mimic natural systems. These differences in farming system practices fundamentally affect N availability and N use efficiency (NUE) and could impact crop traits and breeding strategies required to optimize NUE. We assess genetic and environmental factors that could assist breeders in improving crop performance in low-input and organic farming systems by examining NUE in natural and agricultural ecosystems. Crop plants have often been bred for high N productivity, while plants adapted to low N ecosystems often have lower productivity and higher levels of internal N conservation. Breeders can potentially combine N productivity and N conservation through the use of elite and wild germplasm. Beneficial genetic traits include the ability to maintain photosynthesis and N uptake under N stress and the ability to extract soil N at low concentrations, perhaps through beneficial associations with soil microorganisms. In addition, breeding for specific adaptation to climactic and management practices so that crop uptake patterns match N availability patterns, while minimizing pathways of N loss, will be critical to improving NUE.
Keywords: Nutrient cycling; Perennial crops; Cereal crops

Z. Xin, C. Franks, P. Payton, J.J. Burke, A simple method to determine transpiration efficiency in sorghum, Field Crops Research, Volume 107, Issue 2, 10 May 2008, Pages 180-183, ISSN 0378-4290, DOI: 10.1016/j.fcr.2008.02.006.
(http://www.sciencedirect.com/science/article/B6T6M-4S6Y5DF-2/2/41798ddc1062c65d191c2a66906591e0)
Abstract:
Sorghum [Sorghum bicolor (L.) Moench] is a C4 cereal grain crop grown primarily in arid and semi-arid regions in the world with limited or no irrigation. Sorghum production fluctuates and largely depends on the amount and distribution of rainfall. Transpiration efficiency (TE), the biomass produced per unit water transpired, could be a potential trait to improve sorghum yield in areas where irrigation is limited. We have developed a mini-lysimetric method that directly measures whole plant TE in sorghum during an early vegetative stage under greenhouse conditions. The method was evaluated with 11 inbred lines and three hybrids under two greenhouse environments. In general, TE determined with the gravimetric method was higher under lower vapor pressure deficit conditions; however, similar rankings in TE were obtained across the experiments. The method described in this report offers a simple, high-throughput, and affordable way to determine the integrated TE in sorghum at an early vegetative stage.
Keywords: Transpiration efficiency; Sorghum; Genetic variation

Enli Wang, Hamish Cresswell, Qiang Yu, Kirsten Verburg, Summer forage cropping as an effective way to control deep drainage in south-eastern Australia--A simulation study, Agriculture, Ecosystems & Environment, Volume 125, Issues 1-4, May 2008, Pages 127-136, ISSN 0167-8809, DOI: 10.1016/j.agee.2007.12.009.
(http://www.sciencedirect.com/science/article/B6T3Y-4RW4RS2-3/2/c29e7ca3b585ae686d5bc780fbee0559)
Abstract:
Excessive drainage of water beyond the root zone of agricultural plants is complicit in causing extensive dryland salinity in southern Australia. Opportunistically sowing summer forage crops within winter cereal rotations could be a flexible means of reducing this deep drainage whilst achieving additional livestock production. A simulation-based feasibility study was conducted to assess the effectiveness of summer forage cropping in altering the water balance and to predict any adverse effects on winter crop yield. At the study location in southern New South Wales an

average of 37% of the 557 mm annual rainfall falls outside wheat growing season, i.e., in the summer fallow period. Summer cowpea crops planted in the fallow period were predicted to yield 1.3 t/ha of biomass on average (range of 0-5.7 t/ha) if sown every year. Crops failed to establish in 1 year out of 5, and predicted yield failed to exceed 1.0 t/ha in 52% of years. Compared with a wheat-fallow scenario, the wheat-cowpea systems increased evapotranspiration outside the wheat growing season by up to 40% depending on summer crop frequency. Continuous wheat-cowpea cropping reduced deep drainage by 62% but also reduced yields of following wheat crops by 13%. Opportunistic summer cropping was less effective than continuous summer cropping in terms of total deep drainage reduction but produced more biomass per crop sown, and incurred smaller yield penalties on wheat. The simulation results suggest that opportunistic summer forage cropping is effective in reducing deep drainage and, compared to lucerne phase farming systems, offers greater management flexibility and smaller winter crop yield penalties. Further studies are needed on the practicality and economic benefit of the proposed summer forage cropping.
Keywords: Water balance; Wheat yield; Cowpea; Climate variability; Modelling

A.R. Askar, J.A. Guada, J.M. Gonzalez, A. de Vega, M. Fondevila, Rumen digestion and microbial protein synthesis by growing lambs fed high-concentrate diets: Effects of cereal processing and animal age, Animal Feed Science and Technology, Volume 142, Issues 3-4, 1 May 2008, Pages 292-305, ISSN 0377-8401, DOI: 10.1016/j.anifeedsci.2007.09.003.
(http://www.sciencedirect.com/science/article/B6T42-4PTN8T6-1/2/5b42d19f3a1879043703e028b53b52a3)
Abstract:
Rumen digestion and microbial protein synthesis were studied using 36 growing lambs given either free choice access to separate feeders with whole barley grain and a pelleted soybean meal-based supplement (treatment WB) or a pelleted compound feed (treatment C) made by combining ground barley (0.65) with the same protein supplement (0.35). Free access to barley straw was offered in treatment C but not in WB. While both treatments were imposed before and after weaning (at 42 days), for a third treatment the compound feed was replaced after weaning by whole barley grain and the protein supplement without access to straw (treatment CWB). Six lambs from each treatment were slaughtered at 10 and 30 days post-weaning after 15N-labelling of microbial N and abomasal digesta flows were estimated using C31 alkane as marker. Processing of barley grain increased ($P<0.05$) the apparent digestibility of dry matter in the rumen irrespective of age (0.53, 0.48 and 0.43 (S.E. 0.027) for C, CWB and WB). Ruminal pH averaged 5.5 (S.E. 0.06) regardless of cereal processing. The molar ratio of acetate to propionate decreased with age reflecting a higher proportion of grain in the mixed diets (WB and CWB) at 30 than 10 days post-weaning. Even with similar dietary proportions of grain and protein supplement, the acetate to propionate ratio was lower for lambs fed the free-choice (WB and CWB) vs. those fed the compound (C) diet (1.3 vs. 2.2 (S.E.D. 0.37)). Ruminal ammonia concentration increased with age and was lower for treatment C compared with treatments WB and CWB (24 vs. 127 (S.E.D. 22.2) mg/L), reflecting the higher protein intake of the latter two treatments. However, recovery of N intake as abomasal non-ammonia N was low for all treatments due to high protein intake and inefficient microbial growth compared to values reported for mixed diets. The efficiency of microbial N synthesis did not differ between treatments but it was negatively correlated ($r = -0.73$) with the organic matter apparently digested in the rumen, resulting in similar microbial yields in spite of the lower digestion in the rumen of whole barley diets. Feeding whole barley is thus a useful strategy to modify the site of digestion in intensive lamb fattening, allowing to reduce ruminal fermentation without depressing microbial N yield.
Keywords: Barley; Processing; Rumen digestion; Microbial protein; Lamb fattening

M.G. Paoletti, A. Tsitsilas, L.J. Thomson, S. Taiti, P.A. Umina, The flood bug, Australiodillo bifrons (Isopoda: Armadillidae): A potential pest of cereals in Australia, Applied Soil Ecology, Volume 39, Issue 1, May 2008, Pages 76-83, ISSN 0929-1393, DOI: 10.1016/j.apsoil.2007.11.009.
(http://www.sciencedirect.com/science/article/B6T4B-4RJKWYD-1/2/3965b04195619f60fc03eb5464aaaea4)
Abstract:
Agricultural invertebrate pests cause substantial losses through reduced productivity and increases in pesticide application. Understanding the basic biology of pest species and how they interact with other invertebrates within specific industries is important for developing targeted control strategies. In 2006, feeding damage to emerging cereal crops in parts of New South Wales, Australia, was caused by Australiodillo bifrons (Budde-Lund, 1885), an endemic slater species. This appears to be a new phenomenon as slaters are not widely known to be a pest of cultivated plants, but rather feed on decaying organic matter. Samples were collected from these areas and affected farmers interviewed. We observed and report on the swarming of A. bifrons populations in the field, a characteristic behaviour that may contribute to the pest status of this species. We also examined the feeding characteristics of A. bifrons and another slater species, Porcellio scaber (Latreille), to wheat seedlings under laboratory conditions. Our results suggest A. bifrons can cause significant feeding damage to wheat seedlings and reaches very high densities in the field. The presence of shelterbelts along crop margins could be harbouring large populations of A. bifrons, although they also provide a refuge for many beneficial invertebrates that could control pest populations. We propose that the pest status of A. bifrons in parts of New South Wales may be increasing due to changes in farming practices and/or in response to climate change.
Keywords: Slaters; Terrestrial isopods; Wheat; Oats; Swarms; Emerging pest; Climate

Zeyaur R. Khan, David G. James, Charles A.O. Midega, John A. Pickett, Chemical ecology and conservation biological control, Biological Control, Volume 45, Issue 2, Conservation Biological Control, May 2008, Pages 210-224, ISSN 1049-9644, DOI: 10.1016/j.biocontrol.2007.11.009.
(http://www.sciencedirect.com/science/article/B6WBP-4R9JTVN-1/2/c2096d07706668ad3e3afcf8b3c10f5f)
Abstract:
Elucidating the chemical ecology of natural enemies, herbivores and host plants is important in the development of effective and successful integrated pest management (IPM) strategies where abundance and distribution of natural enemies could be manipulated by semiochemicals for improved conservation biological control (CBC). In response to attack by herbivores, plants produce semiochemicals called Herbivore-Induced Plant Volatiles (HIPVs) which act to repel pests and attract their natural enemies. Damaged, and in some cases, intact plants may also produce volatile signals that warn other plants of impending attack. Some of these intact plants are used as intercrops in `push-pull' strategies; cropping systems based on stimulo-deterrent principle, where the target crop is intercropped with herbivore repellent plants (push) while attractant plants (pull) are planted around this intercrop. The intercrop, in addition to repelling the herbivores, attracts and conserves natural enemies thereby ensuring continued suppression of the pests. This natural delivery of semiochemicals for CBC is currently being exploited by smallholder farmers in eastern Africa in the management of cereal stemborers in maize and sorghum. Synthetic HIPVs also have the potential to effectively recruit natural enemies, thereby improving CBC as has been demonstrated in a series of field experiments in vineyards and hop yards in the Pacific Northwest of the United States. Potentially, plants could be `turned on' by synthetic HIPV signals, and therefore become sources of natural enemy-recruiting volatiles. With the rapid development of plant molecular biology, modification of secondary plant metabolism is also possible which could allow appropriate semiochemicals to be generated by plants at certain growth stages. By identifying the promoter sequences associated with external plant signals that induce biochemical

pathways, plant defense genes could be `switched on' prior to insect attack. We review recent research on `push-pull' strategies and synthetic HIPVs in recruitment of beneficial arthropods and warding off pest attack.
Keywords: Chemical ecology; Semiochemicals; Herbivore-Induced Plant Volatiles; `Push-pull' strategy; Natural enemies; Conservation biological control

Benoit Gabrielle, Nathalie Gagnaire, Life-cycle assessment of straw use in bio-ethanol production: A case study based on biophysical modelling, Biomass and Bioenergy, Volume 32, Issue 5, May 2008, Pages 431-441, ISSN 0961-9534, DOI: 10.1016/j.biombioe.2007.10.017.
(http://www.sciencedirect.com/science/article/B6V22-4RD44BP-1/2/d4fbd20f8f5092ff059ef554b2afbc43)
Abstract:
Cereal straw, a by-product in the production of agricultural crops, is considered as a potentially large source of energy supply with an estimated value of 47x1018 J worldwide. However, there is some debate regarding the actual amounts of straw which could be removed from arable soils without jeopardizing their quality, as well as the potential trade-offs in the overall straw-to-energy chain compared to the use of fossil energy sources.
Here, we used a deterministic model of C and N dynamics in soil-crop systems to simulate the effect of straw removal under various sets of soil, climate and crop management conditions in northeastern France. Model results in terms of nitrate leaching, soil C variations, nitrous oxide and ammonia emissions were subsequently inputted into the life-cycle assessment (LCA) of a particular bio-energy chain in which straw was used to generate heat and power in a plant producing bio-ethanol from wheat grains.
Straw removal had little influence on simulated environmental emissions in the field, and straw incorporation in soil resulted in a sequestration of only 5-10% of its C in the long term (30 years). The LCA concluded to significant benefits of straw use for energy in terms of global warming and use of non-renewable energy. Only the eutrophication and atmospheric acidification impact categories were slightly unfavourable to straw use in some cases, with a difference of 8% at most relative to straw incorporation. These results based on a novel methodology thereby confirm the environmental benefits of substituting fossil energy with straw.
Keywords: C-N dynamics; Cereal straw; Modelling; Life-cycle assessment; Combined heat and power generation

Nader Katerji, Marcello Mastrorilli, Gianfranco Rana, Water use efficiency of crops cultivated in the Mediterranean region: Review and analysis, European Journal of Agronomy, Volume 28, Issue 4, May 2008, Pages 493-507, ISSN 1161-0301, DOI: 10.1016/j.eja.2007.12.003.
(http://www.sciencedirect.com/science/article/B6T67-4S02888-1/2/9bc7ef68a01e1cc8300c253a47e4f1ed)
Abstract:
Improvement of water use efficiency (WUE) of field crops in the Mediterranean region is an imperative imposed by the critical situation of water resources of the region, as well as by the demographical increment. This review reports the experimental data concerning WUE of 16 species cultivated in the region. The species include cereals, leguminous, horticultural and industrial crops. This review however underlines that WUE data of fruit trees are lacking, despite they represent one of the main productions of the Mediterranean agriculture.
In this region, the large range of WUE values observed, for the same species, can be ascribed mainly to: (i) fertilizers and water management (water regime, mineral supply and water quality); (ii) plant factors (species, variety and sensitivity of growth stage to the stress); and (iii) environmental factors (climate, atmospheric pollution, soil texture and climate change). The conclusion highlights the actual gap concerning WUE in the Mediterranean region. This gap will constitute a field of research designated to ameliorate WUE of agriculture in this region.

Keywords: Water use efficiency; Mediterranean region; Climate; Water management; Cereal; Leguminous; Horticultural species; Industrial crop; Water stress

L. Gabriela Abeledo, Roxana Savin, Gustavo A. Slafer, Wheat productivity in the Mediterranean Ebro Valley: Analyzing the gap between attainable and potential yield with a simulation model, European Journal of Agronomy, Volume 28, Issue 4, May 2008, Pages 541-550, ISSN 1161-0301, DOI: 10.1016/j.eja.2007.12.001.
(http://www.sciencedirect.com/science/article/B6T67-4RWBWRV-1/2/aac5cf70058c8a772abbc5ead56cbed4)
Abstract:
Water deficit is an important constraint for wheat yield generation under Mediterranean environments. However, nitrogen (N) availability could limit yield in a more important way than poor water conditions. The aim of the work was to analyze, using the Ceres-Wheat crop simulation model, to what degree N fertilization constitutes a tool for reducing the gap between attainable and potential yield. Firstly, the model was calibrated and validated under a wide range of N and water conditions for the region of the Ebro Valley (NE Spain). Anthesis and maturity date were adequately predicted by the model. Predictions of yield tended to be quite accurate in general, though under severe water deficits precision was lower. We then assessed the gap between attainable and potential yield considering different N availabilities at sowing taking into account a weather database of 17 years for the location of Agramunt (NE Spain), representative of cereal growing conditions of the Mediterranean Catalonia. Potential yield ranged between 3.5 and 8.1 Mg ha-1. Variations in potential yield were explained by the duration of the period from sowing to anthesis and by the level of incident radiation during the period immediately previous to anthesis. Average attainable yield was 1.8 Mg ha-1 for N availability of 50 kgN ha-1; but increased to 2.8 Mg ha-1 for higher N availabilities (100-250 kgN ha-1). In the 25% of the worst years there was no effect of N availability on attainable yield. Increasing N availability beyond 100 kgN ha-1 generated a gain in yield only in 6% of the years. Variations between years in attainable yields were mainly explained by rainfall during the period from sowing to anthesis, whereas differences in attainable yield between N treatments increased with increases in rainfall. The gap between potential yield and attainable yield was higher in years with higher potential yield. On the other hand, the higher the attainable yield, the lower the gap. Thus, the proportion of the yield gap ascribed to N availability varied depending on the conditions of the growing season. In the high-yielding potential years, the main restriction for growth was water shortage, and fertilizing only slightly reduced the gap. Conversely, in rainy years characterized by low potential yields and mild water stresses, N management may constitute a simple tool for effectively reducing yield gap under rain-fed conditions.
Keywords: Potential yield; Attainable yield; Nitrogen availability; Wheat; CERES model

Cristina Delgado-Andrade, Isabel Seiquer, M. Pilar Navarro, Francisco J. Morales, Estimation of hydroxymethylfurfural availability in breakfast cereals. Studies in Caco-2 cells, Food and Chemical Toxicology, Volume 46, Issue 5, May 2008, Pages 1600-1607, ISSN 0278-6915, DOI: 10.1016/j.fct.2008.01.002.
(http://www.sciencedirect.com/science/article/B6T6P-4RV1JWR-1/2/956a38561c97ad97d4716d351fc7324f)
Abstract:
The transport and availability of hydroxymethylfurfural (HMF), an intermediary product of the Maillard reaction, was investigated in the Caco-2 cell line after in vitro gastrointestinal digestion. The study was carried out at two levels; (a) an HMF-spiked culture medium, and (b) digested commercial breakfast cereals (BC). In both assays, the higher the amount of HMF offered to the cells, the higher the absolute value of transported HMF. However, HMF availability and transport are not directly proportional to the initial HMF content since HMF is partly retained in the non-

soluble fraction after digestion. In addition, HMF is degraded to some extent during the gastrointestinal digestion of both HMF-spiked cell medium and BC. Average HMF availability from three commercial breakfast cereals was 9.1% (4.98-12.99%). Variations in HMF availability may be related to the particular composition of each BC, where fibre could play an important role. On the other hand, possible metabolization into the cell should also be considered.
Keywords: Hydroxymethylfurfural; Breakfast cereals; In vitro digestion; Caco-2 cells; Availability

R.-L. Heinio, K.-H. Liukkonen, O. Myllymaki, J.-M. Pihlava, H. Adlercreutz, S.-M. Heinonen, K. Poutanen, Quantities of phenolic compounds and their impacts on the perceived flavour attributes of rye grain, Journal of Cereal Science, Volume 47, Issue 3, May 2008, Pages 566-575, ISSN 0733-5210, DOI: 10.1016/j.jcs.2007.06.018.
(http://www.sciencedirect.com/science/article/B6WHK-4P77836-2/2/db01d8b8d27466be0e3ab469c9cfe51d)
Abstract:
The use of whole grain rye products, beneficial to one's health, could be substantially extended if the typical intensively bitter flavour of rye could be modified without losing the characteristic rye-like flavour. The aim of the study was to evaluate the contribution of non-volatile phenolic compounds on the perceived flavour. Rye grain was milled into five milling fractions. The levels of phenolic compounds, i.e. the phenolic acids, alkylresorcinols and lignans, of the fractions were analysed and related statistically to sensory flavour profiles by partial least-squares (PLS) regression. The non-bound (free) phenolic acids are suggested to be most flavour-active. Cereal and intense flavour and aftertaste were related to vanillic and veratric acids, alkylresorcinol C23:0, and other lignans except for pinoresinol. The perceived bitterness of the bran fractions was suggested to result from pinoresinol and syringic acid. Sinapic and ferulic acids, alkylresorcinols, except for alkylresorcinol C23:0, and syringaresinol seemed to cause the germ-like flavour. Phenolic acids, alkylresorcinols and lignans distributed with a similar pattern in the rye grain as the flavour attributes: the phenolic compounds were clearly located in the outer bran fractions being intense in flavour, but not in the mild-tasting inner layers of the grain.
Keywords: Rye; Milling fractionation; Flavour; Phenolic compounds

Stephanie Hartmann, Peter Koehler, Fractionation of cereal flour by sedimentation in non-aqueous systems. I. Development of the method and chemical characterisation of the fractions, Journal of Cereal Science, Volume 47, Issue 3, May 2008, Pages 576-586, ISSN 0733-5210, DOI: 10.1016/j.jcs.2007.07.002.
(http://www.sciencedirect.com/science/article/B6WHK-4P77836-5/2/5d4f651c7ddd27d8a60246ba864f760d)
Abstract:
A method for the fractionation of wheat, rye, and barley flours without using aqueous solvents was developed. The separation of protein and starch was based on differences in their densities. Therefore, ball-milled flour was suspended in a mixture of inert solvents (toluene/tetrachoroethene) with a density of 1.47 g/cm3 and centrifuged. Owing to its higher density, the starch fraction was obtained as sediment whereas the protein fraction (PF) formed a layer on the surface of the solvent because of its lower density. The PF was enriched in a solvent mixture with a density of 1.355 g/cm3 yielding a middle fraction (sediment) and the enriched PF (upper layer). The latter was then defatted with toluene (0.87 g/cm) providing a lipid fraction in addition. The influence of ball milling under air or in the sedimentation solvent on the yield and the purity of the fractions was studied. Three varieties of wheat, and one rye and barley variety were fractionated by the optimised method and the obtained fractions were characterised by chemical methods e.g. gel permeation chromatography, SDS electrophoresis, and a combined extraction/HPLC method.
Keywords: Non-aqueous fractionation; Cereals; Flour; Protein

Thomas Terhoeven-Urselmans, Harald Schmidt, Rainer Georg Joergensen, Bernard Ludwig, Usefulness of near-infrared spectroscopy to determine biological and chemical soil properties: Importance of sample pre-treatment, Soil Biology and Biochemistry, Volume 40, Issue 5, May 2008, Pages 1178-1188, ISSN 0038-0717, DOI: 10.1016/j.soilbio.2007.12.011.
(http://www.sciencedirect.com/science/article/B6TC7-4RKMB55-4/2/84a2640dc965e170146859d8d25af50e)
Abstract:
Near-infrared reflectance spectroscopy (NIRS) is known for its inexpensiveness, rapidity and accuracy and may become a useful tool for the assessment of soil quality. Objectives were (i) to evaluate the ability of NIRS to predict several chemical and biological properties of organically managed arable soils as well as the properties of grain yield from winter cereals for a closed population and (ii) to test whether the use of field-moist and pre-treated (quick-freezing followed by freeze-drying and grinding) samples will generate similar results. One hundred and sixteen soil samples from nine organically managed farms from Germany sampled in 2005 and 2006 were used for this investigation. Spectra of the near-infrared region (including the visible range, 400-2500 nm) from field-moist (<2 mm) or pre-treated soil samples were recorded. A modified partial least-square regression method and cross-validation were used to develop an equation over the whole spectrum (first-third derivation). For the pre-treated soils, good predictions were obtained for pH, contents of organic C, total N, plant-available P (Olsen) and exchangeable K (calcium-acetate-lactate (CAL)), contents of microbial biomass C and N (Cmic and Nmic) and ergosterol, basal respiration, metabolic quotient, the ratio of organic C/total N, the grain yield of winter cereals and grain nitrogen uptake. The RSC (the ratio of standard deviation of laboratory results to standard error of cross-validation) was greater than 2.0, the correlation coefficients (r) of a linear regression (measured against predicted values) were greater than or equal to 0.9 and the regression coefficients (a) ranged from 0.9 to 1.1. Similar good predictions were obtained if field-moist samples were used, with the exception of P (Olsen), K (CAL), metabolic quotient, grain yield of winter cereals and grain nitrogen uptake (satisfactory predictions) and ergosterol content (unsatisfactory prediction). Good predictions of the contents of Mg (CaCl2) and microbial biomass P (Pmic) were achieved for field-moist but not for pre-treated samples. Despite sample preparation, only satisfactory predictions were obtained for the ratios of Cmic/Nmic and ergosterol/Cmic and grain nitrogen content (1.4[less-than-or-equals, slant]RSC[less-than-or-equals, slant]2.0, r[greater-or-equal, slanted]0.8 and 0.8[less-than-or-equals, slant]a[less-than-or-equals, slant]1.2). However, unsatisfactory predictions for field-moist and pre-treated samples were achieved for the content of P (CAL), the nitrogen mineralisation rate and the ratios of Cmic/Pmic and basal respiration/nitrogen mineralisation rate. Our results demonstrate that biological soil properties can be predicted with NIRS for closed populations in both sample states. The pre-treatment should be used if samples have to be stored prior to infrared measurements for periods longer than a month.
Keywords: Plant nutrition; Soil biology; Microbial biomass; Ergosterol; Yield prediction; NIRS

Lourdes Bosch, Amparo Alegri'a, Rosaura Farre, Gonzalo Clemente, Effect of storage conditions on furosine formation in milk-cereal based baby foods, Food Chemistry, Volume 107, Issue 4, 15 April 2008, Pages 1681-1686, ISSN 0308-8146, DOI: 10.1016/j.foodchem.2007.09.051.
(http://www.sciencedirect.com/science/article/B6T6R-4PRYG84-H/2/a7f11e92acc3231219561046e6b11e48)
Abstract:
The effect of storage during 9 months at 25, 30 and 37 [degree sign]C on furosine formation in three milk-cereal based baby foods was studied to evaluate development of the Maillard reaction. Furosine was measured by HPLC-UV. Immediately after the manufacturing process, furosine contents were 310-340 mg/100 g protein and at the 9th storage month were 426-603 mg/100 g protein. Storage time and temperature have a significant increase ($p < 0.05$) of furosine content

during storage. Furosine contents were higher in sample containing honey than in those without honey. Interactions ($p < 0.05$) between storage time and temperature or type of sample were found. A predictive model equation of the evolution of furosine during storage explaining 80% of the variability in furosine content was obtained. The blockage of lysine through storage calculated using the furosine and total lysine provided values ranged from 9.5% to 18.1% for analysed baby foods.
Keywords: Storage; Maillard reaction; Baby foods; Furosine; Lysine blockage

Hugo De Groote, Lucy Wangare, Fred Kanampiu, Martins Odendo, Alpha Diallo, Haron Karaya, Dennis Friesen, The potential of a herbicide resistant maize technology for Striga control in Africa, Agricultural Systems, Volume 97, Issues 1-2, April 2008, Pages 83-94, ISSN 0308-521X, DOI: 10.1016/j.agsy.2007.12.003.
(http://www.sciencedirect.com/science/article/B6T3W-4S02K36-1/2/7ab21ef84800ee00b8def194156c4288)
Abstract:
Striga is an obligate parasitic weed that attacks cereal crops in sub-Saharan Africa. In Western Kenya, it has been identified by farmers as their major pest problem in maize. A new technology, consisting of coating seed of imidazolinone resistant (IR) maize varieties with the imidazolinone herbicide, imazapyr, has proven to be very effective in controlling Striga on farmer fields. To bring this technology to the farmer, a sustainable delivery system needs to be developed, preferably with substantial participation of the private sector. To help extension agents and seed companies to develop appropriate strategies, the potential for this technology was analyzed by combining different data sources into a Geographic Information System (GIS). Superimposing secondary data, field surveys, agricultural statistics and farmer surveys made it possible to clearly identify the Striga-prone areas in western Kenya. Results found that Striga affected a maize area of 246,000 ha annually, with a population of 6.4 million people and maize production of 580,000 tons, or 81 kg/person. Population density in this area is high at 359 people/km2. A survey of 123 farmers revealed that 70% of them have Striga in their fields. A contingent valuation (CV) survey indicated that farmers would, on average, be willing to buy 3.67 kg of the IR-maize seed each at current seed prices, sufficient to sow 44% of their maize area. By extrapolation over the maize area in the zone, total potential demand for IR-maize seed is estimated at 2000-2700 tons annually. Similar calculations, but based on much less precise data and expert opinion rather than farmer surveys or trials, gives an estimate of the potential demand for IR-maize seed in Africa of 153,000 tons.
Keywords: Africa; Maize; Pest control; Striga; Herbicide resistant; Weeds (JEL Q12)

Marta Heroldova, Emil Tkadlec, Josef Bryja, Jan Zejda, Wheat or barley?: Feeding preferences affect distribution of three rodent species in agricultural landscape, Applied Animal Behaviour Science, Volume 110, Issues 3-4, April 2008, Pages 354-362, ISSN 0168-1591, DOI: 10.1016/j.applanim.2007.05.008.
(http://www.sciencedirect.com/science/article/B6T48-4NWNF5H-1/2/30c9dbdee6285520df477c88268b66a6)
Abstract:
Spatial distribution of voles and mice and their abundances in agricultural landscape are largely influenced by their food preferences and the distribution of preferred crops. Here we examined the correspondence between food preferences of dominant rodent species (two mice and one vole) for two cereals (wheat and barley) estimated in the lab and the long-term field abundances observed at the harvest time in southern Moravia, Czech Republic. In the first laboratory trial, harvested culms of wheat and barley were offered. The pygmy field mouse preferred (100%) the seed head of wheat, also the wood mouse (87%) and common vole (60%) showed low preference for wheat. In the second trial, we observed similar preferences in consuming the offered grains of both cereals, the wheat being preferred by the pygmy field mouse, and the wood mouse, while with the

common vole showing no preference. Laboratory analysis of the harvested grains indicated a lower fibre content in wheat compared with barley. In the field, rodent abundances in wheat were higher than those in barley, especially in mice. This suggests that food preferences in the laboratory correspond closely to field distribution of these rodents and their abundances. Therefore, studying diet preferences may be of essential in predicting small rodent abundances in changing agricultural landscape.
Keywords: Agro-ecosystem; Small rodent species; Diet preference; Habitat preference; Pests

Malene Soltoft, Lise N. Jorgensen, Bo Svensmark, Inge S. Fomsgaard, Benzoxazinoid concentrations show correlation with Fusarium Head Blight resistance in Danish wheat varieties, Biochemical Systematics and Ecology, Volume 36, Issue 4, April 2008, Pages 245-259, ISSN 0305-1978, DOI: 10.1016/j.bse.2007.10.008.
(http://www.sciencedirect.com/science/article/B6T4R-4RDBFBC-1/2/21df9a63458ac3f3f4c75f9acdc11ac8)
Abstract:
Fusarium Head Blight (FHB) is a destructive disease that affects the grain yield and quality of cereals. The relationship between the natural defense chemicals benzoxazinoids and the FHB resistance of field grown winter wheat varieties was investigated. FHB resistance was assessed by the inoculation of wheat ears with mixtures of Fusarium avenaceum, Fusarium culmorum, Fusarium graminearum, and Microdochium nivale.
The benzoxazinoids detected in the highest concentration were 2,4-dihydroxy-7-methoxy-(2H)-1,4-benzoxazin-3(4H)-one (3.7-9.4 [mu]mol/kg DW) and 2-hydroxy-7-methoxy-(2H)-1,4-benzoxazin-3(4H)-one (HMBOA, 2.0-11 [mu]mol/kg DW). The cultivars most susceptible to FHB were cvs. Hanseat, Asketis, and Ritmo, while cvs. Petrus, Terra, and Hattrick showed high resistance.
2-O-[beta]-d-Glucopyranosyloxy-4,7-dimethoxy-(2H)-1,4-benzoxazin-3(4H)-one (HDMBOA-glc) and 2-O-[beta]-d-glucopyranosyloxy-7-methoxy-(2H)-1,4-benzoxazin-3(4H)-one (HMBOA-glc) were detected. HMBOA-glc was found in higher concentrations than 2-O-[beta]-d-glucopyranosyloxy-2,4-dihydroxy-7-methoxy-(2H)-1,4-benzoxazin-3(4H)-one (DIMBOA-glc). Principal component analyses demonstrated correlation between the susceptibility to FHB and the concentrations of DIMBOA-glc, HMBOA-glc, HMBOA, 2-O-[beta]-d-glucopyranosyloxy-4-hydroxy-(2H)-1,4-benzoxazin-3(4H)-one (DIBOA-glc), 2-O-[beta]-d-glucopyranosyloxy-1,4-benzoxazin-3(4H)-one, and 2-O-[beta]-d-glucopyranosyloxy-4-dihydroxy-(2H)-7,8-dimethoxy-1,4-benzoxazin-3(4H)-one (DIM2BOA-glc).
Keywords: Benzoxazinoids; DIMBOA; Fusarium Head Blight; HMBOA; Susceptibility; Winter wheat

J.F. Shanahan, N.R. Kitchen, W.R. Raun, J.S. Schepers, Responsive in-season nitrogen management for cereals, Computers and Electronics in Agriculture, Volume 61, Issue 1, Emerging Technologies For Real-time and Integrated Agriculture Decisions, April 2008, Pages 51-62, ISSN 0168-1699, DOI: 10.1016/j.compag.2007.06.006.
(http://www.sciencedirect.com/science/article/B6T5M-4PJD9HB-2/2/a9f16652f5d3dce4313ad549ef8920f8)
Abstract:
Current nitrogen (N) management strategies for worldwide cereal production systems are characterized by low N use efficiency (NUE), environmental contamination, and considerable ongoing debate regarding what can be done to improve N fertilizer management. Development of innovative strategies that improve NUE and minimize off-field losses is crucial to sustaining cereal-based farming. In this paper, we review the major managerial causes for low NUE, including (1) poor synchrony between fertilizer N and crop demand, (2) uniform field applications to spatially variable landscapes that commonly vary in crop N need, and (3) failure to account for temporally variable influences on crop N needs. Poor synchronization is mainly due to large pre-plant applications of fertilizer N, resulting in high levels of inorganic soil N long before rapid crop uptake

occurs. Uniform applications within fields discount the fact that N supplies from the soil, crop N uptake, and crop response are spatially variable. Current N management decisions also overlook year-to-year weather variations and sometimes fail to account for soil N mineralized in warm, wet years, ignoring indigenous N supply. The key to optimizing tradeoffs amongst yield, profit, and environmental protection is to achieve synchrony between N supply and crop demand, while accounting for spatial and temporal variability in soil N. While some have advocated a soil-based management zones (MZ) approach as a means to direct variable N applications and improve NUE, this method disregards yearly variation in weather. Thus, it seems unlikely that the soil-based MZ concept alone will be adequate for variable application of crop N inputs. Alternatively, we propose utilizing emerging computer and electronic technologies that focus on the plant to assess N status and direct in-season spatially variable N applications. Several of these technologies are reviewed and discussed. One technology showing promise is ground-based active-light reflectance measurements converted to NDVI or other similar indices. Preliminary research shows this approach addresses the issue of spatial variability and is accomplished at a time within the growing season so that N inputs are synchronized to match crop N uptake. We suggest this approach may be improved by first delineating a field into MZ using soil or other field properties to modify the decision associated with ground-based reflectance sensing. While additional adaptive research is needed to refine these newer technologies and subsequent N management decisions, preliminary results are encouraging. We expect N use efficiency can be greatly enhanced using this plant-based responsive strategy for N management in cereals.
Keywords: Nutrient management; Remote sensing; Geospatial technology; Canopy sensors

Julie D Scholes, Malcolm C Press, Striga infestation of cereal crops - an unsolved problem in resource limited agriculture, Current Opinion in Plant Biology, Volume 11, Issue 2, Genome studies and Molecular Genetics, edited by Juliette de Meaux and Maarten Koornneef / Plant Biotechnology, edited by Andy Greenland and Jan Leach, April 2008, Pages 180-186, ISSN 1369-5266, DOI: 10.1016/j.pbi.2008.02.004.
(http://www.sciencedirect.com/science/article/B6VS4-4S1JK7D-1/2/23bda147aeb4c85d4f091a54c99b4828)
Abstract:
The parasitic weed Striga causes devastating losses in cereal yields in sub-Saharan Africa. The parasite lifecycle is intimately linked with its host via a complex interchange of signals. Understanding the molecular basis of these interactions and of host resistance to Striga is essential for the identification of genes for improving crop yield via biotechnological or marker assisted breeding strategies. Cloning and sequencing of ESTs from the `model' parasite Triphysaria versicolor is facilitating the identification of parasitism genes. The identification of resistance to Striga in sorghum and rice germplasm is allowing molecular dissection of these traits using genomic platforms and quantitative trait loci (QTL) analysis. QTL underlying different resistance phenotypes have been identified and the use of advanced backcross populations is allowing the exploitation of sources of resistance in wild relatives of cereals.

Karl-Heinz Dammer, Judith Wollny, Antje Giebel, Estimation of the Leaf Area Index in cereal crops for variable rate fungicide spraying, European Journal of Agronomy, Volume 28, Issue 3, April 2008, Pages 351-360, ISSN 1161-0301, DOI: 10.1016/j.eja.2007.11.001.
(http://www.sciencedirect.com/science/article/B6T67-4RFD6FM-1/2/3bddf7abe67f11dc961927509993d7db)
Abstract:
One method of optimising fungicide application in heterogeneous cereal fields is to apply the same concentration of active fungicidal substance per unit of crop canopy surface area. The crop canopy surface can be characterised by the Leaf Area Index (LAI). This index is used in precision farming for controlling the application rate in sensor-based fungicide spraying in cereal crops. For research

purposes the LAI is measured using optical hand-held instruments. This method is not applicable in agricultural practice where rapid information about the LAI of the whole field is needed just before spraying. The CROP-Meter is a real-time sensor for measuring crop biomass density within cereal fields.
The paper starts by analysing the correlation between the CROP-Meter records and LAI measurements obtained from hand-held optical instruments in farmers' cereal fields. The sensor signal (deflection angle) of the CROP-Meter showed good linear correlation with the reference LAI measurements (R2 values from 15 errors-in-variable regression analyses: 0.45-0.86).
As the CROP-Meter sensor signal is correlated linearly with the LAI, this mechanical sensor can be used for controlling a field sprayer for variable rate fungicide spraying. The paper goes onto present a calibration routine for variable rate fungicide application for use in conjunction with a CROP-Meter controlled field sprayer:
- The standard dosage of fungicide is prepared with water in the tank of the field sprayer.
- This standard dosage (upper application rate) is applied uniformly along a typical tramline of the field, which is representative of the variability in plant biomass density.
- The upper and lower deflection angle measured along this tramline are then recalled from the working display of the on-board terminal.
- On the calibration display, the upper application rate is assigned to the upper deflection angle and the lower application rate is assigned to the lower deflection angle on the calibration display of the on-board terminal. The proportion of the lower and upper application rates depends on the range of LAI found in the field.
- The application rate is adapted linearly according to the deflection angle of the CROP-Meter.
To define the routine at the on-board terminal the farmer has to decide on the minimum and maximum application rate. As the variability of the LAI occurring in heterogeneous fields is a criterion for choosing the minimum and maximum application rates, the third part of the paper discusses a simple deterministic model to determine the LAI in the field. This was based on the results from 46 errors-in-variable regression analyses of the functional relationship between the product of crop height (m) times number of tillers (m-2) and the measured reference values of LAI. Crop height and the number of tillers were used as the only parameters for this model. The product of the two has to be divided by 100 to obtain an estimate of the LAI. There was a good correlation between the LAI* estimated by the model and the LAI measured by the optical hand-held instruments (Pearson's correlation coefficients: 0.71, 0.91, 0.80, 0.64) in four analysed growth stages in winter wheat and winter barley (shooting, ear emergence, flowering, ripeness). The method presented enables the farmer to obtain information about the range of the LAI occurring within his heterogeneous cereal field very rapidly without using hand-held optical instruments.
Keywords: Cereal; Variable rate spraying; Fungicide; Sensor; Leaf Area Index

S. Delin, A. Nyberg, B. Linden, M. Ferm, G. Torstensson, C. Lerenius, I. Gruvaeus, Impact of crop protection on nitrogen utilisation and losses in winter wheat production, European Journal of Agronomy, Volume 28, Issue 3, April 2008, Pages 361-370, ISSN 1161-0301, DOI: 10.1016/j.eja.2007.11.002.
(http://www.sciencedirect.com/science/article/B6T67-4RCW5B9-1/2/c793e49b0a1e441796ee4ae8596d1aac)
Abstract:
A 3-year (2002-2004) field experiment investigated the effects of disease and insect attack on nitrogen dynamics and losses during cultivation of winter wheat. Three treatments providing different degrees of crop protection were studied on a silty clay soil in south-western Sweden, in three consecutive wheat crops that were continually inspected for pests and diseases. A field with a history of cereal-dominated crop sequences was chosen to increase the possibilities of disease incidence. Nitrogen leaching was measured directly in tile-drained field plots equipped with individual collectors for drainage water. Ammonia emissions from the wheat stands were

measured in one replicate plot during the first two growing seasons. Nitrogen accumulation and distribution in plants were investigated by sampling the crop at different stages of development and analysing different plant parts for total nitrogen content. Soil mineral nitrogen was determined within the 0-90 cm soil layer in early spring, at yellow ripeness and in November. Grain yield and grain nitrogen use efficiency were always significantly larger and mean residual soil mineral nitrogen levels (at maturity and in November) significantly lower in treatments with crop protection. At maturity, total N concentration in straw was significantly higher in the treatment without crop protection. Mean nitrogen leaching tended to be greater in the treatment without crop protection but the differences were not statistically significant. Ammonia emissions of wheat were very small (0.1-0.3 kg N ha-1) in all treatments and could thus be neglected. The better N use efficiency with crop protection was probably due to a combination of larger N amounts in above-ground plant parts and better N translocation to grain when diseases were reduced.
Keywords: Cereal; Disease; Nitrogen use efficiency; Nitrogen leaching; Ammonia emission; Fungicide; Pesticide

Thomas Nemecek, Julia-Sophie von Richthofen, Gaetan Dubois, Pierre Casta, Raphael Charles, Hubert Pahl, Environmental impacts of introducing grain legumes into European crop rotations, European Journal of Agronomy, Volume 28, Issue 3, April 2008, Pages 380-393, ISSN 1161-0301, DOI: 10.1016/j.eja.2007.11.004.
(http://www.sciencedirect.com/science/article/B6T67-4RWHXH4-2/2/56467cb467969263636069 01f645ece9)
Abstract:
Raw materials for animal feeding are highly deficient in Europe, which results in massive imports of soya beans from North and South America. These imports are connected with a number of environmental problems. Increasing the grain legume production in Europe could be a promising alternative. The impacts of introducing grain legumes into existing European crop rotations are investigated in this article. The environmental impacts are evaluated by using the SALCA (Swiss Agricultural Life Cycle Assessment) life cycle assessment method and the ecoinvent life cycle inventory database.
Four regions with potential for increasing their grain legume area were chosen for this study: Saxony-Anhalt (Germany), Barrois (France), Canton Vaud (Switzerland) and Castilla y Leon (Spain). In each of these regions, two crop rotations were defined: a typical cereal-based rotation without grain legumes and an alternative rotation including grain legumes. The production data were collected by the local project partners from statistics, surveys, literature, documents from extension services and using expert knowledge. The impacts of these two crop rotations were compared relative to three functional units representing different functions of agriculture: hectare per year as a measure of the land management function, [euro] gross margin 1 for the financial function and GJ gross energy of the harvested biomass for the productive function. The following environmental impacts were analysed: demand for non-renewable energy resources, global warming potential, ozone formation, eutrophication, acidification, terrestrial and aquatic ecotoxicity as well as human toxicity. For Canton Vaud, the impacts on biodiversity and soil quality were assessed in addition.
Analysed per unit of cultivated area, the introduction of grain legumes into intensive crop rotations with a high proportion of cereals and intensive N-fertilisation leads to a reduced energy use, global warming potential, ozone formation and acidification as well as eco- and human toxicity. The main reasons for this are a reduced application of N-fertilisers (no N to the grain legume and less N to the following crop), improved possibilities for using reduced tillage techniques and greater diversification of the crop rotation, which helps to reduce problems caused by weeds and pathogens (and therefore pesticide applications). The nitrate leaching potential tends to be higher in general, but can be reduced by including catch crops or early sowing of winter grain legumes, where possible. No differences were found for the impacts of crop management on soil quality and

biodiversity (studied in Canton Vaud only). In the low-input crop rotation in Spain, the introduction of peas had no favourable environmental effect, mainly because little or no N-fertiliser can be saved.
The analysis per [euro] gross margin 1 (financial function) leads to slightly more favourable results for the grain legume crop rotations compared to the analysis per ha and year. Due to the lower yields of grain legumes compared with cereals, the advantages of grain legumes are smaller when considered per GJ gross energy of the harvested products (productive function). However, the energy efficiency is higher in crop rotations with grain legumes.
On the whole, introducing grain legumes into European crop rotations offers interesting options for reducing environmental burdens, especially in a context of depleted fossil energy resources and climate change.
Keywords: Crop rotation; Environmental impact; Life cycle assessment; Grain legume

Jaclyn E. Robinson, Rakesh Singh, Sandra E. Kays, Evaluation of an automated hydrolysis and extraction method for quantification of total fat, lipid classes and trans fat in cereal products, Food Chemistry, Volume 107, Issue 3, 1 April 2008, Pages 1144-1150, ISSN 0308-8146, DOI: 10.1016/j.foodchem.2007.09.041.
(http://www.sciencedirect.com/science/article/B6T6R-4PRYG84-9/2/79344e3d3755237252c7946ec3f22c6f)
Abstract:
The utility of an automated acid hydrolysis-extraction (AHE) system was evaluated for extraction of fat for the quantification of total, saturated, polyunsaturated, monounsaturated, and trans fat in cereal products. Oil extracted by the AHE system was assessed for total fat gravimetrically and by capillary gas chromatography (GC) for total fat, lipid classes, and trans fat. All AHE system results were compared with parallel determinations using the standard AOAC Method 996.01 or a modified version for trans fatty acids. For gravimetric and gas chromatographic evaluations, the AHE system results were equivalent to those using the standard AOAC Method ([alpha] = 0.01). Thus, the AHE oil extraction system can be used for measurement of total, saturated, polyunsaturated, monounsaturated, and trans fat with sufficient accuracy for nutrition labeling purposes, while having the advantages of reduced use of solvent, operator exposure to solvent, operator time, and potential for operator error.
Keywords: Fat extraction; Acid hydrolysis; Total fat; Saturated fat; Polyunsaturated fat; Monounsaturated fat; Trans fat

Ian T. Johnson, Nigel J. Belshaw, Environment, diet and CpG island methylation: Epigenetic signals in gastrointestinal neoplasia, Food and Chemical Toxicology, Volume 46, Issue 4, Molecular and Physiological Effects of Bioactive Food Components, April 2008, Pages 1346-1359, ISSN 0278-6915, DOI: 10.1016/j.fct.2007.09.101.
(http://www.sciencedirect.com/science/article/B6T6P-4PRYG77-6/2/693051fbf9a11bd475b3fa4ce98a3b7d)
Abstract:
The epithelial surfaces of the mammalian alimentary tract are characterised by very high rates of cell proliferation and DNA synthesis, and in humans they are highly susceptible to cancer. The role of somatic mutations as drivers of carcinogenesis in the alimentary tract is well established, but the importance of gene silencing by epigenetic mechanisms is increasingly recognised. Methylation of CpG islands is an important component of the epigenetic code that regulates gene expression during development and normal cellular differentiation, and a number of genes are well known to become abnormally methylated during the development of tumours of the oesophagus, stomach and colorectum. Aberrant patterns of DNA methylation develop as a result of pathological processes such as chronic inflammation, and in response to various dietary factors, including imbalances in the supply of methyl donors, particularly folates, and exposure to DNA

methyltransferase inhibitors, which include polyphenols and possibly isothiocyanates from plant foods. However the importance of these environmental interactions in human health and disease remains to be established. Recent moves to modify the exposure of human populations to folate, by mandatory supplementation of cereal foods, emphasise the importance of understanding the susceptibility of the human epigenome to dietary and other environmental effects.
Keywords: Colorectal cancer; Nutrition; Folate; Selenium; Epigenome

Ameena Batada, Maia Dock Seitz, Margo G. Wootan, Mary Story, Nine out of 10 Food Advertisements Shown During Saturday Morning Children's Television Programming Are for Foods High in Fat, Sodium, or Added Sugars, or Low in Nutrients, Journal of the American Dietetic Association, Volume 108, Issue 4, April 2008, Pages 673-678, ISSN 0002-8223, DOI: 10.1016/j.jada.2008.01.015.
(http://www.sciencedirect.com/science/article/B758G-4S5496J-P/2/5cadb3b42bdfbeb31a37ccfb1e872cd2)
Abstract:
A 2005 review by the Institute of Medicine of the National Academies concluded that food marketing influences children's food preferences, consumption, and health. Given the powerful influence of marketing on children's diets, this cross-sectional study examined the types of foods, the nutritional quality of those foods, and the marketing techniques and messages used in food advertising during Saturday morning children's television programming. During 27.5 hours of programming in May 2005, 49% of advertisements shown were for food (281 food advertisements out of 572 total advertisements). The most commonly advertised food categories were ready-to-eat breakfast cereal and cereal bars (27% of all food advertisements), restaurants (19% of food advertisements), and snack foods (18% of food advertisements). Ninety-one percent of food advertisements were for foods or beverages high in fat, sodium, or added sugars or were low in nutrients. Cartoon characters were used in 74% of food advertisements, and toy or other giveaways were used in 26% of food advertisements. About half of food advertisements contained health/nutrition or physical activity messages and 86% of food advertisements contained emotional appeals. This study provides food and nutrition professionals with information about the amount and types of food children are encouraged to eat during Saturday morning television programming. The findings can help food and nutrition professionals counsel children about healthful eating and/or develop programs or policies to balance those advertisements with healthful eating messages.

Marlene B. Schwartz, Lenny R. Vartanian, Christopher M. Wharton, Kelly D. Brownell, Examining the Nutritional Quality of Breakfast Cereals Marketed to Children, Journal of the American Dietetic Association, Volume 108, Issue 4, April 2008, Pages 702-705, ISSN 0002-8223, DOI: 10.1016/j.jada.2008.01.003.
(http://www.sciencedirect.com/science/article/B758G-4S5496J-V/2/7f2284eaa958a008aff23d3d250f47fb)
Abstract:
There are both public health and food industry initiatives aimed at increasing breakfast consumption among children, particularly the consumption of ready-to-eat cereals. The purpose of this study was to determine whether there were identifiable differences in nutritional quality between cereals that are primarily marketed to children and cereals that are not marketed to children. Of the 161 cereals identified between January and February 2006, 46% were classified as being marketed to children (eg, packaging contained a licensed character or contained an activity directed at children). Multivariate analyses of variance were used to compare children's cereals and nonchildren's cereals with respect to their nutritional content, focusing on nutrients required to be reported on the Nutrition Facts panel (including energy). Compared to nonchildren's cereals, children's cereals were denser in energy, sugar, and sodium, but were less dense in fiber

and protein. The proportion of children's and nonchildren's cereals that did and did not meet national nutritional guidelines for foods served in schools were compared using [chi]2analysis. The majority of children's cereals (66%) failed to meet national nutrition standards, particularly with respect to sugar content. t tests were used to compare the nutritional quality of children's cereals with nutrient-content claims and health claims to those without such claims. Although the specific claims were generally justified by the nutritional content of the product, there were few differences with respect to the overall nutrition profile. Overall, there were important differences in nutritional quality between children's cereals and nonchildren's cereals. Dietary advice for children to increase consumption of ready-to-eat breakfast cereals should identify and recommend those cereals with the best nutrient profiles.

Lisa M. Alvy, Sandra L. Calvert, Food Marketing on Popular Children's Web Sites: A Content Analysis, Journal of the American Dietetic Association, Volume 108, Issue 4, April 2008, Pages 710-713, ISSN 0002-8223, DOI: 10.1016/j.jada.2008.01.006.
(http://www.sciencedirect.com/science/article/B758G-4S5496J-X/2/6515986582a3573792895451036a5371)
Abstract:
In 2006 the Institute of Medicine (IOM) concluded that food marketing was a contributor to childhood obesity in the United States. One recommendation of the IOM committee was for research on newer marketing venues, such as Internet Web sites. The purpose of this cross-sectional study was to answer the IOM's call by examining food marketing on popular children's Web sites. Ten Web sites were selected based on market research conducted by KidSay, which identified favorite sites of children aged 8 to 11 years during February 2005. Using a standardized coding form, these sites were examined page by page for the existence, type, and features of food marketing. Web sites were compared using [chi]2 analyses. Although food marketing was not pervasive on the majority of the sites, seven of the 10 Web sites contained food marketing. The products marketed were primarily candy, cereal, quick serve restaurants, and snacks. Candystand.com, a food product site, contained a significantly greater amount of food marketing than the other popular children's Web sites. Because the foods marketed to children are not consistent with a healthful diet, nutrition professionals should consider joining advocacy groups to pressure industry to reduce online food marketing directed at youth.

R.H. Razminowicz, M. Kreuzer, H. Leuenberger, M.R.L. Scheeder, Efficiency of extruded linseed for the finishing of grass-fed steers to counteract a decline of omega-3 fatty acids in the beef, Livestock Science, Volume 114, Issues 2-3, April 2008, Pages 150-163, ISSN 1871-1413, DOI: 10.1016/j.livsci.2007.04.019.
(http://www.sciencedirect.com/science/article/B7XNX-4NYJS87-1/2/2e336ab8277874a8cd2a57c2400c39ed)
Abstract:
Effects of different finishing regimes with and without conventional or linseed-supplemented concentrate on growth performance and carcass composition of grass-fed steers as well as meat quality and lipid composition of the beef were investigated. Limousin x Brown Swiss and Limousin x Holstein-Friesian crossbred steers were fed on a grass-based forage-only diet up to an average live weight of 470 kg and an age of 18 months. During the following finishing period, two groups received 3 kg/day of concentrate additional to fresh grass and hay. One concentrate was a conventional cereal-based type (CC) the other contained extruded linseed (LS). Steers of these two groups were fattened to 560 kg of live weight. Two other groups further on received only grass and hay and were slaughtered either at the same average weight (G1) or at the same age (G2) as CC steers. The concentrate supplementation in the finishing period did not significantly increase average daily gains of the steers. The killing-out percentage was improved by CC, which was reflected in heavier hot carcasses. No other carcass quality trait was significantly affected by the

different feeding regimes. The direct comparison of G2 with CC showed a significantly higher shear force and compression energy in m. longissimus dorsi (LD) of G2, suggesting a less tender LD, but not m. biceps femoris (BF), of the grass-fed steers. In the groups compared at the same slaughter weight, no significant differences were observed in meat colour and texture. Lower proportions of C18:3n-3 (omega-3) in total lipids and in phospholipids of LD and BF were found for CC steers compared to grass-fed steers. This effect was partly compensated for by the supplementation of linseed to the concentrate which also exerted a trend towards higher levels of conjugated linoleic acid. However, since the n-6/n-3 ratio in the beef of the CC steers was still favourably low, it remains a matter of economic calculations and marketing considerations to determine whether linseed supplementation might be a cost-efficient measure in pasture beef programs to produce meat with claimed dietetic advantages in terms of fatty acid composition.
Keywords: Forage-finishing; Beef quality; Growth rate; Omega-3 fatty acids; Conjugated linoleic acid

Koreen Ramessar, Maite Sabalza, Teresa Capell, Paul Christou, Maize plants: An ideal production platform for effective and safe molecular pharming, Plant Science, Volume 174, Issue 4, April 2008, Pages 409-419, ISSN 0168-9452, DOI: 10.1016/j.plantsci.2008.02.002.
(http://www.sciencedirect.com/science/article/B6TBH-4RTW3K8-3/2/32daad15ba185d51dd5be8fa876bf666)
Abstract:
Maize (Zea mays), the world's third most important cereal crop, was the first plant developed into a commercial platform for molecular pharming in the field. Although there are now many different plant-based platforms, including leafy crops, fruit and vegetable crops, other cereals, aquatic plants, algae and systems based on plant viruses and cultured plant cells, maize still demonstrates the unique combination of advantages that made it the first choice for many researchers. In this review, we look at the drivers for using maize as a platform for large-scale production of recombinant pharmaceutical proteins. As well as discussing the technical merits and limitations of the species, we explore the regulatory burden that plant-made pharmaceuticals carry, and use scientific data to expose the misconceptions surrounding the perceived `risks' of using maize as a pharmaceutical crop.
Keywords: Maize; Transgenic plants; Plant-made pharmaceutical; Biosafety; Risk assessment; Regulatory framework

Balesh Tulema, Jens B. Aune, Fred H. Johnsen, Bernard Vanlauwe, The prospects of reduced tillage in tef (Eragrostis tef Zucca) in Gare Arera, West Shawa Zone of Oromiya, Ethiopia, Soil and Tillage Research, Volume 99, Issue 1, April 2008, Pages 58-65, ISSN 0167-1987, DOI: 10.1016/j.still.2007.12.001.
(http://www.sciencedirect.com/science/article/B6TC6-4S02JRH-1/2/e852c95e4d26f1358543e25901b1241b)
Abstract:
Soils in Ethiopia are traditionally ploughed repeatedly with an oxen-drawn plough before sowing. The oxen ploughing system exposes the soil to erosion and is expensive for farmers without oxen. This study was undertaken to assess agronomic and economic impacts of alternative, reduced tillage methods. Field experiments were carried out on a Vertisol and a Nitisol for 2 years to study the effect of zero tillage, minimum tillage, conventional tillage, and broad bed furrows (BBF) on the yield of tef (Eragrostis tef Zucca). No significant differences in tef biomass and grain yields were observed between the treatments on both soils in the first year. In Nitisol in the second year, yield was lower in the zero tillage treatment as compared to the other treatments. No difference in yield was observed between single plough, conventional, and BBF. On Vertisol, the yields were higher in BBF as compared to the other treatments. The yields on Vertisol were 1368, 1520, 1560 and 1768 kg ha-1 for the zero tillage, minimum tillage, conventional tillage and BBF treatments

respectively. More than twice as much grass weed was observed on zero tillage treatment as compared to the BBF treatment on both soils. Zero tillage gave the lowest gross margin on both soils whereas BBF gave the highest gross margin. The gross margin on Nitisols for the zero tillage and BBF treatments were -108 and 1504 Birr/ha respectively and corresponding numbers for the Vertisol were 520 and 1924 Birr ha-1. On Vertisol there were no significant difference in gross margin between minimum tillage and conventional tillage. Minimum tillage is an interesting option on Vertisols, particularly for female-headed households as it reduces the tillage cost. It may also improve overall productivity of the farming system because it allows partial replacement of oxen with cows and reduces soil erosion.
Keywords: Cereals; Ethiopian highland; Minimum tillage; Oxen plough; Nitisols; Vertisols; Gross margin

Magdalena Opanowicz, Philippe Vain, John Draper, David Parker, John H. Doonan, Brachypodium distachyon: making hay with a wild grass, Trends in Plant Science, Volume 13, Issue 4, April 2008, Pages 172-177, ISSN 1360-1385, DOI: 10.1016/j.tplants.2008.01.007.
(http://www.sciencedirect.com/science/article/B6TD1-4S2VG4N-1/2/268a7ddc2a3eacbdff0e6aff1f2d000b)
Abstract:
Brachypodium distachyon is a wild grass with a short life cycle. Although it is related to small grain cereals such as wheat, its genome is only a fraction of the size. A draft genome sequence is currently available, and molecular and genetic tools have been developed for transformation, mutagenesis and gene mapping. Accessions collected from across its ancestral range show a surprising degree of phenotypic variation in many traits, including those implicated in domestication of the cereals. Thus, given its rapid cycling time and ease of cultivation, Brachypodium will be a useful model for investigating problems in grass biology.

Miren Castells, Sonia Marin, Vicente Sanchis, Antonio J. Ramos, Distribution of fumonisins and aflatoxins in corn fractions during industrial cornflake processing, International Journal of Food Microbiology, Volume 123, Issues 1-2, 31 March 2008, Pages 81-87, ISSN 0168-1605, DOI: 10.1016/j.ijfoodmicro.2007.12.001.
(http://www.sciencedirect.com/science/article/B6T7K-4RDR16S-1/2/2f737718a3a8f0f2152b7a862e8d8f01)
Abstract:
The aim of this study was to investigate the distribution of fumonisins (B1 B2, and B3) and total aflatoxins (B1, B2, G1, and G2) in various corn processed fractions. 92 batches of whole corn and derived dry-milled fractions (animal feed flour, flaking grits, corn flour and corn meal) and cooked and roasted cornflakes fractions were industrially obtained. Samples were analyzed for both groups of mycotoxins by enzyme-linked immunosorbent assay (ELISA). Dry milling of corn led to a heterogeneous distribution of the two groups of mycotoxins in the different parts of the grain, with increased levels in fractions processed from outer layers (animal feed flour and corn flour) and decreased levels in fractions processed from inner portions, such as corn meal and flaking grits. Levels of fumonisins in cornflakes were lower than 400 [mu]g/kg, the maximum tolerable limit set by the EU. By contrast, three samples of final product were found to exceed the aflatoxin maximum tolerable limit of 4 [mu]g/kg. Animal feed flour showed concentration factors of 317 and 288% for fumonisins and aflatoxins, respectively. Food traceability system was used by the industrial companies which processed corn into breakfast cereals. Nevertheless, even though the use of food traceability, which is defined as the ability to trace any food, feed, food-producing animal or substance that will be used for consumption through all stages of production, processing and distribution, only initial fumonisin contamination of whole corn and contamination of animal feed flour and corn flour were found to be correlated.
Keywords: Aflatoxins; Fumonisins; Corn; Cornflakes; Dry milling

A. Mekoya, S.J. Oosting, S. Fernandez-Rivera, A.J. Van der Zijpp, Multipurpose fodder trees in the Ethiopian highlands: Farmers' preference and relationship of indigenous knowledge of feed value with laboratory indicators, Agricultural Systems, Volume 96, Issues 1-3, March 2008, Pages 184-194, ISSN 0308-521X, DOI: 10.1016/j.agsy.2007.08.001.
(http://www.sciencedirect.com/science/article/B6T3W-4PP1YX2-1/2/9f769a2b43e0aea001e6e3f636fd34c8)
Abstract:
In the tropics, numerous organizations have promoted multipurpose fodder trees (MPFT) with an emphasis on exotic species. These species have generally been selected and recommended by the research system through the conventional nutritional and agronomic experimentation for use as animal feed and soil conservation. In Ethiopia, the introduction of exotic MPFT started in the 1970s. However, despite its apparent benefits, the adoption of exotic MPFT by smallholder farmers has been slow and in some cases farmers ceased using exotic MPFT in their farming systems. The objectives of the present study were to assess farmers' preference criteria, compare their preference between exotic and local MPFT, and evaluate the relationship of farmers' knowledge of feed value assessment with laboratory indicators. Focus group discussions and preference ranking and scoring by a total of 40 farmers were conducted in two districts representing two production systems (cereal and coffee-based livestock production systems) in the Ethiopian highlands. The comparison between exotic and local MPFT for their benefits and desired tree characteristics showed that farmers preferred local MPFT to exotics for biomass production, multi-functionality, life span, and compatibility to the cropping system. In terms of feed value, ease of propagation, and growth potential local MPFT were ranked lower than or comparable to exotics. There was also a strong correlation between farmers' feed value score and laboratory results. Farmers were able to discriminate effectively MPFT species that had high and low protein and fibre content using their indigenous feed value indicator system for all pairwise comparisons. We concluded from this study that farmers' preference criteria encompass multiple objectives beyond feed value and soil rehabilitation. The different merits that farmers associate with exotic and local MPFT could provide the opportunity to use both MPFT types and to improve farm bio-diversity. Hence, incorporating locally available MPFT, farmers' indigenous knowledge and preference criteria at the research inception process is vital to maximize the likelihood of farmers' adopting and maintaining these technologies.
Keywords: Farm households; Multipurpose fodder trees; Highlands; Indigenous knowledge; Preference ranking; Nutrient composition

Ludwika Martyniak, Response of spring cereals to a deficit of atmospheric precipitation in the particular stages of plant growth and development, Agricultural Water Management, Volume 95, Issue 3, March 2008, Pages 171-178, ISSN 0378-3774, DOI: 10.1016/j.agwat.2007.10.014.
(http://www.sciencedirect.com/science/article/B6T3X-4RV2DC6-2/2/9a1ea0ae858d8692e0c72b789c25acb0)
Abstract:
In this study, the results of 330 field experiments of the Research Centre for Testing Cultivars (COBORU) conducted on spring cereals during the years 1976-2000 in the central part of Poland have been utilized. The aim of this work was to determine empirical indices of plant sensitivity to precipitation deficit requirements in relation to water requirements at basic developmental stages of spring cereals.
The sensitivity of the plants to water deficit in three species of spring cereals, i.e. barley, wheat and triticale were determined, with the analysis of the relationship between the deficit of precipitation in relation to the water requirements during vegetative growth and the grain yield, employing the Pearson correlation coefficient. The statistically significant correlations were given in the form of regression equations for different stages of plant growth and development.

Keywords: Spring cereals; Evapotranspiration; Precipitation; Growth stages

G. Izzi, H.J. Farahani, A. Bruggeman, T.Y. Oweis, In-season wheat root growth and soil water extraction in the Mediterranean environment of northern Syria, Agricultural Water Management, Volume 95, Issue 3, March 2008, Pages 259-270, ISSN 0378-3774, DOI: 10.1016/j.agwat.2007.10.008.
(http://www.sciencedirect.com/science/article/B6T3X-4R71DPS-3/2/1f5d5c51a48964173757b2ae71ef8c98)
Abstract:
Wheat is the most important cereal crop in the semi-arid eastern Mediterranean region that includes northern Syria. Knowledge of wheat root depth and the vertical distribution during the winter growing season is needed for sound scheduling of irrigation and efficient use of water. This article reports evaluation of root development for three winter-grown bread (Triticum aestivum L.) and durum (Triticum turgidum L.) wheat under four soil water regimes (rainfed and full irrigation with two intermediate levels of 33 and 66% of full irrigation). Roots were sampled by soil coring to a depth of 0.75 m at four occasions during 2005-2006 growing season. Two distinct phases of root development were identified, a rapid downward penetration from emergence to end tillering phase, followed by a substantial root mass growth along the profile from tillering to mid-stem-elongation phase. Roots were detected as deep as 0.75 m during the initial rapid penetration, yet only 29% of the total seasonal root mass was developed. This downward penetration rate averaged 7 mm d-1 and produced 10.8 kg ha-1 d-1 of root dry-biomass. The bulging of root mass from tillering to mid-stem-elongation coincided with vigorous shoot growth, doubling root dry-biomass at a rate of 52 kg ha-1 d-1, compared to the seasonal root growth rate of 18.3 kg ha-1 d-1. A second-degree equation described the total root dry-biomass as a function of days after emergence (r2 = 0.85), whereas a simpler equation predicted it as a function of cumulative growing degree days (r2 = 0.85). The final grain yield was a strong function of irrigation regimes, varying from 3.0 to 6.5 t ha-1, but showed no correlation with root biomass which remained similar as soil water regimes changed. This observation must be viewed with care as it lacks statistical evidence. Results showed 90% of root mass at first irrigation (15 April) confined in the top 0.60-0.75 m soil in bread wheat. Presence of shallow restricting soil layers limited root depth of durum wheat to 0.45 m, yet total seasonal root mass and grain yield were comparable with non-restricted bread wheat. Most root growth occurred during the cool rainy season and prior to the late irrigation season. The root sampling is short of rigorous, but results complement the limited field data in literature collectively suggesting that irrigation following the rainy season may best be scheduled assuming a well developed root zone as deep as the effective soil depth within the top meter of soil.
Keywords: Rooting depth; Root distribution; Root zone; Root extraction; Wheat; Irrigation

Albert Romero, Lourdes Chamorro, Francesc Xavier Sans, Weed diversity in crop edges and inner fields of organic and conventional dryland winter cereal crops in NE Spain, Agriculture, Ecosystems & Environment, Volume 124, Issues 1-2, Special Section: Problems and Prospects of Grassland Agroecosystems in Western China, March 2008, Pages 97-104, ISSN 0167-8809, DOI: 10.1016/j.agee.2007.08.002.
(http://www.sciencedirect.com/science/article/B6T3Y-4PPWM5D-1/2/a664de4466f23704e3098be67f6204bd)
Abstract:
A comparative survey of weed vegetation in organic and conventional dryland winter cereal fields was performed in central Catalonia (NE Spain) in order to assess the effects of agricultural intensification on the diversity, structure and composition of weed communities. A total of 36 cereal fields were surveyed in nine agricultural sites, where a pair of one long-established organic and one conventional farms were selected. Weed surveys were carried out before harvest in 2003 and 2004, taking into account the spatial pattern. Organic practices produced an increase in weed

cover, species richness and Hill's first order diversity (but not in equitability), as well as a shift in weed vegetation composition, which favoured potentially rare arable, broad-leaved, insect-pollinated and legume weeds. Weed diversity was concentrated in the crop edges, especially in the weed communities of conventional cereal fields, which were found to be more spatially heterogeneous than the organic ones.
Keywords: Weed diversity; Organic farming; Crop management; Crop edges; Dryland winter cereals

N.J. Walker, R.E. Schulze, Climate change impacts on agro-ecosystem sustainability across three climate regions in the maize belt of South Africa, Agriculture, Ecosystems & Environment, Volume 124, Issues 1-2, Special Section: Problems and Prospects of Grassland Agroecosystems in Western China, March 2008, Pages 114-124, ISSN 0167-8809, DOI: 10.1016/j.agee.2007.09.001.
(http://www.sciencedirect.com/science/article/B6T3Y-4PYYFX2-1/2/3ddd33baebee94506de2d08492df5ad7)
Abstract:
The Highveld region in South Africa is an important area for its food production for the nation, as 70% of country's cereal crops and 90% of the commercially grown maize is cultivated there. The sustainability of these agro-ecosystems is, therefore, of vital importance for the nation's food security. The western part of the Highveld is characterised by relatively low mean annual precipitation (MAP) and highly variable yields, and while rainfall increases towards the east, inter-annual yield variability remains high. Variability of yields is already a concern for agro-ecosystems and it is hypothesised that it could be exacerbated by future climate changes.
A sustainability framework was used to assess the sustainability agro-ecosystems under plausible future climate scenarios. Three Quaternary Catchments were assessed ranging from relatively dry (MAP 432 mm) to relatively moist (MAP 903 mm). A sensitivity analysis of plausible scenarios was performed with incremental increases in temperature by 1, 2 or 3 [degree sign]C, increases/decreases of rainfall by 10% and a doubling of pre-industrial atmospheric CO2 concentrations to 555 ppmv.
From the present and nine plausible future climate scenarios which were modelled using CERES-Maize over a 44-year period, it is shown that climatic changes could have major negative effects on the already drier western, and therefore more vulnerable, areas of the South African Highveld. An increase in temperature increases the variability of yields in the relatively moist Piet Retief area (MAP 903 mm), while at the more sub-humid Bothaville, with a MAP of only 552 mm, the inter-annual variability remains the same but mean yield over 44 seasons is reduced by 30%. A simulated increase in temperature coupled with a doubling of CO2 increases the rate of soil organic nitrogen depletion from the agro-ecosystem. Therefore, long-term perspectives in regard to human well-being and ecological integrity need to be applied to policies and actions for sustainability of both commercial and smallholder agro-ecosystems, particularly, in the western Highveld.
Keywords: Agro-ecosystem; Climate change; Sustainability; Food security; South Africa

A. Wilfart, Y. Jaguelin-Peyraud, H. Simmins, J. Noblet, J. van Milgen, L. Montagne, Kinetics of enzymatic digestion of feeds as estimated by a stepwise in vitro method, Animal Feed Science and Technology, Volume 141, Issues 1-2, 1 March 2008, Pages 171-183, ISSN 0377-8401, DOI: 10.1016/j.anifeedsci.2007.05.021.
(http://www.sciencedirect.com/science/article/B6T42-4NYBMD9-3/2/ae11b65519a0d428513bc1236806c32a)
Abstract:
Nutritional feed values are currently based on aggregate criteria such as the ileal or faecal digestibility. Digestibility is the result of several processes including hydrolysis, absorption, secretion and passage. In order to develop mechanistic models of digestion to be used for feed

evaluation, these processes have to be quantified. The aim of the current study was to determine the enzymatic hydrolysis (or: in vitro digestion) kinetics of main constituents (organic matter, nitrogen and starch) in wheat, barley, wheat bran and soybean meal, using a three-step, enzymatic in vitro method that mimics digestion in the stomach, small and large intestine of pigs. The in vitro results were compared with in vivo results. Hydrolysis kinetics (i.e., solubilisation of feed constituents) was modelled using an exponential segmented model estimating the extent and rate of digestion for each enzymatic digestion step. In vitro digestion of organic matter of soybean meal occurred mainly through the action of pepsin (0.67 versus <0.30 for other feeds, $P<0.05$), which was caused by the enzymatic digestion of protein at this site. Organic matter of cereals was mainly hydrolysed by enzymes mimicking digestion in the small intestine, and was mainly caused by starch digestion. Fractional in vitro digestion rates of organic matter were higher in the stomach than in the small intestine for cereals (0.20-0.34 min-1 versus 0.02-0.15 min-1, $P<0.05$). The potential in vitro digestibility of organic matter was nearly 0.88 for wheat and soybean meal, 0.79 for barley and 0.61 for wheat bran, which correspond to typical in vivo digestibility values. The in vitro digestibility corresponded reasonably well to in vivo results for enzyme systems mimicking ileal and total tract digestion. The results of this study indicate that it is possible to quantify dynamic aspects of digestion of feedstuffs fed to non-ruminant animals.
Keywords: Digestion; Feed; In vitro method; Pig

A. Hoyland, C. Lawton, L. Dye, Influence of breakfast on cognitive performance, appetite and mood in healthy young adults, Appetite, Volume 50, Issues 2-3, March-May 2008, Page 560, ISSN 0195-6663, DOI: 10.1016/j.appet.2007.09.036.
(http://www.sciencedirect.com/science/article/B6WB2-4RW4RRV-P/2/7b5fb0f7c5ea9975f00479e17d7afa70)
Abstract:
The consumption of glucose or a carbohydrate-rich food has been associated with the facilitation of verbal short-term, spatial and long-term memory performance. The present study evaluated the effects of two different equi-caloric (300 kcal) breakfasts, and the omission of breakfast, on cognitive performance, mood and appetite across the morning. Participants (N=32) were non-smoking, unrestrained eaters between 18 and 22 years with normal body mass index (mean=22.2 kg/m2). Participants attended three test mornings with a week between each session. Memory, attention and reaction time was assessed before breakfast, shortly after breakfast and later in the morning. Subjective ratings of appetite and mood and measurements of blood glucose levels were taken periodically throughout the morning. The non-cereal breakfast produced a smaller increase in blood glucose which was sustained for longer compared to the cereal breakfast. The consumption of breakfast produced attenuation in the decline of cognitive performance, satiety and mood observed in the breakfast omission condition. In addition, short-term and delayed verbal memory was significantly enhanced following the non-cereal breakfast relative to the cereal breakfast. The non-cereal breakfast also heightened subjective ratings of mood in comparison to the cereal breakfast.

E. Viola, F. Zimbardi, M. Cardinale, G. Cardinale, G. Braccio, E. Gambacorta, Processing cereal straws by steam explosion in a pilot plant to enhance digestibility in ruminants, Bioresource Technology, Volume 99, Issue 4, March 2008, Pages 681-689, ISSN 0960-8524, DOI: 10.1016/j.biortech.2007.02.001.
(http://www.sciencedirect.com/science/article/B6V24-4NBR8KT-3/2/031bdeb8be0f566744356eb8328fdf09)
Abstract:
Wheat, barley and oat straws were treated by steam explosion (SE) and then washed with 50 g/l NaOH solution. The SE treatment was optimized at batch scale on the basis of carbohydrate recovery. Stocks of fodder (300 kg) were produced at 198 [degree sign]C for 2.5 min by a

continuous reactor and used for in vivo digestibility tests carried out on sheep. The flow-sheet and the mass balances were obtained for the entire process. For the three straws, the water consumption has been 7.3 kg/kg of straw. To delignify and improve the digestibility of the straws, 20 g of NaOH/kg straw was used. The yield of fodder, lignin and hemicellulose is dependant on the nature of the starting straw. Delignified fodder (insoluble fraction) can be produced with a yield of 0.64, 0.59, 0.55, respectively, from wheat, barley and oat straw. SE improved the digestibility of the straw by 25%; alkaline washing further increased it by 9%. Balanced rations containing, on a DM basis, 1/4 of treated straw, had digestibility coefficients similar to those of commercial rations based on alfalfa.
Keywords: Straw; Steam explosion; Digestibility; Fodder

R. Choudhary, J. Paliwal, D.S. Jayas, Classification of cereal grains using wavelet, morphological, colour, and textural features of non-touching kernel images, Biosystems Engineering, Volume 99, Issue 3, March 2008, Pages 330-337, ISSN 1537-5110, DOI: 10.1016/j.biosystemseng.2007.11.013.
(http://www.sciencedirect.com/science/article/B6WXV-4RN48FD-3/2/36549a2dd00a9be97a63a8e62b7e6c0d)
Abstract:
Images of non-touching kernels of Canada Western Red Spring (CWRS) wheat, Canada Western Amber Durum (CWAD) wheat, barley, oats, and rye were acquired using an area scan camera. Morphological, colour, textural, and wavelet features were extracted from colour images of cereal grains for classification. A total of 51 morphological features, 93 colour features, 56 textural features, and 135 wavelet features were extracted from each kernel. Linear and quadratic statistical classifiers were used for classification using individual types of features and their combinations to find the best feature set and classification method for improved classification of cereal grains.
Combining all morphological, colour, textural and wavelet features gave the best classification using the linear discriminant classifier with a classification accuracy of 99.4% for CWRS wheat, followed by 99.3%, 98.6%, 98.5%, and 89.4% for rye, barley, oats, and CWAD wheat, respectively.

Alberto Tellaeche, Xavier P. BurgosArtizzu, Gonzalo Pajares, Angela Ribeiro, Cesar Fernandez-Quintanilla, A new vision-based approach to differential spraying in precision agriculture, Computers and Electronics in Agriculture, Volume 60, Issue 2, March 2008, Pages 144-155, ISSN 0168-1699, DOI: 10.1016/j.compag.2007.07.008.
(http://www.sciencedirect.com/science/article/B6T5M-4PKP47N-1/2/4a604553e8cb930d6f31aaa56d3e8448)
Abstract:
One of the objectives of precision agriculture is to minimize the volume of herbicides by using site-specific weed management systems. To reach this goal, two major factors need to be considered: (1) the similarity of spectral signatures, shapes, and textures between weeds and crops and (2) irregular distribution of weeds within the crop. This paper outlines an automatic computer vision method for detecting Avena sterilis, a noxious weed growing in cereal crops, and differential spraying to control the weed. The proposed method determines the quantity and distribution of weeds in the crop fields and applies a decision-making strategy for selective spraying, which forms the main focus of the paper. The method consists of two stages: image segmentation and decision-making. The image segmentation process extracts cells from the image as the low-level units. The quantity and distribution of weeds in the cell are mapped as area and structural based attributes, respectively. From these attributes, a multicriteria decision-making approach under a fuzzy context allows us to decide whether any given cell needs to be sprayed. The method was compared with other existing strategies.

Keywords: Precision agriculture; Machine vision; Weed detection; Image segmentation; Multicriteria decision-making

Tahsein Amein, Zahra Omer, Chris Welch, Application and evaluation of Pseudomonas strains for biocontrol of wheat seedling blight, Crop Protection, Volume 27, Issues 3-5, March-May 2008, Pages 532-536, ISSN 0261-2194, DOI: 10.1016/j.cropro.2007.08.007.
(http://www.sciencedirect.com/science/article/B6T5T-4PRRH4C-1/2/18eb5d9693cf547fefd6a40d631a1eed)
Abstract:
Microdochium nivale, the causal agent of snow mould, is a serious pathogen of many important cereal crops. This pathogen, like many related Fusarium species, causes seedling blight, foot rot and head blight diseases of cereals. Four bacterial strains showing good effect in increasing seedling emergence and in reducing disease severity in greenhouse screenings were tested in field experiments. One Pseudomonas fluorescens strain significantly improved plant establishment and harvest yield in infested winter wheat. Plant numbers were increased by up to 48% and yield by 26.5% in different field trials. Significant increases in head numbers were also observed. There was consistent and good plant protection for long periods of the growing seasons.
Keywords: Biological control; Microdochium nivale; Pseudomonas fluorescens; Seedborne pathogens; Seedling blight

Ajay Mahal, Anup K. Karan, Adequacy of dietary intakes and poverty in India: Trends in the 1990s, Economics & Human Biology, Volume 6, Issue 1, March 2008, Pages 57-74, ISSN 1570-677X, DOI: 10.1016/j.ehb.2007.10.001.
(http://www.sciencedirect.com/science/article/B73DX-4PW05CH-1/2/a927c42570d3c0a85b7893fc90809b9d)
Abstract:
Linear programming methods, indicators of nutritional adequacy from the Indian Council of Medical Research and household expenditure survey data from the National Sample Survey Organization were used to construct poverty lines for India. Poverty ratios were calculated for 1993-1994 and 1999-2000 on the basis of nutritional adequacy poverty lines and compared to official estimates of poverty based on energy requirements.
Nutritional adequacy poverty lines are higher than official poverty lines, particularly in rural areas. The application of nutritional adequacy poverty lines points to greater rural-urban poverty differences than in official estimates. Declines in rural poverty during the 1990s were also slower under the nutritional adequacy definition, especially in south India. There is a greater degree of rural-urban and regional bias in nutritional adequacy poverty reduction than suggested by official data.
Inter-state variations in changes in nutritional poverty and official poverty in the 1990s are largely explained by differences in assumptions on overall price movements. However, relative price movements in food items also played a role, particularly the slow increase in prices of cereals and edible oils in comparison to the prices of pulses, and in some southern states, compared to milk and vegetable prices as well.
Keywords: Poverty; Dietary intakes; Linear programming; Recommended dietary allowances (RDA); Nutritional adequacy; Poverty; India

C. Crosatti, D. Pagani, L. Cattivelli, A.M. Stanca, F. Rizza, Effects of growth stage and hardening conditions on the association between frost resistance and the expression of the cold-induced protein COR14b in barley, Environmental and Experimental Botany, Volume 62, Issue 2, March 2008, Pages 93-100, ISSN 0098-8472, DOI: 10.1016/j.envexpbot.2007.07.008.
(http://www.sciencedirect.com/science/article/B6T66-4PB6VXH-3/2/9724a70bfa16f1eec3fdb9bbe580b76f)

Abstract:
Sowing date, being determinant for growth stage, may play a decisive role in optimising freezing resistance of winter annual plants. In cereal species, in spite of the abundant literature analysing the factors responsible for the acquisition of frost resistance through the cold hardening process, the involvement of the growth stage per se, has been seldom considered, especially at the earlier vegetative phases. In this work the contribution of growth stage in determining resistance to freezing temperature has been analysed in field and growth chamber experiments using winter and spring barley cultivars exposed to different hardening conditions. Field damage was assessed twice during winter on plants sown at three different dates. In the growth chamber experiments several acclimation treatments at 11/7 and/or 3/1 [degree sign]C (day/night) were simulated. In both field and laboratory experiments the development of cold acclimation was monitored by means of a COR14b specific antibody, since in previous studies the expression of COR14b was found genetically linked to frost resistance. The lowest resistance, found in the youngest plants and in spring cultivars, however, was not always associated with the lowest level of COR14b accumulation. COR14b accumulation correlated with frost resistance at the earlier field sampling date and in plants grown at 11/7 [degree sign]C. In a following phase of the hardening process (second sampling in field and 4 weeks at 3/1 [degree sign]C in growth chamber) the accumulation of COR14b was independent of plant stage and genotype, showing no association with freezing resistance. Results suggest that growth stage is crucial for the achievement of maximal resistance in barley, but not for COR14b expression.
Keywords: Cold acclimation; Barley; COR14b; Phenological development

C. Juan, J.C. Molto, C.M. Lino, J. Manes, Determination of ochratoxin A in organic and non-organic cereals and cereal products from Spain and Portugal, Food Chemistry, Volume 107, Issue 1, 1 March 2008, Pages 525-530, ISSN 0308-8146, DOI: 10.1016/j.foodchem.2007.08.019.
(http://www.sciencedirect.com/science/article/B6T6R-4PDSBTJ-2/2/87ab83727bf2c55b3f534c17a48322f7)
Abstract:
The objective of this work was to know the occurrence of OTA in organic and non-organic cereals and cereal products from Spain and Portugal. A method based on extraction with matrix solid phase dispersion (MSPD) using octylsilica (C8) followed by liquid chromatography coupled with fluorescence detection (LC-FD) was used to determine OTA from the selected samples. Recoveries of OTA from the studied samples spiked at 10 ng/g level ranged from 78% to 89% with a standard deviation of 3.66. The limits of detection and quantification of this method were 0.05 and 0.19 ng/g, respectively. Furthermore, LC-FD after OTA methylation was used to confirm the identity of OTA in all positive samples. This procedure was applied to 83 organic and non-organic samples including rice, wheat, barley, rye, oats and maize from Spain and Portugal. OTA was detected in 22% of the samples, with concentrations ranging from 0.20 to 27.10 ng/g. From the total OTA contaminated samples (n = 18), 72% were organic cereal and 28% were non-organic cereal samples, with mean concentrations of 1.64 and 0.05 ng/g, respectively. The 66% and 34% of contaminated samples were from Spain and Portugal, respectively, with mean concentrations of 0.93 and 0.64 ng/g for each country. Six contaminated samples exceeded the maximum limits (ML) for OTA fixed by European Commission Regulation (5 [mu]g/kg), among them three were from Spain and three from Portugal.
Keywords: Cereal; Organic; Non-organic; Ochratoxin A; Portugal; Spain

Achim Claus, Reinhold Carle, Andreas Schieber, Acrylamide in cereal products: A review, Journal of Cereal Science, Volume 47, Issue 2, March 2008, Pages 118-133, ISSN 0733-5210, DOI: 10.1016/j.jcs.2007.06.016.
(http://www.sciencedirect.com/science/article/B6WHK-4P59X6X-2/2/bccbf283a8ab129e2dbcea0cbc7d6c99)

Abstract:
The review summarises the results of almost 5 years of academic and industrial research on acrylamide in cereal products. Significant progress in this field has been made during that time, as reflected by the numerous publications on this subject. In addition to studies of their formation, mechanisms and toxicological studies, ways to minimise acrylamide in heat-treated starch-rich foods have been the main focus. Therefore, this review will first give a brief overview of acrylamide formation and toxicology, including its mitigation in potato products, with further focus being on cereal products. In the latter commodities, acrylamide can be limited either by selecting suitable raw materials, e.g. flours produced from varieties low in asparagine and of a low extraction rate, respectively, or by optimisation of the production technology. The latter strategy not only comprises technological measures such as temperature control and selection of the oven type, but also product formulation and the use of low molecular additives.
Keywords: Acrylamide; Bakery products; Cereal; Technology; Formulation; Additives

Qian Zhang, Yanmin Dong, Xueli An, Aili Wang, Yanzhen Zhang, Xiaohui Li, Liyan Gao, Xianchun Xia, Zhonghu He, Yueming Yan, Characterization of HMW glutenin subunits in common wheat and related species by matrix-assisted laser desorption/ionization time-of-flight mass spectrometry (MALDI-TOF-MS), Journal of Cereal Science, Volume 47, Issue 2, March 2008, Pages 252-261, ISSN 0733-5210, DOI: 10.1016/j.jcs.2007.04.013.
(http://www.sciencedirect.com/science/article/B6WHK-4NS2GGG-2/2/39267dd82e9f63ae6ff0629aedae4988)
Abstract:
The sample preparation method of high molecular weight glutenin subunits (HMW-GS) for matrix-assisted laser desorption/ionization time-of-flight mass spectrometry (MALDI-TOF-MS) analysis, without a separation step, by high-performance liquid chromatography (HPLC) was established in this study. Three major factors influencing mass spectra--the ratio of components of the solvent, the resolving time, and the sample volume--were optimized using HMW-GS mixtures extracted from Chinese cultivar Jing 411. The results showed that the optimized method for sample preparation was to resolve HMW-GS from 20 mg in an hour with 50 [mu]l solvent of 0.4% TFA, 30.0% ACN and 69.6% H2O. The stable mass spectra and accurate molecular weights of 16 major HMW glutenin subunits from common wheat and related species were obtained using the optimized MALDI-TOF-MS method. Seven subunits, where each was from 2-5 cultivars, showed very similar molecular weights. The determined molecular weights of 11 subunits were close to those calculated from their coding sequences. In addition, no positive reaction between HMW-GS and GelCode(R) Glycoprotein Staining Reagent was observed. These results suggested that HMW-GS lack extensive post-translational modifications (PTMs), but low levels of glycosylation or phosphorylation present in some subunits cannot be ruled out. Because of its ability to obtain a rapid, complete and precise profile of HMW glutenin subunits without purifying procedures, MALDI-TOF-MS is expected to be a powerful technique for structural and functional studies of HMW glutenin subunits as well as other cereal proteins.
Keywords: HMW-GS; Molecular weight; Mass spectrometry; PTM

Vito M. Paradiso, Carmine Summo, Antonio Trani, Francesco Caponio, An effort to improve the shelf life of breakfast cereals using natural mixed tocopherols, Journal of Cereal Science, Volume 47, Issue 2, March 2008, Pages 322-330, ISSN 0733-5210, DOI: 10.1016/j.jcs.2007.04.009.
(http://www.sciencedirect.com/science/article/B6WHK-4NSX00G-3/2/750342906113aa1aa42ff867586e8877)
Abstract:
An experimental investigation was carried out with the aim of appraising the effects of natural tocopherols on lipid oxidation in extruded breakfast cereals. Corn flakes produced on an industrial scale, with and without added tocopherols and stored in commercial packing under shelf

conditions, were compared using sensory evaluation and analyses of volatile compounds and triacylglycerol polymerization products. The sensory evaluation showed the effectiveness of tocopherols in limiting the development of off-flavour during storage. The analysis of the volatile compounds, focused on the secondary products of the lipid oxidation, showed that the antioxidant activity of tocopherols limited the evolution of the headspace towards a more intense oxidation, notably the further oxidation of hexanal into hexanoic acid (that reached 32% and 15% in the flakes, respectively, without and with added tocopherols, after 360 days). The percentage of hexanoic acid in the headspace positively correlated with almost all the descriptors of the defect considered for the sensory evaluation. The analysis of the triacylglycerol polymerization products confirmed the inhibiting action of tocopherols on lipid oxidative degradation.
Keywords: Breakfast cereals; Natural antioxidants; Shelf life; Volatile oxidation compounds

Andrew J. Jay, Mary L. Parker, Richard Faulks, Fiona Husband, Peter Wilde, Andrew C. Smith, Craig B. Faulds, Keith W. Waldron, A systematic micro-dissection of brewers' spent grain, Journal of Cereal Science, Volume 47, Issue 2, March 2008, Pages 357-364, ISSN 0733-5210, DOI: 10.1016/j.jcs.2007.05.006.
(http://www.sciencedirect.com/science/article/B6WHK-4NX2NHF-2/2/5528d94a72e7669be54ccbc209f8eaf1)
Abstract:
Brewers' spent grain (BSG), one of the co-products of the brewing industry, has been mainly used as cattle feed. Spent grain was shown to contain a number of potentially high-value components such as feruloylated arabinoxylan and protein, as confirmed by microscopy and chemical analysis. A significant quantity of starch was also identified, a polysaccharide generally considered to be removed through the malting and mashing steps of brewing. As part of a study to increase the exploitation of spent grain, five separate fractions were prepared through combined milling and vibratory sieving and characterised in terms of chemical composition (polysaccharide composition and linkage; phenolic composition) and by fluorescence microscopy. Material retained on sieve mesh plates of 500, 250 and 150 [mu]m consisted mainly of arabinoxylan-rich palea and lemma, while material passing through 106 and 55 [mu]m sieves was fine, crumb-like material enriched in protein and starch. Lignin was present in all fractions, and originated from the fragmented palea and lemma. The results are discussed in relation to the potential for whole BSG exploitation.
Keywords: Arabinoxylan; Barley; Brewers' spent grain; Carbohydrate; Cereal processing co-products; Fractionation; Phenolic acids; Ferulic acid

V.O. Adetunji, D.O. Alonge, R.K. Singh, J. Chen, Production of wara, a West African soft cheese using lemon juice as a coagulant, LWT - Food Science and Technology, Volume 41, Issue 2, March 2008, Pages 331-336, ISSN 0023-6438, DOI: 10.1016/j.lwt.2007.02.012.
(http://www.sciencedirect.com/science/article/B6WMV-4N66R5J-1/2/83d62526ca02bb029e239615f3a74680)
Abstract:
As an important protein source for West African consumers, wara cheese made from the leave extract of Calotropis procera has extremely short shelf life of only 2-3 days [Adegoke, G. O., Nse, E. N., & Akanni, A. O. (1992). Effects of heat, processing time, and pH on the microflora, aflatoxin content, and storability of wara, a soft white cheese. Die Nahrung, 36(3), 259-264; Umoh, V. J., & Solomon, O. (2001). Safety assessment and critical control point of milk product and some cereal beverages in Northern Nigeria. In: Proceedings of USDA/USAID/NIGERIA international conference on food safety and security, August 1-3 (pp. 122-127). Ibadan, Nigeria: IITA; Belewu, M. A., Belewu, K. Y., & Nkwunonwo, C.C. (2005). Effect of biological and chemical preservatives on the shelflife of West African soft cheese. African Journal of Biotechnology, 4, 1076-1079; Adetunji, A. O., Alonge, D. O., & Chen, J. (Unpublished). Microbial quality of wara, a southwestern Nigerian soft cheese]. Lemon juice was used in this study as a substitute coagulant during wara

manufacture in order to improve the microbial quality of wara. The cheese was manufactured from pasteurized milk inoculated with 101 or 102 CFU ml-1 of Listeria monocytogenes. Samples of the milk or cheese were taken along the manufacturing steps and during a 5 d storage period at 15 and 28 [degree sign]C in order to determine the populations of L. monocytogenes, total aerobes, Enterobacteriaceae, and psychrotrophs, as well as mold and yeast. On the 4th day of storage, portions of the un-inoculated control cheese from 28 [degree sign]C were deep fried in vegetable oil, mimicking the practice of West African local cheese processors. The results showed that L. monocytogenes, at both inoculation levels, did not survive the manufacture of wara. In samples initially inoculated with 101 CFU ml-1 of L. monocytogenes, the Enterobacteriaceae counts decreased from the initial 1.78 to 1.00 Log10 CFU g-1 with the addition of lemon juice, and became undetectable (<1.00 Log10 CFU g-1) at the curdling point as well as during the 5 d storage period at both temperatures. The total aerobic counts increased from the undetectable level on the 1st day of storage to 7.65 and 3.39 Log10 CFU g-1, respectively at 28 or 15 [degree sign]C on the 5th day of storage. The psychrotrophic, as well as the yeast and mold counts increased from the undetectable levels on the 1st day of storage to 7.11 and 5.03 Log10 CFU g-1, respectively at 28 [degree sign]C. At 15 [degree sign]C however, the population of pyschrotrophs remained undetectable throughout the 5 d storage period whereas, the yeast and molds count increased to 3.08 Log10 CFU g-1 on day 3 before quickly decreasing to the undetectable levels on the 5th day of storage. A similar trend was observed in cheese made from the milk with an initial Listeria inoculation level of 102 CFU ml-1. The results of this study showed that lemon juice significantly reduced the populations of the sampled microorganisms, especially the populations of Enterobacteriaceae.

Keywords: Wara cheese; Lemon juice; Coagulant; Listeria monocytogenes; Spoilage microorganisms

P. Lund, M.R. Weisbjerg, T. Hvelplund, Profile of digested feed amino acids from untreated and expander treated feeds estimated using in situ methods in dairy cows, Livestock Science, Volume 114, Issue 1, March 2008, Pages 62-74, ISSN 1871-1413, DOI: 10.1016/j.livsci.2007.04.012.
(http://www.sciencedirect.com/science/article/B7XNX-4NVC96J-1/2/ec75e77e5f48f7b6dc8930d9eb1ecfa7)

Abstract:
Guar meal, sunflower meal, rapeseed cake, peas, maize, rye, wheat and barley were subjected to expander treatment at different temperatures (95-150 [degree sign]C), and effect on amino acid availability was assessed using rumen nylon bag and mobile bagin situ methods. Expander treatment of rapeseed cake at 142 [degree sign]C decreased feed lysine content, probably due to formation of complex compounds. Effective rumen degradability and total tract digestibility of protein, total amino acids, lysine, methionine, threonine, isoleucine, leucine, valine, and phenylalanine were compared to values for the untreated feeds. Effective rumen degradability seemed to decrease due to expander treatment for all cereals, except maize. Effective rumen degradability for sunflower meal and rapeseed cake was unaffected by expander treatment at 115 [degree sign]C, whereas expander treatment at 142 [degree sign]C appeared to decreased effective rumen degradability for rapeseed meal. Total amino acid digestibility was not decreased by expander treatment. Both for untreated and heat treated feeds rumen degradability and total tract digestibility of individual amino acids were generally in agreement with results for crude protein. Observed amino acid profiles supplied by digestible rumen undegraded feed amino acids were compared to a theoretical optimal profile obtained from the literature using a [chi]2-index. A low index is equivalent to a high biological value. Smallest and largest index for the difference between the observed and theoretical optimal amino acid profile were obtained for peas and maize, respectively. Lysine was the first limiting amino acid for cereals, sunflower meal, expander treated (142 [degree sign]C) rapeseed cake and untreated guar meal, leucine for untreated and expander treated (115 [degree sign]C) rapeseed cake, and methionine for peas and expander

treated guar meal. It was concluded that based on the assumed ideal amino acid profile, expander treatment only changed the first limiting amino acid for rapeseed cake and guar meal, and that although expander treatment decreased the index, and thereby improved the biological value of the intestinally digested feed amino acids, the ranking of feeds based on the index was unaffected by expander treatment.
Keywords: Heat treatment; Lysine; Nylon bag; Mobile bag; Processing

A. Horadagoda, W.J. Fulkerson, I. Barchia, R.C. Dobos, K.S. Nandra, The effect of grain species, processing and time of feeding on the efficiency of feed utilization and microbial protein synthesis in sheep, Livestock Science, Volume 114, Issue 1, March 2008, Pages 117-126, ISSN 1871-1413, DOI: 10.1016/j.livsci.2007.04.016.
(http://www.sciencedirect.com/science/article/B7XNX-4NX8RRM-1/2/4073fd274225c0edab4e59f09527157b)
Abstract:
This study investigated the effect of cereal grain species (sorghum, wheat, oats and barley), extent of processing (cracked barley, finely ground barley, and wet whole barley) and time of feeding (barley grain mixed with ryegrass hay or fed 2 h before hay was fed), on whole tract dry matter digestibility (WTDMD), and microbial protein synthesis (MPS), as a supplement to ryegrass hay when fed to rumen-cannulated sheep.
Expected dry matter digestibility (EDMD) in mixtures of cereal grain and ryegrass hay was calculated by interpolation between in vitro dry matter digestibility (DMD) of each grain and the ryegrass hay. These were compared with measured actual WTDMD to detect positive or negative associative effects. Among grain species, the percentage difference in digestibility between actual WTDMD and EDMD was negative at - 6.6% units for wheat but positive at + 2.3%, + 4.3% and + 5.7% units for sorghum, oats, cracked or finely ground barley, respectively.
As expected, the supplementation of sheep fed ryegrass hay with different sources of carbohydrates increased urinary allantoin output (as an indicator of MPS) when compared to sheep fed ryegrass hay alone. The concentration of urinary allantoin was significantly higher in sheep supplemented with sorghum (1916 mg/sheep/day) than wheat, oats or cracked barley ([mean +/- S.E.M.] 1451 +/- 24 mg/sheep/day) grain. There was a significantly higher urinary allantoin concentration in sheep fed cracked barley compared to finely ground barley or wet whole barley (1479 vs. 1095 vs. 1031 mg/sheep/day, respectively). There was no significant ($P > 0.05$) difference in urinary allantoin output, expressed as output/kg DM intake, when cracked barley was mixed and fed with the hay or fed 2 h before hay. However, in terms of total output of allantoin this was significantly higher ($P < 0.05$) (1479 vs. 1209 mg/sheep/day).
In sacco degradability characteristics of organic matter and nitrogen for sorghum, oats, wheat, barley at different levels of processing and for ryegrass hay were also measured in the rumen of cannulated sheep.
Among grain species, wheat had the highest effective organic matter degradability in the rumen (78.1%) while sorghum had the lowest. The effective degradability of protein of finely ground barley in the rumen was found to be higher than cracked barley or wet whole barley.
Wheat grain, being highly degradable in the rumen, had a negative effect on WTDMD. In contrast, sorghum grain, being more slowly degradable in the rumen, would be expected to provide a substantially increased supply of energy to microbes over time in the rumen for MPS.
Both cracked barley and finely ground barley also had a positive associative effect on WTDMD when fed with ryegrass increasing it by 5.7% units. The MPS was significantly higher ($P < 0.05$) in sheep fed cracked barley compared to finely ground barley or wet whole barley. This supports the hypothesis that slowly degrading carbohydrate sources synchronise more closely with available N from degradation of forage in the rumen.
Keywords: Cereal grains; Allantoin; Microbial protein synthesis; Rumen degradability; In vivo digestibility

Jonathan Gressel, Transgenics are imperative for biofuel crops, Plant Science, Volume 174, Issue 3, March 2008, Pages 246-263, ISSN 0168-9452, DOI: 10.1016/j.plantsci.2007.11.009.
(http://www.sciencedirect.com/science/article/B6TBH-4R7NPW3-1/2/aab1d8e54b7ff4aeccedcc89d9cd8e90)
Abstract:
Petroleum dependency is a challenge that can potentially be partly offset by agricultural production of biofuels, while decreasing net, non-renewable carbon dioxide output. Plants have not been domesticated for modern biofuel production, and the quickest, most efficient, and often, the only way to convert plants to biofuel feedstocks is biotechnologically. First generation biofuel feedstock sources: sugarcane and cereal grains to produce bioethanol and biobutanol and oilseeds to produce biodiesel compete directly with needs for world food security. The heavy use of oilseed rape releases quantities of methyl bromide to the atmosphere, which can be prevented by gene suppression. Second generation bioethanolic/biobutanolic biofuels will come from cultivated lignocellulosic crops or straw wastes. These presently require heat and acid to remove lignin, which could be partially replaced by transgenically reducing or modifying lignin content and upregulating cellulose biosynthesis. Non-precipitable silicon emissions from burning could be reduced by transgenically modulating silicon content. The shrubby Jatropha and castor beans should have highly toxic protein components transgenically removed from their meal, cancer potentiating diterpenes removed from the oils, and allergens from the pollen, before extensive cultivation. Algae and cyanobacteria for third generation biodiesel need transgenic manipulation to deal with 'weeds', light penetration, photoinhibition, carbon assimilation, etc. The possibilities of producing fourth generation biohydrogen and bioelectricity using photosynthetic mechanisms are being explored. There seem to be no health or environmental impact study requirements when the undomesticated biofuel crops are grown, yet there are illogically stringent requirements should they transgenically be rendered less toxic and more efficient as biofuel crops.
Keywords: Biofuels; Lignocellulosics; Jatropha; Switchgrass; Straw

K. Saffih-Hdadi, B. Mary, Modeling consequences of straw residues export on soil organic carbon, Soil Biology and Biochemistry, Volume 40, Issue 3, March 2008, Pages 594-607, ISSN 0038-0717, DOI: 10.1016/j.soilbio.2007.08.022.
(http://www.sciencedirect.com/science/article/B6TC7-4PXDXS9-1/2/7057690edc54f69253a31a2be0703bc3)
Abstract:
Cereal straw, which is most often returned to the soil in arable cropping systems, is of renewed interest as a potential source of bioenergy. However, the sustainability of this practice which implies systematic removal of aerial biomass of cereal crops is a controversial issue, particularly in soils having a low soil organic carbon (SOC) content. This study aims at evaluating a simple model (AMG) to predict the consequences of straw export on SOC evolution in various cropping and pedoclimatic conditions. The model was tested on nine long-term field experiments (18-35 yr) dominated by cereal crops and differing in climate, soil type and carbon inputs. The model was able to provide satisfactory simulations of the evolution of SOC in most experiments with a unique set of parameters. The sensitivity analysis indicated that the quality of fit was very sensitive to humification coefficient, moderately sensitive to the size of the stable SOC pool and weakly affected by the ratio of belowground: aerial C input. The dependence of model parameters (humification and mineralization rates) on pedoclimatic conditions (soil clay content and temperature) was analyzed and compared to those proposed in other models (DAISY, CENTURY, ROTHC, CN-SIM) since they vary widely between models. AMG functions provided the best fit in seven out of nine experiments. More generally, the best fit was obtained by assuming that clay content had a small or no effect on humification coefficient and a marked effect on mineralization rate, in accordance with incubation studies in literature. The AMG model was used to simulate the

impact of a straw export scenario in nine experiments considering a systematic straw removal one year out of two. With this scenario, straw removal vs. incorporation would reduce carbon stocks by 2.5-10.9% of the initial SOC after 50 yr, depending primarily on the experiment (soil, climate, productivity) and secondarily on the size of the stable C pool (varying from 10% to 65%).
Keywords: Organic carbon; Model; Straw; Clay; Soil organic matter; Long term

Mukesh Jain, Prem S. Chourey, Qin-Bao Li, Daryl R. Pring, Expression of cell wall invertase and several other genes of sugar metabolism in relation to seed development in sorghum (Sorghum bicolor), Journal of Plant Physiology, Volume 165, Issue 3, 18 February 2008, Pages 331-344, ISSN 0176-1617, DOI: 10.1016/j.jplph.2006.12.003.
(http://www.sciencedirect.com/science/article/B7GJ7-4N1SJK7-2/2/081885f33ff3c810ec3c3c4dbd0ce86f)
Abstract: Summary
We report expression profiles of several genes of carbohydrate metabolism, cell wall invertase (CWI) in particular, to better understand sugar transport and its utilization in developing caryopses of grain sorghum [Sorghum bicolor (L.) Moench]. Gene expression analyses for CWI using RNA gel blot and real-time quantitative PCR approaches on developing caryopses, including the glumes (maternal tissue appended to the seeds), showed expression of SbIncw (ZmIncw2 ortholog) primarily in the basal sugar unloading zone of endosperm. The expression of ZmIncw1 ortholog was significantly less abundant and restricted to the glumes. The protein and enzyme activity data corroborated the temporal transcript expression profile that showed maximal CWI protein (INCW) expression preceding the starch-filling phase of endosperm development, i.e. 6-12 d-after-pollination (DAP). Protein gel blot analysis using polyclonal maize INCW1 antibodies showed a single polypeptide of 72 kDa. The highest level of enzyme activity was unique to the basal part of the endosperm, in particular the basal endosperm transfer cell (BETC) layer and the maternal pedicel region that were highly enriched for the INCW protein, as seen by immunolocalization. High hexose-to-sucrose ratio in 6-12 DAP seeds, and negligible starch deposition in glumes corroborated the CWI activity data. Additionally, we report transcription profiles of several other genes related to sugar-to-starch metabolism in developing sorghum endosperm. As in maize, the INCW-mediated apoplastic cleavage of sucrose in the BETC and pedicel during the early developmental stages of caryopses is essential for the normal development of filial tissues. The unique cell-specificity of the INCW protein to both proximal and distal ends of placental sac shown here for the first time is likely to greatly increase uptakes of both hexose sugars and water through turgor sensing into developing seed. This trait is unique to sorghum among cereals and may facilitate its survival in drought environment.
Keywords: Caryopsis development; Cell wall invertase; Sugar-to-starch transition; Sugar unloading

C. Bourlieu, V. Guillard, H. Powell, B. Valles-Pamies, S. Guilbert, N. Gontard, Modelling and control of moisture transfers in high, intermediate and low aw composite food, Food Chemistry, Volume 106, Issue 4, 4th International Workshop on Water in Foods, 15 February 2008, Pages 1350-1358, ISSN 0308-8146, DOI: 10.1016/j.foodchem.2007.03.079.
(http://www.sciencedirect.com/science/article/B6T6R-4P192R1-7/2/f813ce119576fe7a3de9ae7b6807b148)
Abstract:
Limitation of moisture transfer in composite food products can be achieved by two main techniques: reduction of aw difference between components and use of hydrophobic barrier at the interface of the system. Both techniques were tested in a multi-domain model food associating a dry cereal-based component to a wet component using a model based on Fick's second law. Required input modelling parameters were moisture equilibrium and transport properties of the components. The two stabilisation techniques permitted a significant extension of the period of acceptability of the dry component: from 7 min to more than 40 h using solutes addition and up to

12 days using a 300 [mu]m hydrophobic barrier. A further extension of this period of acceptability was achieved by combining the two techniques. However, this had a detrimental effect on the relative efficiency of the barrier due to increased internal resistance of the wet component.
Keywords: Lipidic barriers; Predictive modelling; Water migration; Ready-to-eat food products

W.P. Weglarz, M. Hemelaar, K. van der Linden, N. Franciosi, G. van Dalen, C. Windt, H. Blonk, J. van Duynhoven, H. Van As, Real-time mapping of moisture migration in cereal based food systems with Aw contrast by means of MRI, Food Chemistry, Volume 106, Issue 4, 4th International Workshop on Water in Foods, 15 February 2008, Pages 1366-1374, ISSN 0308-8146, DOI: 10.1016/j.foodchem.2007.04.077.
(http://www.sciencedirect.com/science/article/B6T6R-4P2YWX5-1/2/390c38fcb42f21086fcdd1e739980e66)
Abstract:
The redistribution of water in prototype food systems, comprising phases with contrasting water activity (Aw), was investigated. To accomplish this task, MRI techniques adapted to migration rate were used. RARE and SPI measuring methods were used to monitor water redistribution in crunchy inclusions in water and biscuit shells with apple filling during storage, respectively. In the first case, fast migration, which typically last some tens of minutes, was monitored with a temporal resolution 3.5 min or better, while in the second case of slow migration it was monitored during 2 months with 10 days temporal resolution. 3D MR images with sub-millimeter resolution visualise the spatial redistribution of moisture and allow a quantification of its rate and extent of matrix swelling. Correlation with high resolution X-ray (XRT) images allows to identify structural elements responsible for unwanted fast hydration.
The obtained results demonstrate the potential of a combined MRI/XRT approach for dynamical monitoring of the migration of moisture into porous cereal material in a broad range of Aw contrast and hydration levels. The measured migration rates through samples of different internal structures can be used for validating models for prediction of water redistribution in multiple phase systems in a quantitative manner.
Keywords: Cereal material; Water activity contrast; Water (re)distribution; MRI; RARE; SPI; XRT

J.-H. Chung, J.-A. Han, B. Yoo, P.A. Seib, S.-T. Lim, Effects of molecular size and chain profile of waxy cereal amylopectins on paste rheology during retrogradation, Carbohydrate Polymers, Volume 71, Issue 3, 8 February 2008, Pages 365-371, ISSN 0144-8617, DOI: 10.1016/j.carbpol.2007.05.018.
(http://www.sciencedirect.com/science/article/B6TFD-4NXHCC0-1/2/45c3525ed9c41a9c6eb36497c7efdce2)
Abstract:
Amylopectins were purified from five waxy cereal starches (corn, sorghum, barley, wheat, and rice) in amorphous state by ethanol precipitation from dimethyl-sulfoxide (DMSO) solution followed by removing any amylose complexes with butanol in water. Their molecular weights (Mw) were determined by size-exclusion chromatography in tandem with multi-angle laser light scattering and refractive index detectors. Chain length distributions were determined by debranching followed by size-exclusion chromatography coupled with a refractive index detector. Amylopectin pastes (15% dry solids) were also analyzed using a dynamic rheometer while cooling to 4 [degree sign]C and storing for 20 days, and the relations between the structural and rheological characteristics were investigated. The weight-average molecular weights (Mw) of the waxy cereal amylopectins ranged from 204.4 x 106 to 344.4 x 106 g/mol, and the average chain length (CLw) ranged from 26.8 to 30.4. Among the tested starches, waxy rice had the largest amylopectin molecules and the longest B [greater-or-equal, slanted] 2 chains. The order of chain length of B [greater-or-equal, slanted] 2 chains among the samples were waxy rice > waxy corn = waxy sorghum > waxy barley = waxy wheat. But there were no difference in the CLw of total chains among the amylopectins. Storage

(G') and loss (G'') moduli of amylopectin pastes (15% solids) significantly increased during the cooling period from 95 to 4 [degree sign]C, which was more than the increase during cold storage for 20 days at 4 [degree sign]C. Among the waxy samples, waxy rice displayed the greatest moduli increases both during the initial cooling and during the cold storage. Among the structural parameters measured, the Mw of amylopectin and CLw of B [greater-or-equal, slanted] 2 chains correlated positively with complex modulus(G*) increases.
Keywords: Amylopectin; Molecular weight; Chain profile; Rheology; Retrogradation

Maj Rundlof, Helena Nilsson, Henrik G. Smith, Interacting effects of farming practice and landscape context on bumble bees, Biological Conservation, Volume 141, Issue 2, February 2008, Pages 417-426, ISSN 0006-3207, DOI: 10.1016/j.biocon.2007.10.011.
(http://www.sciencedirect.com/science/article/B6V5X-4RFKKMY-1/2/954143b0d080b168fc0d4fd8fff02957)
Abstract:
Organic farming has been suggested to counteract declines in farmland biodiversity, but comparisons to conventional farming have produced variable outcomes. To examine whether this is due to the landscape context farms are situated in and traits of the studied organisms, we surveyed bumble bees in cereal field borders and margins at 12 pairs of matched organic and conventional farms, with half the pairs located in heterogeneous farmland and the remaining in homogeneous plains. Species richness and abundance of bumble bees were significantly positively related to both organic farming and landscape heterogeneity. However, there was an interaction effect between farming practice and landscape context so that species richness and abundance were only significantly higher on organic farms in homogeneous landscapes. The higher abundance of bumble bees on organic farms was partly related to higher flower abundance on these sites. The effect of landscape context on bumble bee abundance was stronger for species with medium sized colonies than for those with smaller and larger colony sizes. These patterns may reflect that species with medium sized foraging ranges are most affected by fragmentation of foraging habitat, because colony size reflects the spatial scale at which bumble bees utilize resources. We conclude that both organic farming and landscape heterogeneity can be used to increase bumble bee species richness and abundance, but that organic farming has a larger effect in homogeneous landscapes and landscape heterogeneity a larger effect on conventional farms. The effects differed between species, suggesting that a single prescription to increase pollinator abundance may not be valid.
Keywords: Agri-environment schemes; Bombus; Conservation; Landscape heterogeneity; Organic farming; Spatial scale

E. Zahran, J. Sauerborn, A.A. Abbasher, E.A. Ahmed, R.I. Mohukker, P. Karlovsky, E.A. Mohamed, D. Muller-Stover, 'Pesta' and alginate delivery systems of Fusarium spp. for biological control of Striga hermonthica (Del.) Benth. under Sudanese field conditions, Biological Control, Volume 44, Issue 2, February 2008, Pages 160-168, ISSN 1049-9644, DOI: 10.1016/j.biocontrol.2007.10.025.
(http://www.sciencedirect.com/science/article/B6WBP-4R29FK9-1/2/07197032e05ca70ae847e90dff0f8729)
Abstract:
The parasitic weed, Striga hermonthica, is one of the main biotic factors affecting cereal production in the semi-arid tropics. Field experiments were conducted at Gezira, Sudan, in two consecutive seasons (2003/2004), to study the efficacy of two Fusarium isolates originating from Sudan (Fusarium nygamai (FN) and Fusarium sp.'Abuharaz' (FA)) formulated in wheat flour-kaolin granules on Striga infestation and to determine the dose needed for effective weed control. Furthermore, an alginate formulation was tested as alternative delivery system. In the first season the highest control efficacy was achieved by applying FA in 'Pesta' granules at 1.5 g per planting

hole, which reduced the total number of parasite shoots by 82% and the number of healthy Striga shoots by 88% compared to the untreated control. As a consequence, sorghum biomass and sorghum 100-seed weight were increased by 88% and 110%, respectively, compared to the untreated control. FN and the combination of the fungal isolates were slightly less efficient in controlling the parasites. During the second season all preparations applied at 1.5 g per planting hole showed a lower efficacy in reducing Striga total number compared to the first season. Nevertheless, FA formulated in 'Pesta' or alginate pellets caused disease in 74% and 80% of the Striga plants, respectively, and consequently improved sorghum performance.
Keywords: Striga hermonthica; Parasitic weeds; Fusarium mycoherbicide; Formulation

Jose E. Sanchez, Laura Mejia, Daniel J. Royse, Pangola grass colonized with Scytalidium thermophilum for production of Agaricus bisporus, Bioresource Technology, Volume 99, Issue 3, February 2008, Pages 655-662, ISSN 0960-8524, DOI: 10.1016/j.biortech.2006.11.067.
(http://www.sciencedirect.com/science/article/B6V24-4N55TFB-1/2/f2af9a926e3cbbff2993ebe279cd8f88)
Abstract:
This work had the dual objective of selecting a substrate for rapid mycelial growth of Scytalidium thermophilum and then comparing the growth and production of a brown variety of Agaricus bisporus on substrate non-colonized and colonized with S. thermophilum. Mycelial growth of S. thermophilum at 45 [degree sign]C was significantly greater on potato dextrose yeast extract agar (0.58 mm/h) as compared to malt extract glucose agar (0.24 mm/h) and yeast extract glucose agar (0.44 mm/h). On cereal grain, S. thermophilum grew significantly faster on rice (0.31 mm/h) compared to sorghum (0.22 mm/h) and millet (0.18 mm/h). It also grew faster on Pangola grass (0.49 mm/h) compared to corncobs (0.30 mm/h) and sawdust (0.18 mm/h). Colonization of Pangola grass with S. thermophilum was influenced by the addition of calcium salts in the form of gypsum, hydrated lime and ground limestone. For production of A. bisporus, biological efficiency (BE) on pasteurized Pangola grass pre-colonized by S. thermophilum for 4 days at 45 [degree sign]C was more than twice (26.4%) that on grass non-colonized by S. thermophilum (11.0%). The addition of 2% hydrated lime to Pangola grass prior to colonization by S. thermophilum resulted in an additional doubling of BE of mushroom production (48.1%). These results show the possibility of developing a non-composted substrate method for producing A. bisporus without autoclaving the substrate.
Keywords: Portobello cultivation; Digitaria decumbens; Non composted substrate; Edible mushrooms; Mushroom production

Andrea Maiorano, Massimo Blandino, Amedeo Reyneri, Francesca Vanara, Effects of maize residues on the Fusarium spp. infection and deoxynivalenol (DON) contamination of wheat grain, Crop Protection, Volume 27, Issue 2, February 2008, Pages 182-188, ISSN 0261-2194, DOI: 10.1016/j.cropro.2007.05.004.
(http://www.sciencedirect.com/science/article/B6T5T-4P2J2YN-1/2/1d249d233bd88619c3cf2de27e659c65)
Abstract:
Fusarium head blight (FHB) of small grains is a worldwide spread disease that reduces yield, causes mycotoxin production in grain and reduces seed quality. Previous crop residues such as maize stalks and grain, and straw of barley, wheat, and other cereals are considered the principal inoculum sources for Fusarium graminearum and Fusarium culmorum, the most important Fusarium spp. causing FHB in Europe. The residues present on the soil surface and in the first 10 cm of soil in tilled and not tilled fields were quantified and their relative influence on Fusaria infection and deoxynivalenol contamination was evaluated. The total amount of residues in the first layer of the soil (10 cm) and on its surface was found to be correlated with DON contamination (R2=0.848), but ANOVA showed that tillage was not significant (P>0.05) and that the major role in

Fusarium spp. infection and DON contamination was played mainly by the residues lying on the surface of the soil ($P<0.05$). These results were used to evaluate management strategies of four different previous crop residues by comparing their effectiveness in reducing crop residues from the surface of the soil and the consequent contamination and their costs.
Keywords: Deoxynivalenol; Previous crop residues; Fusarium head blight; Wheat; Tillage

R.E. Blackshaw, Agronomic merits of cereal cover crops in dry bean production systems in western Canada, Crop Protection, Volume 27, Issue 2, February 2008, Pages 208-214, ISSN 0261-2194, DOI: 10.1016/j.cropro.2007.05.006.
(http://www.sciencedirect.com/science/article/B6T5T-4P2J2YN-2/2/89c781540605c3d6d51e31f31a1625e2)
Abstract:
Cover crops may have a valuable role to play in developing improved dry bean production systems. A field experiment was conducted to determine the agronomic benefits of including various fall-seeded and spring-seeded cereal cover crops with and without in-crop herbicides in dry bean. Main plot treatments included fall-seeded winter rye, barley, oat, and spring rye; spring-seeded barley, oat, and spring rye; and a no-cover crop control. Subplot treatments consisted of in-crop sethoxydim/bentazon and an untreated control. Fall-seeded cover crops were often superior to spring-seeded cover crops in terms of providing sufficient ground cover to reduce the risk of soil erosion and reducing weed emergence and growth. Among the fall-seeded cover crops, winter rye provided the greatest ground cover and often resulted in the greatest weed suppression. Dry bean density was not affected by any of the cover crops, but fall-seeded cover crops delayed emergence by up to 5 days and delayed maturity by up to 4 days. Cover crop effects on dry bean yield were most evident in the absence of in-crop herbicides, where fall-seeded cover crops increased dry bean yield by 20-90%. Cover crops also increased dry bean yield in 2 of 3 years when in-crop herbicides were used but yield increases were much smaller, ranging from 5% to 13%. These yield increases occurred with fall-seed cover crops that aided in weed management but also with spring-seeded cover crops where weed suppression was not evident, suggesting that cover crops provided additional benefits beyond weed management. Information gained in this study will be utilized to advise farmers on the most suitable use of cover crops in sustainable dry bean production systems.
Keywords: Cover crops; Dry bean yield; Soil erosion; Sustainable agriculture; Weed management

Samuel Sahile, Chemeda Fininsa, P.K. Sakhuja, Seid Ahmed, Effect of mixed cropping and fungicides on chocolate spot (Botrytis fabae) of faba bean (Vicia faba) in Ethiopia, Crop Protection, Volume 27, Issue 2, February 2008, Pages 275-282, ISSN 0261-2194, DOI: 10.1016/j.cropro.2007.06.003.
(http://www.sciencedirect.com/science/article/B6T5T-4P898YF-1/2/8f21819c69b5c781837ae4fd745357c5)
Abstract:
The effects of four cropping systems: faba bean (FB) alone , FB mixed with field pea (FB:FP), with barley (FB:BA) and maize (FB:MA), and three spray intervals of fungicide (mancozeb) applied at 7, 14 and 21 days at the rate of 2.5 kg a.i. ha-1 and unsprayed control on FB chocolate spot caused by Botrytis fabae were studied in two cultivars. The experiment was conducted during the 2004 and 2005 cropping seasons at Adet, Ethiopia. The treatments were arranged in a randomized complete block design in a factorial combination with four replications. Treatment effects studied were disease severity, progress rate, area under disease progress curve (AUDPC) and grain yield. In some of the mixed cropping systems, disease severity showed a downward trend. FB:MA mixed cropping had a significant effect on disease severity, AUDPC and disease progress rate. The system reduced the epidemics of chocolate spot and increased FB grain yield. FB:FP increased the disease progress rate and reduced grain yield in both seasons. Short fungicide spray intervals

(7 days) reduced the disease severity, AUDPC, and disease progress rate and increased the yield. Both local and the improved FB cultivar CS20DK showed almost similar disease progress rates. Mixed cropping with cereals contributed to the slowing of chocolate spot epidemics and increased grain yield of FB. It also promotes proactive integrated disease management.
Keywords: Botrytis fabae; Chocolate spot; Epidemics; Mixed cropping; Vicia fabae; Fungicide

Frank Hochholdinger, Roman Zimmermann, Conserved and diverse mechanisms in root development, Current Opinion in Plant Biology, Volume 11, Issue 1, Growth and Development - Edited by Christian Hardtke and Keiko Torii, February 2008, Pages 70-74, ISSN 1369-5266, DOI: 10.1016/j.pbi.2007.10.002.
(http://www.sciencedirect.com/science/article/B6VS4-4R5GKC6-1/2/9d13a9eeafbc88da4c57c2ae223cf88c)
Abstract:
The molecular basis of root formation and growth is being analyzed in more and more detail in the dicot model organism Arabidopsis. However, considerable progress has also been made in the molecular and genetic dissection of root system development in the monocot species rice and maize. This review will highlight some recent molecular data that allow for the comparison of cereal and Arabidopsis root development. Members of the COBRA, GRAS, and LOB domain gene families and a gene encoding a subunit of the exocyst complex are associated with root development. Analyses of these genes revealed some common and distinct molecular principles and functions in cereal versus Arabidopsis root formation.

J. Ryan, M. Pala, S. Masri, M. Singh, H. Harris, Rainfed wheat-based rotations under Mediterranean conditions: Crop sequences, nitrogen fertilization, and stubble grazing in relation to grain and straw quality, European Journal of Agronomy, Volume 28, Issue 2, February 2008, Pages 112-118, ISSN 1161-0301, DOI: 10.1016/j.eja.2007.05.008.
(http://www.sciencedirect.com/science/article/B6T67-4P7FHVP-1/2/d30b1057cb21361429cad4e64ca9871c)
Abstract:
Crop rotations have evolved as a strategy to obtain harvestable yields in stressed environments due to improved water-use efficiency, nitrogen (N) fixation, and breaking diseases cycles. While fallowing or growing legume crops in the alternate year have shown to consistently increase yields in semi-arid environments such as in the Mediterranean area, little emphasis has been given to cereal quality in rotation trials, especially with respect to N, and thus improved animal and human nutrition. This paper reports the effect of those treatments on cereal quality parameters, especially N, and thus protein, in wheat grain and straw in a long-term (14 years) rainfed cropping systems trial in the medium rainfall zone (300-400 mm year-1) in northern Syria that examined seven alternative-year options with durum wheat (Triticum turgidum var durum), i.e., vetch (Vicia sativa), medic (Medicago spp.), chickpea (Cicer arietinum), lentil (Lens culinaris), fallow, watermelon (Citrullus vulgaris) as a summer crop in the fallow year, and continuous wheat. Two ancillary treatments involved N fertilization (0, 30, 60, 90 kg N ha-1) in the cereal phase, and stubble grazing management (moderate and heavy grazing, and no grazing or stubble retention). Both the rotation and N treatments had a significant influence on all parameters (test weight, grain and straw N percentage, and total N uptake). By comparison, grazing management had little influence on quality parameters except test weight; however, the residue x N interaction was significant. Rotations such as those with medic and vetch enriched the N in grain and straw. These rotations thus improved the nutritional value in terms of protein of the grain, an important consideration as per capita consumption of bread is high in the Middle East and other sources of protein are limited. Similarly, as grazed or fed straw is dominant in the diet of sheep, the enhanced nutrition is of significance. While fallow produced the highest yields, and is a hedge against the effects of drought, it produces grain and straw of low nutritional value with respect to protein, as a result of

dilution of available soil N in the increased biomass. Though less obvious than yield, crop quality parameters should be considered in any cropping system involving rotations, especially those involving legumes.
Keywords: Mediterranean agriculture; Cereal cropping; Crop rotation; Grain/straw quality

J. Ryan, H. Ibrikci, M. Singh, A. Matar, S. Masri, A. Rashid, M. Pala, Response to residual and currently applied phosphorus in dryland cereal/legume rotations in three Syrian Mediterranean agroecosystems, European Journal of Agronomy, Volume 28, Issue 2, February 2008, Pages 126-137, ISSN 1161-0301, DOI: 10.1016/j.eja.2007.06.001.
(http://www.sciencedirect.com/science/article/B6T67-4P6TH6M-1/2/b322acc4a885d6e660f0e50c5c6826a8)
Abstract:
Given the complex nature of rainfed cropping systems in Mediterranean agriculture and the dynamic nature of phosphorus (P) in soils, agronomic assessment of P fertilization must be long term in order to consider residual effects. Thus, a 9-year study involved initial relatively large applications of P (0, 50, 100, 150, 200 kg P2O5 ha-1) and yearly smaller dressings (0, 15, 30, 45, 60 kg P2O5 ha-1) in a trial involving dryland cereals (wheat/barley) in rotation with legumes (chickpea, lentil, or vetch) at three locations with varying mean annual rainfall in northern Syria; Breda (270 mm), Tel Hadya (342 mm) and Jindiress (470 mm). Assessment was made of grain, straw and total biomass yield and crop P uptake and available P (Olsen). While crop responses varied due to seasonal rainfall fluctuations, they tended to decrease with increasing initial available soil P levels (2.7, 6.2, and 4.4 mg kg-1 for Breda, Tel Hadya and Jindiress, respectively). Residual P was not significant for cereals or legumes at any site, but direct P was significant for both crops at Breda and Jindiress, as well as for legumes at Tel Hadya. In contrast, residual and direct P significantly influenced Olsen-P and seasonal and total P uptake. With no P fertilizer, or where minimal amounts (15 kg P2O5 ha-1) were applied annually, the balance between applied P and crop P offtake became increasingly negative; after 8 years without applied P, the P balance was -54, -38, -27, -17, and +7 kg ha-1 for the initial (residual) P application of 0, 50, 100, 150, and 200 kg P205, respectively. This was counterbalanced by the higher annual application rates and to a lesser extent the amounts of P applied initially. The study demonstrated the highly variable nature of crop responses to fertilizer P under semi-arid field conditions over several years, with soil moisture from seasonal rainfall being the dominant influence on overall yields. While crop responses may not occur in any given year, especially if available P is near or above critical threshold levels, dryland cropping without P fertilizer is unsustainable in the long run.
Keywords: Dryland cereal cropping; Cereal/legume rotation; P dynamics; Fertilizer efficiency; Mediterranean agriculture

Woonho Yang, Shaobing Peng, Maribel L. Dionisio-Sese, Rebecca C. Laza, Romeo M. Visperas, Grain filling duration, a crucial determinant of genotypic variation of grain yield in field-grown tropical irrigated rice, Field Crops Research, Volume 105, Issue 3, 1 February 2008, Pages 221-227, ISSN 0378-4290, DOI: 10.1016/j.fcr.2007.10.006.
(http://www.sciencedirect.com/science/article/B6T6M-4R70VT9-2/2/408fb9ca19af89bc1a6071bab96d537b)
Abstract:
Grain filling, a crucial determinant of grain yield in cereal crops, is characterized by duration and rate of grain filling. This study aimed to (1) seek genotypic variations in grain filling duration and rate on area basis, (2) compare the contribution of grain filling duration and rate to grain yield and (3) examine the influence of temperature and solar radiation on grain filling duration and rate for effective grain filling period in the field-grown tropical irrigated rice. Six tropical genotypes were used in the 2004 dry season and wet season at the International Rice Research Institute (IRRI), Laguna, Philippines.

Grain filling rate and duration exhibited highly significant genotypic variations in each crop season. Grain weight on area basis was positively associated with grain filling duration, irrespective of crop seasons, but negatively or not significantly associated with grain filling rate. Grain filling rate and duration were negatively correlated with each other. Final grain weight linearly increased with the rise in cumulative mean temperature and cumulative solar radiation. Longer grain filling duration resulted in higher cumulative mean temperature and cumulative solar radiation for effective grain filling. Higher daily mean temperature and radiation did not accelerate daily grain filling rates of different rice genotypes.
It was concluded that longer grain filling duration, which provided rice plants with more cumulative mean temperature and cumulative solar radiation for effective grain filling period, was the main factor that determined grain yield on unit area basis in the field-grown tropical irrigated rice genotypes.
Keywords: Rice; Grain filling duration; Grain filling rate; Temperature; Solar radiation

Evariste Comlan Simon Mitchikpe, Romain A.M. Dossa, Eric-Alain D. Ategbo, Joop M.A. van Raaij, Paul J.M. Hulshof, Frans J. Kok, The supply of bioavailable iron and zinc may be affected by phytate in Beninese children, Journal of Food Composition and Analysis, Volume 21, Issue 1, February 2008, Pages 17-25, ISSN 0889-1575, DOI: 10.1016/j.jfca.2007.06.006.
(http://www.sciencedirect.com/science/article/B6WJH-4P59X64-2/2/6a5cfb8c4f6527a52b0de31f9021e987)
Abstract:
Food composition data are important for estimating energy and nutrient intakes. The objectives of this study were, first, to evaluate the proximate and inorganic composition of foods eaten in northern Benin and second, to estimate the potentially inhibiting effect of phytate on iron and zinc bioavailability. Chemical analyses were performed in 23 samples of most frequently consumed foodstuffs collected from retailers in local markets. Proximate composition was analysed by routine methods. Inorganic constituents and phytate were analysed using ICP-AES and HPLC. Protein contents were in agreement with those in FAO food composition database. Fat and fibre were in general higher whereas carbohydrate and energy were lower. Differences were mainly due to analytical or calculation methods. The most important sources of iron and zinc in children's diets were maize, sorghum and millet. In these cereals, iron and zinc ranged from 2.6 to 8.4 and 2.2 to 3.4 mg/100 g, respectively. Phytate ranged from 104 to 503 mg/100 g. Phytate/iron and phytate/zinc molar ratios ranged from 1 to 11 and 3 to 22, respectively. They suggest poor iron and zinc bioavailability. Reducing phytate and polyphenol contents in order to improve iron and zinc bioavailability from the most frequently consumed cereal food needs to be studied.
Keywords: Proximate composition; Inorganic constituents; Phytate; Iron and zinc bioavailability; Benin

Sally Schakel, Rebecca Schauer, John Himes, Lisa Harnack, Nancy Van Heel, Development of a glycemic index database for dietary assessment, Journal of Food Composition and Analysis, Volume 21, Supplement 1, 30th US National Nutrient Databank Conference, February 2008, Pages S50-S55, ISSN 0889-1575, DOI: 10.1016/j.jfca.2007.02.004.
(http://www.sciencedirect.com/science/article/B6WJH-4N61FT2-2/2/fa3e657ecea7a151467e50bd4e31aa10)
Abstract:
To address growing research interests and needs, a glycemic index (GI) database was developed for the more than 18,000 foods in the University of Minnesota's dietary data collection software, the Nutrition Data System for Research (NDSR). The primary source of data was current scientific literature with GI selected whenever possible from studies that used the following methodology: North American foods, healthy subjects, and a 2-h glucose response. Two GI numbers were included for all foods, one based on glucose as a reference, and the other, a white bread

reference. Assigning indices within a large database also required imputation, because there are relatively few data available from the literature. For database foods that were not a match to foods in the literature, GI was either estimated from similar foods or calculated from available carbohydrate amounts and the GI of ingredients within the food. To evaluate the calculation procedure, GIs were calculated and then compared to known literature values for 102 multi-ingredient foods. A wide range of foods had comparable GIs, while some sweetened dairy products and unsweetened breakfast cereals showed larger GI differences. The GI database provides researchers with a tool to identify low- and high-GI foods and to investigate whether GI or glycemic load (GL) in the diet will influence disease risk factors.
Keywords: Glycemic index; Glycemic load; Database; Dietary assessment

Yunsheng Ma, Wenjun Li, Barbara C. Olendzki, Sherry L. Pagoto, Philip A. Merriam, David E. Chiriboga, Jennifer A. Griffith, Jamie Bodenlos, Yanli Wang, Ira S. Ockene, Dietary Quality 1 Year after Diagnosis of Coronary Heart Disease, Journal of the American Dietetic Association, Volume 108, Issue 2, February 2008, Pages 240-246, ISSN 0002-8223, DOI: 10.1016/j.jada.2007.10.047.
(http://www.sciencedirect.com/science/article/B758G-4RPSH9J-G/2/b6774ec3d2d81e958e81b0a916030c1c)
Abstract: Objective
The purpose of this ancillary study is to determine the quality of diets in patients with documented coronary heart disease (CHD).Design
Dietary data were originally collected using a 24-hour dietary recall in 555 patients with CHD, 1 year after a diagnostic coronary angiography. Data used for this investigation were collected between March 2001 and November 2003.Subjects/setting
Patients were participants in a clinical trial to improve adherence to lipid-lowering medications. The Alternate Healthy Eating Index, an instrument designed to evaluate the degree to which a diet has the potential to prevent cardiovascular disease, measured dietary quality.Main outcome measures
Linear regression models were used to assess the association of dietary quality with patients' sociodemographic and clinical characteristics.Results
Mean age of participants was 61 years, with an average body mass index of 30 (calculated as kg/m2). Sixty percent were men. Average daily caloric intake was 1,775 kcal, with 50% of calories derived from carbohydrates, 18% from protein, and 32% from total fat. Average Alternate Healthy Eating Index score was 30.8 out of a possible maximum score of 80. Only 12.4% of subjects met the recommended consumption of vegetables, 7.8% for fruit, 8% for cereal fiber, and 5.2% for trans-fat intake. Lower dietary quality was associated with lower total caloric intake, as well as with smoking, obesity, and lower educational level.Conclusions
A high proportion of patients reported poor dietary quality 1 year after experiencing a coronary event. Our data support continued efforts to enhance healthful dietary changes over time for secondary prevention of CHD. Dietary change should be emphasized with CHD patients who are less educated, smokers, or obese.

Ruairidh J.H. Sawers, Caroline Gutjahr, Uta Paszkowski, Cereal mycorrhiza: an ancient symbiosis in modern agriculture, Trends in Plant Science, Volume 13, Issue 2, February 2008, Pages 93-97, ISSN 1360-1385, DOI: 10.1016/j.tplants.2007.11.006.
(http://www.sciencedirect.com/science/article/B6TD1-4RTCPX5-1/2/22bac15705f21af543ef870617c80c8a)
Abstract:
The majority of terrestrial plants live in association with symbiotic fungi that facilitate mineral nutrient uptake. The oldest and most prevalent of these associations are the arbuscular mycorrhizal (AM) symbioses that first evolved ~400 million years ago, coinciding with the appearance of the first land plants. Crop domestication, in comparison, is a relatively recent event, beginning ~10 000 years ago. How has the dramatic change from wild to cultivated ecosystems

impacted AM associations, and do these ancient symbioses potentially have a role in modern agriculture? Here, we review recent advances in AM research and the use of breeding approaches to generate new crop varieties that enhance the agronomic potential of AM associations.

Q. Zebeli, M. Tafaj, I. Weber, H. Steingass, W. Drochner, Effects of dietary forage particle size and concentrate level on fermentation profile, in vitro degradation characteristics and concentration of liquid- or solid-associated bacterial mass in the rumen of dairy cows, Animal Feed Science and Technology, Volume 140, Issues 3-4, 15 January 2008, Pages 307-325, ISSN 0377-8401, DOI: 10.1016/j.anifeedsci.2007.04.002.
(http://www.sciencedirect.com/science/article/B6T42-4NMCV60-2/2/eb087f06f1d3fb1684c45f1fab177e39)
Abstract:
This study investigated effects of dietary forage particle size (PS) and concentrate level (CL) on fermentation profiles of particle-associated rumen liquid (PARL) and free rumen liquid (FRL), in vitro degradation characteristics and concentration of bacterial mass attached to the solid or fluid rumen digesta phase in dairy cows. The experiment was a 4 x 4 Latin square design with four late-lactation dairy cows in four 23 day periods. Cows were restrictively fed (17 kg dry matter (DM)/d) one of four diets varying in the theoretical PS (6 and 30 mm) of grass hay and in the levels (approximately 200 and 550 g/kg, DM basis) of a cereal-based concentrate. Proportion of large particles (>6 mm) and the content of structural fibre in the diet increased by reducing dietary CL and, particularly, by increasing hay PS. This effect was not reflected by changes in mean total volatile fatty acid concentration or pH in the rumen. However, cows fed high concentrate diets had pH of 5.28 and 5.37 in PARL at 3 h after the last meal, when fine or long chopped hay was offered. The low pH may indicate a depression of the capacity of PARL to degrade fibre in vitro. Gas production in vitro of concentrate increased with the high concentrate diet at 12 h, suggesting that amylolytic capacity was affected only in early phases of fermentation. In addition, elevating dietary CL appeared to shift ruminal fermentation outputs from propionate to butyrate and valerate. Inclusion of coarsely chopped hay to a high concentrate diet does not appear to bring advantages due to increased structure in restrictively fed dairy cows. In addition, results suggest that the response of pH in PARL is more sensitive to dietary changes (i.e., forage PS and CL) than the response in FRL, and so PARL might be better to evaluate the risk of ruminal disfunction in dairy cows.
Keywords: Ruminal fermentation; In vitro; Particle size; Dairy cow

Y.-L. Yin, T.-J. Li, R.-L. Huang, Z.-Q. Liu, X.F. Kong, W.-Y. Chu, B.-E. Tan, D. -Deng, P. Kang, F.-G. Yin, Evaluating standardized ileal digestibility of amino acids in growing pigs, Animal Feed Science and Technology, Volume 140, Issues 3-4, 15 January 2008, Pages 385-401, ISSN 0377-8401, DOI: 10.1016/j.anifeedsci.2007.04.005.
(http://www.sciencedirect.com/science/article/B6T42-4NT24XG-1/2/018b5251c7bec845fdcb6db1e8699dcf)
Abstract:
The ileal digestibility coefficient (CSID) of amino acids (AA) and crude protein (CP) in 40 feedstuffs for growing pigs were determined with the protein-free (PF) and enzyme-hydrolyzed casein (EHC) methods. The 40 feedstuffs that were used earlier were 10 samples of cereals and cereal by-products, 12 samples of legumes, 6 samples of animal protein feedstuff and 12 samples of oil seed meals. Six growing pigs (initial body weight of 35 +/- 1.5 kg), fitted with T-cannula at the terminal ileum, were randomly allocated to either a PF or a EHC diet according to a crossover design during two ileal digesta collection periods. In each period, pigs were adjusted to the experimental diets for 5 days. On days 6 and 8, ileal digesta were collected continuously for 24 h to determine ileal endogenous AA and CP losses. Pigs fed the EHC diet had a higher ileal flow of endogenous CP and of most of AA ($P<0.05$) than pigs fed the PF diet. Among the ileal

endogenous AA flows (g/kg dry matter intake for pigs), methionine excretion was the lowest in pigs (0.09 and 0.25 g/kg dry matter intake) fed the PF and EHC diet, respectively, whereas glutamate (1.83 g/kg dry matter intake) and proline (1.22 g/kg dry material intake) excretion were the highest in pigs fed the EHC and the PF diet, respectively. Endogenous losses of CP and AA determined in the current study and previously published data on apparent ileal digestibility [Yin, Y.L., Huang, R.L., Zhong, H.Y., Chen, C.M., Li, T.J., Pan, Y.F., 1993. Nutritive value of feedstuffs and diets for pigs: 1. Chemical composition, apparent ileal and fecal digestibilities. Anim. Feed Sci. Technol. 44, 1-27] were used to calculate CSID coefficients. For most cereals and cereal by-products, the CSID coefficients of CP determined by the EHC method were higher than those determined by the PF method. Arginine, lysine, methionine, threonine, valine, alanine, aspartate, glutamate, glycine, proline and serine in some cereals and cereal by-products; methionine, valine, alanine and proline in some legumes; and methionine, alaline and proline in some oilseed meals had higher CSID determined by the EHC method than the PF method indicating that there are methodological differences when evaluating the CSID of feed ingredients.
Keywords: Endogenous losses; Enzyme-hydrolyzed casein diet; Protein-free diet; Standardized ileal digestibility

Jing Wang, Baoguo Sun, Yanping Cao, Yuan Tian, Xuehong Li, Optimisation of ultrasound-assisted extraction of phenolic compounds from wheat bran, Food Chemistry, Volume 106, Issue 2, 15 January 2008, Pages 804-810, ISSN 0308-8146, DOI: 10.1016/j.foodchem.2007.06.062.
(http://www.sciencedirect.com/science/article/B6T6R-4P4FV90-1/2/721931b5a5f8b3bdfb55bf44dfa29b09)
Abstract:
Wheat bran, an important by-product of the cereal industry, is rich in potentially health-promoting phenolic compounds. In this paper, the phenolic compounds from wheat bran were extracted by ultrasound-assisted extraction technology. The experiments were carried out according to a five level, three variable central composite rotatable design (CCRD), and the best possible combination of solvent concentration, extraction temperature and extraction time with the application of ultrasound, for maximum extraction of phenolic compounds from wheat bran, was obtained, through response surface methodology (RSM). The optimum extraction conditions were as follows: ethanol concentration, 64%; extraction temperature, 60 [degree sign]C; and extraction time, 25 min; and the extraction time was the most significant parameter for the process. Under the above-mentioned conditions, the experimental total phenolic content was 3.12 mg gallic acid equivalents/g of wheat bran tested, which is well matched with the predicted content.
Keywords: Central composite rotatable design; Phenolic compounds; Ultrasound extraction; Wheat bran

S. Karavoltsos, A. Sakellari, M. Dassenakis, M. Scoullos, Cadmium and lead in organically produced foodstuffs from the Greek market, Food Chemistry, Volume 106, Issue 2, 15 January 2008, Pages 843-851, ISSN 0308-8146, DOI: 10.1016/j.foodchem.2007.06.044.
(http://www.sciencedirect.com/science/article/B6T6R-4P37JPF-2/2/b7651bacb30abe2616322d7f7cb192d1)
Abstract:
Determinations of cadmium and lead content in a wide variety of organically produced foodstuffs available in the Greek market were carried out in the present study. The mean values detected ranged from non detectable to 53.4 ng g-1 and 65.0 ng g-1 for cadmium and lead, respectively. The highest cadmium concentrations were observed in the food categories of cereals (21.7 ng g-1), followed by leafy vegetables (15.4 ng g-1), whereas for lead the highest concentrations were found in leafy vegetables (33.4 ng g-1), followed by pulses (21.4 ng g-1) and alcoholic beverages (20.0 ng g-1). The comparison of the two metals' content in certified organically grown foodstuffs to that of conventional ones from the Greek market demonstrates that cadmium and lead

concentrations are higher in conventional foodstuffs in a percentage equal to 64% and 61% of the products compared, respectively. The results also show that 'uncertified' organic products contained far larger concentrations of cadmium and lead than either the certified organic or conventional foodstuffs. These results demonstrate that although the majority of certified organic products may have lower metal content, organic agriculture as such does not necessarily reduce the cadmium and lead content of organically cultivated products, unless additional provisions are observed.
Keywords: Cadmium; Lead; Organic foodstuffs; Greece

Beatriz Rosana Cordenunsi, Tania Misuzu Shiga, Franco Lajolo, Non-starch polysaccharide composition of two cultivars of banana (Musa acuminata L.: cvs Mysore and Nanicao), Carbohydrate Polymers, Volume 71, Issue 1, 5 January 2008, Pages 26-31, ISSN 0144-8617, DOI: 10.1016/j.carbpol.2007.05.009.
(http://www.sciencedirect.com/science/article/B6TFD-4NRK4JB-3/2/61937271b02312907419a5767231e29f)
Abstract:
Fruits represent a rich source of soluble and insoluble fibre, and the pectin is the most common and known soluble fraction from the cell wall solubilization occurring during fruit ripening. Banana fruit, for example, is one of the most consumed fruits in the world, but its non-starch polysaccharide composition is almost unknown. Despite few works have been carried out about the enzymes concerning cell wall loosening focusing banana ripening, there is no knowledge about the composition of the banana cell wall. Moreover, there is no information about the influence of the cultivar in that composition. Nanicao and Mysore cultivars were chosen for this work because of their differential accumulation of both starch during development and amounts of total fibre in the ripe fruit. Nanicao and Mysore had their fibres subfractioned and their composition analysed. Results showed that the cultivars are distinct not only in terms of starch and soluble sugars accumulation, but also in non-starch polysaccharides amounts and composition. Non-starch polysaccharides are similar in total amounts in both banana cultivars (~3.5), but substantially different in the content of CDTA and NaOH-4M soluble fractions and also in the molecular mass distribution of WSP and CDTA. Nanicao has more calcium-linked pectin than Mysore, which in turn is richer in hemicellulose-like polysaccharides. Both cultivars likewise cereals polysaccharides seem to be composed of galacturonans and arabinoxylans.
Keywords: Banana; Cell wall; Dietary fibre; Non-starch polysaccharides

Margrethe Askegaard, Jorgen Eriksen, Residual effect and leaching of N and K in cropping systems with clover and ryegrass catch crops on a coarse sand, Agriculture, Ecosystems & Environment, Volume 123, Issues 1-3, January 2008, Pages 99-108, ISSN 0167-8809, DOI: 10.1016/j.agee.2007.05.008.
(http://www.sciencedirect.com/science/article/B6T3Y-4P6MBRP-1/2/11506f3a6a6c23c63c54ee84d38d66de)
Abstract:
In low input farming systems without inorganic N-fertilizer input, cereal cropping is a challenge because of the need for an adequate N supply. The objective of this investigation was to explore the feasibility of using clover (red/white) catch crops instead of ryegrass in crop production on coarse sand. Two field experiments tested the effects of clover and ryegrass catch crops on N and K leaching and on grain yield of a succeeding spring barley. Treatments included animal manure regimes, main crops (spring barley = low soil N status or lupin = high soil N status) and levels of K fertilizer (no K or 80 kg K ha-1). The residual effect of the clover catch crop on grain yield of the succeeding spring barley was significantly higher than that of the ryegrass, especially under the low N conditions. When animal manure (70 kg total-N ha-1) was added to the spring barley succeeding a ryegrass catch crop, the difference in residual effect between clover and ryegrass

catch crops disappeared. Thus, clover appeared to have the potential to substitute animal manure. Leaching of NO3-N and K was estimated by means of porous ceramic suction cups installed at 1 m depth. Both the clover and ryegrass catch crops reduced the annual flow-weighted mean NO3-N concentrations from 13-16 to 5-8 mg L-1, which is below the WHO maximum for drinking water. The annual NO3-N leaching from a spring barley treatment without catch crops was approximately 100 kg ha-1. Clover and ryegrass catch crops reduced the losses significantly by approximately 40-80% depending on year and treatment, with ryegrass being more effective than clover. Catch crops reduced K leaching significantly but the relative effect was lower than for N. The clover catch crops appeared suitable for low-N cropping systems on coarse sand with respect to both production and environment.
Keywords: Organic agriculture; White clover; Red clover; Perennial ryegrass; Animal manure; Low soil fertility

Nathalie Colbach, Carolyne Durr, Sabine Gruber, Carola Pekrun, Modelling the seed bank evolution and emergence of oilseed rape volunteers for managing co-existence of GM and non-GM varieties, European Journal of Agronomy, Volume 28, Issue 1, January 2008, Pages 19-32, ISSN 1161-0301, DOI: 10.1016/j.eja.2007.04.005.
(http://www.sciencedirect.com/science/article/B6T67-4NX2VYX-2/2/9c7e72356b5a9f15569b6aa780c60d22)
Abstract:
Gene flow in oilseed rape is a process occurring over the years and large distances and has been the object of several models for evaluating the co-existence of GM and non-GM crops. Oilseed rape volunteers play a major role and the survival, dormancy and emergence of the volunteer seeds left after oilseed rape crops are key processes for gene flow. In the present paper, these processes were analysed and modelled in detail for integration into the GENESYS model, which quantifies the effects of cropping systems on spatio-temporal gene flow. In this model, seed bank dynamics are the result of seed survival, dormancy induction, dormancy cycles, germination processes and pre-emergent shoot growth in soil. These biological processes depend on tillage tools and dates, in interaction with temperature and soil moisture. The model was evaluated by comparing its simulations to independent field data on volunteer emergence after different tillage strategies and in different cropping systems. Finally, the model was used to simulate the effect of tillage strategies on volunteer densities in winter cereals and the adventitious presence of GM seeds in non-GM oilseed rape crops in case of temporal and/or spatial co-existence of GM and non-GM oilseed rape varieties.
Keywords: Modelling; Brassica napus L.; Oilseed rape; Co-existence; Genetically modified; Seed bank; Germination; Dormancy; Pre-emergent growth; Tillage

Bhaskarachary Kandlakunta, Ananthan Rajendran, Longvah Thingnganing, Carotene content of some common (cereals, pulses, vegetables, spices and condiments) and unconventional sources of plant origin, Food Chemistry, Volume 106, Issue 1, 1 January 2008, Pages 85-89, ISSN 0308-8146, DOI: 10.1016/j.foodchem.2007.05.071.
(http://www.sciencedirect.com/science/article/B6T6R-4NX2NNH-1/2/64160aadf10a392ba97e6bd5440b33c0)
Abstract:
This study provides new data on the the total carotenoids and [beta]-carotene content of commonly consumed cereals, pulses, vegetables, spices and condiments. Separation of carotenoids by HPLC showed that [beta]-carotene is the predominant carotenoid in all the foods studied. Cereals and pulses appear to be poor sources of provitamin A precursors. Among the vegetables studied pumpkin, ridge gourd, green chillies, tomato, green peas, field beans and French beans are not only inexpensive but are better sources of [beta]-carotene (20-120 mg/100 g). Among the spices and condiments, red chilli (1310 mg/100 g) and Smilax (2136 mg/100 g),

which are regularly used in Indian recipes are good sources of provitamin A precursors. The study also identified unconventional sources like Gulmohar, Peltiforum ferruginum,Lucern and Spirulina as rich sources of [beta]-carotene. Considering that Indian diets predominantly consist of cereals and pulses, choosing appropriate combinations of cereals and pulses will contribute significantly to overall vitamin A intakes. Together with our earlier efforts, the present study has generated a database of [beta]-carotene contents of Indian plant foods, which could be of help in the elimination of vitamin A deficiency.
Keywords: Cereals; Pulses; Vegetables; Spices and condiments; Unconventional sources; [beta]-carotene; HPLC

Odunayo Clement Adebooye, Vasudeva Singh, Physico-chemical properties of the flours and starches of two cowpea varieties (Vigna unguiculata (L.) Walp), Innovative Food Science & Emerging Technologies, Volume 9, Issue 1, January 2008, Pages 92-100, ISSN 1466-8564, DOI: 10.1016/j.ifset.2007.06.003.
(http://www.sciencedirect.com/science/article/B6W6D-4P06CHW-1/2/8421c83351a0ea6e66d4f5560b91c42d)
Abstract:
The physical and chemical properties of the starches and flours of whole grain and decorticated two cowpea varieties (Vigna unguiculata (L.) Walp) were investigated. The two cowpea varieties were: C-152-White, having big grain and S-1552-White, having small grain with black eye. Results showed that starch yields were 19.2 and 16.4 g/100 g grain for C-152 and S-1552, respectively. Statistical analysis shows that the total amylose contents of the starch of the two cowpea varieties were significantly higher (P <= 0.05) than that of the whole grain and decorticated flours. The swelling power of C-152 starch was significantly higher than that of S-1552 starch. The water-binding capacity (WBC) for S-1552 starch was higher than for C-152 starch. The results of pasting profile of both the flour and the starch showed that the two cowpea varieties possess different properties in relation to gelatinization temperature(GT), peak viscosity (PV), hot paste viscosity (HPV), cold paste viscosity (CPV), break down (BD), set back (SB), total set back (SBt) and relative breakdown (BDr). The information generated in this study on the properties of the starch could provide guidance on possible industrial uses of starches of these two varieties.Industrial relevance
This work showed the peculiar characteristics (solubility, water-binding capacity, amylose content, carbohydrate composition, granules characteristics and behaviour in Brabender viscoamlograph) of pure cowpea starch. The results that we obtained could be very valuable in decision making for industries that want to take advantage of cowpea starch as alternative or supplement to cereal/tuber starch. Cowpea starch could be useful in the manufacture of thickeners, gelling agent, extenders and texture modifiers in food formulation.
Keywords: Cowpea; Flour; Starch; Physico-chemical properties

Peter De Schryver, Susana Sesena, Bert Decaigny, Tom Van de Wiele, Willy Verstraete, Nico Boon, Xylanases from microbial origin induce syrup formation in dough, Journal of Cereal Science, Volume 47, Issue 1, January 2008, Pages 18-28, ISSN 0733-5210, DOI: 10.1016/j.jcs.2006.10.010.
(http://www.sciencedirect.com/science/article/B6WHK-4N3GFH2-1/2/fa3380c07885037d74d2ed2a1b3154f6)
Abstract:
Syrup formation in refrigerated doughs is a problem since it reduces the doughs' shelf life. Microbial exogenous xylanases associated with wheat kernels were found to play a role in this syruping phenomenon. Using xylanase-producing microorganisms isolated from wheat kernels, we investigated their potency to induce syruping in dough. Growth of the fungal xylanase producer Fusarium sp. (102 colony forming units (CFU)/g dough) and the bacterial xylanase producer

Paenibacillus sp. (104 CFU/g dough) in synthetic media and their respective addition to wheat dough could not bring about a significant amount of syruping. However, when these species were grown on moist wheat kernels and an extract of these kernels containing both the organisms and its xylanases was made and added to dough, intensive syruping was noted. This effect was primarily attributed to the xylanases present in the extract. These findings suggest that the involvement of xylanase-producing microorganisms in the syruping phenomenon is situated prior to harvest. Additional quantitative analyses of microbial biomass present on wheat kernels revealed that the fungi in particular could be correlated to higher microbial exogenous xylanase activities on wheat. Our results indicate that the syruping is linked to fungal xylanase production on the wheat kernels in the field.
Keywords: Microbial endoxylanases; Cereal; Syrup; Refrigerated dough

Mirko Bunzel, Ella Allerdings, John Ralph, Hans Steinhart, Cross-linking of arabinoxylans via 8-8-coupled diferulates as demonstrated by isolation and identification of diarabinosyl 8-8(cyclic)-dehydrodiferulate from maize bran, Journal of Cereal Science, Volume 47, Issue 1, January 2008, Pages 29-40, ISSN 0733-5210, DOI: 10.1016/j.jcs.2006.12.005.
(http://www.sciencedirect.com/science/article/B6WHK-4N25VSS-1/2/75285d8ff366a29e76f9a557ffe3b457)
Abstract:
Dehydrodiferulates are likely the most important arabinoxylan cross-links in cereals and grasses in general. However, association of dehydrodiferulates and arabinoxylans has only been authenticated for 5-5- and 8-O-4-dehydrodiferulates to date. In the present study, a saccharide ester of 8-8(cyclic)-dehydrodiferulate was isolated from maize bran insoluble fibre following mild acidic hydrolysis by using Sephadex LH-20 chromatography, gel chromatography on Bio-Gel P-2, and RP-HPLC. Mass spectrometry, one- and two-dimensional NMR and analysis of the carbohydrate and phenolic constituents following further hydrolysis identified the isolated compound as the di-5-O-l-arabinosyl ester of 8-8(cyclic)-dehydrodiferulic acid. From this finding it is apparent that 8-8(cyclic)-dehydrodiferulate exists as such in the plant cell wall and acts as an arabinoxylan cross-link. In addition, a fraction was isolated that contained two saccharide esters of 8-O-4-dehydrodiferulates. This fraction was comprised of two compounds, both built from 8-O-4-dehydrodiferulate, a 5-linked arabinofuranose and a 5-linked xylopyranosyl-(1-->2)-arabinofuranose unit. These compounds show that, in addition to the 5-O-(trans-feruloyl)-l-arabinofuranosyl sidechain, the more complex [beta]-d-xylopyranosyl-(1-->2)-5-O-trans-feruloyl-l-arabinofuranosyl sidechains are involved in the formation of 8-O-4-dehydrodiferulates.
Keywords: Diferulic acid; Ferulic acid; Cell-wall cross-linking; Arabinoxylans; Dietary fibre

M.E. Hassani, M.R. Shariflou, M.C. Gianibelli, P.J. Sharp, Characterisation of a [omega]-gliadin gene in Triticum tauschii, Journal of Cereal Science, Volume 47, Issue 1, January 2008, Pages 59-67, ISSN 0733-5210, DOI: 10.1016/j.jcs.2007.01.008.
(http://www.sciencedirect.com/science/article/B6WHK-4N7S544-1/2/731123296b6df19a18e9ebb19827892d)
Abstract:
A [omega]-gliadin gene at the Gli-Dt1 locus of Triticum tauschii accession AUS18913 was isolated using PCR primers, designed from published sequences of [omega]-gliadin genes of bread wheat cv Cheyenne, and deduced sequences of the N-terminal amino acids of [omega]-gliadin proteins. Further, the derived protein was isolated from A-PAGE and was sequenced. The protein sequence contained a signal peptide of 19 amino acids followed by a short N-terminal sequence of 11 amino acids, a central repetitive domain that covers approximately 90% of the sequence and a short C-terminal domain of 12 amino acids. The sequence comparison with other [omega]-gliadins showed a high level of similarities between them. Further analysis of the [omega]-gliadins using A-PAGE revealed that there are three [omega]-gliadin proteins in AUS18913 accession. Comparison of N-

terminal sequences of these proteins revealed that two of these proteins have very high homologies with [omega]-gliadins of Cheyenne while the third one was significantly different.
Keywords: Triticum tauschii; D genome; [omega]-gliadin gene; DNA sequence; N-terminal sequences; PCR

Gulay Mann, Simon Diffey, Helen Allen, Jennifer Pumpa, Zena Nath, Matthew K. Morell, Brian Cullis, Alison Smith, Comparison of small-scale and large-scale mixing characteristics: Correlations between small-scale and large-scale mixing and extensional characteristics of wheat flour dough, Journal of Cereal Science, Volume 47, Issue 1, January 2008, Pages 90-100, ISSN 0733-5210, DOI: 10.1016/j.jcs.2007.03.001.
(http://www.sciencedirect.com/science/article/B6WHK-4N7XP7M-2/2/850f0452fda4159c100ce0ba02eefaf8)
Abstract:
Mixing measurements provide valuable information about dough strength and stability (STAB) traits. These measurements are important in milling and baking operations, and for varietal selection in wheat breeding programmes. There are several techniques with different sample sizes used for measuring these traits so there is interest in examining the agreement between methods in terms of genotypic (varietal) rankings. This issue has been investigated by using two different mixing methods, a small-scale Mixograph (2 g) and large-scale Farinograph (50 g) using data from a doubled haploid population (190 lines) from a Chara (excellent dough strength)xWW2449 (poor dough strength) cross. The cross was grown in a field trial at the Wagga Wagga Agricultural Institute (WWAI) in 2000. Eleven mixing traits were measured and compared according to a statistical design. The estimated genetic correlation matrix for six of the 11 mixing traits, dough development time (DDT), STAB, mixing tolerance index (MTI), maximum bandwidth (MBW), bandwidth at peak resistance (BWPR) and peak resistance (PR) revealed that for these dough-strength-related parameters, both methods were measuring equivalent traits, although individual parameters had widely different coefficients of variation. In this population, PR was correlated with the extensibility trait length determined by large-scale extension testing. None of the large-scale or small-scale mixing traits was an effective predictor of the small-scale extensibility parameter extensibility at Rmax (Ext_Rmax). The data verified that small-scale Mixograph tests are a robust and efficient alternative to large-scale Farinograph tests for both commercial breeding and research.
Keywords: Small-scale Mixograph; Farinograph; Dough mixing characteristics; Dough strength traits; Rheology; Mixing; Small-scale extensibility; Statistics; Glutenin; Wheat; Genetic correlation matrix; Heritability; Wheat breeding; Rmax; Ext_Rmax

D. Silhacek, C. Murphy, Moisture content in a wheat germ diet and its effect on the growth of Plodia interpunctella (Hubner), Journal of Stored Products Research, Volume 44, Issue 1, 2008, Pages 36-40, ISSN 0022-474X, DOI: 10.1016/j.jspr.2006.03.004.
(http://www.sciencedirect.com/science/article/B6T8Y-4PK8MN3-1/2/651d1b796507362742f4b1dd71a1d1d2)
Abstract:
The growth rate of Plodia interpunctella larvae feeding on wheat germ was highly dependent upon the water content in the diet. The water content in a cereal diet is established by the hygroscopicity of the dietary components and the relative humidity (r.h.) in the equilibrating atmosphere. The larval growth rates on wheat germ increased with corresponding increases in r.h. over the range of 40-85%. Similar changes in r.h. had a measurable, albeit minimal, impact on the time required for embryonic development and egg hatch. The water content of wheat germ was further increased by supplementing the germ with the humectant, glycerol. The larval growth rate increased with each incremental increase in dietary water content irrespective of whether it resulted from increases in

r.h. or glycerol. However, glycerol supplementation provided an additional boost to the growth rate that was in addition to and distinct from the dietary water increase.
Keywords: Moisture; Wheat germ; Diet; Growth; Plodia interpunctella

Duong T. Nguyen, Rick J. Hodges, Steven R. Belmain, Do walking Rhyzopertha dominica (F.) locate cereal hosts by chance?, Journal of Stored Products Research, Volume 44, Issue 1, 2008, Pages 90-99, ISSN 0022-474X, DOI: 10.1016/j.jspr.2007.06.008.
(http://www.sciencedirect.com/science/article/B6T8Y-4PYRKDR-1/2/4a075b06e34308a3138116dc1fa8efd1)
Abstract:
To clarify the role of host odours in host location by walking Rhyzopertha dominica, locomotory responses of beetles were investigated in an experimental arena. Movements of beetle downwind of clean wheat, brown rice or maize, or wheat infested by conspecifics, were recorded by video and analysed using motion analysis software. No differences could be detected in the responses of beetles to the odours of clean wheat or to clean air; they showed equally strong positive anemotaxis to both. On average, only 37% of beetles arrived at the three clean food sources tested while 80% were able to locate the infested wheat. Both sexes showed an orientation component (taxis) in their behaviour towards the infested food source; females turned more (positive klinokinesis) and walked faster (positive orthokinesis) while there was no difference in male velocity between the odours of clean or infested wheat. There was no evidence of response to host odours and the locomotory responses of beetles that were able to locate clean wheat were similar to those that failed to do so. Investigation of beetles in potentially different physiological states, i.e. those that had actively dispersed from a food source or females reared in an environment isolated from other insects, showed no behavioural responses to wheat volatiles. Together, these studies gave no evidence that walking R. dominica use host volatiles to locate cereals. On the contrary, initial host location of cereals may occur by chance, as would seem to be the case in the closely related Prostephanus truncatus. The implications of this for better pest management of R. dominica are discussed.
Keywords: Locomotory behaviour; Host selection; Pheromones; Plant volatiles; Coleoptera; Bostrichidae

Mary M. Murphy, Judith Spungen Douglass, Anne Birkett, Resistant Starch Intakes in the United States, Journal of the American Dietetic Association, Volume 108, Issue 1, January 2008, Pages 67-78, ISSN 0002-8223, DOI: 10.1016/j.jada.2007.10.012.
(http://www.sciencedirect.com/science/article/B758G-4RDH61V-J/2/3ca8fab97618a85689bb8dd56ea7d733)
Abstract: Objective
Dietary fiber represents a broad class of undigested carbohydrate components. The components vary in chemical and physical nature and in their physiological outcomes. Resistant starch is starch that escapes digestion in the small intestine and that may be fermented in the large intestine. The purpose of this study was to estimate consumption of resistant starch by the US population and to identify key sources of dietary resistant starch.Design
A database of resistant starch concentrations in foods was developed from the publicly available literature. These concentrations were linked to foods reported in 24-hour dietary recalls from participants in the 1999-2002 National Health and Nutrition Examination Surveys and estimates of resistant starch intakes were generated.Subjects
The study population included 18,305 nonbreastfeeding individuals in the United States.Statistical analysis
The dietary intake of resistant starch was determined for 10 US subpopulations defined by age, sex, and race/ethnicity. Three estimates of resistant starch intake were made for each person

based on the minimum, mean, and maximum concentrations of resistant starch in the foods consumed.Results
Americans aged 1 year and older were estimated to consume approximately 4.9 g resistant starch per day based on mean resistant starch concentrations (range 2.8 to 7.9 g resistant starch per day). Breads, cooked cereals/pastas, and vegetables (other than legumes) contributed 21%, 19%, and 19% of total resistant starch intake, respectively, and were top sources of resistant starch.Conclusions
Findings from this study suggest that the estimated intake of resistant starch by Americans is approximately 3 to 8 g per person per day. These estimates of resistant starch intake provide a valuable reference for researchers and food and nutrition professionals and will allow for more accurate estimates of total intakes of carbohydrate compounds that escape digestion in the small intestine.

Nelson K.O. Ojijo, Eyal Shimoni, Minimization of cassava paste flow properties using the `Farris effect', LWT - Food Science and Technology, Volume 41, Issue 1, January 2008, Pages 51-57, ISSN 0023-6438, DOI: 10.1016/j.lwt.2007.01.020.
(http://www.sciencedirect.com/science/article/B6WMV-4N3GHR9-2/2/eca579e26ace11cf64382874b39c0412)
Abstract:
Cereals and tuber crops are the raw materials for thin porridges meant for infant feeding in many parts of the world. However, the high viscosity and low energy density of such starchy porridges limit their use as complementary foods. In this study, we have employed the so-called 'Farris effect' to minimize the apparent viscosity of cooked cassava pastes. The particle size distributions of cassava flour, ground to varying degrees of fineness, were obtained using a laser diffraction particle size analyzer. Pastes were then prepared at various flour solids concentrations by boiling for 15 min under reflux. Flow properties were then determined at 25+/-0.02 [degree sign]C over the shear rate range 0-1200 s-1 using a Haake Rheostress I rheometer. The swelling power, extent of solubilization, volume fraction at maximum packing, paste viscosity, and yield stress all depended on the average flour particle size. By mixing fine and coarse flours of different particle size distributions, the apparent viscosity and yield stress of the resulting pastes were reduced by over 20% at a some critical volume fraction and particle size ratio. This technique could provide an effective means of improving the energy density of cereal and root crop-based thin porridges.
Keywords: Cassava; Paste; Viscosity; Energy density; Rheology; Particle size distribution

Erik Lichtenberg, Chengri Ding, Assessing farmland protection policy in China, Land Use Policy, Volume 25, Issue 1, January 2008, Pages 59-68, ISSN 0264-8377, DOI: 10.1016/j.landusepol.2006.01.005.
(http://www.sciencedirect.com/science/article/B6VB0-4NHV74H-2/2/8f116238eade25f6ac4116f640ca4c85)
Abstract:
The government of China targeted conversion of farmland to industrial and residential uses, especially in the most productive agricultural regions, as the chief threat to the nation's continued capacity to produce adequate levels of staple cereals. In response, it has introduced a number of measures aimed at protecting farmland, especially farmland with the greatest production potential. This paper reviews the existing evidence regarding the performance of China's farmland protection policies in light of its food security goals. We summarize recent farmland protection measures. Despite administrative restrictions on farmland conversion, cropland continues to decline. The evidence suggests that a substantial share of farmland losses does not represent a reduction in food production capacity. It also suggests that increases in other factors of production can compensate for farmland losses and that farmland protection is not the most efficient--or even a necessary--means of meeting China's food security goals. However, the existing institutional and

policy structure create incentives for both insufficient farmland retention and excessive farmland conversion, resulting in significant inefficiencies in land use. We discuss the implications of these failures for future policy development, with an emphasis on reform of the land allocation system.
Keywords: China; Farmland conversion; Farmland preservation; Food security; Land allocation

Florian Wichern, Elmar Eberhardt, Jochen Mayer, Rainer Georg Joergensen, Torsten Muller, Nitrogen rhizodeposition in agricultural crops: Methods, estimates and future prospects, Soil Biology and Biochemistry, Volume 40, Issue 1, January 2008, Pages 30-48, ISSN 0038-0717, DOI: 10.1016/j.soilbio.2007.08.010.
(http://www.sciencedirect.com/science/article/B6TC7-4PNF89G-1/2/4af9459020f60050bef1bd5fb6e7f15e)
Abstract:
The objective of the present review was to present the current knowledge on nitrogen (N) rhizodeposition, including techniques for 15N labelling of agricultural plants, amounts of N rhizodeposition and its fate in soil. Rhizodeposition is the process of release of organic and inorganic compounds from living plant roots. It is often quantified in terms of carbon (C) and less often as N derived from rhizodeposition (NdfR). Rhizodeposition of N can be estimated by labelling plants with 15N and following its fate in soil. Most methods used for labelling plants with 15N can only be applied after appearance of the first leaf and only allow pulse or multiple pulse labelling. Only the split-root technique and the application of gaseous 15N allow continuous labelling. All methods available at present have their flaccidities mostly due to the fact that the application of N is not following its physiological pathway of assimilation or by using artificial conditions. In the studies reviewed, amounts of N rhizodeposits ranged from 4% to 71% of total assimilated plant N. In legumes the median was 16% and in cereals it was 14%. Rhizodeposits were 15-96% of the below-ground plant biomass (BGP). In legumes the median was 73% and in cereal it was 57%. The high variability of these results shows the need for more investigations on N rhizodeposition looking especially on the factors influencing the amounts released in different plant species under field conditions.
Keywords: 15N; Labelling; Nitrogen; Rhizodeposition; Rhizodeposits; Stable isotopes

Jascha I. Leenhouwers, Roy C. Ortega, Johan A.J. Verreth, Johan W. Schrama, Digesta characteristics in relation to nutrient digestibility and mineral absorption in Nile tilapia (Oreochromis niloticus L.) fed cereal grains of increasing viscosity, Aquaculture, Volume 273, Issue 4, 20 December 2007, Pages 556-565, ISSN 0044-8486, DOI: 10.1016/j.aquaculture.2007.10.044.
(http://www.sciencedirect.com/science/article/B6T4D-4PYYTNX-1/2/d05027eec686df862fb73ec04d86d761)
Abstract:
Soluble non-starch polysaccharides (NSP) present in cereal grains may affect performance of Nile tilapia through changes in digesta characteristics. The objective of this study was to investigate whether dietary cereal grains of increasing viscosity induce changes in digesta viscosity, dry matter and volatile fatty acids (VFA) and if these changes explain differences in nutrient digestibility and mineral absorption. Four experimental diets were formulated by adding 40% grains to a basal diet to obtain a range of dietary viscosities, increasing in the order of maize, barley, wheat and rye. The diets were assigned to 16 tanks with 40 fish (mean weight 70 g) each. Digesta viscosity increased with increasing grain viscosity ($P < 0.001$), whereas digesta dry matter decreased with increasing grain viscosity ($P < 0.05$). No significant differences were found among diets in total concentration and type of VFA. Nutrient digestibility was not significantly correlated with digesta viscosity. Of all nutrients, only starch digestibility was significantly negatively correlated with digesta dry matter in the middle intestine ($r = - 0.57$; $P = 0.03$). Absorption of sodium was significantly negatively correlated with digesta viscosity in all intestinal segments ($r = - 0.76$ to $- 0.82$; $P < 0.001$) and positively correlated with digesta dry matter in all intestinal

segments (r = + 0.60 to + 0.67; P < 0.05), except for the proximal intestine (P = 0.18). Of the other minerals, potassium and magnesium absorption were positively correlated with digesta dry matter in the distal (r = + 0.56; P = 0.03) and proximal (r = + 0.54; P = 0.04) intestine, respectively. Phosphorus absorption was significantly negatively correlated with dry matter in the stomach (r = - 0.55; P = 0.03), middle (r = - 0.58; P = 0.02) and distal (r = - 0.54; P = 0.04) intestine. In conclusion, viscous cereal grains induce increases in digesta viscosity and decreases in digesta dry matter in Nile tilapia. These changes do not explain differences in nutrient digestibility among diets, but seem more related to differences in mineral absorption. The strong negative correlations between digesta viscosity and sodium absorption suggest negative effects of dietary viscous grains on intestinal water balance.
Keywords: Nile tilapia; Non-starch polysaccharides; Digesta; Viscosity; Nutrient digestibility; Mineral absorption

Selim Kapur, John Ryan, Erhan Akca, Ismail Celik, Marcello Pagliai, Yusuf Tulun, Influence of mediterranean cereal-based rotations on soil micromorphological characteristics, Geoderma, Volume 142, Issues 3-4, 15 December 2007, Pages 318-324, ISSN 0016-7061, DOI: 10.1016/j.geoderma.2007.08.024.
(http://www.sciencedirect.com/science/article/B6V67-4PSJT4N-2/2/f6853d4e0cb0eaab53c67b86eb0d1106)
Abstract:
The extent to which land management practices are sustainable depends on the maintenance of soil quality from the physical, chemical and biological perspectives. However, there is little information on soil quality in Mediterranean environments where climatic factors limit carbon (C) input and yet promote mineralization of what little C is returned to the soil. The impact of any soil and crop management practice on soil quality attributes in any ecosystem can only be objectively assessed under long-term agronomic trials. In such trials, especially in fragile, semi-arid regions, little emphasis has been given to soil physical parameters despite the perceived importance of aggregation on crop growth, water relations and erosion. In one long-term, cereal-based trial from Syria, four representative crop sequences were selected as they have varying influence on soil organic matter (SOM) levels, e.g., fallow, continuous wheat (Triticum turgidum var durum), vetch (Vicia sativa), and medic (Medicago spp.). These rotations showed increased aggregate stability as SOM increased. Our study examined water-stable aggregates from these rotations at the micromorphological level using the polarizing (on thin sections) and scanning electron microscope. The observations of the influence of SOM at the micro level were inconsistent with those at the macro level as determined by wet sieving. This discrepancy may be related to the age of the SOM and the extent to which organic carbon is intimately mixed with mineral matter. Nevertheless, the changes determined on the shape and porosity characteristics of the water-stable aggregates suggest the value of the micro-scale approach in understanding the mechanism of soil microstructure development. Micromorphology can identify visual details of the physical changes in the evolution of soil microstructure under varying cropping systems.
Keywords: Micromorphology; Crop sequences; Mediterranean ecosystems; Water-stable aggregates; Soil microstructure

Pavel Saska, Maarten Vodde, Theodoor Heijerman, Paula Westerman, Wopke van der Werf, The significance of a grassy field boundary for the spatial distribution of carabids within two cereal fields, Agriculture, Ecosystems & Environment, Volume 122, Issue 4, December 2007, Pages 427-434, ISSN 0167-8809, DOI: 10.1016/j.agee.2007.02.013.
(http://www.sciencedirect.com/science/article/B6T3Y-4NK46JW-1/2/b81c593c66ab3a86f18475511c37b9eb)
Abstract:

This paper investigated how distance from the field edge affects overall activity-density, species richness and distribution of individual carabid (Coleoptera: Carabidae) species. Carabid beetles were sampled using pitfall traps at six different locations: grassy field boundary, 0 (field edge), 4, 11, 24 and 49 m distance from the field edge, in two fields of winter wheat (Wageningen, the Netherlands) during the spring and early summer of 2004. The assemblage of carabid beetles was highly diverse, consisting of 75 species. Carabid activity-density was low in the boundary compared to the field. Within the field, it was highest at the edge and decreased towards the field centre. Species richness, standardized to the number of individuals, did not differ between sampling locations. Based on the within-field distribution three ecological groups of carabids were distinguished: (i) boundary species; (ii) field-interior species and (iii) field-edge species. Because species within one genus differ in their response to the boundary, the importance of studies at species level is stressed.
Keywords: Ground beetles; Functional diversity; Field margins; Edge-effect; Biotope interface

Thomas Amon, Barbara Amon, Vitaliy Kryvoruchko, Andrea Machmuller, Katharina Hopfner-Sixt, Vitomir Bodiroza, Regina Hrbek, Jurgen Friedel, Erich Potsch, Helmut Wagentristl, Matthias Schreiner, Werner Zollitsch, Methane production through anaerobic digestion of various energy crops grown in sustainable crop rotations, Bioresource Technology, Volume 98, Issue 17, December 2007, Pages 3204-3212, ISSN 0960-8524, DOI: 10.1016/j.biortech.2006.07.007.
(http://www.sciencedirect.com/science/article/B6V24-4KRY8R8-2/2/5ab59fb2ffaa359192b976d797f35a4c)
Abstract:
Biogas production is of major importance for the sustainable use of agrarian biomass as renewable energy source. Economic biogas production depends on high biogas yields. The project aimed at optimising anaerobic digestion of energy crops. The following aspects were investigated: suitability of different crop species and varieties, optimum time of harvesting, specific methane yield and methane yield per hectare. The experiments covered 7 maize, 2 winter wheat, 2 triticale varieties, 1 winter rye, and 2 sunflower varieties and 6 variants with permanent grassland. In the course of the vegetation period, biomass yield and biomass composition were measured. Anaerobic digestion was carried out in eudiometer batch digesters. The highest methane yields of were achieved from maize varieties with FAO numbers (value for the maturity of the maize) of 300 to 600 harvested at 'wax ripeness'. Methane yields of cereals ranged from . Cereals should be harvested at 'grain in the milk stage' to 'grain in the dough stage'. With sunflowers, methane yields between were achieved. There were distinct differences between the investigated sunflower varieties. Alpine grassland can yield . The methane energy value model (MEVM) was developed for the different energy crops. It estimates the specific methane yield from the nutrient composition of the energy crops.
Energy crops for biogas production need to be grown in sustainable crop rotations. The paper outlines possibilities for optimising methane yield from versatile crop rotations that integrate the production of food, feed, raw materials and energy. These integrated crop rotations are highly efficient and can provide up to 320 million t COE which is 96% of the total energy demand of the road traffic of the EU-25 (the 25 Member States of the European Union).
Keywords: Biogas; Anaerobic digestion; Methane; Sustainable production of biomass; Energy crops

Soo-Yeun Moon, Eunice C.Y. Li-Chan, Assessment of added ingredient effect on interaction of simulated beef flavour and soy protein isolate by gas chromatography, spectroscopy and descriptive sensory analysis, Food Research International, Volume 40, Issue 10, December 2007, Pages 1227-1238, ISSN 0963-9969, DOI: 10.1016/j.foodres.2007.08.002.
(http://www.sciencedirect.com/science/article/B6T6V-4PGPVR1-1/2/023b535da9871b7e24480be310c08587)

Abstract:
The influence of ingredients such as glucosamine, sucrose, ascorbic acid, and/or polyethylene glycol, on the release of beefy aroma components of simulated beef flavour (SBF) in the presence of soy protein isolate (SPI), were investigated. Conformational changes of SPI protein structure induced by the added ingredients were also detected. Addition of ascorbic acid alone or with polyethylene glycol resulted in reduction of disulfide bonds, increase in surface hydrophobicity and increase in unordered structure of SPI. The SPI-SBF mixtures containing ascorbic acid alone or with polyethylene glycol showed increased GC peak areas of indicator peaks, which were associated with an increase in the perceived beef characteristic attributes in descriptive analysis, as expressed by enhancement of roasted note and diminishing of soymilk-like and cereal notes. These results provide the basis for further research to elucidate strategies to maximize perception of beefy aroma in soy based products.
Keywords: Soy protein isolate; Simulated beef flavour; Ascorbic acid; Gas chromatography; Raman spectroscopy; Sensory analysis

Soo-Yeun Moon, Eunice C.Y. Li-Chan, Changes in aroma characteristics of simulated beef flavour by soy protein isolate assessed by descriptive sensory analysis and gas chromatography, Food Research International, Volume 40, Issue 10, December 2007, Pages 1239-1248, ISSN 0963-9969, DOI: 10.1016/j.foodres.2007.08.003.
(http://www.sciencedirect.com/science/article/B6T6V-4PGPVR1-2/2/ee71d1fba639d6bef348aea67fc10212)
Abstract:
Descriptive sensory analysis (DA) and gas chromatography (GC) analysis were conducted to investigate changes in aroma characteristics of simulated beef flavour (SBF) upon addition of soy protein isolate (SPI). Five attributes (beefy, roasted, yeasty, soymilk-like and cereal) were selected to assess various mixtures of SBF and SPI. The results of DA confirmed that 'roasted', 'beefy' and 'yeasty' notes were highly positively correlated with SBF concentration, and the beefy related notes were substantially suppressed by increasing SPI content. Fifteen peaks from GC analysis were selected as indicator peaks to represent beefy attribute based on their odour-active properties assessed by GC-olfactometry and correlation of their peak areas with beefy intensity in mixtures of SPI and SBF assessed by DA. The indicator peaks may form the basis of further research to explicate the nature of SPI-SBF interactions to explain the suppression of perceived intensity of beef flavour in soy protein products.
Keywords: Simulated beef flavour; Soy protein isolate; Descriptive sensory analysis; Gas chromatography; Aroma

I. Barikmo, F. Ouattara, A. Oshaug, Differences in micronutrients content found in cereals from various parts of Mali, Journal of Food Composition and Analysis, Volume 20, Issue 8, 6th International Food Data Conference, December 2007, Pages 681-687, ISSN 0889-1575, DOI: 10.1016/j.jfca.2007.04.002.
(http://www.sciencedirect.com/science/article/B6WJH-4NJ209J-1/2/d26f0f28b01750d580e22f50d7221e03)
Abstract:
Food samples were collected from four different regions (Mopti, Segou, Timbuktu and Bamako) in Mali. The cereals, analyzed for iron, zinc, thiamine, riboflavin and niacin, were millet (Pennisetum glaucum), sorghum (Sorghum bicolor), rice (Oryza sativa), wheat (Triticum aestivum) and fonio (Digitaria exilis). For millet the lowest coefficient of variation (CV %) between the regions was found in thiamine (15%) and the highest variation in niacin (126%). For sorghum it was the same nutrients that gave the lowest and highest CV, 34% in thiamine and 98% in niacin. For rice, however, the main variations were for zinc (lowest, CV 20%) and iron (highest, 141%). For wheat the lowest CV was in thiamine (47%) and highest in iron (115%), while for fonio the lowest CV was

in zinc (9%) and highest in iron (61%). Even though the variation was very high for all nutrients except zinc in fonio, it was thiamine and zinc that differed the least and iron and niacin that differed the most. The use of different methods and laboratories could not explain the variation between different regions. The variation between ecological zones seems rather important. This raises the question of whether we can defend borrowing data on food composition from one country or area to another, with different ecological and climatic conditions. The globalization process impacting all countries actualize this question even more than before. Finally this has consequences for the design and use of the food composition table for Mali, which contain one main table giving average values, and separated tables from each region giving regional data when they are available.
Keywords: Food composition data; Mali; Cereal; Micronutrient content; Ecological zones

Sara S. Duvenage, Hettie C. Schonfeldt, Impact of South African fortification legislation on product formulation for low-income households, Journal of Food Composition and Analysis, Volume 20, Issue 8, 6th International Food Data Conference, December 2007, Pages 688-695, ISSN 0889-1575, DOI: 10.1016/j.jfca.2007.04.001.
(http://www.sciencedirect.com/science/article/B6WJH-4NJ209J-2/2/97fa8411dce031e57bcfe9aa6d8cc505)
Abstract:
Newly introduced legislation for the fortification of maize meal and bread flour in South Africa enhanced nutritive intakes for selected nutrients and enabled the formulation of an affordable, dry, plant-based premixed food product for low-income households. Firstly, the nutritive intakes and relatedness to prevalent nutrient deficiencies in South Africa were calculated to portray the impact of the implemented food fortification legislation [Republic of South Africa (RSA), 2003. Department of Health. Government notice. No. R2003. Regulations relating to the fortification of certain foodstuffs. Section 15(1) of the Foodstuffs, Cosmetics and Disinfectants Act, No. 54 of 1972. Retrieved February 25, 2005, <http://www.doh.gov.za/search/default.asp>]. Despite fortification, nutritive intakes were still significantly less than recommended. Linear programming was then applied to plot the estimated average requirements (EAR) for females (19-50 years) against nutritive content and cost of 100 g cooked product of each of the constituent ingredients of the premix product. Programming constraints were manipulated to identify the most viable ratio of possible ingredients to satisfy the indicated nutritive requirements and affordability. Due to fortification, vitamin A was eliminated as major formulation constraint, enabling satisfaction for vitamin A, zinc, iron and folate. Constraints for pyridoxine, riboflavin and thiamine were alleviated, facilitating product formulation. The provisioning for energy (-5%) and potassium (-7%) were indicated as limitations and relaxed to derive a reasonable answer. However, nutrients naturally restricted in cereal grains and legumes could not be provided for. The approach as developed could be applied by industry and others to enhance affordable and sustained nutrient intake to survival households.
Keywords: Fortification legislation; Amino acid score; Dietary reference intakes; Linear programming; Product optimisation

Nelofar Athar, J. Cunningham, W. Aalbersberg, Food composition activities in the Oceania region, Journal of Food Composition and Analysis, Volume 20, Issue 8, 6th International Food Data Conference, December 2007, Pages 709-712, ISSN 0889-1575, DOI: 10.1016/j.jfca.2007.01.003.
(http://www.sciencedirect.com/science/article/B6WJH-4N2D2SK-2/2/c0accd13c6703b2a4c0629bd57e7a0ed)
Abstract:
OCEANIAFOODS was established in 1987. Countries under its umbrella are Australia, New Zealand and the Secretariat of Pacific Communities (SPC, formerly the South Pacific Commission), which represents 22 Pacific Island governments. The convenorship rotates among these three regions. This report highlights major activities undertaken by OCEANIAFOODS from

2002 to 2005. The SPC, based in New Caledonia, includes a Lifestyle Health section (LHS) and a sub-office in Fiji. In Fiji, the Food and Agriculture Organisation (FAO) commissioned a project to strengthen food analytical capability in the Pacific region. The project, which ran from April 2002 to August 2004, succeeded in meeting all its goals with some adjustments. In Australia, food composition work is undertaken by Food Standards Australia New Zealand (FSANZ) and has focused on three key areas: providing a free web-based nutrition panel calculator for nutrition labelling, preparing for the release of updated Australian nutrient data, and initiating several small analytical projects including the analysis of iodine levels in common foods and folates and folic acid in foods such as breakfast cereals. Activities outside FSANZ include further research on folate analysis at the University of New South Wales. In New Zealand, the focus has been on developing the food composition database. In 2003, Dr. Heather Greenfield reviewed the New Zealand Food Composition Database (NZFCDB), and in July 2004 the Ministry of Health renewed Crop and Food Research's contract until June 2007 to maintain the database. Publications over the last 3 years include the sixth edition of the concise food composition tables and release of an updated FOODFiles2004 electronic data files. In April 2005, the Seventh OCEANIAFOODS Conference, Innovations in Nutrient Information, was held in Wellington, New Zealand. Fifty-nine delegates attended the conference at which keynote addresses were given by Joanne Holden (USA), Bill Aalbersberg (Fiji), and Heather Greenfield (Australia). The conference resulted in 13 recommendations being formulated. The convenor of the next OCEANIAFOODS conference is Professor Bill Aalbersberg, Fiji.
Keywords: OCEANIAFOODS; Food composition; Nutrient data

R. Shyama Prasad Rao, R. Sai Manohar, G. Muralikrishna, Functional properties of water-soluble non-starch polysaccharides from rice and ragi: Effect on dough characteristics and baking quality, LWT - Food Science and Technology, Volume 40, Issue 10, December 2007, Pages 1678-1686, ISSN 0023-6438, DOI: 10.1016/j.lwt.2006.12.014.
(http://www.sciencedirect.com/science/article/B6WMV-4MX56PM-2/2/3e539285e691614ac6f7995f8652ba8b)
Abstract:
Water-soluble non-starch polysaccharides (NSP) were isolated from native and malted rice and ragi. The effects of addition of water-soluble NSP on dough rheological characteristics and baking quality were investigated. Water-soluble NSP had low relative viscosity and showed no gelling activity despite considerable amount of ferulic acid (~492.5-528.0 [mu]g/g). However, they were found to stabilize protein foams against thermal disruption. Addition of water-soluble NSP (0.25 and 0.50%) to wheat flour resulted in increased water absorption and decreased dough development time. However, prolonged mixing resulted in slightly lower dough stability. Increase in dough extensibility and improvement in starch pasting characteristics were observed upon the addition of water-soluble NSP. Significant increase in loaf volume and softness of the bread was also observed. Water-soluble NSP both from malted rice and ragi had higher effect compared to the native one. Results showed that water-soluble NSP can be added to various low-fiber food preparations with positive dough functionality.
Keywords: Cereals; Dough characteristics; Non-starch polysaccharides; Ragi; Rice

Shin-ichiro Mitsunaga, Midori Kobayashi, Satoe Fukui, Kayoko Fukuoka, Osamu Kawakami, Junji Yamaguchi, Masahiro Ohshima, Toshiaki Mitsui, [alpha]-Amylase production is induced by sulfuric acid in rice aleurone cells, Plant Physiology and Biochemistry, Volume 45, Issue 12, December 2007, Pages 922-925, ISSN 0981-9428, DOI: 10.1016/j.plaphy.2007.09.004.
(http://www.sciencedirect.com/science/article/B6VRD-4PRYFW0-1/2/df981178676c887433d131a233519f78)
Abstract:

The hydrolytic enzyme [alpha]-amylase (EC 3.2.1.1) is produced mainly in aleurone cells of germinating cereals, and the phytohormone gibberellin (GA) is essential for its induction. However, in rice (Oryza sativa L.), sulfuric acid (H2SO4) induces [alpha]-amylase production in aleurone tissue even in the absence of GA. Here, the pre-treatment of rice aleurone cells with H2SO4 and incubation in water induced [alpha]-amylase activity, as if the cells had been incubated in GA solution.
Keywords: Rice; [alpha]-Amylase; Aleurone cells; Gibberellin; Sulfuric acid

T. Brevault, S. Bikay, J.M. Maldes, K. Naudin, Impact of a no-till with mulch soil management strategy on soil macrofauna communities in a cotton cropping system, Soil and Tillage Research, Volume 97, Issue 2, December 2007, Pages 140-149, ISSN 0167-1987, DOI: 10.1016/j.still.2007.09.006.
(http://www.sciencedirect.com/science/article/B6TC6-4R34DR3-1/2/fec1318c3a0015a7e28667b4fd972051)
Abstract:
Systematic exportation, burning of crop residues and decreases in fallow periods have led to a large-scale depletion of soil organic matter and degradation of soil fertility in the cotton (Gossypium hirsutum L.) cropping systems of Cameroon. The present study tested whether soil management systems based on a no-till with mulch approach intercropped with cereals, which has been shown to restore cotton production, could boost the biological activity of soil macrofauna. The impacts of no tillage with grass mulch (Brachiaria ruziziensis Germain and Eward) (NTG) and no tillage with legume mulch (Crotalaria retusa L. or Mucuna pruriens Bak.) (NTL) on the abundance, diversity and functional role of soil invertebrates were evaluated during the third year of implementation in northern Cameroon (Winde and Zouana), compared to conventional tillage (CT) and no tillage (NT) without mulch. Macrofauna were sampled from two 30 cm x 30 cm soil cubes (including litter) at the seeding stage of cotton, and 30 days later. The collected organisms were grouped into detritivores, herbivores and predators. Examination of the soil macrofauna patterns revealed that the abundance and diversity of soil arthropods were significantly higher in NTG and NTL than in CT plots (+103 and +79%, respectively), while that of NT plots was in-between the no tillage groups and CT (+37%). Regarding major ecological functions, herbivores and predators were significantly more abundant in NTG and NTL plots than in CT plots at Winde (+168 and +180%, respectively), while detritivores, predators and herbivores were significantly more abundant in the NTG plots than in CT plots at Zouana (+92, +517 and +116%, respectively). Formicidae (53.6%), Termitidae (24.7%) and Lumbricidae (9.4%) were the most abundant detritivores while Julidae (46.1%), Coleoptera larvae (22.1%) and Pyrrhocoridae or Reduviidae (11.8%) were the dominant herbivores. The major constituents of the predatory group were Araneae (33.8%), Carabidae (24.6%), Staphylinidae (15.7%) and Scolopendridae (10.3%). Direct seeding mulch-based systems, NTG and NTL, favoured the establishment of diverse macrofaunal communities in the studied cotton cropping system.
Keywords: Soil; Macrofauna; Conservation agriculture; No tillage; Cover crop; Cotton; Africa

I.A.M. Yunusa, M.A. Rashid, Productivity and rotational benefits of grass, medic pastures and faba beans in a rainfall limited environment, Soil and Tillage Research, Volume 97, Issue 2, December 2007, Pages 150-161, ISSN 0167-1987, DOI: 10.1016/j.still.2007.09.013.
(http://www.sciencedirect.com/science/article/B6TC6-4R2H1NK-2/2/9b6240e95c7bf1d09a26fe30e98b95ab)
Abstract:
This study was undertaken to ascertain whether pulses, instead of pasture legumes, were more beneficial to grain yields by the following cereals in ley rotation systems. We evaluated growth processes for pastures or pulses and growth and yields for the following sequential crops of wheat and barley in a 3-crop rotation. The pasture or pulse phase that formed the main treatments

consisted of grass pastures (Grass), medics (Medic) or faba beans that was either green manured (Faba-gm) or harvested for grain (Faba-gr). The rotations were initiated in two phases with Phase 1 starting in 1994 and Phase 2 in 1995, and each phase ran over 2 rotation cycles lasting 6 years. Despite differences in dry matter (DM) produced in the shoots and roots by the pastures and faba beans in the first years, they had similar seasonal evapotranspiration (ET) so water stored in the 100 cm profile of the soil was always similar when wheat was planted. By contrast, inorganic N in soil at wheat planting was always higher in legume rotations than in Grass and these differences persisted to the barley crop. Cereals in rotations with faba beans (Faba-gr and Faba-gm) produced more DM and grains than in Grass. In only 2 out of 8 croppings of cereals did wheat or barley in Medic out-yield those in Grass. These yield differences were not associated with uptake of soil N or use of soil-water by the cereals, but possibly due to lower levels of Pratylenchus neglectus in the soil under rotations with faba beans compared with pasture. Increased N supply after legumes or from fertilizer, however, increased grain protein in the cereals. This study showed that rotations with faba beans produced higher yields for the following cereals than with grassy or legume pastures, also green manuring of faba beans produced no advantage in yield for the cereals.
Keywords: Grain yield; Nitrogen; Pratylenchus neglectus; Root growth; Rotations; Soil-water; Water use efficiency

Brian S. Atkinson, Debbie L. Sparkes, Sacha J. Mooney, Using selected soil physical properties of seedbeds to predict crop establishment, Soil and Tillage Research, Volume 97, Issue 2, December 2007, Pages 218-228, ISSN 0167-1987, DOI: 10.1016/j.still.2007.09.017.
(http://www.sciencedirect.com/science/article/B6TC6-4R5G32P-2/2/6abee524461cae4d20561d5c9aea9d81)
Abstract:
Seedbed preparation can involve a wide range of tillage methods from intensive to reduced cultivation systems. The state or quality of the soil to which these tillage methods are applied for cereal crop management is not easily determined and excessive cultivations are often used. Seedbed preparation is crucial for crop establishment, growth and ultimately yield. A key aspect of the soil condition is the soil physical environment under which germination, growth and establishment occur. Crucially this affects factors such as temperature, water content, oxygen availability, soil strength and ultimately the performance of a seedbed. The dynamics of soil physical properties of a range of seedbeds and how they relate to crop establishment are considered in this paper. Significant interactions between cultivation techniques, physical properties of the seedbed in terms of penetration resistance, shear strength, volumetric water content and bulk density and the interaction with crop establishment were identified. A soil quality of establishment (SQE) model was developed for the prediction of crop establishment based upon soil bulk density and cultivation practices. The SQE significantly accounted for ca. 50% of the variation occurring and successfully predicted crop establishment to a standard error of around 20 plants per m-2 across contrasting soil types and environmental conditions.
Keywords: Soil quality; Tillage; Soil physical properties; Seedbed; Establishment

Michael J. Bell, Graham R. Stirling, Clive E. Pankhurst, Management impacts on health of soils supporting Australian grain and sugarcane industries, Soil and Tillage Research, Volume 97, Issue 2, December 2007, Pages 256-271, ISSN 0167-1987, DOI: 10.1016/j.still.2006.06.013.
(http://www.sciencedirect.com/science/article/B6TC6-4KMYKXS-1/2/38b970de7979cba00e78c7eaa7914348)
Abstract:
The grain and sugarcane industries are the dominant cropping enterprises in Australia. Both are facing similar problems in maintaining productivity and profitability, although the management practices employed to achieve these objectives in the two industries differ markedly. The farming systems of both industries have evolved in recent years as our understanding of the physical and

chemical benefits of practices like residue retention, reduced tillage and controlled traffic have improved. However the impact of such practices is often evaluated in terms of cost savings, operational efficiencies and efficient capture and use of water.
Soil health has not always been an important consideration in system change in either industry, with the exception that crop rotation has always been recognised as important in minimising the impact of soil-borne pathogens. Rotations have been a key feature of grain cropping systems and short duration legume fallows are becoming more prevalent in the sugar industry after more than 25 years of monocultures. However, intensification of cropping in recent years has meant that the pasture leys that were once a dominant component of the grain rotation systems are increasingly being supplanted by short duration cropping breaks with grain legume or other non-cereal crops.
Soil organic C has generally been recognised as an important component of soil fertility, but more for the role it plays in soil physical and chemical fertility. Links between organic matter status and soil biological health, and particularly to farming system viability and sustainability, have proven difficult to quantify. This has been partly due to a lack of tools or criteria for monitoring relevant soil properties and also to our limited understanding of the interactions between soil health and other system components. However recent studies are suggesting that the amount and quality of organic matter returned as roots and residues, and the placement of that residue relative to areas of future crop root activity, may be significant factors in the sustainable farming systems of the future.
This paper identifies key issues associated with current and developing farming systems in the grain and sugar industries in Australia, and assesses the impact of management practices employed in those systems on soil health. It also identifies some key challenges facing soil biologists and farming systems researchers who are trying to achieve improvements in soil health and sustainability.
Keywords: Sugarcane; Cereal grain; Tillage; Residue management; Rotation; Soil health

Inge Skrumsager Moller, Mark Tester, Salinity tolerance of Arabidopsis: a good model for cereals?, Trends in Plant Science, Volume 12, Issue 12, December 2007, Pages 534-540, ISSN 1360-1385, DOI: 10.1016/j.tplants.2007.09.009.
(http://www.sciencedirect.com/science/article/B6TD1-4R70K7J-2/2/6977ec3a91eaa0cb59fa9d6912f89b08)
Abstract:
Arabidopsis is a glycophyte species that is sensitive to moderate levels of NaCl. Arabidopsis offers unique benefits to genetic and molecular research and has provided much information about both Na+ transport processes and Na+ tolerance. A compilation of data available on Na+ accumulation and Na+ tolerance in Arabidopsis is presented, and comparisons are made with several crop plant species. The relationship between Na+ tolerance and Na+ accumulation is different in Arabidopsis and cereals, with an inverse relationship often found within cereal species that is not as evident in Arabidopsis ecotypes. Results on salinity tolerance obtained in Arabidopsis should therefore be extrapolated to cereals with caution. Arabidopsis remains a useful model to study and discover plant Na+ transport processes.

M.A. Aslaksen, O.F. Kraugerud, M. Penn, B. Svihus, V. Denstadli, H.Y. Jorgensen, M. Hillestad, A. Krogdahl, T. Storebakken, Screening of nutrient digestibilities and intestinal pathologies in Atlantic salmon, Salmo salar, fed diets with legumes, oilseeds, or cereals, Aquaculture, Volume 272, Issues 1-4, 26 November 2007, Pages 541-555, ISSN 0044-8486, DOI: 10.1016/j.aquaculture.2007.07.222.
(http://www.sciencedirect.com/science/article/B6T4D-4PBDPW6-5/2/b736d5dfbbff8feadc22147cece6e2ba)
Abstract:

Ten different plant protein and/or starch sources were studied in a 5-week experiment with triplicate groups of 0.7-kg Atlantic salmon in seawater, pre-adapted to a diet with fish meal, faba beans, sunflower cake, and wheat gluten as sources of protein and starch. The experimental ingredients were corn gluten, defatted soybean, defatted sunflower, dehulled lupin, defatted double-low rapeseed, whole field pea, whole and dehulled faba bean, whole wheat and naked oat, tested one at a time (14-24% inclusion). The diets were balanced by addition of pure wheat starch and/or pure cellulose, to obtain equal macro nutrient compositions. The control diet consisted of fish meal, wheat starch, cellulose and fish oil. The results showed reduced faecal dry matter content in fish fed the soybean diet and to a lesser extent in those fed the sunflower, lupin and rapeseed diets. Diets containing lupin and rapeseed resulted in a moderate increase in the viscosity of the digesta, while diets with wheat and oat increased viscosity of digesta more. Apparent digestibility of lipid decreased linearly with increasing dietary cellulose level. A significant reduction in the digestibility of crude protein was seen for the soybean, sunflower, rapeseed and oat diets, reflecting reduced digestibilities of most amino acids. The salmon fed the corn gluten, lupin, pea, bean and wheat diets had protein digestibilities comparable to the control group. The digestibility of phosphorus was highest for salmon fed the rapeseed diet and lowest for fish fed the oat diet. Faecal excretion of sodium was highly elevated for salmon fed the soybean diet, and moderately elevated for fish fed the corn gluten and sunflower diets. Faecal excretion of zinc was elevated in the fish fed the oat diet. None of these observations were significantly related to the dietary concentration of phytic acid. A histological examination of the stomach, mid- and distal intestine of all groups showed no other irregularities than enteritis in the distal intestine of salmon fed soybean meal. The present study demonstrated a potential for several plant ingredients, such as field pea and faba bean, partly replacing high-quality fish meal in diets for Atlantic salmon, based on nutrient digestibilities and absence of pathologies in the stomach and intestine.
Keywords: Atlantic salmon; Corn gluten; Soybean; Sunflower; Lupin; Rapeseed; Field pea; Faba bean; Wheat; Oat; Viscosity; Digestibility; Pathology; Enteritis

M. Pala, J. Ryan, H. Zhang, M. Singh, H.C. Harris, Water-use efficiency of wheat-based rotation systems in a Mediterranean environment, Agricultural Water Management, Volume 93, Issue 3, 16 November 2007, Pages 136-144, ISSN 0378-3774, DOI: 10.1016/j.agwat.2007.07.001.
(http://www.sciencedirect.com/science/article/B6T3X-4PK8MJH-1/2/d5910637b5f8228d710a89baf3e856d8)
Abstract:
Crop production in Mediterranean-type environments is invariably limited by low and erratic rainfall (200-600 mm year-1), and thus soil moisture, and by high evapotranspiration resulting from high temperature. Consequently, a major research challenge is to devise cropping systems that maximize water-use efficiency (WUE). In a long-term trial in northern Syria (1986-1998) we compared the effects of seven wheat-based rotations on soil water dynamics and WUE in both the wheat and non-wheat phase. The cropping systems were durum wheat (Triticum turgidum L.) in rotation with fallow, watermelon (Citrullus vulgaris), lentil (Lens culinaris), chickpea (Cicer arietinum), vetch (Vicia sativa), medic pasture (Medicago spp.), and wheat. Seasonal recharge/discharge were identified using the neutron probe. Depth of wetting varied with seasonal rainfall (233-503 mm). Based on crop yields, WUE was calculated for each cropping option in relation to the durum wheat crop.
The greatest limitation to growth was the supply of water and not the soil moisture storage potential. Wheat grain yield was dictated by the extent to which the alternative crops in the rotation dried out the soil profile, in addition to seasonal rainfall and its distribution. Chickpea and medic extracted as much water as continuous wheat. Wheat after these crops was solely dependent on current seasonal rainfall, but fallow, lentil, watermelon, and vetch did not deplete soil moisture to the same extent, leaving some residual soil moisture for the succeeding wheat crop. This difference in soil water resulted in a significant difference in wheat yield and hence WUE, which

decreased in the following crop rotation sequence: fallow, medic, lentil, chickpea, and continuous wheat. However, on the system basis, the wheat/lentil or wheat/vetch systems were most efficient at using rainfall, producing 27% more grain than the wheat/fallow, while the wheat/chickpea system was as efficient as wheat/fallow system, with continuous wheat being least efficient. With N added to the cereal phase, system WUE of the system increased, being least for continuous wheat and greatest for wheat/lentil. Wheat-legume rotation systems with additional N input in the wheat phase not only can maintain sustainable production system, but also are more efficient in utilizing limited rainfall.
Keywords: Wheat; Cereals; Food/forage; Legumes; Fallow; Water-use efficiency; Water productivity; Cereal-legume rotations

Z. Andrianjaka, R. Bally, M. Lepage, J. Thioulouse, G. Comte, M. Kisa, R. Duponnois, Biological control of Striga hermonthica by Cubitermes termite mound powder amendment in sorghum culture, Applied Soil Ecology, Volume 37, Issue 3, November 2007, Pages 175-183, ISSN 0929-1393, DOI: 10.1016/j.apsoil.2007.03.001.
(http://www.sciencedirect.com/science/article/B6T4B-4PMJ9TR-1/2/e7e8646e23e5cca140a6580648bff91d)
Abstract:
Striga hermonthica (Del.) Benth is an obligate root hemi-parasite of several cereals. Its effect on cereal crops is the main constraint for food production in sub-Saharan Africa. Various control methods have been already proposed, but the infestation by these parasitic plants persists. An appropriated method for Striga management adapted for the African farmer is very much needed. In this study, amendment of soil infested by this phytoparasite with Cubitermes mound powder is proposed as chemical amendment and natural microbial inoculum, to promote plant growth and reduce damage by S. hermonthica on sorghum (Sorghum bicolor L.). The influence of Cubitermes mound powder on the development of several microbial groups (arbuscular mycorrhizal fungi, actinomycetes, saprophytic fungi) was investigated in a pot experiment with sorghum cultured in a sandy soil infested by S. hermonthica. In the amended soil, sorghum growth and mycorrhizal colonization of sorghum plants were significantly greater than in the control treatment. Mycorrhizal colonization was negatively correlated with the number of emerged Striga plants per pot and positively correlated with sorghum growth. The relationship with substrate-induced respiration (SIR) responses showed that amended soil was characterized by its response to hydroxybutyric acid (catabolic marker of mycorrhizal colonization) and non-amended soil by its response to phenylalanine. We noted that the number of emerged Striga plants in amended pots was significantly decreased. Since Cubitermes mound suspensions did not affect Striga seed germination under axenic conditions, it suggests that the amendment with Cubitermes powder reduces S. hermonthica infestation indirectly, i.e. via its effect on the indigenous soil microflora. Overall, it appears that management of Cubitermes mounds is a promising strategy to consider for effective protection of sorghum from Striga infestation.
Keywords: Termite; Arbuscular mycorrhiza; Striga; Sorghum; Plant protection

Lukas Pfiffner, Henryk Luka, Earthworm populations in two low-input cereal farming systems, Applied Soil Ecology, Volume 37, Issue 3, November 2007, Pages 184-191, ISSN 0929-1393, DOI: 10.1016/j.apsoil.2007.06.005.
(http://www.sciencedirect.com/science/article/B6T4B-4PBG1DW-2/2/51044e9b5525c6e48e40352b2fbbb886)
Abstract:
Earthworm populations in low-input integrated crop management (ICM: no application of insecticides, fungicides and growth regulators) and organic farming systems were compared. The study was performed as a 3-year field survey using a paired-farm approach in six different locations in northwestern Switzerland. Earthworms were extracted from soils sampled from 24

winter cereal fields using a combined method of extraction by mustard flour solution and handsorting.
Earthworm communities differed between these farming systems. Over all sites, the mean biomass, abundance and species richness of earthworms found in the low-input ICM fields were significantly lower than in the organic fields. Adult earthworms in organic fields were 114% more abundant than in ICM fields, but the frequencies of most species within the respective systems were similar in both farming systems. The numbers of earthworm species and juveniles were higher in organic fields. Five species - Lumbricus terrestris (L.), Nicodrilus longus (Ude), Nicodrilus nocturnus (Evans), Nicodrilus caliginosus (Sav.) and Allolobophora rosea (Sav.) - were significantly more numerous in the organic fields than in the ICM fields.
Multivariate analysis showed that the farming system explained most of the variance and was found to be the key factor in altering the earthworm fauna. Late ploughing in autumn was found to have a major negative effect on earthworm abundance, irrespective of the farming system. Farming practices that differ between these farming systems and may considerably influence earthworm populations and diversity are discussed.
Keywords: Integrated crop management; Organic agriculture; Sustainable agriculture; Earthworms; Agri-environmental programme; Soil management

Thomas Foyle, Linda Jennings, Patricia Mulcahy, Compositional analysis of lignocellulosic materials: Evaluation of methods used for sugar analysis of waste paper and straw, Bioresource Technology, Volume 98, Issue 16, November 2007, Pages 3026-3036, ISSN 0960-8524, DOI: 10.1016/j.biortech.2006.10.013.
(http://www.sciencedirect.com/science/article/B6V24-4MGVJ12-1/2/ed3327c938f3dec9b78adee7e97c3a55)
Abstract:
To determine the overall efficiency of processes designed to convert lignocellulosic polysaccharides to ethanol, it is first necessary to determine the composition of the lignocellulosic substrates. Three standard methods routinely referenced in the literature for this purpose are monoethanolamine, trifluoroacetic acid and concentrated sulphuric acid-based methods. However, in the course of our studies, the suitability of these standard methods for analysis of wastepaper and wheat straw came into question. This paper details our investigations in this area, together with recommendations for appropriate modifications to one of the standard methods for reproducible and representative lignocellulosic compositional analysis of waste paper and cereal straw.
Keywords: Lignocellulosics; Cellulose; Hemicellulose; Lignin; Biofuel; Wheat straw; Paper

D.B. Ishaya, S.A. Dadari, J.A.Y. Shebayan, Evaluation of herbicides for weed control in sorghum (Sorghum bicolour) in Nigeria, Crop Protection, Volume 26, Issue 11, November 2007, Pages 1697-1701, ISSN 0261-2194, DOI: 10.1016/j.cropro.2007.02.013.
(http://www.sciencedirect.com/science/article/B6T5T-4NY4RH3-1/2/6aad067db9e96228981d796f0c111e96)
Abstract:
Weed infestation is one of the major threats to cereal production in the Nigerian Savanna. Two trials were conducted in 2002 and 2003 to evaluate different types of herbicides for weed control in sorghum. Among the herbicides tested, pretilachlor+dimethametryne at 2.5 kg a.i./ha, cinosulfuron at 0.05 kg a.i./ha and piperophos+cinosulfuron at 1.5 kg a.i./ha performed best as they effectively controlled weeds, increased crop vigour, plant height, reduced crop injury and produced higher grain yield of sorghum.
Keywords: Herbicides; Sorghum; Weed; Control hoe-weeding

A.R. Tahir, S. Neethirajan, D.S. Jayas, M.A. Shahin, S.J. Symons, N.D.G. White, Evaluation of the effect of moisture content on cereal grains by digital image analysis, Food Research International, Volume 40, Issue 9, November 2007, Pages 1140-1145, ISSN 0963-9969, DOI: 10.1016/j.foodres.2007.06.009.
(http://www.sciencedirect.com/science/article/B6T6V-4P40KHK-1/2/6a6430548fa80e24a82019d4b834b937)
Abstract:
Physical appearance and kernel morphology significantly affect the grade of a harvested crop in addition to other factors such as test weight, percentage of foreign matter and constituent components. Moisture content of grain can potentially affect the physical appearance and kernel morphology. The objective of this study was to evaluate the effect of moisture content on the classification capability of colour, morphology and textural features of imaged grains. Colour images of individual kernels and bulk samples of three grain types, namely Canada Western Amber Durum (CWAD) wheat, Canada Western Red Spring (CWRS) wheat and barley were acquired using a machine vision system. The grain kernels were conditioned to 12%, 14%, 16%, 18% and 20% moisture contents before imaging. Previously developed algorithms were used to extract 123 colour, 56 textural features from bulk sample images and 123 colour, 56 textural, 51 morphological features from individual kernel images. The extracted features were analysed for the effect of moisture content. Statistical classifiers and a back propagation neural network model were used for classifying the grain bulk at different moisture contents. The colour and textural features of bulk grain images were affected by the moisture content more than that of the single kernel images.
Keywords: Moisture content; Wheat kernels; Barley; Colour features; Textural features; Morphological features; Image processing

Marco Beyer, Melanie B. Klix, Joseph-Alexander Verreet, Estimating mycotoxin contents of Fusarium-damaged winter wheat kernels, International Journal of Food Microbiology, Volume 119, Issue 3, 1 November 2007, Pages 153-158, ISSN 0168-1605, DOI: 10.1016/j.ijfoodmicro.2007.07.007.
(http://www.sciencedirect.com/science/article/B6T7K-4P6M5X1-2/2/2be8cc64e0d72dd28d7c2b61f50e3504)
Abstract:
Winter wheat (Triticum aestivum L., cultivars Ritmo and Dekan) grain was sampled in Northern Germany between 2001 and 2006. Kernels damaged by fungi of the genus Fusarium were separated from sound grain by visual assessment. Samples containing 0%, 20%, 40%, 60%, 80% and 100% of Fusarium-damaged kernels were compiled and analyzed for the Fusarium type B trichothecenes deoxynivalenol (DON, 2001-2006), nivalenol (NIV, 2006), 3-acetyl-deoxynivalenol (3AcDON, 2006) and 15-acetyl-deoxynivalenol (15AcDON, 2006). The relationship between mycotoxin contents and the percentage of Fusarium-damaged kernels was calculated for each lot of grain. Apart from one exception, relationships between the percentage of Fusarium-damaged kernels and NIV, 3AcDON or 15AcDON were non-significant. In contrast, close relationships between the percentage of Fusarium-damaged kernels and the DON content were observed (r2 = 0.93-0.99). The y-axis intercepts were not significantly different from zero, but the DON content of the damaged kernels varied by a factor of 11.59 between years and by a factor of 1.87 between cultivars. Fusarium-damaged kernels contained between 0.21 and 2.39 [mu]g DON kernel- 1. The overall average DON content of a Fusarium-damaged wheat kernel was 1.29 +/- 0.11 [mu]g. The DON content of diseased kernels was affected by environment and wheat genotype but not by genotype x environment interaction. On average, Fusarium-damaged kernels contained 9.7-fold more DON than 15AcDON, 19.5-fold more DON than NIV, and 26.9-fold more DON than 3AcDON. 3AcDON and 15AcDON contents per wheat kernel were not significantly different between cultivars. On average, 4.27% of Fusarium-damaged kernels were sufficient to reach the 1.25 mg

DON kg- 1 grain limit for unprocessed cereals in the EU. Given the low percentages of Fusarium-damaged kernels that are equivalent to current legal DON limits, grading accuracies > 96% would be needed when using automatic grading systems for separating sound from damaged kernels.
Keywords: Breeding; Deoxynivalenol; Fusarium culmorum; Fusarium graminearum; Grading

Angel Medina, Rufino Mateo, Francisco M. Valle-Algarra, Eva M. Mateo, Misericordia Jimenez, Effect of carbendazim and physicochemical factors on the growth and ochratoxin A production of Aspergillus carbonarius isolated from grapes, International Journal of Food Microbiology, Volume 119, Issue 3, 1 November 2007, Pages 230-235, ISSN 0168-1605, DOI: 10.1016/j.ijfoodmicro.2007.07.053.
(http://www.sciencedirect.com/science/article/B6T7K-4PC8RBR-3/2/ad753c76f147a01b56fca2ed9d620584)
Abstract:
Carbendazim is a systemic fungicide that is commonly used on several crops (tobacco, fruit, vegetables, cereals, etc.). This fungicide is used to control fungal infections in vineyards. It is indicated against Botrytis cinerea, Uncinula necator, Plasmopara viticola and other fungi and can be used either alone or coupled with other fungicides. However, there is a lack of in-depth studies to evaluate its effectiveness against growth of Aspergillus carbonarius isolated from grapes and OTA production. A medium based on red grape juice was used in this study. Preliminary studies were performed at 0.98 aw and 25 [degree sign]C using carbendazim concentrations over a wide range (1-2000 ng/ml medium) to control both growth of a strain of A. carbonarius isolated from grape and its ability to produce OTA. As the lag phase increased considerably at levels > 1000 ng/ml of medium, detailed studies were carried out in the range 50-450 ng/ml of medium at 0.98-0.94 aw and 20-28 [degree sign]C. Statistical analysis (multifactor ANOVA) of the data revealed that the three factors assayed and the interactions aw-carbendazim concentration and aw-temperature had significant effects on lag phase duration. The highest lag-times were observed at 0.94 aw, 20 [degree sign]C, and with 450 ng carbendazim/ml. The three factors also had significant effects of the growth rate and there was an interaction between aw and temperature. The growth rate of A. carbonarius in these cultures is favoured by high water availability and relatively high temperatures. However, addition of carbendazim at the assayed levels did not significantly influenced fungal growth rate. Accumulation of OTA was studied as a function of four factors (the three previously considered, and time). All factors had significant effects on the accumulation of OTA. There were also two significant interactions (aw-temperature and temperature-time). On the basis of the results obtained, carbendazim does not increase the lag phase of A. carbonarius except at relatively low aw and temperatures. It does not substantially decrease fungal growth rate once growth is apparent but it appears to cause an increase in OTA accumulation in the medium at the doses assayed. Carbendazim, which is widely used against fungal infections in grape, can positively influence OTA production by A. carbonarius in field, which can increase OTA content in grape juices and wines.
Keywords: Aspergillus carbonarius; Carbendazim; Ochratoxin A; Mycotoxins; Fungal growth

M. Dean, R. Shepherd, A. Arvola, M. Vassallo, M. Winkelmann, E. Claupein, L. Lahteenmaki, M.M. Raats, A. Saba, Consumer perceptions of healthy cereal products and production methods, Journal of Cereal Science, Volume 46, Issue 3, The Contribution of Cereals to a Healthy Diet, November 2007, Pages 188-196, ISSN 0733-5210, DOI: 10.1016/j.jcs.2007.06.007.
(http://www.sciencedirect.com/science/article/B6WHK-4P2J03V-2/2/9a53f7f2e90c5e3bef1ee1558fda00ef)
Abstract:
Using a survey, this study investigated public perceptions relating to different healthy grain foods (bread, pasta and biscuits) and how these perceptions are influenced by gender, nationality, base product (staple vs. fun food), type of health claim (general vs. specific) and people's perceptions

associated with different production methods. Two thousand and ninety-four (50.4% women, 49.5% men) members of the public from the UK, Italy, Finland and Germany completed the survey questionnaire. The participants were over 18 years of age and were solely or jointly responsible for the family's grocery shopping.
Results confirmed that similar to other functional foods, there were gender and country differences in people's perceptions of benefits relating to functional grain products. Men perceived more benefit in products with specific health claims and women in products with general health claims. However, when it was personally relevant, men's levels of perceived benefit in products with general health claims were equally high as women's. Further, modification of staple foods was perceived as more beneficial than fun foods and people preferred processes such as fortification and traditional cross-breeding to others such as genetic modification. In addition, the differences in perceived benefits between foods with general and specific health claims were largest for staple foods than for hedonistic foods.
Keywords: Functional food; Cereal products; Public perceptions

A. Arvola, L. Lahteenmaki, M. Dean, M. Vassallo, M. Winkelmann, E. Claupein, A. Saba, R. Shepherd, Consumers' beliefs about whole and refined grain products in the UK, Italy and Finland, Journal of Cereal Science, Volume 46, Issue 3, The Contribution of Cereals to a Healthy Diet, November 2007, Pages 197-206, ISSN 0733-5210, DOI: 10.1016/j.jcs.2007.06.001.
(http://www.sciencedirect.com/science/article/B6WHK-4P06CDS-7/2/595a8856710816f447ae7c16f2faab70)
Abstract:
The objective of this study was to increase our understanding of consumers' product related expectations that may influence their willingness to use whole grain (WG) foods. Consumers' beliefs about WG and refined grain (RG) product categories were measured, compared and consumers were segmented based on these beliefs. Data were collected with self-completion questionnaires in the UK (N=552), Italy (N=504), and Finland (N=513).
On average, consumers in Finland, Italy and the UK were aware that WG products are healthier than RG products as the WG product category was rated as more nutritionally balanced, healthier, more natural, more filling, releasing energy more slowly and slightly more digestible than the RG product category. However, certain consumer segments did not perceive much difference between whole and RG products in their health-related characteristics suggesting a lack of motivation for increasing WG consumption. This sets a challenge for promoting WG products especially in Italy and the UK, where the respondents were less likely to differentiate between the healthiness of WG and RG products than the Finnish respondents. Differences between the consumer segments and ways of promoting WG consumption are discussed.
Keywords: Whole grain; Cereal foods; Consumer attitudes; Beliefs

David Topping, Cereal complex carbohydrates and their contribution to human health, Journal of Cereal Science, Volume 46, Issue 3, The Contribution of Cereals to a Healthy Diet, November 2007, Pages 220-229, ISSN 0733-5210, DOI: 10.1016/j.jcs.2007.06.004.
(http://www.sciencedirect.com/science/article/B6WHK-4P1P6VC-1/2/ba4947c0f149f207439727841d0fc0e6)
Abstract:
Population studies have shown that whole grain consumption is associated with diminished risk of serious, diet-related diseases, which are major problems in wealthy industrialised economies and are emerging in developing countries with greater affluence. These conditions include coronary heart disease, certain cancers (especially of the large bowel), inflammatory bowel disease and disordered laxation. Carbohydrates are important contributors to the health benefits of whole grains. Insoluble non-starch polysaccharides (NSP, major components of dietary fibre) are effective laxatives. Soluble NSP (especially mixed-link [beta]-glucans) lower plasma cholesterol

and so can reduce heart disease risk but the effect is inconsistent. Processing seems to be an important contributor to this variability and other grain components may be involved. However, starch not digested in the small intestine (resistant starch, RS) appears to be as important as NSP to large bowel function. Dietary analysis suggests that some populations (e.g. native Africans) at low risk of diet-related disease through consumption of unrefined cereals may actually have relatively low fibre intakes. While NSP are effective faecal bulking agents, they are fermented to a very variable extent by the large bowel microflora. In contrast, RS seems to act largely through the short chain fatty acids (SCFA) produced by these bacteria. One SCFA (butyrate) appears to be particularly effective in promoting large bowel function and RS fermentation appears to favour butyrate production. Animal studies show that dietary RS lowers diet-induced colonocyte genetic damage and chemically-induced large bowel cancer which correlates with increased butyrate. These effects could contribute to a lower risk of cancer and ulcerative colitis in the long term. Cereal grain oligosaccharide (OS) may also function as prebiotics and increase the levels of beneficial bacteria in the large bowel. Understanding the relationships between NSP, RS and OS and large bowel health will be facilitated by the advent of new molecular technologies to identify the bacterial species involved. The potential for improvements in public health is considerable.
Keywords: Starch; Oligosaccharides; Non-starch polysaccharides; Cereals; Human health; Resistant starch

Peter J. Wood, Cereal [beta]-glucans in diet and health, Journal of Cereal Science, Volume 46, Issue 3, The Contribution of Cereals to a Healthy Diet, November 2007, Pages 230-238, ISSN 0733-5210, DOI: 10.1016/j.jcs.2007.06.012.
(http://www.sciencedirect.com/science/article/B6WHK-4P3DY10-1/2/e014829b1eb77f2e0738ea94169de15e)
Abstract:
The native mixed linkage [beta]-glucan of cereals is classified as a soluble dietary fibre, with rheological properties generally similar to guar gum and other random coil polysaccharides. The ability of oat and barley products to attenuate postprandial glycemic and insulinemic response is related to content of (1-->3)(1-->4)-[beta]-d-glucan ([beta]-glucan) and viscosity. A role of viscosity of [beta]-glucan has not been directly demonstrated for lowering of serum cholesterol levels, and not all studies report a statistically significant lowering. The wide range of effectiveness reported may partially be explained by the properties of the [beta]-glucan in the diets used, as well as the dose.
Keywords: Cereal [beta]-glucan; Blood glucose; Serum cholesterol; Viscosity; Molecular weight

Peter R. Shewry, Improving the protein content and composition of cereal grain, Journal of Cereal Science, Volume 46, Issue 3, The Contribution of Cereals to a Healthy Diet, November 2007, Pages 239-250, ISSN 0733-5210, DOI: 10.1016/j.jcs.2007.06.006.
(http://www.sciencedirect.com/science/article/B6WHK-4P1P6VC-2/2/396ef015d94e015efcdb12de95846fa6)
Abstract:
Cereals are important sources of protein for human nutrition but have low quality due to limitations in the amounts of essential amino acids, notably lysine. These deficiencies result from the low levels of these amino acids in the prolamin storage proteins and hence are exacerbated when high levels of nitrogen fertiliser are used to increase yield and total protein content.
Genetic and genetic engineering strategies to increase both total protein content and the composition of essential amino acids have been employed. These include the exploitation of mutant high lysine genes and the use of transformation to either express additional proteins which are rich in lysine and/or methionine or to increase the free pools of these amino acids.
Keywords: Cereals; Lysine; Methionine; Protein content; Essential amino acids; Nutritional quality

Sadequr Rahman, Anthony Bird, Ahmed Regina, Zhongyi Li, Jean Philippe Ral, Steve McMaugh, David Topping, Matthew Morell, Resistant starch in cereals: Exploiting genetic engineering and genetic variation, Journal of Cereal Science, Volume 46, Issue 3, The Contribution of Cereals to a Healthy Diet, November 2007, Pages 251-260, ISSN 0733-5210, DOI: 10.1016/j.jcs.2007.05.001.
(http://www.sciencedirect.com/science/article/B6WHK-4NTBFHY-1/2/6d74f835b6fb1ed2a3b27d529a7c6995)
Abstract:
Some of the starch consumed by humans is not digested in the small intestine. Such starch, known as resistant starch, is fermented in the large intestine and leads to the production of short chain fatty acids. Increased consumption of resistant starch is associated with improved cardio-vascular health. A high proportion of amylose in the starch consumed is correlated with increased resistant starch but other unknown aspects of starch structure may also influence the digestibility of starch. Detailed investigation of the starch biosynthetic pathway has revealed that reducing the activity of specific isoforms of branching enzymes and starch synthases can lead to increased amylose. Methods to alter the expression of and detect mutations in targeted genes involved are discussed.
Keywords: Starch; Resistant; Biosynthesis; Mutations; Pathway

Luc Saulnier, Pierre-Etienne Sado, Gerard Branlard, Gilles Charmet, Fabienne Guillon, Wheat arabinoxylans: Exploiting variation in amount and composition to develop enhanced varieties, Journal of Cereal Science, Volume 46, Issue 3, The Contribution of Cereals to a Healthy Diet, November 2007, Pages 261-281, ISSN 0733-5210, DOI: 10.1016/j.jcs.2007.06.014.
(http://www.sciencedirect.com/science/article/B6WHK-4P59X6X-1/2/e3db89cccd977e372e88c8761fe5530b)
Abstract:
Arabinoxylans (AX) are the major polymers of wheat grain cell walls. The content and the structure of AX polymers show large differences between tissues and between wheat cultivars that affect the end-use properties and nutritional quality of the grain. The development of new wheat cultivars with enhanced quality, therefore, requires methods to exploit this variation and it is essential to understand and modulate the mechanisms controlling the key events of cell-wall polymer synthesis.
This paper summarises recent knowledge on the structure and physicochemical properties of AX including variation between cultivars and tissues, methods for analysis and screening, biosynthetic mechanisms and approaches to identifying key genes. This knowledge is essential to understand AX properties and defined possible targets for plant breeding.
Keywords: Biosynthesis; Cell wall; Cereal; Ferulic acid; Grain; Pentosans; Viscosity; QTL; Plant breeding

Malcolm J. Hawkesford, Fang-Jie Zhao, Strategies for increasing the selenium content of wheat, Journal of Cereal Science, Volume 46, Issue 3, The Contribution of Cereals to a Healthy Diet, November 2007, Pages 282-292, ISSN 0733-5210, DOI: 10.1016/j.jcs.2007.02.006.
(http://www.sciencedirect.com/science/article/B6WHK-4N9P4KK-1/2/68f5e74a837c066f20740583e6c075d4)
Abstract:
Selenium (Se) is essential for humans and animals but has no known function in plants. Excess accumulation is toxic to both plants and animals. Dietary intake of Se is low in a large number of people worldwide. This is due to low bioavailability of Se in some soils and consequently low concentrations of Se in plant tissues.
Both selenate and selenite are taken up by plants and subsequently translocated around the plant. Selenate, an analogue of sulphate, is transported by the sulphate transporter family. Some plants

are able to accumulate high internal concentrations of Se (hyperaccumulators); however, genetic variation in accumulation ability amongst non-accumulators such as cereals, is relatively small.
Within plant tissues, Se enters the pathways for sulphate assimilation and metabolism and will replace cysteine and methionine in proteins, often with detrimental effect. Alternatively, Se may be accumulated as methylated derivatives or lost from the plant following volatilisation.
Agronomic biofortification of crops with Se-containing fertilisers, which is practised in some countries, provides the best short-term solution for improving Se content of wheat. Longer-term genetic improvement, particularly by targeting substrate discrimination of transporters between selenate and sulphate, for example, may provide a means to enhance uptake and promote accumulation.
Keywords: Wheat; Selenium; Diet; Health; Sulphate transporter

Henrik Brinch-Pedersen, Soren Borg, Birgitte Tauris, Preben B. Holm, Molecular genetic approaches to increasing mineral availability and vitamin content of cereals, Journal of Cereal Science, Volume 46, Issue 3, The Contribution of Cereals to a Healthy Diet, November 2007, Pages 308-326, ISSN 0733-5210, DOI: 10.1016/j.jcs.2007.02.004.
(http://www.sciencedirect.com/science/article/B6WHK-4N8BMWX-1/2/dc79e8127286b302e98dd8a5dcaa0b03)
Abstract:
The present paper summarizes the current state of knowledge on molecular genetic approaches to increasing iron and zinc availability and vitamin content in cereals. We have also attempted to integrate the scientific issues into the wider context of human nutrition. In the cereal grain, iron and zinc are preferentially stored together with phytate in membrane-enclosed globoids in the protein storage vacuole (PSV) found in the aleurone and the embryo scutellum. The PSV is accordingly central for understanding mineral deposition during grain filling and mobilization of minerals during germination. Recent studies in Arabidopsis have led to the first identification of iron and zinc transporters of the PSV and further illustrate some of the dynamics associated with mineral and phytate transport and deposition into the vacuole. This provides new opportunities for modulating iron and zinc deposition in the cereal grain. Current strategies towards increasing the iron content of the endosperm are largely based on the expression of legume ferritin genes in an endosperm-specific manner. However, it is apparent that this approach, at least in rice, only allows a two- to three-fold increase in the iron content of the grain due to exhaustion of the iron stores in leaves. Further increases thus have to rely on additional uptake and transport of iron from the root. Phytate is generally considered to be the single most important anti-nutritional factor for iron and zinc availability. In the current paper we summarize attempts to increase phytase activity in the grain by transformation and evaluate the potential of this approach as well as the reduction of phytate biosynthesis for improving the bioavailability of iron and zinc. Vitamins constitute the second important group of micronutrients in grain and we discuss current efforts to increase the amounts of provitamin A, vitamin C and vitamin E.
Keywords: Minerals; Bioavailability; Cereals; Vitamins

J.L. Golbach, V.I. Chalova, C.L. Woodward, S.C. Ricke, Adaptation of Lactobacillus rhamnosus riboflavin assay to microtiter plates, Journal of Food Composition and Analysis, Volume 20, Issue 7, November 2007, Pages 568-574, ISSN 0889-1575, DOI: 10.1016/j.jfca.2007.03.012.
(http://www.sciencedirect.com/science/article/B6WJH-4NKXWHJ-1/2/ba844890e51d0dfa6e51357e9c6714f6)
Abstract:
Riboflavin (vitamin B2) is essential to humans and must be obtained through the diet. It plays a significant role in the metabolism of carbohydrates, fatty acids and amino acids. The test microorganism, most commonly used to quantify riboflavin is Lactobacillus rhamnosus ATCC 7469 since this bacterium requires external B2 for growth. The objective of the current study was to

reduce the time of the assay and volumes of assay media by adaptation to microtiter plates while still maintaining the repeatability of the original tube assay. A previously developed riboflavin tube assay was used as a guideline for adapting the method to a microtiter plate assay. The standard growth curve for the riboflavin assay was linear from 0 to 20 ng/mL (R2=0.99) and from 0 to 10 ng/mL (R2=0.97) when conducted in microtiter plates and tubes, respectively. The data showed no significant difference between the tube assay and microtiter plate assay (P>0.05) for the commercial maize sample. Commercial cereal and grain samples were analyzed to confirm repeatability among multiple independent trials performed with the microtiter plates. The microtiter assay reduced the amount of time required for sufficient bacterial growth response to generate linear standard curves from 16.5 to 10 h.
Keywords: Lactobacillus rhamnosus; Riboflavin; Vitamin B2; Microtiter plate assay

Lan T.T. Bui, Darryl M. Small, The contribution of Asian noodles to dietary thiamine intakes: A study of commercial dried products, Journal of Food Composition and Analysis, Volume 20, Issue 7, November 2007, Pages 575-583, ISSN 0889-1575, DOI: 10.1016/j.jfca.2007.03.010.
(http://www.sciencedirect.com/science/article/B6WJH-4NK4G5G-2/2/a265e66407dddd63a48a16f125fc0de4)
Abstract:
Cereal based foods, including Asian noodles which represent the end use of at least one-eighth of global wheat production, are potentially good sources of thiamine. However, there is a lack of data on the stability of thiamine during processing. The aim of this study was to investigate the thiamine contents of three styles of Asian noodle products: white salted, yellow alkaline and instant. A standard method of analysis (Association of Official Analytical Chemists (AOAC), method number 953.17) was used to determine the thiamine content of noodles before and after cooking. Factors influencing thiamine stability were also investigated. The results showed that Asian noodles include products which vary significantly in formulation and are manufactured by distinct processes. pH levels were highest in yellow alkaline and lowest in white salted style. White salted noodles have higher thiamine levels although there is clearly variation between individual samples for each style of product. For most samples, thiamine levels were relatively low and considerable losses occurred during cooking. Thiamine values were particularly low for samples where alkaline salts were incorporated during manufacture. It is concluded that greater losses occur where higher pH values were observed and there is considerable variation in the thiamine content of Asian noodles.
Keywords: Asian noodles; Nutrients; Retention; Thiamine

Sanny S.L. Chan, Elaine L. Ferguson, Karl Bailey, Umi Fahmida, Timothy B. Harper, Rosalind S. Gibson, The concentrations of iron, calcium, zinc and phytate in cereals and legumes habitually consumed by infants living in East Lombok, Indonesia, Journal of Food Composition and Analysis, Volume 20, Issue 7, November 2007, Pages 609-617, ISSN 0889-1575, DOI: 10.1016/j.jfca.2007.03.003.
(http://www.sciencedirect.com/science/article/B6WJH-4N9880F-1/2/045e06d273dc42e11e0d6f8bc4ea57cb)
Abstract:
There is a paucity of analysed data on contents of minerals and phytate in Asian complementary foods. Thus, cereals and legumes (n=27) consumed by Indonesian infants were analysed for iron, zinc and calcium using flame Atomic Absorption Spectrophotometry and for phytate using high performance liquid chromatography (HPLC). Results (per 100 g dry weight) showed unfortified cereals had lower concentrations of zinc (1.5-3.2 mg/100 g vs. 3.2-5.8 mg/100 g), iron (0.3-5.4 mg/100 g vs. 2.9-17.4 mg/100 g), calcium (5-48 mg/100 g vs. 41-926 mg/100 g) and phytate (hexa- and penta-inositol phosphates; 70-246 mg/100 g vs. 177-1042 mg/100 g) than legumes and lower phytate: mineral molar ratios. Tempe had the lowest concentration of phytate (236-366

mg/100 g vs. 763-1042 mg/100 g), and the lowest molar ratios of phytate: zinc (6.3-12.6 vs. 14.3-21.1) and phytate: iron (1.6-4.0 vs. 5.0-11.3) compared to other soybean products. Milling increased concentrations of iron and calcium in rice (1.2 vs. 0.4 mg/100 g, p=0.002; and 8.1 vs. 5.1 mg/100 g, p=0.029, respectively); but reduced zinc (1.6 vs. 1.7 mg/100 g, p=0.013). Boiling increased calcium concentrations in rice and rice flour (5.1-16.7 mg/100 g, p=0.004; and 8.1-31.4 mg/100 g, p<0.001, respectively); whereas frying decreased iron concentrations in tempe (13.3-6.1 mg/100 g, p=0.038). When expressed per infant portions, fortified cereals and tempe were the best sources of zinc, iron, and calcium, because of their relatively high mineral and low phytate contents.
Keywords: Zinc; Iron; Calcium; Phytate; Indonesia; Cereals; Legumes

Lisa J. Newey, Chris E. Caten, Jonathan R. Green, Rapid adhesion of Stagonospora nodorum spores to a hydrophobic surface requires pre-formed cell surface glycoproteins, Mycological Research, Volume 111, Issue 11, November 2007, Pages 1255-1267, ISSN 0953-7562, DOI: 10.1016/j.mycres.2007.09.007.
(http://www.sciencedirect.com/science/article/B7XMR-4PSK94V-2/2/21029f7611807264777132c802d9b83b)
Abstract:
Adhesion of fungal pathogens to leaf surfaces is an important first step in the infection process. Previous work on Stagonospora nodorum, a major necrotrophic pathogen of wheat and other cereals, has shown that conidia attach rapidly to a hydrophobic surface and this is followed by the active secretion of extracellular matrix material to consolidate adhesion. In this paper the role of pre-formed spore surface glycoproteins in the rapid adhesion of S. nodorum conidia to an artificial surface, polystyrene, has been investigated. Sodium dodecyl sulphate (SDS) and the enzymes chitinase and lyticase have been used to release cell wall glycoproteins from spores and these have been identified using SDS polyacrylamide gel electrophoresis (PAGE) and Western blotting. Labelling with fluorescently tagged lectins has also been used to study the spore surface. The results show that there are a small number of glycoproteins non-covalently and covalently attached to other components in the spore wall, which is not a uniform structure. The effects of proteases, lectins, and other treatments of spores in an adhesion assay have been used to show that pre-formed glycoproteins are involved in rapid adhesion to a hydrophobic surface. There is also evidence for a rapid release of glycoproteins by spores that is also involved in adhesion and this is not an active process.
Keywords: Conidia; Fungal pathogen; Phaeosphaeria nodorum; Plant pathology; Spore

Cristina Marta-Pedroso, Tiago Domingos, Helena Freitas, Rudolf S. de Groot, Cost-benefit analysis of the Zonal Program of Castro Verde (Portugal): Highlighting the trade-off between biodiversity and soil conservation, Soil and Tillage Research, Volume 97, Issue 1, November 2007, Pages 79-90, ISSN 0167-1987, DOI: 10.1016/j.still.2007.08.010.
(http://www.sciencedirect.com/science/article/B6TC6-4PXP0K5-1/2/2cd068e6aafc712dc5afd0fb1d74e69c)
Abstract:
We address the effects of erosion on the environmental services provided by the soil and explore possibilities for integrating soil erosion impacts in cost-benefit analyses of agri-environmental policies. As a case study, we considered the continued soil erosion caused by the traditional cereal farming system which is financially supported by the Zonal Program of Castro Verde. This case study illustrated the conflict between the preservation of biodiversity habitat requirements and the maintenance of soil productivity. We conclude that soil erosion is currently a major threat to the long-term sustainability of the Cereal Steppe of Castro Verde and largely reduced the cost-efficiency of public expenditure in local biodiversity conservation. Although replacement cost has proven to be a suitable method to determine the cost of soil productivity loss from erosion, we

argue that there is a need to frame the erosion cost estimate obtained within more integrative approaches of assessing erosion costs.
Keywords: Environmental services; Soil erosion; Replacement cost method; Agri-environmental policy cost-efficiency; Cost-benefit analysis

Ingrid K. Thomsen, Bent T. Christensen, Fertilizer 15N recovery in cereal crops and soil under shallow tillage, Soil and Tillage Research, Volume 97, Issue 1, November 2007, Pages 117-121, ISSN 0167-1987, DOI: 10.1016/j.still.2007.09.004.
(http://www.sciencedirect.com/science/article/B6TC6-4PYYFXM-2/2/cde12c98122b82f43775638b05de9419)
Abstract:
We examined the effect of tillage system on crop recovery of soil and fertilizer N. 15N-labelled ammonium nitrate was applied in the spring to small confined plots at five experimental sites where shallow tillage (ST) and mouldboard ploughing (MP) had been practised for up to 36 years. Winter wheat was grown on three sites and spring barley on the other two. Grain yields were similar under ST and MP at all sites, and total N uptake was similar under MP and ST at four of the five sites. Grain and straw recovered 59-64% of the applied 15N fertilizer except at the most sandy site where crop recovery was 37% (ST) and 44% (MP). At two sites, crop 15N recovery was lower under ST despite similar total N uptake for the two tillage systems. Recovery of 15N in crop and soil was 74-75% at the most sandy site and 86-92% at the other sites. Conversion from MP to ST tillage appeared to have little influence on the fertilizer N balance at each site.
Keywords: Crop 15N recovery; 15N-labelled fertilizer; Soil tillage; Spring barley; Winter wheat

Silvio Uhlig, Marika Jestoi, Paivi Parikka, Fusarium avenaceum -- The North European situation, International Journal of Food Microbiology, Volume 119, Issues 1-2, Mycotoxins from the Field to the Table, 20 October 2007, Pages 17-24, ISSN 0168-1605, DOI: 10.1016/j.ijfoodmicro.2007.07.021.
(http://www.sciencedirect.com/science/article/B6T7K-4P9SN8X-9/2/3d1673e372b8ed9efa71bb118db6cf58)
Abstract:
The Fusarium species complex found on small-grain cereals in Northern Europe is largely dominated by F. avenaceum, while other important species include F. tricinctum, F. poae, F. culmorum and F. graminearum. The dominance of F. avenaceum has in recent years initiated extensive analytical activity in Norway and Finland in order to gain insight into the contamination of grain with secondary metabolites related to the fungus. Of these, moniliformin is the most studied compound with regard to toxicity. However, the data from analytical surveys indicate that field conditions in Northern Europe do not favour production of the metabolite. Instead, enniatins are regularly found in ppm-concentrations in grain, especially wheat and barley, while the bio-production of a range of other F. avenaceum related metabolites has so far barely been investigated. This paper summarises the results from mycological and chemical analyses of grain samples from Norway and Finland for major Fusarium species and F. avenaceum-related secondary metabolites.
Keywords: Enniatins; Fusarium; Moniliformin; Northern Europe

Franz Berthiller, Michael Sulyok, Rudolf Krska, Rainer Schuhmacher, Chromatographic methods for the simultaneous determination of mycotoxins and their conjugates in cereals, International Journal of Food Microbiology, Volume 119, Issues 1-2, Mycotoxins from the Field to the Table, 20 October 2007, Pages 33-37, ISSN 0168-1605, DOI: 10.1016/j.ijfoodmicro.2007.07.022.
(http://www.sciencedirect.com/science/article/B6T7K-4P9SN8X-5/2/e77dabc3bfe4e41ed816f6aedaaaaa2e)
Abstract:

About 300-400 mycotoxins are known today. To some extent these compounds show very different physicochemical properties, which led to a vast quantity of analytical methods for single toxins or certain classes of mycotoxins in a variety of matrices. Due to synergistic effects of co-occurring toxins, endeavors have been made to simultaneously detect and quantify several classes of mycotoxins. This paper discusses several of the published LC-MS/MS multi-mycotoxin-methods and also introduces a new method, which allows the concurrent detection and quantification of 90 major mycotoxins and other secondary fungal metabolites in cereals. Even more, known plant derived metabolites of mycotoxins, like zearalenone-4-glucoside or deoxynivalenol-3-glucoside are included in this method. The significance of mycotoxin conjugates is briefly discussed as well.
Keywords: Mycotoxins; Multi-toxin analysis; Conjugated mycotoxins; Mass spectrometry; LC-MS/MS

A.E. Desjardins, R.H. Proctor, Molecular biology of Fusarium mycotoxins, International Journal of Food Microbiology, Volume 119, Issues 1-2, Mycotoxins from the Field to the Table, 20 October 2007, Pages 47-50, ISSN 0168-1605, DOI: 10.1016/j.ijfoodmicro.2007.07.024.
(http://www.sciencedirect.com/science/article/B6T7K-4P9SN8X-M/2/b99abb7344b14b7ba512c9ff516d3128)
Abstract:
As the 20th century ended, Fusarium mycotoxicology entered the age of genomics. With complete genomes of Fusarium graminearum and F. verticillioides and several Fusarium gene expression sequence databases on hand, researchers worldwide are working at a rapid pace to identify mycotoxin biosynthetic and regulatory genes. Seven classes of mycotoxin biosynthetic genes or gene clusters have been identified in Fusarium to date; four are polyketide synthase gene clusters for equisetin, fumonisins, fusarins, and zearalenones. Other Fusarium mycotoxin biosynthetic genes include a terpene cyclase gene cluster for trichothecenes, a cyclic peptide synthetase for enniatins, and a cytochrome P450 for butenolide. From the perspective of the United States Department of Agriculture, the ultimate goal of research on Fusarium molecular biology is to reduce mycotoxins in cereal grains. With this goal in mind, efforts have focused on identifying aspects of mycotoxin biosynthesis and regulation that can be exploited for mycotoxin control. New information on fungal and plant genomes and gene expression will continue to provide information on genes important for fungal-plant interactions and to facilitate the development of targeted approaches for breeding and engineering crops for resistance to Fusarium infection and mycotoxin contamination.
Keywords: Fusarium; Gene cluster; Mycotoxin

Kenji Tanaka, Yuki Sago, Yazhi Zheng, Hiroyuki Nakagawa, Masayo Kushiro, Mycotoxins in rice, International Journal of Food Microbiology, Volume 119, Issues 1-2, Mycotoxins from the Field to the Table, 20 October 2007, Pages 59-66, ISSN 0168-1605, DOI: 10.1016/j.ijfoodmicro.2007.08.002.
(http://www.sciencedirect.com/science/article/B6T7K-4PCPFBK-5/2/403de3e6f54865183bf7c90bc4223be3)
Abstract:
Mycotoxin contamination in rice is usually lower as in wheat or corn. However, there are some reports that rice has been contaminated with mycotoxins such as aflatoxin B1, B2, G1, G2 (AFS), citrinin, deoxynivalenol (DON), fumonisin B1, B2, B3 (FMS), fusarenon-X (Fus.-X), nivalenol (NIV), ochratoxin A (OTA), sterigmatocystin (STE), and zearalenone. Rice in Japan is preserved in warehouses where moisture content and temperature are regulated. Therefore, mycotoxin contamination from post harvest fungal growth occurs very seldom. Trichothecenes, aflatoxins, and STE in rice were recently analyzed in our laboratory. In 1998, a typhoon struck before rice harvesting in Japan, and the unpolished rice was found to be stained brown. Samples were

collected and analyzed for the presence of trichothecenes. Mycotoxins DON, Fus.-X, and NIV were detected and confirmed with GC-MS. The quantity of trichothecenes was determined using GC-ECD. STE is a carcinogenic mycotoxin produced by Aspergillus versicolor and some other fungi. STE contamination of rice was studied in our laboratory since 1973. GC-MS, LC-MS, LC-MS/MS, and LC-UV methods for STE determination were examined, giving good results for the LC-UV method using a photo diode array detector. Different techniques for the extraction of STE from rice were also studied. Finally, brown rice was ground, and the ground rice was extracted with acetonitrile-water. An Autoprep MF-A 1000 column was used to clean up AFS and STE. The cleaned-up extract was analyzed with HPLC-UV. Forty-eight brown rice samples were analyzed, and none of them were contaminated with STE. These rice samples were also analyzed for AFS and FMS, and none of the samples were contaminated. The Ministry of Agriculture, Forestry and Fisheries in Japan is making the appropriate Institutes develop analytical methods for mycotoxins and survey mycotoxin contamination on rice as well as wheat, corn, and some other cereals.
Keywords: Mycotoxins; Rice; Deoxynivalenol; Fusarenon-X; Nivalenol; Sterigmatocystin

Lawrence E. Osborne, Jeffrey M. Stein, Epidemiology of Fusarium head blight on small-grain cereals, International Journal of Food Microbiology, Volume 119, Issues 1-2, Mycotoxins from the Field to the Table, 20 October 2007, Pages 103-108, ISSN 0168-1605, DOI: 10.1016/j.ijfoodmicro.2007.07.032.
(http://www.sciencedirect.com/science/article/B6T7K-4P9SN8X-S/2/efe3b30029a1a0c6a205907e01de4e49)
Abstract:
Fusarium head blight (FHB) is one of the most serious diseases affecting wheat and barley worldwide. It is caused by Fusarium graminearum along with F. culmorum, F. avenaceum and other related fungi. These fungi also produce several mycotoxins. Though the disease results in reduced seed quality and yield, the toxins which may accompany the disease are often a more serious problem. Pathogen inoculum is usually very abundant, however production and dispersal of inoculum are weather-sensitive processes. An abundance of colonized substrate (i.e. maize or cereal debris) in a region contributes to airborne inoculum throughout the area. Local residues beneath the cereal crop (i.e. from previous crop) may have a less obvious effect, particularly in regions where long-distance dispersal is likely due to wind conditions. The host is most susceptible to infection at anthesis and shortly thereafter. A warm, moist environment characterized by frequent precipitation or heavy dew is highly favorable to fungal growth, infection and development of disease in head tissues. As the fungus grows, it produces mycotoxins which are water-soluble and may be translocated between tissues or leeched from source tissues. Important epidemiological issues have arisen recently and include an apparent shift in prevalence of Fusarium species on infected heads in Europe toward F. graminearum; and the presence of multiple chemotypes and aggressiveness variants within a species in a region.
Keywords: Fusarium head blight; DON; Mycotoxins; Epidemiology; Wheat; Barley

Gary Y. Yuen, Susan D. Schoneweis, Strategies for managing Fusarium head blight and deoxynivalenol accumulation in wheat, International Journal of Food Microbiology, Volume 119, Issues 1-2, Mycotoxins from the Field to the Table, 20 October 2007, Pages 126-130, ISSN 0168-1605, DOI: 10.1016/j.ijfoodmicro.2007.07.033.
(http://www.sciencedirect.com/science/article/B6T7K-4P9SN8X-C/2/adf6fa2a7bcaadf384429315e91b3a74)
Abstract:
Many mycotoxigenic fungi infect plant hosts and cause disease in the field. Therefore, control of field infection by these fungi is a critical step in managing mycotoxin accumulation in the harvested product. Fusarium graminearum, also known as Gibberella zeae, is the causal agent of Fusarium head blight (FHB), or scab, in cereals and is also the primary agent responsible for contamination

of grain with deoxynivalenol (DON). Research efforts worldwide are devoted to the development of strategies to control field infection of wheat and barley by this pathogen. Strategies include the use of fungicides and biological control agents to protect flowering heads from infection. There is extensive effort in breeding for host resistance to infection and spread of the pathogen within the heads. Scientists are also seeking exogenous traits to introduce into cereals to enhance resistance. Cultural practices are also being examined, primarily as measures to reduce pathogen survival and inoculum production in crop residues. The successes and limitations of these strategies in the management of Fusarium head blight and deoxynivalenol are discussed.
Keywords: Barley; Deoxynivalenol; Fusarium head blight; Scab; Vomitoxin; Wheat

Naresh Magan, David Aldred, Post-harvest control strategies: Minimizing mycotoxins in the food chain, International Journal of Food Microbiology, Volume 119, Issues 1-2, Mycotoxins from the Field to the Table, 20 October 2007, Pages 131-139, ISSN 0168-1605, DOI: 10.1016/j.ijfoodmicro.2007.07.034.
(http://www.sciencedirect.com/science/article/B6T7K-4P9SN8X-D/2/d6f15d22937762c6baeefa87e67a3b9c)
Abstract:
Contamination of cereal commodities by moulds and mycotoxins results in dry matter, quality, and nutritional losses and represents a significant hazard to the food chain. Most grain is harvested, dried and then stored on farm or in silos for medium/long term storage. Cereal quality is influenced by a range of interacting abiotic and biotic factors. In the so-called stored grain ecosystem, factors include grain and contaminant mould respiration, insect pests, rodents and the key environmental factors of temperature, water availability and intergranular gas composition, and preservatives which are added to conserve moist grain for animal feed. Thus knowledge of the key critical control points during harvesting, drying and storage stages in the cereal production chain are essential in developing effective prevention strategies post-harvest. Studies show that very small amounts of dry matter loss due to mould activity can be tolerated. With < 0.5% dry matter loss visible moulding, mycotoxin contamination and downgrading of lots can occur. The key mycotoxigenic moulds in partially dried grain are Penicillium verrucosum (ochratoxin) in damp cool climates of Northern Europe, and Aspergillus flavus (aflatoxins), A. ochraceus (ochratoxin) and some Fusarium species (fumonisins, trichothecenes) on temperate and tropical cereals. Studies on the ecology of these species has resulted in modelling of germination, growth and mycotoxin minima and prediction of fungal contamination levels which may lead to mycotoxin contamination above the tolerable legislative limits (e.g. for ochratoxin). The effect of modified atmospheres and fumigation with sulphur dioxide and ammonia have been attempted to try and control mould spoilage in storage. Elevated CO2 of > 75% are required to ensure that growth of mycotoxigenic moulds does not occur in partially dried grain. Sometimes, preservatives based on aliphatic acids have been used to prevent spoilage and mycotoxin contamination of stored commodities, especially feed. These are predominantly fungistats and attempts have been made to use alternatives such as essential oils and anti-oxidants to prevent growth and mycotoxin accumulation in partially dried grain. Interactions between spoilage and mycotoxigenic fungi and insect pests inevitably occurs in stored grain ecosystems and this can further influence contamination with mycotoxins. Effective post-harvest management of stored commodities requires clear monitoring criteria and effective implementation in relation to abiotic and biotic factors, hygiene and monitoring to ensure that mycotoxin contamination is minimised and that stored grain can proceed through the food chain for processing.
Keywords: Drying; Dry matter loss; Mycotoxins; Cereals; Preservation; Spoilage fungi

Lloyd B. Bullerman, Andreia Bianchini, Stability of mycotoxins during food processing, International Journal of Food Microbiology, Volume 119, Issues 1-2, Mycotoxins from the Field to the Table, 20 October 2007, Pages 140-146, ISSN 0168-1605, DOI: 10.1016/j.ijfoodmicro.2007.07.035.

(http://www.sciencedirect.com/science/article/B6T7K-4P9SN8X-F/2/6fbe1fd19d7b951ad6d7b843c2de57e0)
Abstract:
The mycotoxins that commonly occur in cereal grains and other products are not completely destroyed during food processing operations and can contaminate finished processed foods. The mycotoxins most commonly associated with cereal grains are aflatoxins, ochratoxin A, fumonisins, deoxynivalenol and zearalenone. The various food processes that may have effects on mycotoxins include sorting, trimming, cleaning, milling, brewing, cooking, baking, frying, roasting, canning, flaking, alkaline cooking, nixtamalization, and extrusion. Most of the food processes have variable effects on mycotoxins, with those that utilize the highest temperatures having greatest effects. In general the processes reduce mycotoxin concentrations significantly, but do not eliminate them completely. However, roasting and extrusion processing show promise for lowering mycotoxin concentrations, though very high temperatures are needed to bring about much of a reduction in mycotoxin concentrations. Extrusion processing at temperatures greater than 150 [degree sign]C are needed to give good reduction of zearalenone, moderate reduction of alfatoxins, variable to low reduction of deoxynivalenol and good reduction of fumonisins. The greatest reductions of fumonisins occur at extrusion temperatures of 160 [degree sign]C or higher and in the presence of glucose. Extrusion of fumonisin contaminated corn grits with 10% added glucose resulted in 75-85% reduction in Fumonisin B1 levels. Some fumonisin degredation products are formed during extrusion, including small amounts of hydrolyzed Fumonisin B1 and N-(Carboxymethyl) -- Fumonisin B1 and somewhat higher amounts of N-(1-deoxy-d-fructos-1-yl) Fumonisin B1 in extruded grits containing added glucose. Feeding trial toxicity tests in rats with extruded fumonisin contaminated corn grits show some reduction in toxicity of grits extruded with glucose.
Keywords: Mycotoxins; Extrusion; Thermal Processing; Aflatoxins; Fumonisins; Deoxynivalenol

Elena Cubera, Gerardo Moreno, Effect of land-use on soil water dynamic in dehesas of Central-Western Spain, CATENA, Volume 71, Issue 2, Soil Water Erosion in Rural Areas, 15 October 2007, Pages 298-308, ISSN 0341-8162, DOI: 10.1016/j.catena.2007.01.005.
(http://www.sciencedirect.com/science/article/B6VCG-4NH6D0N-1/2/b42776a270b0edc930a2b9ff49171712)
Abstract:
Dehesa ecosystems are open woodlands with scattered oak trees as their main component. As a result of differing land-uses, the structure of vegetation found within dehesas varies between: (i) oak trees and intercropped cereals (cropped), (ii) oak trees and native grass vegetation (grazed), and (iii) oak trees with abundant understorey shrubs (encroached). The aim of this study is to investigate whether land-use influences the water dynamics of dehesas by measuring available soil water content (AWC) in the upper 250 cm of the soil at different distances from tree trunks (maximum 30 m) at four Quercus ilex dehesas in Central-Western Spain. The technique used was Time Domain Reflectometry and the study was undertaken between May of 2002 and December of 2005. Leaf water potential ([Psi]) was also measured on trees at one site by mean of a pressure chamber. Within the upper meter of the soil, it appears that trees, grasses and shrubs extracted soil water resources in a similar way from both beneath and beyond the tree canopy. However, encroached plots in general showed lower average AWC values than cropped or grazed plots (3.7, 5.6, and 6.2% in encroached, cropped and grazed, respectively). Cereal crops do not compete more strongly than grasses with trees for available soil water resources. The similar [Psi] values found at cropped and grazed plots supported these results. From our results, it could be hypothesized that ploughed dehesas could facilitate soil re-watering in the plots with pronounced slopes. The decrease of AWC values at encroached plots with respect to the cropped and grazed plots was found mostly beyond the tree trunk at deeper soil layers, indicating that shrubs use water partly not accessible to trees. The presence of an understory of shrubs seems to have slightly increased the water constraints on trees during the summer period ([Psi]d values of - 0.5, -

0.5, and - 0.8 MPa in cropped, grazed, and encroached plots, respectively). In cropped and grazed plots, an important amount of water seems to have remained unused for trees and grasses.
Keywords: Land-use; Available water content; Cultivation; Encroachment; Fertilisation

Esther Goidts, Bas van Wesemael, Regional assessment of soil organic carbon changes under agriculture in Southern Belgium (1955-2005), Geoderma, Volume 141, Issues 3-4, 15 October 2007, Pages 341-354, ISSN 0016-7061, DOI: 10.1016/j.geoderma.2007.06.013.
(http://www.sciencedirect.com/science/article/B6V67-4PHSFKV-1/2/1ef8877fda4310b8c143eeed019ef68e)
Abstract:
The evolution of SOC stock over time is difficult to assess at a regional scale due to the small magnitude of the changes, to the important spatial variability of SOC and the lack of detailed information on present and past management practices. This paper aimed to detect changes in SOC stocks of agricultural soils of southern Belgium over a long time period (1955-2005), and to determine the driving forces of SOC evolution. The stratification of the study area into homogeneous units (based on land use, soil type, climate and agricultural region) and the re-sampling of soil profiles from the 1950s allowed detection of significant changes in SOC stocks. The use of equivalent masses for SOC stock comparisons based on the plough depth of 2005 allowed excluding dilution effect from changes in plough depth or in bulk density. For units under cropland, an average decrease of 5.8 t C ha- 1 was measured in the plough layer (from an initial equivalent SOC stock of 46.4 t C ha- 1), while for units under grassland, an average increase of 21.9 t C ha- 1 was observed in the 0-30 cm depth (from an initial equivalent SOC stock of 61.2 t C ha- 1). Explanatory factors include human driving forces (land management) and inherent soil properties. The decrease in mass of farmyard manure and slurry applied on cropland along with the change in the types of crops cultivated (progressive replacement of cereals by root crops and fodder) could explain the decrease in SOC stocks observed for cropland, while the increase in livestock density per grazing area has lead to an increase in the SOC stocks of grassland. The increase in plough depth for cropland (+ 1.5 cm) was slightly correlated to the silt content (r = -0.14) but not to the decrease in SOC content. The impact of erosion or climate on SOC changes remained uncertain. Soil texture was not highlighted as a driving force in the SOC changes, while a strong negative relationship existed between the initial SOC content and the change in SOC content. Therefore, any attempt to increase SOC content in agricultural soils should mainly focus on farming practices through adapted regulations and policies.
Keywords: Soil organic carbon; Long term evolution; Regional scale; Agricultural management; Belgium

M. Trnka, F. Muska, D. Semeradova, M. Dubrovsky, E. Kocmankova, Z. Zalud, European Corn Borer life stage model: Regional estimates of pest development and spatial distribution under present and future climate, Ecological Modelling, Volume 207, Issues 2-4, 10 October 2007, Pages 61-84, ISSN 0304-3800, DOI: 10.1016/j.ecolmodel.2007.04.014.
(http://www.sciencedirect.com/science/article/B6VBS-4P1G911-1/2/fb6cfd2c704d903edfbc993337848266)
Abstract:
Predicting the potential distribution of agricultural pests, both indigenous and introduced, plays a key role in determining the impact of global change on agricultural, horticultural and forestry ecosystems. This study investigates changes in the climatic niche of one of the most important agricultural pests, the European Corn Borer (Ostrinia nubilalis, Hubner), using the multi-generational phenology model ECAMON. The model enables us to predict the development of the European Corn Borer (ECB), to estimate the risk of its establishing a permanent population, and to give an indication of climate-related stress factors affecting the species. The evaluation of ECAMON demonstrated that it provides accurate predictions of the onset and duration of the key

phenological stages over a broad range of sites. It explains over 70% of the variation in the timing of key developmental stages based only on daily weather data. ECAMON simulations correctly predicted the presence/absence of the ECB over the study region during the 1961-1990 reference period. It also helped to explain the sudden increase in the maize infestation over the territory of the Czech Republic during the unusually warm period of 1991-2000. The ECAMON results demonstrated that the effect of climate will be significant and complex. According to our estimates, the extent of the climate niche will expand within the next 20-30 years to cover almost the entire area suitable for agriculture by 2040-2075. The establishment of a bivoltine population is not imminent within the next decade, but it is likely to take place during the period of 2025-2050. The timing and extent of these changes will be affected not only by changes in the means of key meteorological parameters, but also in their variability. These shifts will be clearly accompanied by an earlier onset of key developmental stages of the pest. The study demonstrated that the level of uncertainty caused both by emission scenarios and by differences in global circulation models (GCMs) are of the same order of magnitude. Thus, only the combination of a wide range of emission scenarios and GCMs can provide insight into the potential effect of climate change on any particular species. Under future climate conditions, grain maize is expected to partly replace traditional cereals (e.g. winter wheat, rye, etc.); thus the establishment of a national or international monitoring scheme is desirable, and an ECAMON-like tool might serve as the basic modeling platform for such an effort.
Keywords: Corn borer; ECAMON; GCMs; Degree day model; Climate change impacts

Sheng Wang, Qian-Hao Zhu, Xingyi Guo, Yijie Gui, Jiandong Bao, Chris Helliwell, Longjiang Fan, Molecular evolution and selection of a gene encoding two tandem microRNAs in rice, FEBS Letters, Volume 581, Issue 24, 2 October 2007, Pages 4789-4793, ISSN 0014-5793, DOI: 10.1016/j.febslet.2007.09.002.
(http://www.sciencedirect.com/science/article/B6T36-4PN07M2-1/2/7a2d85bd5e0f659e23e3aea68b6210d4)
Abstract:
It has been shown that overexpression of MIR156b/c resulted in a bushy phenotype in maize and rice. Our results indicated that the MIR156b/c locus was highly conserved among cereals, but not in dicots and that genome duplication events played an important role in the evolution of the miR156 family. Genetic diversity investigation at the locus indicated that only ~9% of nucleotide diversity observed in wild rice (O. rufigogon) was maintained in the cultivated rice and the neutral model was rejected ($P < 0.05$) based on Tajima's D and Fu and Li's D* and F* tests. To our knowledge, this is the first example of miRNA gene to be targeted by both natural and domestication selection in plants.
Keywords: MicroRNA; MIR156b/c; Selection; Genome duplication; Oryza sativa

Per Schjonning, Lars J. Munkholm, Susanne Elmholt, Jorgen E. Olesen, Organic matter and soil tilth in arable farming: Management makes a difference within 5-6 years, Agriculture, Ecosystems & Environment, Volume 122, Issue 2, October 2007, Pages 157-172, ISSN 0167-8809, DOI: 10.1016/j.agee.2006.12.029.
(http://www.sciencedirect.com/science/article/B6T3Y-4N1SJKG-2/2/499b383bd57a83f3af9299c38b078d65)
Abstract:
Management-induced depletion in soil organic carbon (SOC) may create critical tilth conditions for arable farming. We investigated the short-term effect of crop rotation and addition of animal manure on SOC fractions, the dispersibility of soil clay, the length of fungal hyphae, wet aggregate stability, tensile strength of dry aggregates, and the pore size distribution, gas diffusivity and permeability of undisturbed bulk soil. SOC fractions were measured in whole-soil samples and in 1-2 mm air-dried aggregates. Plough layer soil was sampled 5 and 6 years after the start of a field

experiment with different cropping systems at two loamy sand soils (Foulum, ~9% clay and Flakkebjerg, ~14% clay). A soil drop test was performed in the field to evaluate in situ soil friability. A system dominated by small grain cereals not receiving animal manure served as a reference treatment (`CEREAL'). This system was compared to the same crop sequence but with application of animal manure (`CEREAL + MANURE', only at one location), and to a diversified crop rotation including grass/clover but without addition of animal manure (`CEREAL + GRASS'). A part of each field plot was compacted by a medium-sized tractor. The content of SOC was lowest for the CEREAL system at both locations. Hot-water extractable SOC displayed the same pattern. The carbon fractions in aggregates responded similarly to cropping systems as those in whole-soil samples. Clay dispersibility was highest in the CEREAL system. The length of fungal hyphae was enhanced by the versatile crop rotation. Soil compaction tended to increase clay dispersibility. Our results confirmed agronomic observations that the tilth in the Flakkebjerg soil was problematic and worse than in the Foulum soil, but generally only trends were found in amelioration of the poor mechanical tilth characteristics. In contrast, soil (macro)porosity was significantly higher for the CEREAL + GRASS system compared to the other two systems, and the CEREAL + MANURE and CEREAL + GRASS systems had more tortuous pore systems compared to the CEREAL system and better resisted compaction than the latter. We conclude that only 5-6 years of differentiated soil management significantly affected SOC fractions, the dispersibility of clay, and the growth of fungal hyphae. As only trends were found in the mechanical aspects of soil tilth, the tilth-forming agents may serve as early indicators of changes in soil tilth. Our results also indicate that soil pore characteristics are affected by short-term management and probably provide the basis for later significant changes also in mechanical tilth characteristics.
Keywords: Soil tilth; Soil organic carbon; Labile carbon; Fungal hyphae; Clay dispersibility; Aggregation; Soil pores; Cropping system; Manure; Compaction

S. Oberg, B. Ekbom, R. Bommarco, Influence of habitat type and surrounding landscape on spider diversity in Swedish agroecosystems, Agriculture, Ecosystems & Environment, Volume 122, Issue 2, October 2007, Pages 211-219, ISSN 0167-8809, DOI: 10.1016/j.agee.2006.12.034.
(http://www.sciencedirect.com/science/article/B6T3Y-4N3GNG8-1/2/3d5459ab7756b9f3ac94b8eb0b771b5d)
Abstract:
Lycosid and linyphiid spiders were collected over a full cropping season around Uppsala, Sweden, in eight organic spring sown cereal fields in three different habitat types: field margin, field, and the edge between the two. The sites were located in landscapes with different proportions of non-crops, forest, perennial crops, annual crops, and number and sizes of arable fields. The field margin, compared with the field habitat, was found to be important for the activity density of lycosids, and for the species richness and composition of linyphiids. Landscape parameters were central for the activity density of linyphiids and for the species richness and composition of Lycosidae. A diverse landscape with easy access to perennial crops and forest in addition to field margins will augment both the number of species and individuals of the two spider families.
Keywords: Araneae; Lycosidae; Linyphiidae; Activity density; Species richness; Species composition; Spring cereals; Field margin; Predators

Karl L. Evans, Jeremy D. Wilson, Richard B. Bradbury, Effects of crop type and aerial invertebrate abundance on foraging barn swallows Hirundo rustica, Agriculture, Ecosystems & Environment, Volume 122, Issue 2, October 2007, Pages 267-273, ISSN 0167-8809, DOI: 10.1016/j.agee.2007.01.015.
(http://www.sciencedirect.com/science/article/B6T3Y-4N5CSFX-1/2/1c6549dd6b6bd8792c131a562eb05830)
Abstract:

The influence of crop type (pasture, silage and cereal) on the abundance of aerial invertebrates and the density of foraging barn swallows Hirundo rustica was investigated in lowland mixed farmland in southern Britain. After taking weather and other confounding factors into account aerial invertebrate abundance over pasture fields was more than double that over silage, and more than three and a half times greater than that over cereal fields. Pasture fields also hosted approximately twice as many foraging barn swallows as both silage and cereal fields. The results suggest that past reductions in the availability of pasture will have reduced the numbers of aerial invertebrates, and may have contributed to barn swallow population declines, and possibly those of other aerial insectivores. Maintaining grazed pasture, especially that which is closest to farm buildings and other potential nest sites, will help to maintain breeding barn swallow populations on lowland farmland.
Keywords: Agricultural intensification; Cereal; Farmland; Grassland management; Hirundo rustica; Invertebrates; Silage

R. Krska, E. Welzig, H. Boudra, Analysis of Fusarium toxins in feed, Animal Feed Science and Technology, Volume 137, Issues 3-4, Fusarium and their toxins: Mycology, occurrence, toxicity, control and economic impact, 1 October 2007, Pages 241-264, ISSN 0377-8401, DOI: 10.1016/j.anifeedsci.2007.06.004.
(http://www.sciencedirect.com/science/article/B6T42-4P8994R-1/2/0ddb8a60e1fca26e913c21cdea7704c0)
Abstract:
Contamination of cereals and related products with Fusarium toxins causes feed-borne intoxication especially in farm animals. Therefore, efficient analytical tools for qualitative analysis and quantitation of fungal metabolites in feed are required. Methods usually include an exhaustive extraction, a clean-up step to reduce or eliminate unwanted matrix components and a separation and detection step. Currently, quantitative methods of analysis for most Fusarium toxins use immunoaffinity clean-up with high performance liquid chromatography (HPLC) or gas chromatography (GC) in combination with a variety of detectors. Screening of samples contaminated with mycotoxins is frequently performed by thin layer chromatography (TLC) and yields qualitative or semi-quantitative results. More recently, enzyme-linked immunosorbent assays (ELISA) are often used for rapid screening. A number of emerging methods such as fluorescence polarization immunoassays, dipsticks, or even newer methods such as biosensors and non-invasive methods based on infrared and acoustic techniques have shown great potential for mycotoxin analysis. Currently, there is a trend towards developing multimycotoxin methods for the simultaneous analysis of several Fusarium mycotoxins belonging to different chemical families which is best achieved by LC-MS/MS (liquid chromatography with tandem mass spectrometry). The current paper gives an overview of the currently used methodology for the analysis of the Fusarium toxins fumonisins (FBs), moniliformin (MON), zearalenone (ZON) and type-A and -B trichothecenes in feeds, as well as other essential issues in mycotoxin analysis such as the availability of reliable calibrants and reference materials.
Keywords: Fusarium mycotoxins; Analysis; Animal feed

James J. Pestka, Deoxynivalenol: Toxicity, mechanisms and animal health risks, Animal Feed Science and Technology, Volume 137, Issues 3-4, Fusarium and their toxins: Mycology, occurrence, toxicity, control and economic impact, 1 October 2007, Pages 283-298, ISSN 0377-8401, DOI: 10.1016/j.anifeedsci.2007.06.006.
(http://www.sciencedirect.com/science/article/B6T42-4P7FCW1-1/2/c60a8207a7d89561fa442fb8dc874000)
Abstract:
Trichothecene contamination of agricultural staples such as wheat, barley and maize during Fusarium colonization is an increasingly common problem possibly because of expanded use of

'no-till farming' and changing climate patterns. Since food and feed contamination by trichothecenes have been associated with human and animal toxicoses, serious questions remain regarding assessment of potential risks from ingesting foodborne trichothecenes and how they should be regulated. Deoxynivalenol (DON), known colloquially as 'vomitoxin' is the trichothecene most commonly detected, often at the ppm level. All animal species evaluated to date are susceptible to DON according to the rank order of pigs > mice > rats > poultry [approximate] ruminants. Differences in metabolism, absorption, distribution, and elimination of DON among animal species might account for this differential sensitivity. Both 3- and 15-acetyl DON, which sometimes co-occur in smaller amounts cereal grains, are equivalently or less toxic than DON based on LD50 values in mice and are thus unlikely to pose any additional risk. Acute exposure to extremely high DON (>=27 mg/kg body weight; b.w.) doses is required to cause mortality or marked tissue injury in experimental animals. In contrast, acute exposure to relatively low doses (>=50 [mu]g/kg b.w.) can cause vomiting in pigs, the most sensitive species. This corresponds to human food poisoning outbreaks with nausea, diarrhea and vomiting as primary symptoms that were associated with Fusarium-infested cereals. The most common effects of prolonged dietary exposure of experimental animals to DON are decreased weight gain, anorexia, decreased nutritional efficiency and altered immune function with species differences again being apparent.
Keywords: Mycotoxin; Fusarium; Trichothecenes

J. Fink-Gremmels, H. Malekinejad, Clinical effects and biochemical mechanisms associated with exposure to the mycoestrogen zearalenone, Animal Feed Science and Technology, Volume 137, Issues 3-4, Fusarium and their toxins: Mycology, occurrence, toxicity, control and economic impact, 1 October 2007, Pages 326-341, ISSN 0377-8401, DOI: 10.1016/j.anifeedsci.2007.06.008.
(http://www.sciencedirect.com/science/article/B6T42-4P5RVV6-2/2/249e833d24ca31f30d243183db57486a)
Abstract:
The mycoestrogen zearalenone (ZEA) is found worldwide as a contaminant in cereals and grains, including maize and soybeans. Despite its non-steroidal structure, ZEA activates estrogen receptors resulting in functional and morphological alteration in reproductive organs. Among farm animals, pigs are considered to be the most sensitive species, and clinical signs of exposure include ovarian atrophy, prolonged estrus intervals, persistent corpora lutea, decreased fertility and stillbirth. Controlled experiments demonstrated that the intensity of these effects depends upon the reproductive status and is more pronounced in prepubertal gilts. ZEA interacts not only with both types of estrogen receptors but is also a substrate for hydroxysteroid dehydrogenases, which convert it into two stereoisomeric metabolites, [alpha]-zearalenol and [beta]-zearalenol. A second reduction step yields the two minor metabolites [alpha]-zearalanol and [beta]-zearalanol. Alpha-hydroxylation results in an increase in estrogenic potency as compared to the parent compound, and the species-specific rate of alpha-hydroxylation may account for the susceptibility of certain animal species, including pigs, towards ZEA exposure. Another factor that might contribute to the species-specific sensitivity is the glucuronidation capacity inactivating ZEA as well as its metabolites. In comparison with other animal species, certain pig breeds have a low glucuronidation capacity, and hence this may cause a delayed inactivation of the ZEA. Experiments in vivo and in vitro indicate that ZEA and its metabolites are substrates for various enzymes involved in steroid metabolism. Hence, considering the interaction with estrogen receptors mentioned above and the modulation of enzyme kinetics, ZEA is grouped with the compounds known collectively as endocrine disrupters. This classification is substantiated by the findings that maternal exposure to ZEA affects the development and reproductive activity in the offspring (F1), as demonstrated in rodent studies. The diversity of biological effects also seems to account for the significant variability in the outcome of clinical trials conducted with pigs of different age groups, and suggests that adverse effects associated with exposure to ZEA occur at concentrations in feed that do not cause obvious clinical signs.

Keywords: Zearalenone; Alpha-zearalenol; Beta-zearalenol; Hydroxysteroid dehydrogenases; Hyperestrogenism; Endocrine disruptors; Mycoestrogens; Pigs

Jean Pierre Jouany, Methods for preventing, decontaminating and minimizing the toxicity of mycotoxins in feeds, Animal Feed Science and Technology, Volume 137, Issues 3-4, Fusarium and their toxins: Mycology, occurrence, toxicity, control and economic impact, 1 October 2007, Pages 342-362, ISSN 0377-8401, DOI: 10.1016/j.anifeedsci.2007.06.009.
(http://www.sciencedirect.com/science/article/B6T42-4P7FCW1-2/2/6c27652fbad7532ebf120193499b565c)
Abstract:
Moulds and associated mycotoxins are important factors adversely affecting foods produced using contaminated plant products or animal products derived from animals fed on contaminated feeds. Mycotoxins are toxic to humans and animals, which explains the major concern of food and feed industries in preventing them from entering the food chain. Prevention is essential since there are few ways to completely overcome problems once mycotoxins are present.
Toxin-producing moulds may invade plant material in the field before harvest, during post-harvest handling and storage and during processing into food and feed products. Thus, toxigenic fungi have been roughly classified into two groups (i) field fungi; (ii) storage fungi. The Fusarium genus, e.g. F. verticillioides (formerly F. moniliforme), F. roseus, F. tricinctum and F. nivale, are ubiquitous soil organisms, which may infect cereals directly in the field thereby, increasing fumonisins, trichothecene, and zearalenone levels (depending on the species) during growth, ripening of grain and at harvesting. Fusarium sp. can have deleterious effect on plants and decrease plant productivity. Many species can infect heads of wheat and other small grain cereals in fields causing head scab or blight (FHB). Ear rot also can be caused by Fusarium sp. growing on maize. Furthermore, fungi can grow on the non-grain part of plants producing large amounts of mycelium towards the stem where it colonizes the vascular bundles, which inhibits the transfer of nutrients in the upper part of the plant. On the contrary, Fusarium sp. does not significantly contribute to the storage fungi or to the fungal contaminants found only on damaged grains.
Due to the multiple possible origins of fungal infection, any prevention strategy for fungal and mycotoxin contamination must be carried out at an integrative level all along the food production chain. Three steps of intervention have been identified. The first step in prevention should occur before any fungal infestation; the second step is during the period of fungal invasion of plant material and mycotoxin production; the third step is initiated when the agricultural products have been identified as heavily contaminated. Such hazard analysis has some similarity with the HACCP management system of food safety [Degirmencioglu N., Esecali H., Cokal Y., Bilgic M., 2005. From safety feed to safety food: the application of HACCP in mycotoxin control. Arch. Zootech. 8, 19-32], mainly with the principles 2 (Determination of critical control points) and 3 (Establish critical limits). Most of the efforts must be concentrated on the two first steps since, once mycotoxins are present, it is difficult to eliminate them in a practical way.
Keywords: Prevention; Decontamination; Mycotoxins; Feeds

E.S. Dennis, W.J. Peacock, Epigenetic regulation of flowering, Current Opinion in Plant Biology, Volume 10, Issue 5, Cell Signalling and Gene Regulation - Edited by Jian-Kang Zhu and Ko Shimamoto, October 2007, Pages 520-527, ISSN 1369-5266, DOI: 10.1016/j.pbi.2007.06.009.
(http://www.sciencedirect.com/science/article/B6VS4-4PG2VH2-1/2/d029aa3a8993ae85d6a1a89008179a93)
Abstract:
The acceleration of flowering by prolonged low temperature treatment (vernalization) has unique properties including the floral transition occurring at a time separate from the vernalization treatment. This implies the vernalization condition is inherited through mitotic divisions, but this vernalized state is not inherited from one generation to the next. FLC, the key gene mediating this

response in the Arabidopsis is repressed by histone modifications involving the VRN2 protein complex. Other protein complexes participate in activating the gene. While many plant species depend on vernalization for optimising flowering time, the genes involved differ between dicot and monocot plants in both Arabidopsis and cereals, vernalization regulates photoperiod control of flowering by preventing the induction of the floral promoter FT by long days in autumn but allowing induction of FT in spring and hence flowering occurs at an optimal time in the annual life cycle.

R.H. Harris, T.S. Clune, M.B. Peoples, A.D. Swan, W.D. Bellotti, W. Chen, S. Norng, The importance of in-crop lucerne suppression and nitrogen for cereal companion crops in south-eastern Australia, Field Crops Research, Volume 104, Issues 1-3, `Ground-breaking Stuff'- Proceedings of the 13th Australian Society of Agronomy Conference, 10-14 September 2006, Perth, Western Australia, October-December 2007, Pages 31-43, ISSN 0378-4290, DOI: 10.1016/j.fcr.2007.05.013.
(http://www.sciencedirect.com/science/article/B6T6M-4P83HJY-1/2/b98a91e42fd02703fe14bcff85bb5d34)
Abstract:
Five field experiments located at four sites across south-eastern Australia found cereal grain yields were less in the presence of lucerne (companion cropping) than in the absence of lucerne (cereal monoculture). Top-dressed nitrogen (N) and in-crop lucerne suppression, generally did not enhance cereal crop yields in the presence of lucerne compared with cereals growing in monoculture. Grain yield reductions from cereals growing with lucerne were found at four of the five sites, with reductions ranging from 16 to 26% compared with cereals growing in monoculture. In regard to cereal production, there was no main treatment by top-dressed N interaction at all sites, indicating that applying N to cereals irrespective of whether they were growing with or without lucerne, resulted in the same yield responses. With favourable growing seasons (decile > 6) and low available soil N levels, top-dressing N resulted in a 31% and a 0.8 unit increase in grain yield and grain protein, respectively, across all cereal crops and years. However, the absence of a grain yield response to top-dressed N at one site was due to excessive cereal biomass production from N application, causing extensive crop lodging in 2003, and decile 2 growing season rainfall in 2004. At another site, high available soil N levels and low growing season rainfall (decile 3) resulted in a 12% decline in grain yield across all cereal crops and years in response to top-dressing N. We therefore conclude that N application to cereals growing with lucerne can increase cereal grain yields, but only when accompanied by favourable growing season rainfall and low available soil N levels. In-crop lucerne suppression was effective at reducing cereal grain contamination by lucerne pods and flowers in companion crops, but was less effective under dry seasonal conditions, demonstrating that soil moisture will affect herbicide efficacy and the effectiveness of this practice. Economic analyses of companion cropping based on grain yields alone, will not be adequate without an assessment of summer lucerne production, until such data exists across a range of environments, it would be premature to conclude whether and or where this practice has commercial merit.
Keywords: Inter-cropping; Companion cropping; Grain yield reduction; In-crop lucerne suppression; Top-dressed nitrogen; Lucerne; Wheat; Barley

Mohammad-Reza Oveisi, Behrooz Jannat, Naficeh Sadeghi, Mannan Hajimahmoodi, Azadeh Nikzad, Presence of aflatoxin M1 in milk and infant milk products in Tehran, Iran, Food Control, Volume 18, Issue 10, October 2007, Pages 1216-1218, ISSN 0956-7135, DOI: 10.1016/j.foodcont.2006.07.021.
(http://www.sciencedirect.com/science/article/B6T6S-4M7K9PR-1/2/6255011a9b272b3c5309a28e9b691242)
Abstract:

Aflatoxins are highly toxic, mutagenic, teratogenic and carcinogenic compounds. The purpose of this survey was to determine natural occurrence and level of AFM1 in pasteurized liquid milk, infant formula and milk-based cereal weaning food consumed in Tehran, Iran.
A total of 328 branded milk products and liquid milk samples were collected and investigated by Enzyme Linked Immuno Sorbent Assay (ELISA).
The samples of pasteurized liquid milk (n = 128), infant formula (n = 120) and milk-based cereal weaning food (n = 80) showed that the incidence of contamination with AFM1 is 96.3%, the presence of AFM1 in each group was 72.2 +/- 23.5, 7.3 +/- 3.9 and 16.8 +/- 12.5 ng/kg, ranging between 31-113, 1-14 and 3-35 ng/kg, respectively.
In general, the amount of AFM1 in 100 (78%) of liquid milk samples and 24 (33%) of milk-based weaning food was higher than the maximum tolerance limit accepted by European Union, but in all of the infant formula samples was lower (European Communities and Codex Alimentarius has prescribed a limit of 50 ng/kg for AFM1 in milk and 25 ng/kg in infant milk products).
Keywords: Aflatoxin M1; Milk; Infant formula; Weaning food

Reyad Shaker, Tareq Osaili, Wail Al-Omary, Ziad Jaradat, Mahmoud Al-Zuby, Isolation of Enterobacter sakazakii and other Enterobacter sp. from food and food production environments, Food Control, Volume 18, Issue 10, October 2007, Pages 1241-1245, ISSN 0956-7135, DOI: 10.1016/j.foodcont.2006.07.020.
(http://www.sciencedirect.com/science/article/B6T6S-4M4KK5R-1/2/5c0bf57ceab40341e9838bed5caac475)
Abstract:
Enterobacter sakazakii and other Enterobacter species have caused foodborne illnesses through consumption of a variety of foods, including infant foods. The prevalence of E. sakazakii and other Enterobacter sp. in infant food and milk formula, milk powder, cereal products, spices, sugar and food production environments were studied. A total of 106 samples were tested for the presence of E. sakazakii and other Enterobacter sp. The presence of E. sakazakii and Enterobacter sp. was detected using the FDA enrichment procedure and a chromogenic medium. E. sakazakii was isolated from 2/15 infant food formula, 2/8 infant milk formula, 1/18 cereal products. However none of the powder milk, spices, sugar and environmental samples were positive for E. sakazakii. E. agglomerans was isolated from infant food formula, infant milk formula, milk powder, cereal products, spices and environmental samples. E. cloacae was isolated from infant milk formula.
Keywords: Enterobacter sakazakii; Infant formula; Production environments

Minghui Zhang, Xuejun Gao, Yanbo Yu, Jinxia Ao, Jun Qin, Yonghao Yao, Qingzhang Li, Detection of Roundup Ready soy in highly processed products by triplex nested PCR, Food Control, Volume 18, Issue 10, October 2007, Pages 1277-1281, ISSN 0956-7135, DOI: 10.1016/j.foodcont.2006.09.001.
(http://www.sciencedirect.com/science/article/B6T6S-4MD9G32-1/2/0e7768e0623e7f5d3c36d7096464fb45)
Abstract:
Till now, there still has not an effective detection method for the highly processed GM (genetically modified) products. A novel method of the triplex nested PCR, was developed for the sensitive detection of several foreign genes (Lectin, CaMV 35S, CTP, CP4-EPSPS, NOS) in highly processed products. We detected seven representative highly processed products (soya lecithin, soya protein powder, chocolate beverage, infant rice cereal, crude soybean oil, soybean refine oil, soybean salad oil) by the triplex nested PCR. The first triplex PCR cannot detect the insert signals in the processed products, and the sensitivity is 0.5%. However the second triplex PCR, which can simultaneously detect RR soybean targets with a sensitivity of 0.005% in the triplex nested PCR. The result indicates the advanced level of the method for the GM products detection. It is a flexible assay to detect the RR soybean in highly processed products.

Keywords: RR soybean; Highly processed products; Triplex nested PCR; Detection of genetically modified organism

Li-Chun Lin, Larry R. Beuchat, Survival of Enterobacter sakazakii in infant cereal as affected by composition, water activity, and temperature, Food Microbiology, Volume 24, Issues 7-8, October-December 2007, Pages 767-777, ISSN 0740-0020, DOI: 10.1016/j.fm.2007.02.001.
(http://www.sciencedirect.com/science/article/B6WFP-4N4J302-1/2/b75d6f69497aac6013dae92604b3010b)
Abstract:
Enterobacter sakazakii infections in preterm neonates and infants have been epidemiologically associated with consumption of reconstituted powdered infant formula. The bacterium has been isolated from grain, infant cereals, and cereal factory environments. A study was done to determine the survival characteristics of E. sakazakii initially at populations of 0.31 and 5.03 log CFU/g of infant rice cereal (aw 0.30, 0.45-0.46, and 0.68-0.69). Cereal was stored at 4, 21, and 30 [degree sign]C and populations were monitored for up to 12 months. Survival of the pathogen in infant rice, barley, oatmeal, and mixed grain cereals (aw 0.63-0.66, 0.76, or 0.82-0.83) initially containing a population of 4.93-5.64 log CFU/g and held at 4, 21, and 30 [degree sign]C up to 24 weeks was determined. Populations decreased significantly (p[less-than-or-equals, slant]0.05) in all cereals stored at 21 and 30 [degree sign]C regardless of aw. Increases in aw or storage temperature accelerated the rate of death of E. sakazakii in dry infant cereals. However, at an initial population of 0.31 log CFU/g, E. sakazakii survived in rice cereal (aw 0.30-0.69) for up to 12 months at all storage temperatures. Survival of E. sakazakii was not affected by the composition of dry infant rice, barley, mixed grain, and oatmeal cereals (initial aw 0.63-0.83) stored for up to 24 weeks at 4, 21, or 30 [degree sign]C. This study demonstrated that E. sakazakii can survive for up to 12 months in infant cereals having a wide range of aw when storage is at temperatures simulating those to which they may be exposed during distribution, at retail, and in the home.
Keywords: Enterobacter sakazakii; Infant cereal; Water activity

Hong Yang, Lei Wang, Alexander J.B. Zehnder, Water scarcity and food trade in the Southern and Eastern Mediterranean countries, Food Policy, Volume 32, Issues 5-6, October-December 2007, Pages 585-605, ISSN 0306-9192, DOI: 10.1016/j.foodpol.2006.11.004.
(http://www.sciencedirect.com/science/article/B6VCB-4MSHTJY-2/2/47a4d98205423a6960fd88ac3776dadf)
Abstract:
This study investigates food trade patterns in relation to water resources availability in the Southern and Eastern Mediterranean countries (SEMED). Examinations show that most of these countries have a high dependence on the import of water intensive crops - cereal, vegetable oil and sugar, in the domestic food supply. The region as a whole is marginally a net exporter of fruits and vegetables, while variations are substantial across countries. Multi-variable regression analyses show that intensification of water scarcity is an important factor in explaining the increase in food import in the SEMED countries during the past two decades. It also finds that while GDP per capita has a strong influence on the level of food import in a country, its impact on changes in the import during the same period is rather modest. No significant relationship is found between the trade of fruits and vegetables and water resources availability. The projection on food import with respect to the decline in per capita water resources availability results in an increase of 40%, 39% and 14%, respectively, for cereal, vegetable oil and sugar by 2020 in the region, holding other factors constant. The European Union (EU) is the major food trade partner of the SEMED countries, except for cereal. About 70% of the fruit export and 55% of the vegetable export of the region currently go to the EU market. Expanding the export of fruits and vegetables is conducive to improving the value of water use in the SEMED countries. However, the expansion is constrained partly by the barriers in the destination markets, notably the EU.

Keywords: Water scarcity; Southern and Eastern Mediterranean; Food trade; Multi-variable regression

Bernadette Videmann, Jonathan Tep, Severine Cavret, Sylvaine Lecoeur, Epithelial transport of deoxynivalenol: Involvement of human P-glycoprotein (ABCB1) and multidrug resistance-associated protein 2 (ABCC2), Food and Chemical Toxicology, Volume 45, Issue 10, October 2007, Pages 1938-1947, ISSN 0278-6915, DOI: 10.1016/j.fct.2007.04.011.
(http://www.sciencedirect.com/science/article/B6T6P-4NKJ0M0-2/2/1e445faa21ac27bcf9df19935e2eb4c7)
Abstract:
Deoxynivalenol (DON) is a major mycotoxic contaminant of cereal grains in Europe and North America. Human and animal contamination occurs mainly orally, and the toxin must traverse the intestinal epithelial barrier before inducing potential health effects. This study investigates the mechanisms of DON transepithelial transfer. Investigations using the human intestinal Caco-2 cell line showed a basal-to-apical polarized transport of the toxin. Both apical-basolateral (AP-BL) and basolateral-apical (BL-AP) transfers were time- and concentration-dependent, and not saturable between 5 and 30 [mu]M DON. Arrhenius plot analysis revealed that transfer of 10 [mu]M DON was temperature-dependent, with apparent activation energy Ea = 3.2 kcal mol-1 in the AP-BL direction, and Ea = 10.4 kcal mol-1 in the BL-AP direction. Intracellular DON accumulation was increased and DON efflux was decreased by ATP depletion, by P-glycoprotein inhibitor valspodar and by MRP2 inhibitor MK571, but not by BCRP inhibitor Ko143. Intracellular DON accumulation was then investigated using epithelial cell lines transfected with human P-glycoprotein or MRP2. This accumulation was decreased in LLCPK1-MDR1 and MDCKII-MRP2 cells, compared to wild-type cells, and the decrease could be reversed by valspodar or MK571. Taken together, these results suggest that DON is a substrate for both P-glycoprotein and MRP2.
Keywords: Trichothecenes; Deoxynivalenol; P-Glycoprotein; Multidrug resistance-associated protein 2; Epithelial cells; Intestinal transfer

Gonul Kaletunc, Prediction of specific heat of cereal flours: A quantitative empirical correlation, Journal of Food Engineering, Volume 82, Issue 4, October 2007, Pages 589-594, ISSN 0260-8774, DOI: 10.1016/j.jfoodeng.2007.03.028.
(http://www.sciencedirect.com/science/article/B6T8J-4NB997T-4/2/6673a8cb183633b6d444c1f3fd0c5dfa)
Abstract:
Thermograms of wheat, corn and rice flour samples were recorded using pressure variable DSC. Pressure was maintained at 20 atm during measurements, and thermograms were normalized to yield specific heat curves as a function of temperature, moisture content and protein content. Specific heat data were fitted to a general empirical equation, using an algorithm for multiple regression with subsequent statistical analysis. A quantitative empirical equation incorporating temperature, moisture content, and protein content dependent terms was developed to predict specific heat of cereal flours and starches between 20 and 110 [degree sign]C and the moisture content between 0% and 70% dry basis. Proposed equation predicts the specific heat of flours in the database with an average absolute error of 2.3% and the specific heat of cereal flours and starches reported in the literature with an average absolute error of 4.3%.
Keywords: Specific heat; Cereal flours; Starch

Glenn A. Gaesser, Carbohydrate Quantity and Quality in Relation to Body Mass Index, Journal of the American Dietetic Association, Volume 107, Issue 10, October 2007, Pages 1768-1780, ISSN 0002-8223, DOI: 10.1016/j.jada.2007.07.011.
(http://www.sciencedirect.com/science/article/B758G-4PSK6FG-K/2/42097ffb87c05738aaa412b72f1a5480)

Abstract:
The increased prevalence of overweight and obesity in the United States since approximately 1980 is temporally associated with an increase in carbohydrate intake, with no appreciable change in absolute intake of fat. Despite speculation that both carbohydrate quantity and quality have contributed significantly to excess weight gain, the relationship between carbohydrate intake and body mass index (BMI) is controversial. A review of relevant literature indicates that most epidemiologic studies show an inverse relationship between carbohydrate intake and BMI, even when controlling for potential confounders. These observational studies are supported by results from a number of dietary intervention studies wherein modest reductions in body weight were observed with an ad libitum, low-fat, high-carbohydrate diet without emphasis on energy restriction or weight loss. With few exceptions, high glycemic load is associated with lower BMI, even when adjusted for total energy intake. Data on the association between glycemic index and BMI are not as consistent, with more studies showing either no association or an inverse relationship, rather than a positive relationship. Whole-grain intake is generally inversely associated with BMI; refined grain intake is not. Because overall dietary quality tends to be higher for high-carbohydrate diets, a low-fat dietary strategy with emphasis on fiber-rich carbohydrates, particularly cereal fiber, may be beneficial for health and weight control.

Pieter Pypers, Michael Huybrighs, Jan Diels, Robert Abaidoo, Erik Smolders, Roel Merckx, Does the enhanced P acquisition by maize following legumes in a rotation result from improved soil P availability?, Soil Biology and Biochemistry, Volume 39, Issue 10, October 2007, Pages 2555-2566, ISSN 0038-0717, DOI: 10.1016/j.soilbio.2007.04.026.
(http://www.sciencedirect.com/science/article/B6TC7-4NWMRV1-3/2/66b531c8a258f9081637595bc8478ed3)
Abstract:
Field data have suggested that under P-deficient conditions, legumes supplied with phosphate rock (PR) increase P acquisition by a subsequent maize crop compared to direct application of PR to maize. This study assessed the mechanism of this positive rotational effect in terms of soil P availability using a greenhouse trial with large volume (74 l) containers. The rotation effect was analysed in relation to PR application, previous legume growth and incorporation of the legume residues. Velvet bean (Mucuna pruriens) and maize were grown in a representative Acrisol from the Nigerian Northern Guinea savannah (NGS). All soils were applied with sufficient urea to exclude N-effects in the rotations. In a first season, velvet bean and maize responded similarly to PR application, and P uptake by both crops increased by 45%. The soil total labile P quantity (E-value) and P concentration in soil solution after plant growth were increased by PR-application only in soils previously grown by velvet bean, suggesting enhanced PR solubilisation in the legume-grown soils. In the subsequent season, grain yields and P uptake of a maize crop following velvet bean were twice as large compared to maize following a first maize crop. This residual effect of velvet bean was even significant in treatments without PR-application, although both maize and velvet bean withdrew similar amounts of P during the first season and no differences in soil P availability were observed. Furthermore, legume residue incorporation in soils previously grown by maize did not affect yields or P uptake of the subsequent maize crop, while it significantly increased the E-value and during the first 7 weeks in the second season. As such, the positive rotational effects of velvet bean were larger than predicted by soil P availability measures. Maize yield significantly increased with increasing plant P concentration among all treatments. However, the rotational effect was unrelated to internal P concentration: significantly larger yields were obtained for maize following velvet bean than for maize following maize at identical internal P. This suggested the presence of another growth-limiting which is counteracted by the previous velvet bean growth. In conclusion, our results confirmed that the introduction of a legume supplied with PR into a maize-based cropping system increases yield and P-uptake by a subsequent maize crop, compared to maize following a first maize crop supplied with PR. These stimulations,

however, went beyond improved P nutrition. Results strongly suggested that the legume in the rotation system has other positive, possibly soil-microbiological effects which enhance maize growth and production.
Keywords: E-value; Legume-cereal rotation; Maize; Mucuna pruriens; P acquisition; P deficiency; P uptake; Phosphate rock; Soil solution P; Residue incorporation

S. Hang, S. Houot, E. Barriuso, Mineralization of 14C-atrazine in an entic haplustoll as affected by selected winter weed control strategies, Soil and Tillage Research, Volume 96, Issues 1-2, October 2007, Pages 234-242, ISSN 0167-1987, DOI: 10.1016/j.still.2007.06.004.
(http://www.sciencedirect.com/science/article/B6TC6-4P9T962-1/2/f6257f5c5970926deeeae8e995832e8e)
Abstract:
The effect of winter weed control (WWC) management on 14C-atrazine (6-chloro-N2-ethyl-N4-isopropyl-1,3,5-triazine-2,4-diamine) mineralization was investigated in an Entic Haplustoll in Argentina. Three WWC managements were selected: Chemical Fallow (CF) and Cereal Cover Crop (CCC), both under no-tillage, and Reduced Tillage (RT) with chisel and moldboard plow. Soil was sampled at two depths: 0-5 and 5-10 cm, to evaluate the soil stratification induced by the tillage system. To distinguish differences in atrazine degradation in soils with and without previous history of atrazine application two crop sequences were selected: continuous soybean [Glycine max L., Merr.] (CS) without previous atrazine exposure, and soybean-maize (Zea mays L.) rotation (SM) with atrazine application every winter and in alternate springs. The release of 14C-CO2 during laboratory incubations of soils treated with ring labelled 14C-atrazine was determined. Soil organic matter (SOM) distribution was determined with depth and among three soil size fractions: 200-2000 [mu]m, 50-200 [mu]m and <50 [mu]m. Previous atrazine application enhanced atrazine degrading microorganims. Atrazine mineralization was influenced by both WWC management and the tillage system. Chemical fallow showed the highest atrazine mineralization in the two crop sequences. Depth stratification in atrazine degradation was observed in the two WWC treatments under the no-tillage. Depth stratification in the content of soil organic C and relative accumulation of organic C in coarsest fractions (200-2000 and 50-200 [mu]m) were observed mainly in no-till systems. Depth stratification of atrazine degrading activity was mainly correlated to the stratification of fresh organic matter associated with the coarsest fractions (200-2000 [mu]m). Atrazine persistence in soil is strongly affected by soil use and management, which can lead to safe atrazine use through selection of appropriate agricultural practices.
Keywords: Crop sequence; Non-tillage; Reduced tillage; Soil organic matter stratification; Herbicides

Roel Van der Meulen, Silvia Grosu-Tudor, Fernanda Mozzi, Frederik Vaningelgem, Medana Zamfir, Graciela Font de Valdez, Luc De Vuyst, Screening of lactic acid bacteria isolates from dairy and cereal products for exopolysaccharide production and genes involved, International Journal of Food Microbiology, Volume 118, Issue 3, 30 September 2007, Pages 250-258, ISSN 0168-1605, DOI: 10.1016/j.ijfoodmicro.2007.07.014.
(http://www.sciencedirect.com/science/article/B6T7K-4P9SN8X-1/2/44bf7a7b4496df8c6bef7b1782c7414e)
Abstract:
A total of 174 lactic acid bacteria (LAB) strains isolated from dairy and cereal products were screened for the production of exopolysaccharides (EPS). Therefore, a rapid screening method was developed based on ultrafiltration and gel permeation chromatography. Furthermore, a screening through the polymerase chain reaction (PCR) was performed with primer pairs targeting different genes involved in EPS production. Nine isolates produced a homopolysaccharide of the glucan type, whereas only one strain produced a heteropolysaccharide. The production of a glucan by a strain of Lactococcus lactis and the production of a heteropolysaccharide by a strain of

Lactobacillus curvatus are reported for the first time. The PCR screening revealed many positive strains. For three of the ten EPS-producing strains, no corresponding genes could be detected. Furthermore, a lot of strains possessed one or more eps genes but did not produce an EPS. Therefore, a screening on the molecular level should always be accompanied by another screening method that is able to distinguish true EPS producer strains from non-producing ones. Statistical analysis did not reveal any relationship between the type and origin of the strains, the presence or absence of a capsular polysaccharide or EPS, and the presence or absence of eps genes.
Keywords: Lactic acid bacteria; Exopolysaccharides; Screening; Ultrafiltration

C.Z. Ren, B.L. Ma, V. Burrows, J. Zhou, Y.G. Hu, L. Guo, L. Wei, L. Sha, L. Deng, Evaluation of early mature naked oat varieties as a summer-seeded crop in dryland northern climate regions, Field Crops Research, Volume 103, Issue 3, 13 September 2007, Pages 248-254, ISSN 0378-4290, DOI: 10.1016/j.fcr.2007.07.001.
(http://www.sciencedirect.com/science/article/B6T6M-4PFDPJC-2/2/0556766bf8f9834fa695785239d6c787)
Abstract:
Increased land degradation and shortage of forage resources for animal production over-winter have accentuated the need for alternative cropping systems in northeast China. While short frost-free period and cool temperatures are major limitations to cereal grain production in the northern regions of China (45[degree sign]N, 122[degree sign]E), crop varieties that are able to produce food and feed in short growing season and tolerant to low temperature may extend the total cropping period. Three hulless oat (Avena sativa L.) lines, Baiyan 9015, Baiyan 9017 and Baiyan 9044, were bred and tested for 3 years (2004-2006) to determine their suitability for summer seeding in a double cropping system. The new lines were sown both in the spring and summer to provide growers with opportunities to harvest two grain-crops in a year. Averaged across 3 years, Baiyan 9044 produced 2.5 and 1.6 Mg ha-1 yr-1 grain yield when sown in spring and summer, respectively. The new lines seeded in 20th or 21st July and harvested in early October allowed utilization of an average of over 1500 growing degree days (GDDs). For grain yield alone, the net income for two oat crops a year was up to 1390 Chinese yuan (RMB) ha-1, more than that of growing a single oat crop in 3 years, or in most cases, equivalent to monocultured corn (Zea mays L.) production, the dominant crop in the region. In addition, an average of 5 Mg ha-1 of oat straw was produced as valuable forage fodder for the livestock industry, which was in great demand for over-wintering animals. Furthermore, in the traditional single small grain cereal cropping system, bare ground after harvest leads to severe water and wind erosions. Our results indicate that the new oat lines could be a potential crop for summer seeding, particularly when spring-seeded crops fail due to abiotic (hail, drought, etc.) or biotic (e.g. insects) stresses. The double cropping system provides growers with a potential opportunity to facilitate the farming strategy of food, cash crops and control soil erosion in the region.
Keywords: Avena sativa; Cool temperatures; Early maturity; Double-cropping; Hulless oat; Short growing season; Summer-seeding

M.B. Fontenot, S.L. Watson, K.A. Roberts, R.W. Miller, Effects of food preferences on token exchange and behavioural responses to inequality in tufted capuchin monkeys, Cebus apella, Animal Behaviour, Volume 74, Issue 3, September 2007, Pages 487-496, ISSN 0003-3472, DOI: 10.1016/j.anbehav.2007.01.015.
(http://www.sciencedirect.com/science/article/B6W9W-4PGPM0V-5/2/baf63cbccffba373c698e20e38ea9eef)
Abstract:
We examined the extent to which female capuchin monkeys show an `aversion to inequitable work effort' by providing the monkeys with the opportunity to engage in token exchange tasks to earn

either a preferred (grape) or nonpreferred (oat cereal) food item. In experiment 1, monkeys were paired with partners such that both were required to exchange a token (work effort) for either a preferred or nonpreferred food reward. The subject's exchange behaviour was then compared to conditions in which the partner received the food reward for no work effort. We found no evidence that differential work effort influenced the percentage of incomplete exchanges. Furthermore, capuchins completed exchanges more rapidly for the preferred food item, regardless of the work effort of the partner. In experiment 2, we evaluated, in the absence of differential work effort, behavioural responses of monkeys to receipt of a preferred or nonpreferred food in conditions where their partner received either the same or different food. These conditions were compared to control conditions where either the same or different food was placed in an adjacent empty cage. Capuchins were less likely to accept nonpreferred food and consumed it more slowly than preferred food. We found no evidence that the presence of a partner influenced acceptance or consumption of the nonpreferred food under inequitable conditions. Overall, we found no indication that capuchins are able to evaluate either the relative work effort of a partner or the inequity of a food reward and are thus unlikely to possess an `aversion to inequity'.
Keywords: Cebus apella; exchange behaviour; food preference; inequality; token exchange; tufted capuchin

Joao Paulo Silva, Nuno Faria, Teresa Catry, Summer habitat selection and abundance of the threatened little bustard in Iberian agricultural landscapes, Biological Conservation, Volume 139, Issues 1-2, September 2007, Pages 186-194, ISSN 0006-3207, DOI: 10.1016/j.biocon.2007.06.013.
(http://www.sciencedirect.com/science/article/B6V5X-4PF0XDT-1/2/0cfb4da0cb5c47135f3fd5f85340f651)
Abstract:
The little bustard Tetrax tetrax is a threatened grassland bird highly reliant on agro-ecosystems for survival. Understanding its habitat requirements throughout its yearly cycle is essential to promoting adequate management practices. A late summer, post-breeding habitat selection study was conducted at three sites located in Alentejo, in the south of Portugal. Overall, 48 flocks were counted. A highly-significant explanatory logistic model demonstrated that little bustard post-breeding sightings primarily occur in locations with greater food availability, adequate vegetation height, and more productive soils. Fallow land and areas grazed by sheep tend to be avoided. Additionally, the species abundance was estimated at 18 sites distributed among the specie's main range in Portugal, covering 67,000 ha and 971 km of car transects. Another 119 flocks were registered. Surprisingly, hardly any birds were found at priority breeding sites. Overall, the data suggest that important breeding populations of the little bustard dependent upon extensive agriculture within Iberia (generally where soils are less productive), are likely to depend on other areas with greater food availability during the dry summer season. Maintaining suitability of the habitat near important breeding areas with more productive soils could prevent further species movement in search of foraging areas and diminish mortality risk. At these sites, conservation efforts should focus on maintaining the landscape open and ensure the dominance of low intensity land uses with short vegetation, such as cereal stubbles or certain legume crops.
Keywords: Tetrax tetrax; Post-breeding; Habitat selection; Movements; Management

Abdelhamid Sadiki, Ali Faleh, Ana Navas, Saidati Bouhlassa, Assessing soil erosion and control factors by the radiometric technique in the Boussouab catchment, Eastern Rif, Morocco, CATENA, Volume 71, Issue 1, Soil erosion and sediment transport under different land use/land cover scenarios, 1 September 2007, Pages 13-20, ISSN 0341-8162, DOI: 10.1016/j.catena.2006.10.003.
(http://www.sciencedirect.com/science/article/B6VCG-4MFKK9T-2/2/6a4339c80af80258bd427f78b2cf5df7)
Abstract:

In the Eastern Rif of N Morocco, soil conservation is seriously threatened by water erosion. Large areas of soil have reached an irreversible state of degradation. In this study, the 137Cs technique was used to quantify erosion rates and identify the main factors involved in the erosion process based on a representative catchment of the Eastern Rif. To estimate erosion rates in terms of the main factors affecting soil losses, samples were collected taking into account the lithology, slope and land use along six selected transects within the Boussouab catchment. The transects were representative of the main land uses and physiographic characteristics of that Rif sector. The reference inventory for the area was established at a stable, well preserved, matorral site (value of 4250 Bq m- 2). All the sampling sites were eroded and 137Cs inventories varied widely (between 245 and 3670 Bq m- 2). The effective soil losses were also highly variable (between 5.1 and 48.8 t ha- 1 yr- 1). Soil losses varied with land use. The lowest average values were on matorral and fallow land (10.5 and 15.2 t ha- 1 yr- 1, respectively) but much higher with alfa vegetation or cereal crops (31.6 and 27.3, respectively). The highest erosion rate was on a badland transect at the more eroded part of the catchment, with rates exceeding 40 t ha- 1 yr- 1 and reaching a maximum of 48.8 t ha- 1 yr- 1.The average soil losses increased by more than 100% when the slope increased from 10[degree sign] (17.7 t ha- 1 yr- 1) to 25[degree sign] (40. 8 t ha- 1 yr- 1). Similar results were obtained when comparing erosion rates in soils that were covered by matorral with respect to those under cultivation. Lithology was also a key factor affecting soil loss. Soils on marls were more erodible and the average erosion rates reached 29.36 t ha- 1 yr- 1, which was twice as high as soils on the glacis and old fluvial terraces (average rates of 14.98 t ha- 1 yr- 1). The radiometric approach was very useful to quantify erosion rates and to examine the pattern of soil movement. The analysis of main erosion factors can help to promote rational soil use and establish conservation strategies in the study area.
Keywords: Soil erosion; 137Cs; Erosion factors; Anthropogenic impact; Rif; Morocco

A. Lazaridou, C.G. Biliaderis, Molecular aspects of cereal [beta]-glucan functionality: Physical properties, technological applications and physiological effects, Journal of Cereal Science, Volume 46, Issue 2, September 2007, Pages 101-118, ISSN 0733-5210, DOI: 10.1016/j.jcs.2007.05.003.
(http://www.sciencedirect.com/science/article/B6WHK-4NSMMP7-1/2/4d48763c3548c0aff6f8a086f9ef795f)
Abstract:
Cereals [beta]-glucans are linear homopolysaccharides of consecutively linked (1-->4)-[beta]-d-glucosyl residues (i.e. oligomeric cellulose segments) that are separated by single (1-->3)-linkages. [beta]-Glucans display all the functional properties of viscous and gel forming food hydrocolloids combined with all the physiological properties of dietary fibres. This review focuses on the relationships between the molecular-structural characteristics of [beta]-glucans and their physicochemical properties in aqueous dispersions and in food systems as well as their physiological functions in the gastro-intestinal tract. The physical properties of [beta]-glucans, such as solubility and rheological behaviour in the solution and gel states, are controlled by their molecular features, such as their distribution of cellulosic oligomers, their linkage pattern and their molecular weight as well as by temperature and concentration. The technological and nutritional functionality of [beta]-glucans is often related to their rheological behaviour. Incorporation of [beta]-glucans into various products (bread, muffins, pasta, noodles, salad dressings, beverages, soups, reduced-fat dairy and meat products) showed that attributes, such as breadmaking performance, water binding and emulsion stabilising capacity, thickening ability, texture, and appearance appear to be related to the concentration, molecular weight and structure of the polysaccharide. The health benefits of [beta]-glucans, such as reducing blood serum cholesterol and regulating blood glucose levels, are also correlated with the amount and molecular weight of the solubilised [beta]-glucans in the gastro-intestinal tract.
Keywords: Cereal [beta]-glucans; Structure; Molecular weight; Function; Rheology; Gels; Viscoelasticity; Applications; Physiological effects

Paivi Ekholm, Heli Reinivuo, Pirjo Mattila, Heikki Pakkala, Jani Koponen, Anu Happonen, Jarkko Hellstrom, Marja-Leena Ovaskainen, Changes in the mineral and trace element contents of cereals, fruits and vegetables in Finland, Journal of Food Composition and Analysis, Volume 20, Issue 6, September 2007, Pages 487-495, ISSN 0889-1575, DOI: 10.1016/j.jfca.2007.02.007.
(http://www.sciencedirect.com/science/article/B6WJH-4N61FT2-1/2/4cbe81d5bb43bf0856755894e610657b)
Abstract:
The contents of calcium, potassium, magnesium, phosphorous, aluminium, cobalt, copper, iron, manganese, nickel, selenium, zinc, cadmium and lead in cereal products, fruits and vegetables were analysed and the results were compared with those obtained 30 years previously in food samples from Finland. There were significant changes in the trace elements. In most cases trace elements contents are now lower than before. Only the selenium content of foods had clearly increased in Finland, through the use of selenium-supplemented fertilizers. There was a change in average mineral element content only for potassium, whose content was significantly lower than in the middle of the 1970s. We found that trace element density in vegetable foods has decreased over the past three decades. Per capita daily intakes of mineral elements in the 2000s were lower than in the 1970s, although the consumption of fruits and vegetables has increased since 1970s.
Keywords: Mineral element content; Trace element content; Cereal product; Fruits; Root vegetables; Vegetables; Berries; Intake

Mateusz Stasiak, Marek Molenda, Jozef Horabik, Determination of modulus of elasticity of cereals and rapeseeds using acoustic method, Journal of Food Engineering, Volume 82, Issue 1, September 2007, Pages 51-57, ISSN 0260-8774, DOI: 10.1016/j.jfoodeng.2007.01.017.
(http://www.sciencedirect.com/science/article/B6T8J-4N0HJ8Y-1/2/ca3fefe133ee0901014df36fb8ba3a5c)
Abstract:
The objective of presented project was to validate acoustic method as a tool for determination of elastic parameters of a bulk of cereal grains and rapeseeds. Six kinds of cereals were tested at five levels of moisture content 10%, 12.5%, 15%, 17.5% and 20% while rapeseeds were tested at four levels of moisture content of 6%, 9%, 12%, 15%. Tests were performed in 70 mm in diameter, 150 mm high cylindrical chamber equipped with piezoelements, that allowed for generating and recording of acoustic shear waves. Values of shear wave velocity Vs were found to increase with an increase in hydrostatic pressure ph for all tested materials. The highest variability of Vs with changing hydrostatic pressure was observed in the case of wheat (from approximately 50 m s-1 in initial state to approximately 240 m s-1 for maximum hydrostatic pressure of 90 kPa). Modulus of elasticity E calculated on the base on Vs was found increasing with an increase in hydrostatic pressure and decreasing with increasing moisture content. The highest course of E(ph) ranging from 20 to 140 MPa was obtained in the case of wheat of 10% of m.c., while location the curve for corn of 20% of m.c. was the lowest, ranging from 10 to 32 MPa.
Keywords: Food powders; Granular materials; Cereals; Rapeseeds; Mechanical properties; Elastic parameters; Young's modulus; Acoustic wave

Hiroshi IKEHASHI, The Origin of Flooded Rice Cultivation, Rice Science, Volume 14, Issue 3, September 2007, Pages 161-171, ISSN 1672-6308, DOI: 10.1016/S1672-6308(07)60023-7.
(http://www.sciencedirect.com/science/article/B8JG8-4PYHTY3-1/2/ccf2c96f5c3eaaf2febb7e3045cfb436)
Abstract:
Rice cultivation has long been considered to have originated from seeding of annual types of wild rice somewhere in subtropics, tropics or in the Yangtze River basin. That idea, however, contains a fatally weak point, when we consider the tremendous difficulty for primitive human to seed any

cereal crop in the warm and humid climate, where weed thrives all year round. Instead of the accepted theory, we have to see a reality that vegetative propagation of edible plants is a dominant form of agriculture in such regions. The possibility is discussed that Job's tears and rice, two cereal crops unique to the region, might have been developed via vegetative propagation to obtain materials for medicine or herb tea in backyard gardens prior to cereal production. This idea is supported by the fact that rice in temperate regions is still perennial in its growth habit and that such backyard gardens with transplanted taro can still be seen from Yunnan Province of China to Laos. Thanks to detailed survey of wild rice throughout China for 1970-1980, it is now confirmed that a set of clones of wild rice exist in shallow swamps in Jiangxi Province, an area with severe winter cold. In early summer ancient farmers may have divided the sprouting buds and spread them by transplanting into flooded shallow marsh. Such way of propagation might have faster improved less productive rice through a better genetic potential for response to human interference than quick fixation in seed propagation, because vegetative parts are heterogeneous. Obviously, such a primitive manner of rice cultivation did include the essential parts of rice farming, i.e., nursery bed, transplanting in flooded field of shallow marsh like. Transfer from the primitive nursery to true nursery by seed may have later allowed rice cultivation to be extended to northern regions. In thus devised flooded cultivation there were a series of unique advantages, i.e.; continuous cropping of rice in a same plot, no soil erosion, slow decline of soil fertility, availability of minerals, and resulting in high yield per unit area, which have collectively attained the highly productive cereal cultivation in the warm and humid region. Rice cultivation in marsh is also favorable to raise fish culture, both of which constituted a nutritionally balanced base. Development of irrigation technology to construct flooded farms gave strong bases for stable rice-cultivating society, which in the end formulated the rise of ancient kingdoms of Yue and Wu in China in BC 6th -5th centuries. They were direct descendents of those people who had developed the unique rice cultivation from the era of Hemudu culture, which is dated back to 5 000 BC. Their movement to the south is considered to have established rice-cultivating communities in South China and Southeast Asia, while to the north it transferred the rice-based technology to ancient Korea and Japan and had established there a base for a civilized society.
Keywords: primitive agriculture; vegetative propagation; perennial habit; sustainable cultivation; rice and fish farming; ancient kingdom; spread of rice cultivation

V. Sanchez-Giron, A. Serrano, M. Suarez, J.L. Hernanz, L. Navarrete, Economics of reduced tillage for cereal and legume production on rainfed farm enterprises of different sizes in semiarid conditions, Soil and Tillage Research, Volume 95, Issues 1-2, September 2007, Pages 149-160, ISSN 0167-1987, DOI: 10.1016/j.still.2006.12.007.
(http://www.sciencedirect.com/science/article/B6TC6-4MYF5YH-2/2/2c9563af957f7a5d3749ca058392ccc1)
Abstract:
Rainfed crop yields are low in semiarid central Spain because precipitation is limited and highly variable. Under these circumstances, producers have to adopt alternative tillage systems that convey a reduction in their unit costs of production to offset the continuous decline in commodity prices. Farmers respond to this situation in essentially two ways: there is a growing interest in adopting reduced tillage systems for seedbed preparation, and a trend to enlarge enterprises by acquiring more arable land either as ownership or tenancy. The objective of the present study was to assess, in semiarid conditions of central Spain, the economic feasibility of chisel ploughing (CP) and no-tillage (NT) systems compared to mouldboard ploughing (MP) for rainfed winter wheat (Triticum aestivum L.) and forage legume, either vetch (Vicia sativa L.) or pea (Pisum sativum L.), production on different farm sizes ranging from 100 to 1600 ha. A decision support system was used to solve for the least-cost machinery selection for each farm enterprise and tillage system considered. No differences were observed in either wheat or forage vetch crop yields averaged across several years, irrespective of the tillage system used. The economic performance was

found to depend on the tillage system adopted and farm size. On average fuel consumption was 23% lower in CP and 62% in NT than in MP. Total variable unitary costs were 3.7 and 5.6% lower in CP and NT than in MP. The cost of herbicides in NT was [euro]7.6 ha-1 year-1 higher than in MP and CP. Average unitary gross margins were 11.9 and 10.8% higher in NT than in MP and CP, respectively. If revenues were considered similar in the three tillage systems, MP would still exhibit the poorest economic results in all farm sizes, while CP performance would improve NT values in farm sizes with 200 ha, or less, of arable land. NT was clearly the most profitable system on farms with 400 ha or more of arable land. The 400 ha farm enterprise was observed to mark the breakeven point between the two reduced tillage systems, since up to that size CP was found to provide a better economic performance than NT.
Keywords: Rainfed tillage systems; Economic analyses; Crop rotation; Winter wheat; Legume; Fallow

K.H.D. Tiessen, D.A. Lobb, G.R. Mehuys, H.W. Rees, Tillage erosion within potato production in Atlantic Canada: II: Erosivity of primary and secondary tillage operations, Soil and Tillage Research, Volume 95, Issues 1-2, September 2007, Pages 320-331, ISSN 0167-1987, DOI: 10.1016/j.still.2007.02.009.
(http://www.sciencedirect.com/science/article/B6TC6-4NH6N1R-1/2/b7dc1aa6550d13a2e6492da543d6e3b3)
Abstract:
To date, tillage erosion experiments in Canada have only been conducted on conventionally tilled corn-based production systems in Ontario and conventionally tilled cereal-based production in Manitoba. Estimates and assumptions have been made for all other production systems. Therefore, the objective of this study was to evaluate the erosivity of primary and secondary tillage operations within conventional and conservation potato production systems used in Atlantic Canada. Regression analysis determined that a direct relationship exists between slope gradient and both the mean displacement distance of the tilled layer (TL) and the mass of translocated soil (TM) for the chisel plough (CP), mouldboard plough (MP) and offset disc (OD), but not for the vibrashank (VS). Overall, the potential for tillage erosion of the MP, CP, and OD was similar (1.8-1.9 kg m-1 %-1 pass-1) and larger than that of the VS (0.3 kg m-1 %-1 pass-1). The regression coefficients for each implement were improved after including slope curvature, and we recommend that curvature be included in any future tillage erosion modelling. Our results show that both residue management to control wind and water erosion and soil movement to control tillage erosion must be considered when choosing implements and developing best management practices with regards to reducing the negative impacts of total soil erosion on potato production systems in Atlantic Canada.
Keywords: Tillage erosion; Tillage erosivity; Primary tillage; Secondary tillage; Conventional tillage; Conservation tillage; Potato production; Atlantic Canada

Thomas B. Biddulph, Julie A. Plummer, Tim L. Setter, Daryl J. Mares, Influence of high temperature and terminal moisture stress on dormancy in wheat (Triticum aestivum L.), Field Crops Research, Volume 103, Issue 2, 30 August 2007, Pages 139-153, ISSN 0378-4290, DOI: 10.1016/j.fcr.2007.05.005.
(http://www.sciencedirect.com/science/article/B6T6M-4P5YK4H-1/2/0a3508c964c1922d95b60ee8ed79cc91)
Abstract:
Preharvest sprouting is common in cereals that lack grain dormancy if maturing grain is exposed to rain. Over three successive seasons wheat genotypes with a range of dormancy levels, were exposed to moisture stress and periods of high temperature stress (>30 [degree sign]C) in controlled field trials. Dormancy assessments were based on a germination index of hand threshed grain throughout grain filling. There were three main results. First, moisture stress

combined with consistently high temperature during grain filling was associated with induced dormancy in Cunderdin, (germination index of 0.41) in a normally non-dormant genotype (germination index normally >0.80), but no additional dormancy in DM 2001, a dormant genotype (germination index normally <0.10). In contrast sudden heat shocks (>30 [degree sign]C max. for >12 days) at 30-50 days post-anthesis reduced dormancy, germination index increase of 0.42 on average across five genotypes. Secondly, whilst dormancy was affected by moisture and heat stress, genotypes maintained their relative rankings across environments and genotype had the most effect on dormancy (70-92% of the variation in germination index) with DM 2001 and DH 22 more dormant than DH 56, DH 45 and Cunderdin. Finally, the effect of environment was different for different genotypes; those with partial dormancy (germination index usually 0.20-0.50, DH 56 and DH 45) were most influenced by the environmental conditions with germination indexes ranging from 0.06 to 0.85 depending on environment. Consequently avoidance of high temperatures, moisture stress, and maturity x stress interactions, are important prerequisites in screening for genotypes with genetic differences in dormancy.
Keywords: Preharvest sprouting; Germination index; Drought; Temperature

David B. Lobell, Changes in diurnal temperature range and national cereal yields, Agricultural and Forest Meteorology, Volume 145, Issues 3-4, 15 August 2007, Pages 229-238, ISSN 0168-1923, DOI: 10.1016/j.agrformet.2007.05.002.
(http://www.sciencedirect.com/science/article/B6V8W-4NXGS61-3/2/c997e3e5f2c33aa943a0963a68802e5c)
Abstract:
Models of yield responses to temperature change have often considered only changes in average temperature (Tavg) with the implicit assumption that changes in the diurnal temperature range (DTR; the difference between daily maximum and minimum temperature) can safely be ignored. The goal of this study was to evaluate this assumption using a combination of historical datasets and climate model projections. Data on national crop yields for 1961-2002 in the ten leading producers of wheat (Triticum spp.), rice (Oryza spp.) and maize (Zea mays) were combined with datasets on climate and crop locations to evaluate the empirical relationships between Tavg, DTR and crop yields. In several rice and maize growing regions, including the two major nations for each crop, there was a clear negative response of yields to increased DTR. This finding reflects a nonlinear response of yields to temperature, which likely results from greater water and heat stress during hot days. In many other cases, the effects of DTR were not statistically significant, in part because correlations of DTR with other climate variables, and the relatively short length of the time series resulted in wide confidence intervals for the estimates.
To evaluate whether future changes in DTR are relevant to crop impact assessments, yield responses to projected changes in Tavg and DTR by 2046-2065 from 11 climate models were estimated. The mean of climate model projections indicated an increase in DTR in most seasons and locations where wheat is grown, mixed projections for maize, and a general decrease in DTR for rice. These mean projections were associated with wide ranges that included zero in nearly all cases. The estimated impacts of DTR changes on yields were generally small (<5% change in yields) relative to the consistently negative impact of projected warming of Tavg. However, DTR changes did significantly affect yield responses in several cases, such as in reducing US maize yields and increasing India rice yields. Because DTR projections tend to be positively correlated with Tavg, estimates of yield changes for extreme warming were particularly affected by including DTR (up to 10%). Finally, based on the relatively poor performance of climate models in reproducing the magnitude of past DTR trends, it is possible that future DTR changes and associated yield responses will exceed the ranges considered here.
Keywords: DTR; Climate change impacts; Maize; Wheat; Rice

Alena Gajdosova, Zuzana Petrulakova, Michaela Havrlentova, Viera Cervena, Bernadetta Hozova, Ernest Sturdik, Grigorij Kogan, The content of water-soluble and water-insoluble [beta]-d-glucans in selected oats and barley varieties, Carbohydrate Polymers, Volume 70, Issue 1, 2 August 2007, Pages 46-52, ISSN 0144-8617, DOI: 10.1016/j.carbpol.2007.03.001.
(http://www.sciencedirect.com/science/article/B6TFD-4N7RW8K-1/2/f43b896709d0111370a4d9b841c3594b)
Abstract:
In this paper, data on the inter-variety variability in chemical composition of oats and barley are summarized. The obtained results show that the content of soluble glucans decreases in the following order: barley (3.75 +/- 0.14-7.96 +/- 0.09 g/100 g of dry mass) [greater-or-equal, slanted] naked oats (3.91 +/- 0.15-7.47 +/- 0.06 g/100 g of dry mass) > hulled oats (1.97 +/- 0.08-4.09 +/- 0.19 g/100 g of dry mass), whereas the content of insoluble glucans decreases in the order: hulled oats (33.73 +/- 1.55-13.79 +/- 0.51 g/100 g of dry mass) > barley (10.89 +/- 0.60-21.70 +/- 0.73 g/100 g of dry mass) > naked oats (5.15 +/- 0.06-10.80 +/- 0.54 g/100 g of dry mass). When comparing the content of insoluble [beta]-glucan in whole flour, bran and flour it was found that the content decreases from the outer coat to the endosperm. These results were confirmed for both cereals mentioned.
In this work, the influence of warehousing duration on the change in quantity of soluble [beta]-glucans when stored at room temperature (25 +/- 2 [degree sign]C) and in a refrigerator (8 +/- 2 [degree sign]C) was monitored. From the results obtained, it can be concluded that the content of soluble [beta]-glucans decreases with time. Slower alteration in soluble [beta]-glucans content was detected in samples stored in refrigeration; however, lower temperatures did not halt the decrease of soluble [beta]-glucans content in ground samples. The results show the need for stating the duration of warehousing from the time the sample was processed.
Keywords: Oats; Barley; Water-soluble [beta]-d-glucan; Water-insoluble [beta]-d-glucan; Warehousing

C. Lanzas, D.G. Fox, A.N. Pell, Digestion kinetics of dried cereal grains, Animal Feed Science and Technology, Volume 136, Issues 3-4, 1 August 2007, Pages 265-280, ISSN 0377-8401, DOI: 10.1016/j.anifeedsci.2006.09.004.
(http://www.sciencedirect.com/science/article/B6T42-4M1TSY6-2/2/e213c4b0bac96dec047efa865b3b648b)
Abstract:
Grain fermentability largely determines the feed value of grains for ruminants. Our objective was to evaluate the variation in kinetics of gas production of cereal grains and the relationship among gas production, chemical composition and feed value. Eighteen barley, 99 corn, 23 sorghum, and 57 wheat samples were fermented in vitro for 48 h. Gas production was measured with a computerized system and an exponential model was fitted to the data. The impact of the variation in composition and kinetics on the feed value of grains in feedlot rations was assessed with the Cornell Net Carbohydrate and Protein System (CNCPS). Fractional gas rates were significantly different between grains (P<0.001), with a mean and S.D. of 0.24 (0.029) h-1 for barley (n = 20), 0.15 (0.026) h-1 for corn (n = 98), 0.06 (0.016) h-1 for sorghum (n = 23) and 0.26 (0.039) h-1 for wheat (n = 57). Fermentation rates were more variable than the chemical components. Fractional rates were poorly correlated with chemical composition within grain with the highest correlations for acid detergent insoluble crude protein (ADICP) (r = -0.31, P<0.01) and ADF (r = -0.27, P<0.01) for corn and neutral detergent insoluble crude protein (NDICP) (r = 0.35, P<0.05) for wheat. The impact of the variation in composition and kinetics on the feed value of grains in feedlot rations was assessed. The CNCPS predicted a maximal variation of <2.1 MJ/day and <60 g/day in metabolizable energy (ME) and metabolizable protein (MP) supply from grains, respectively. For sorghum, the fermentation rate was predicted to be a major determinant of the site of starch

fermentation. A detailed evaluation of feed values for grains needs to include information on rates of fermentation.
Keywords: Fermentation rates; Cereal grains; Gas production; Feed variation; CNCPS

Olivier Evrard, Charles L. Bielders, Karel Vandaele, Bas van Wesemael, Spatial and temporal variation of muddy floods in central Belgium, off-site impacts and potential control measures, CATENA, Volume 70, Issue 3, 1 August 2007, Pages 443-454, ISSN 0341-8162, DOI: 10.1016/j.catena.2006.11.011.
(http://www.sciencedirect.com/science/article/B6VCG-4N1SK0M-1/2/f4dc820a50ea277cef2744fcbae57120)
Abstract:
Numerous villages in the European loess belt are confronted with floods caused by runoff from agricultural land. Seventy-nine percent of the municipalities in central Belgium experienced at least one muddy flood during the last decade. Of these flooded municipalities, 22% have been affected more than 10 times during this period. Twenty municipalities have been selected for a detailed analysis. A database of 367 locations affected by muddy floods has been compiled, and the connectivity between cultivated areas and inhabited zones could be assessed for 100 flooded locations. Roads and drainage network facilitate runoff transfer between cultivated and inhabited areas in 64% of cases. Three types of areas producing muddy floods have been identified: hillslopes (1-30 ha) without thalweg where runoff is generally dominated by sheet flow; small catchments (10-300 ha) characterised by runoff concentration in the thalweg and medium catchments (100-300 ha) with multiple thalwegs dominated by concentrated runoff. About 90% of muddy floods are generated on hillslopes and in small catchments. A critical area-slope threshold for triggering muddy floods has been computed for hillslopes. A logistic regression shows that muddy floods are generated in small and medium catchments with 99% probability after 43 mm rainfall. Rainfall depths required to trigger muddy floods are lower in May and June (25 +/-12 mm) than between July and September (46 +/- 20 mm), because of different surface conditions (crusting, roughness and crop cover). Each year, muddy floods lead to a total societal cost of 16 x 106-172 x 106 [euro] in central Belgium, depending on the extent and intensity of thunderstorms and monetary values damaged. Recent datasets suggest that the phenomenon is becoming more frequent in central Belgium, because of land consolidation, urban sprawl and expansion of row crops, sown in spring, at the expense of winter cereals. The huge costs induced by muddy floods justify the installation of erosion control measures. It is suggested to install a grassed buffer strip at the downslope edge of cultivated hillslopes to protect houses and roads. In small and medium catchments, it is preferred to install a grassed waterway and earthen dams in the thalweg.
Keywords: Muddy floods; Runoff control; Cost analysis; Belgium

M.E. Thorne, F.L. Young, J.P. Yenish, Cropping systems alter weed seed banks in Pacific Northwest semi-arid wheat region, Crop Protection, Volume 26, Issue 8, August 2007, Pages 1121-1134, ISSN 0261-2194, DOI: 10.1016/j.cropro.2006.10.021.
(http://www.sciencedirect.com/science/article/B6T5T-4MK0HG0-1/2/935593bc1fd34832c082ef560cdc75a1)
Abstract:
Arable land weed seed banks are dynamic and reflect cropping history, current management, and environment. Changes in crop rotation and tillage system can alter weed seed density and species composition. In the semi-arid region of the Pacific Northwest, USA, no-till spring cropping is being studied as an alternative to the traditional winter wheat (Triticum aestivum L.)/dust-mulch fallow (WWF) rotation. Weed seed bank density and species composition were assessed during the first 6 years of an ongoing cropping system study comparing WWF with three no-till rotations; spring wheat (Triticum aestivum L.)/chemical fallow (SWF), continuous spring wheat (CSW), and spring wheat/spring barley (Hordeum vulgare L.) (SWSB). Soil cores were collected at depths of 0-8, 8-

15, and 15-23 cm in all plots during August each year following crop harvest. Weed seeds were washed from the soil, dried, and germinated in a glasshouse. Weed species most associated with the 0-8 cm depth was Bromus tectorum L., the major winter annual grass weed in WWF. Species most associated with 8-15 cm depth was Chenopodium leptophyllum (Moq.) Nut. ex S. Wats, a native warm season broadleaf weed that may have long seed bank persistence. An initial high density of B. tectorum was reduced with no-till spring crops and in WWF with intensive management strategies. In comparison an initial low weed seed density of B. tectorum remained low with no-till but increased in WWF with less management. Broadleaf weed species did not become management problems in no-till; however, seed bank weed shifts occurred where winter annual broadleaf species remained following reduction of high densities of B. tectorum. Summer annual broadleaf weed seeds such as C. leptophyllum and Salsola tragus L. were present but not at high densities. Summer annual grass weed seeds were not present and are not typical in this region. In this research, no-till spring cereal based systems did not result in an increase in total seed density at the soil surface. Results from this research show that no-till spring crop rotations are effective at controlling winter annual grass weeds as well as broadleaf weeds normally associated with WWF.
Keywords: Seed banks; Weed shifts; No-till cropping; Winter wheat; Dust-mulch fallow; Chemical fallow; Pacific Northwest

Monica Fenandez-Aparicio, Josefina C. Sillero, Diego Rubiales, Intercropping with cereals reduces infection by Orobanche crenata in legumes, Crop Protection, Volume 26, Issue 8, August 2007, Pages 1166-1172, ISSN 0261-2194, DOI: 10.1016/j.cropro.2006.10.012.
(http://www.sciencedirect.com/science/article/B6T5T-4MGVT0J-1/2/9309ffd9fe89ee0146b125f954ae2c7f)
Abstract:
Orobanche crenata is a weedy root parasite that causes huge damage to legume crops. Control strategies have centred around agronomic practices and the use of herbicides, although success has been marginal. Our field experiments show that O. crenata infection on faba bean and pea is reduced when these host crops are intercropped with oat. The number of O. crenata plants per host plant decreased as the proportion of oats increased in the intercrop. Pot and rhizotron experiments confirmed the reduction of infection in faba bean intercropped with cereals. It is suggested that inhibition of O. crenata seed germination by allelochemicals released by cereal roots is the mechanism for reduction of O. crenata infection.
Keywords: Allelopathy; Broomrape; Faba bean; Germination; Intercropping; Pea; Oat

Gulden Z. Omurtag, Ayfer Tozan, Okan Sirkecioglu, Volkan Kumbaraci, Sevim Rollas, Occurrence of diacetoxyscirpenol (anguidine) in processed cereals and pulses in Turkey by HPLC, Food Control, Volume 18, Issue 8, August 2007, Pages 970-974, ISSN 0956-7135, DOI: 10.1016/j.foodcont.2006.05.014.
(http://www.sciencedirect.com/science/article/B6T6S-4KF1HK9-2/2/934f7b4640937c877166f9dd8dae4fa2)
Abstract:
The purpose of this study was to investigate the diacetoxyscirpenol (DAS, anguidine) level of contaminated cereal and pulse products in Turkey. DAS was detected using high performance liquid chromatography (HPLC) with diode array detector (DAD) at 205 nm and suspicious the results for two specimens suspected to contain DAS were confirmed by gas chromatography-mass spectrometry (GC-MS). An acetonitrile-water (21 + 4, v/v) extract of the sample was cleaned up on a column packed with alumina/charcoal (0.35 g + 0.40 g). The minimum detectable amount of DAS was 16 ng/injection, limit of detection was 0.8 [mu]g/g for HPLC. A total of 85 commercially available cereal and pulse product samples, collected from markets and street bazaars, were analyzed. The recoveries for corn flour with the known amounts of DAS (2, 3, 4 [mu]g/g) were

85.3% (SD 4.81, n = 5), 98.1% (SD 12.6, n = 5) and 96.4% (SD 3.2, n = 5), respectively. DAS was detected in none of the cereal and pulse products.
Keywords: Diacetoxyscirpenol; Cereals; Pulses; HPLC

Maren E. Veatch-Blohm, J.-M. Ribaut, Editor, Drought Adaptation in Cereals, Food Products Press, Haworth Press Inc., 10 Alice Street, Binghamton, NY 13904-1580, USA (2006) 642 pp., Softcover, Price: US$ 69.95, ISBN: 1-56022-278-6; Hardcover, Price: US$ 89.95, ISBN: 1-50622-277-8., Industrial Crops and Products, Volume 26, Issue 2, August 2007, Page 237, ISSN 0926-6690, DOI: 10.1016/j.indcrop.2007.03.003.
(http://www.sciencedirect.com/science/article/B6T77-4NM5S63-1/2/d5a4f1056e2f25105e3a9db2ac3fd776)

A.L. Eldridge, D.R. Thompson, A.M. Albertson, Cereal Consumption Related to Waist-to-Height Ratio and Total Cholesterol in Adolescent Girls: The National Heart, Lung and Blood Institute Growth and Health Study (NGHS), Journal of the American Dietetic Association, Volume 107, Issue 8, Supplement 1, ADA FNCE 2007 Food & Nutrition Conference & Expo, ADA FNCE 2007 Food & Nutrition Conference & Expo, August 2007, Page A106, ISSN 0002-8223, DOI: 10.1016/j.jada.2007.05.406.
(http://www.sciencedirect.com/science/article/B758G-4P8G9Y7-DN/2/d8f9ab5764fdb3d058e88e62d825acb5)

L.E. Matthews, WIC Participants' Use and Perception of Ready-to-Eat Cereals in Columbus County, NC, Journal of the American Dietetic Association, Volume 107, Issue 8, Supplement 1, ADA FNCE 2007 Food & Nutrition Conference & Expo, ADA FNCE 2007 Food & Nutrition Conference & Expo, August 2007, Page A109, ISSN 0002-8223, DOI: 10.1016/j.jada.2007.05.416.
(http://www.sciencedirect.com/science/article/B758G-4P8G9Y7-F1/2/5325052dea636cb44f70acacc127c8e1)

Takashi Inuma, Seyed Akbar Khodaparast, Susumu Takamatsu, Multilocus phylogenetic analyses within Blumeria graminis, a powdery mildew fungus of cereals, Molecular Phylogenetics and Evolution, Volume 44, Issue 2, August 2007, Pages 741-751, ISSN 1055-7903, DOI: 10.1016/j.ympev.2007.01.007.
(http://www.sciencedirect.com/science/article/B6WNH-4MY0MHX-4/2/4a52e01f72809c1632a34d8e78bb0b1f)
Abstract:
Blumeria graminis, a powdery mildew fungus, is an important plant pathogen that causes serious damage to a variety of cereal crops. In spite of the importance of the pathogen, information on phylogenetic structure within B. graminis is scarce. In this study we conducted phylogenetic analyses of B. graminis based on the DNA sequences of four different DNA regions (ITS, 28S rDNA, chitin synthase 1, and [beta]-tubulin). The analyses revealed that the protein-coding regions have higher amounts of phylogenetic signals than rDNA regions and are useful for phylogenetic analyses of B. graminis. The present phylogenetic analyses revealed nine distinct groups in the B. graminis isolates used in this study, a result which was commonly supported by all trees constructed from the four DNA regions. Isolates from a single host genus belonged to a single group except for isolates from Lolium and Bromus, in which the isolates were split into two and three groups, respectively. Isolates from Agropyron, Secale and Triticum formed a distinct clade (Triticum clade) with identical or similar DNA sequences. The Hordeum clade was a sister of the Triticum clade, and Poa and Avena clades were distantly related to the Triticum and Hordeum clades. This phylogenetic relationship of B. graminis is well concordant with the level of reproductive isolation between formae speciales and also with phylogeny inferred from a cytological study. Shimodaira-Hasegawa and Templeton tests using sequences of four different

DNA regions significantly rejected the tree topology of plants. Therefore, possibility of co-speciation between B. graminis and its host plants was obscure in this study.
Keywords: [beta]-Tubulin; Chitin synthase 1; Erysiphaceae; Poaceae; rDNA

R. Bodas, F.J. Giraldez, S. Lopez, A.B. Rodriguez, A.R. Mantecon, Inclusion of sugar beet pulp in cereal-based diets for fattening lambs, Small Ruminant Research, Volume 71, Issues 1-3, August 2007, Pages 250-254, ISSN 0921-4488, DOI: 10.1016/j.smallrumres.2006.07.006.
(http://www.sciencedirect.com/science/article/B6TC5-4KNKBY6-2/2/c7d13ffac29c88d37ed95dfe24b66ea3)
Abstract:
Eighteen Merino lambs were used to investigate the effects on feed intake, animal performance and ruminal fermentation and blood biochemistry parameters of the partial substitution of barley grain (12% of the concentrate) with sugar beet pulp (SBP) during the fattening period. Lambs (15.4 +/- 0.14 kg initial weight) were fed concentrate and barley straw ad libitum and slaughtered at 25 kg body weight. Concentrate intake and live body-weight gain were greater ($P < 0.05$) in lambs fed control diet than those receiving SBP concentrate, whereas straw intake was not significantly ($P > 0.05$) affected by treatments. Partial substitution of barley with SBP in the concentrate gave significantly ($P < 0.05$) higher acetate molar proportions, and lower propionate molar proportions and total volatile fatty acid concentrations in the rumen contents. Ruminal pH was higher ($P < 0.05$) and osmolality lower ($P < 0.05$) in lambs receiving the SBP concentrate. Blood parameters (pH, CO_2 pressure, base excess, bicarbonate and packed cell volume) were not affected by treatments. The inclusion of SBP in cereal-based diets for fattening lambs seems to enhance the ruminal environment and prevent ruminal acidosis, but has no positive effects on feed intake or animal performance.
Keywords: Sugar beet pulp; Acidosis; Rumen; Fattening lambs; Cereal

Ben Trevaskis, Megan N. Hemming, Elizabeth S. Dennis, W. James Peacock, The molecular basis of vernalization-induced flowering in cereals, Trends in Plant Science, Volume 12, Issue 8, August 2007, Pages 352-357, ISSN 1360-1385, DOI: 10.1016/j.tplants.2007.06.010.
(http://www.sciencedirect.com/science/article/B6TD1-4P5RW3J-2/2/d6e95ab5492fb76830a7446a11fff56e)
Abstract:
Genetic analyses have identified three genes that control the vernalization requirement in wheat and barley; VRN1, VRN2 and FT (VRN3). These genes have now been isolated and shown to regulate not only the vernalization response but also the promotion of flowering by long days. VRN1 is induced by vernalization and accelerates the transition to reproductive development at the shoot apex. FT is induced by long days and further accelerates reproductive apex development. VRN2, a floral repressor, integrates vernalization and day-length responses by repressing FT until plants are vernalized. A comparison of flowering time pathways in cereals and Arabidopsis shows that the vernalization response is controlled by different MADS box genes, but integration of vernalization and long-day responses occurs through similar mechanisms.

S. Elhani, V. Martos, Y. Rharrabti, C. Royo, L.F. Garcia del Moral, Contribution of main stem and tillers to durum wheat (Triticum turgidum L. var. durum) grain yield and its components grown in Mediterranean environments, Field Crops Research, Volume 103, Issue 1, 25 July 2007, Pages 25-35, ISSN 0378-4290, DOI: 10.1016/j.fcr.2007.05.008.
(http://www.sciencedirect.com/science/article/B6T6M-4P2J354-1/2/9a4794d5fc9747882441d9f222064a6e)
Abstract:
Under terminal drought conditions, cereal varieties with limited tillering have been suggested to be advantageous, because they have fewer nonproductive tillers, thereby limiting water consumption

prior to anthesis. In this study, four field trials were conducted over two growing seasons in southern Spain, under rainfed and irrigated conditions. Twenty-five genotypes were studied to evaluate the contribution of the main stem (MS) and tillers to grain yield and its components. Significant differences were found among genotypes for these contributions under non-stressed environments, but these differences were not significant under water-stress conditions. The contribution of the MS to plant grain yield was higher than that of tillers (68% vs. 32%) and was stable between years in irrigated trials. However, in the rainfed trials, MS contributed differently depending on year-to-year climate variations. Thus, under favorable weather conditions the contribution of MS to grain yield was higher than in the unfavorable year (85% vs. 59%). In irrigated environments, MS and tiller grain yield depended on the number of grains per spike, spikelets per spike, and thousand kernel weight (TKW). Under water-limited conditions, MS yield depended on the number of grains per spike and grains per spikelet, whereas the number of spikelets and TKW had less influence on MS grain yield. Furthermore, under water-stress conditions, high tillering genotypes showed yield levels similar to the genotypes with restricted tillering. Additionally, there was no significant evidence of a positive or negative effect of maximum tiller number on grain yield under rainfed conditions.
Keywords: Uniculm ideotype; Breeding; Crop yield; Durum wheat; Mediterranean environment

Guenaelle Corre-Hellou, Nadine Brisson, Marie Launay, Joelle Fustec, Yves Crozat, Effect of root depth penetration on soil nitrogen competitive interactions and dry matter production in pea-barley intercrops given different soil nitrogen supplies, Field Crops Research, Volume 103, Issue 1, 25 July 2007, Pages 76-85, ISSN 0378-4290, DOI: 10.1016/j.fcr.2007.04.008.
(http://www.sciencedirect.com/science/article/B6T6M-4P0VD3D-1/2/3e67cf5c6e46359e1f34f5ce0ac3cc51)
Abstract:
Competition for soil resources plays a key role in the outcome of intercropping systems. In cereal-legume intercrops, competition for soil nitrogen during the vegetative phase greatly influences the final performance of the intercropped species. However, there is a lack of knowledge on the main factors involved in interspecific soil N competitive interactions between species. The dominance of cereals over legumes is often attributed to their faster growing rooting system. Nevertheless, using only field experimental approaches makes it difficult to isolate the effect of one factor because of the strong interactions between processes and the environment. Given the complexity of intercropping systems, dynamic simulation models can be especially helpful for testing hypotheses about the key factors driving competition between species. The present work was designed to investigate, under non-limiting water conditions, through an experimental and modelling approach, whether differences in root depth penetration among pea and barley grown together determined competition for soil N and dry matter accumulation (DM) by each species during the vegetative phase. This hypothesis was tested through several simulated scenarios generated using the STICS crop model. The model was first used to compare competition for soil N according to differences in root depth penetration rates between species. This rooting depth penetration effect was then studied at three levels of soil N supply leading to different degrees of N demand and N stress. A field experiment carried out in 2003 including pea-barley intercrops grown either with 130 kg N ha-1 or without any fertilizer was used to test the model. Experimental results of aboveground biomass, nitrogen accumulation, N2 fixation and rooting depth monitored regularly during the crop cycle were compared to simulated results. The simulated responses of the intercrops were in agreement with the observations from the experimental dataset. Using the model, it is clear that faster root growth in barley gives it access to more soil nitrogen than pea during the vegetative phase. However, this advantage, which is limited to the vegetative phase, only affects the outcome of the intercrop when soil N supply is low. With higher soil N supplies, soil N sharing is not affected by the differences in rooting depth penetration between species. It appears that with higher N

supplies, the differences in N demand between species have more influence on species dominance than differences in rooting depth.
Keywords: Intercropping; Crop modelling; Rooting depth penetration; Nitrogen; Pea; Barley

I.J. Lorite, L. Mateos, F. Orgaz, E. Fereres, Assessing deficit irrigation strategies at the level of an irrigation district, Agricultural Water Management, Volume 91, Issues 1-3, 16 July 2007, Pages 51-60, ISSN 0378-3774, DOI: 10.1016/j.agwat.2007.04.005.
(http://www.sciencedirect.com/science/article/B6T3X-4NVCFW3-3/2/8ddaec5295064568cb74dba7b0340508)
Abstract:
Water scarcity limits the supply to irrigation schemes worldwide. In many areas, chronic water deficits force irrigation districts to allocate water at levels well below the crop water requirements for maximum yield. We have developed a model that simulates the water balance and the irrigation performance at the plot and scheme levels, to carry out scenario analyses in an irrigation scheme in Southern Spain (Genil-Cabra Irrigation Scheme) that is frequently subjected to water limitation. The major crops in the scheme are winter cereals, sunflower, garlic, and cotton. The model simulated the scheme performance for different allocation levels of 500, 1500, 2500 m3/ha, and full irrigation supply in terms of gross and net income, irrigation water productivity (IWP) and labour needs, using a series of 48 years of climatic data. For each level of water allocation, three strategies were considered. The first strategy allocated the water supply equally to all users, while a second one was aimed at maximising IWP, both assuming the same crop distribution that existed in 2000. In a third strategy, the cropping pattern was allowed to change relative to that existing in 2000. The behaviour of individual farmers in relation to irrigation performance was incorporated into the model, based on the characterization of their performance during four seasons. Results showed that at supply levels of 1500 m3/ha, the best strategy in terms of net income was the one that allocated the water to crops with high water productivity. However, when water supply is very low (500 m3/ha) scheme net income is maximised by adjusting the cropping pattern. As supply increased to 2500 m3/ha, there were no differences in scheme net income among the three strategies. The various levels of water allocation influenced the value of IWP for the scheme, leading to average values that varied between 1.12 [euro]/m3 for the 500 m3/ha supply to 0.50 [euro]/m3 under unlimited water supply. The best strategy varied depending on the level of water allocation and on the maximisation objective (income, IWP, labour) in a complex way. Nevertheless, strategies based on allocating water to crops of high water productivity, combined with a shift in the cropping pattern are recommended when water supply is constrained. The analysis emphasized the need to develop simulation tools for optimising water allocation under scarcity at the irrigation scheme level.
Keywords: Water allocation; Deficit irrigation; Farmers performance; Scenario analysis; Water productivity

Anders Pedersen, Bjorn M. Petersen, Jorgen Eriksen, Soren Hansen, Lars S. Jensen, A model simulation analysis of soil nitrate concentrations--Does soil organic matter pool structure or catch crop growth parameters matter most?, Ecological Modelling, Volume 205, Issues 1-2, 10 July 2007, Pages 209-220, ISSN 0304-3800, DOI: 10.1016/j.ecolmodel.2007.02.016.
(http://www.sciencedirect.com/science/article/B6VBS-4NF2HPX-3/2/fa1b7bc44eb77cbaa1d474b98934d890)
Abstract:
Three different soil organic matter (SOM) submodels were tested within the framework of the soil-plant-atmosphere model Daisy. The three submodels were: the original Daisy SOM module (OLD) with relatively non-dynamic humus pools, a recalibrated Daisy SOM module (STD) with the same pool structure as the original, but with a more rapid turnover of the active humus pool, and a newly developed SOM model structure (CNSIM), with inclusion of a soil microbial residuals pool of

relatively rapid turnover, and a relatively recalcitrant added organic matter pool, producing a larger and more sustained residual N mineralisation. Furthermore, two different parameterisations of the catch crop submodules, differing in grass growth and N assimilation dynamics, were tested and the relative influence of SOM module or catch crop growth module on the simulated variables assessed. The simulations were carried out with data from a field experiment with four mixed cropping systems and compared to measured results of crop production, N uptake and soil nitrate concentration. The cropping sequence was 3 years of grassland (cut or grazed) followed by 3 years of spring cereals with ryegrass as a catch crop and two levels of fertiliser application. Independently of the SOM module, plant production and nitrogen uptake for cereals were simulated well. The dynamics of the added organic matter (AOM) and SOM of the two Daisy submodules were nearly identical, whereas the CNSIM submodule built much more nitrogen into the AOM pools, especially during the pasture years. During the period with spring barley, the CNSIM module simulated similar amounts of AOM as the other modules. In general, the simulated nitrate concentrations at 100 cm depth were higher than the measured values, but the changed dynamics in the CNSIM simulations resulted in even higher overestimation of the nitrate concentration than the two other modules. The choice of catch crop submodule had a considerable effect on nitrate concentration and therefore the potential for nitrate leaching, possibly overshading more futile differences produced by the different SOM submodules. The simulations show the importance of applying appropriate intercrop submodels when the model is used for simulating rotations with intercropping of grass-clover or undersown catch crops.
Keywords: Daisy; Soil organic matter; Modelling; Catch crop modelling

Jeanet Ingwersen, Margaret Anne Defeyter, David O. Kennedy, Keith A. Wesnes, Andrew B. Scholey, A low glycaemic index breakfast cereal preferentially prevents children's cognitive performance from declining throughout the morning, Appetite, Volume 49, Issue 1, July 2007, Pages 240-244, ISSN 0195-6663, DOI: 10.1016/j.appet.2006.06.009.
(http://www.sciencedirect.com/science/article/B6WB2-4MV1GP0-1/2/f420f658c9c67d85291eeed4418b3013)
Abstract:
This study investigated whether the glycaemic index (GI) of breakfast cereal differentially affects children's attention and memory. Using a balanced cross-over design, on two consecutive mornings 64 children aged 6-11 years were given a high GI cereal and a low GI cereal in a counterbalanced order. They performed a series of computerised tests of attention and memory, once prior to breakfast and three times following breakfast at hourly intervals. The results indicate that children's performance declines throughout the morning and that this decline can be significantly reduced following the intake of a low GI cereal as compared with a high GI cereal on measures of accuracy of attention ($M=-6.742$ and -13.510, respectively, $p<0.05$) and secondary memory ($M=-30.675$ and -47.183, respectively, $p<0.05$).
Keywords: Breakfast; Breakfast composition; Glucose; Carbohydrate; Glycaemic index (GI); Cognition; Attention; Memory; Children

D.A. Levitsky, G.T. Hung, Long-term lack of compensation of energy intake for meal replacements at lunch., Appetite, Volume 49, Issue 1, July 2007, Page 308, ISSN 0195-6663, DOI: 10.1016/j.appet.2007.03.121.
(http://www.sciencedirect.com/science/article/B6WB2-4P5SCRM-3X/2/351a7d0ca5bde91cf93e2a2180cf1d1f)
Abstract:
The substitution of liquid meal replacements for a regular meal has been demonstrated to be remarkably effective in reducing daily energy intake resulting in a loss in body weight. The effect is partly due to controlling portion size, a powerful variable determining meal intake of humans. Studies of meal replacements use mostly expensive, nutrient concentrated liquid meals that are

substituted for most of their meals. The present study examined the effect of a daily substitution of a commercial, small portioned meals, such as cans of pasta, soups, cereals, etc. in place of a buffet lunch (~ 200 kcal) on ad libitum energy consumption for a 2 week period in young adults. All foods consumed from Monday to Friday were prepared, eaten and weighed in the Metabolic Unit. The within subject designed compared the effect of eating lunch provided from a buffet to selecting one food from an array of different small portioned commercial foods on total ad lib energy consumed throughout the 2 week period. Subjects failed to increase their energy intake at subsequent meals throughout the 2 week test period to compensate for the reduced energy consumed at lunch. The results suggest that, for most people, replacing lunch with a small energy controlled lunch will result in a significant weight loss.

Terho Hyvonen, Can conversion to organic farming restore the species composition of arable weed communities?, Biological Conservation, Volume 137, Issue 3, July 2007, Pages 382-390, ISSN 0006-3207, DOI: 10.1016/j.biocon.2007.02.021.
(http://www.sciencedirect.com/science/article/B6V5X-4NM5SCD-1/2/fbe00eef012b0ccfcff55428e692b587)
Abstract:
Benefits of organic cropping for biodiversity have usually been demonstrated in relation to modern conventional cropping. In this study, the ability of organic cropping to restore species composition of weed communities was explored by comparing weed communities of present day organic cropping with weed communities at the beginning of the application of modern cropping measures in the 1960s. The data of two weed surveys of spring cereals (conducted in 1961-1964 and 1997-1999) in Finland were utilized for a comparison. Frequency of occurrence and density (plants m-2) of 41 weed species were compared between decades. Partial canonical correspondence analysis (pCCA) was applied to explore the relationship between species composition, management and non-management variables. Eight species had lower and 30 species higher or similar frequency of occurrence in the 1990s' organically cropped fields than in the fields of the 1960s. However, 18 species had lower and 20 species had higher or similar density in the organically cropped fields than in the fields of the 1960s. Three species were not detected at all in the organically cropped fields. Crop and under-sown grass explained more of the variation in species composition in the 1990s than in the 1960s. The role of drainage and pre-crop was more important in the 1960s than in the 1990s. The most immediate benefit was gained by nitrophilous species that had suffered from herbicide application. The recovery of perennials and non-nitrophilous species will take a longer time. The results suggest that despite some benefits for biodiversity, organic farming at early phase cannot recover weed populations to the same level as before application of intensive cropping measures.
Keywords: Agricultural intensification; Agro-biodiversity; Canonical correspondence analysis; Common agricultural policy; Farming systems; Herbicide

J.M. Wagacha, J.W. Muthomi, Fusarium culmorum: Infection process, mechanisms of mycotoxin production and their role in pathogenesis in wheat, Crop Protection, Volume 26, Issue 7, July 2007, Pages 877-885, ISSN 0261-2194, DOI: 10.1016/j.cropro.2006.09.003.
(http://www.sciencedirect.com/science/article/B6T5T-4M7CM8X-4/2/f148913ddf70e996b4d0ab8a4a2c3179)
Abstract:
Fusarium culmorum is an important pathogen of wheat causing seedling blight, foot rot, and head blight (Fusarium head blight (FHB)) or scab. The pathogen is dominant in cooler areas like north, central and western Europe. The fungus reproduces asexually by means of conidia, which form the main mode of dispersal. Head blight is by far the most serious concern of Fusarium infection on pre-harvest wheat and other small grain cereals. The significance of F. culmorum in wheat production is attributed to both head blight and mycotoxin contamination of the grain harvested

from infected ears. Ear infection mainly occurs during anthesis and is favoured by wet weather or high humidity and warm temperatures. The major mycotoxins produced by F. culmorum are deoxynivalenol, nivalenol and zearalenone, which are a potential health hazard for both humans and animals. The mycotoxins, especially deoxynivalenol, are believed to play a role in disease development. Available options of managing FHB include use of fungicides, cultural practices, resistant cultivars and biological agents. However, no wheat cultivar is completely resistant to FHB while fungicides are at most 70% effective against natural infection. This review seeks to document and infer information on F. culmorum, with special emphasis on wheat head blight infection process, mechanisms of mycotoxin production, the role the mycotoxins play in pathogenesis, and the possible management options.
Keywords: Fusarium culmorum; Mycotoxins; Wheat; Head blight; Pathogenesis

Hassan M. Mohamed, Zeyaur R. Khan, Jones M. Mueke, Ahmed Hassanali, Eunice Kairu, John A. Pickett, Behaviour and biology of Chilo partellus (Swinhoe) on Striga hermonthica (Del.) Benth. infested and uninfested maize plants, Crop Protection, Volume 26, Issue 7, July 2007, Pages 998-1005, ISSN 0261-2194, DOI: 10.1016/j.cropro.2006.09.008.
(http://www.sciencedirect.com/science/article/B6T5T-4M7CM8X-5/2/d88a9ef17524243f07dc91a6dc7b75fe)
Abstract:
Stemborers and Striga hermonthica co-exist in cereal fields in sub-Saharan Africa where together they cause crop damage that sometimes results in total crop loss. Striga alters both the chemistry and morphology of cereals and this may influence behaviour and performance of stemborers on the host plants. Studies were undertaken to compare the effects of various levels of Striga infestation of maize on oviposition preference and survival of Chilo partellus. Potted maize plants were exposed to different densities of Striga seeds (0, 1000, 2000 and 3000/pot) and subsequent effects on C. partellus oviposition evaluated in no-choice and choice-tests. In addition, larval arrestment, settlement, feeding, growth and development were assessed. Results showed that Striga infestation and plant height had non-significant influence on oviposition preference of C. partellus, except in 2-choice assays involving uninfested maize and one under high Striga infestation, in which case they preferred to oviposit on the latter. Similarly, Striga infestation had no influence on larval arrest and settlement. The larvae, however, consumed significantly more of the leaves and stems from uninfested than infested maize plants, with a progressive decline in the consumed proportions with increasing level of Striga infestation. Larval food assimilation was not influenced by Striga infestation, but larval period, percentage of pupation and growth rate were significantly higher on uninfested plants as compared to medium and high Striga infested plants. Possible reasons underlying these observations and their implications are discussed.
Keywords: Stemborers; Chilo partellus; Maize; Striga hermonthica; Oviposition

Hannu Kankanen, Christian Eriksson, Effects of undersown crops on soil mineral N and grain yield of spring barley, European Journal of Agronomy, Volume 27, Issue 1, July 2007, Pages 25-34, ISSN 1161-0301, DOI: 10.1016/j.eja.2007.01.010.
(http://www.sciencedirect.com/science/article/B6T67-4NCKK5P-1/2/ab76649ec0a341d185013267902147f4)
Abstract:
Undersowing a cereal crop can reduce nitrogen (N) leaching and increase available N for the successive crop. An undersown crop can also compete with the main crop. Seventeen plant species were undersown in spring barley (Hordeum vulgare L.) to study their suitability regarding establishment, biomass production, competition with the main crop and effects on soil mineral N. Three different seeding rates were evaluated. Italian ryegrass (Lolium multiflorum Lam.) decreased nitrate nitrogen (NO3-N) content in late autumn and timothy (Phleum pratense L.) in the succeeding spring. A mixture was optimal to reduce N leaching. Italian ryegrass is a very

competitive species that should be undersown at moderate seeding rates to avoid large yield reduction in the main crop. Black medic (Medicago lupulina L.) slightly increased N leaching risk, but red clover (Trifolium pratense L.) and white clover (Trifolium repens L.) did not increase soil NO3-N content. As clovers did not compete strongly with the main crop, fairly high seeding rates can be used to maximise N fixation to benefit the successive crop.
Keywords: Cereal; Cover crop; Grass; Intercropping; Legume; Soil ammonium nitrogen; Soil nitrate nitrogen

A.P. Verbyla, C. Saint-Pierre, C.J. Peterson, A.S. Ross, R. Appels, Fourier modelling, analysis and interpretation of high-resolution mixograph data, Journal of Cereal Science, Volume 46, Issue 1, July 2007, Pages 11-21, ISSN 0733-5210, DOI: 10.1016/j.jcs.2006.10.008.
(http://www.sciencedirect.com/science/article/B6WHK-4MSY8F3-1/2/f5fc710e63456644efd007ca71c8eb63)
Abstract:
High resolution mixograph data (HRMD) has the potential to provide improved information on dough rheology. A designed experiment involving nine cultivars grown under two levels of nitrogen fertilization and three levels of irrigation motivated the method of analysis that is based on time-varying Fourier terms. The procedure involves a preliminary time series analysis in the frequency domain based on the periodogram, to determine the main cyclic patterns in the data, followed by modelling of the cyclic patterns found. The estimates of the peak value in dough development and the associated time based on the resulting major cyclic frequency are shown to correlate highly with the existing method of analysis using Mixsmart software. The measure of bandwidth is based on the maximum of the time-varying amplitude of the sinusoidal term corresponding to the major frequency over time. The trace of this amplitude provides a clear single maximum, improves the ability to separate varieties in terms of bandwidth, and has the potential for characterizing dough extension across the full mixing process.
Keywords: Dough mixing; Fourier analysis; Mixograph; Rheology

Behic Mert, David Gonzalez, Osvaldo H. Campanella, A new method to determine viscoelastic properties of corn grits during cooking and drying, Journal of Cereal Science, Volume 46, Issue 1, July 2007, Pages 32-38, ISSN 0733-5210, DOI: 10.1016/j.jcs.2006.10.009.
(http://www.sciencedirect.com/science/article/B6WHK-4N08M9P-1/2/8d273c889eddb4b8f6a38f9affe881ef)
Abstract:
The working principles and the theoretical background of a new method to measure the viscoelastic properties of grains during cooking and drying processes are presented. Specifically, corn grits at different processing stages of cooking and drying were chosen as the model grain and their viscoelastic characteristics, namely elastic stiffness and viscous damping, were determined. During the measurements grits were squeezed between a rigid bottom plate and a top round element oscillating at random frequencies in a range 10-10,000 rad/s. A frequency response of the mechanical impedance of the samples, which is defined as the ratio between the force applied to the samples and the oscillation velocity, was obtained. Corn grits were measured in their raw state, after cooking in a pressure cooker for different times (2, 7, 15, 30, and 60 min), and at different times of drying (30, 60, and 120 min) at 65 [degree sign]C. The measured mechanical impedances of the samples showed that rheological changes upon processing can be monitored by the newly developed method. Non-destructive and quick measurements, data covering a wide range of frequencies, and the adaptability of the method to be used with available instruments used in texture measurement such as texture analyzers are some of the important advantages that the new method provides to the area of cereal processing.
Keywords: Cereal; Corn; Texture analysis; Viscoelastic

Marc Regier, Edme H. Hardy, Kai Knoerzer, Claudia V. Leeb, Heike P. Schuchmann, Determination of structural and transport properties of cereal products by optical scanning, magnetic resonance imaging and Monte Carlo simulations, Journal of Food Engineering, Volume 81, Issue 2, July 2007, Pages 485-491, ISSN 0260-8774, DOI: 10.1016/j.jfoodeng.2006.11.025.
(http://www.sciencedirect.com/science/article/B6T8J-4MV19KR-2/2/151e08f61de758714e7116a86b0b9167)
Abstract:
Structural and transport properties of extruded snacks as well as a bread sample were characterised by a 2D scanner image and 3D magnetic resonance imaging data-analysis. The algorithms were able to determine pore size distributions as well as surface to volume ratios. The results for 2D and 3D were compared and strengths and weaknesses discussed. Additionally by a Monte Carlo simulation the connectivity of the pore space was accessible.
Keywords: Pore size determination; Magnetic resonance imaging; Monte Carlo simulation; Optical scanner; Image analysis

Tika B. Adhikari, Boovaraghan Balaji, Jill Breeden, Stephen B. Goodwin, Resistance of wheat to Mycosphaerella graminicola involves early and late peaks of gene expression, Physiological and Molecular Plant Pathology, Volume 71, Issues 1-3, July-September 2007, Pages 55-68, ISSN 0885-5765, DOI: 10.1016/j.pmpp.2007.10.004.
(http://www.sciencedirect.com/science/article/B6WPC-4PYYTRT-3/2/811765e13b8e3f5afaf1d9a27fd3cc5d)
Abstract:
Large-scale cDNA-AFLP profiling identified numerous genes with increased expression during the resistance response of wheat to the Septoria tritici blotch fungus, Mycosphaerella graminicola. To test whether these genes were associated with resistance responses, primers were designed for the 14 that were most strongly up-regulated, and their levels of expression were measured at 12 time points from 0 to 27 days after inoculation (DAI) in two resistant and two susceptible cultivars of wheat by real-time quantitative polymerase chain reaction. None of these genes was expressed constitutively in the resistant wheat cultivars. Instead, infection of wheat by M. graminicola induced changes in expression of each gene in both resistant and susceptible cultivars over time. The four genes chitinase, phenylalanine ammonia lyase, pathogenesis-related protein PR-1, and peroxidase were induced from about 10- to 60-fold at early stages (3 h-1 DAI) during the incompatible interactions but were not expressed at later time points. Nine other genes (ATPase, brassinosteroid-6-oxidase, peptidylprolyl isomerase, peroxidase 2, 40S ribosomal protein, ADP-glucose pyrophosphorylase, putative protease inhibitor, methionine sulfoxide reductase, and an RNase S-like protein precursor) had bimodal patterns with both early (1-3 DAI) and late (12-24 DAI) peaks of expression in at least one of the resistant cultivars, but low if any induction in the two susceptible cultivars. The remaining gene (a serine carboxypeptidase) had a trimodal pattern of expression in the resistant cultivar Tadinia. These results indicate that the resistance response of wheat to M. graminicola is not completed during the first 24 h after contact with the pathogen, as thought previously, but instead can extend into the period from 18 to 24 DAI when fungal growth increases dramatically in compatible interactions. Many of these genes have a possible function in signal transduction or possibly as regulatory elements. Expression of the PR-1 gene at 12 h after inoculation was much higher in resistant compared to susceptible recombinant-inbred lines (RILs) segregating for the Stb4 and Stb8 genes for resistance. Therefore, analysis of gene expression could provide a faster method for separating resistant from susceptible lines in research programs. Significant differential expression patterns of the defense-related genes between the resistant and susceptible wheat cultivars and RILs after inoculation with M. graminicola suggest that these genes may play a major role in the resistance mechanisms of wheat.
Keywords: Defense-related genes; Cereal; Monocot; Mycosphaerella graminicola; Pathogenesis-related genes; Real-time PCR analysis; Septoria tritici; Triticum aestivum; Wheat

Beate Formowitz, Mary-Catherine Schulz, Andreas Buerkert, Rainer Georg Joergensen, Reaction of microorganisms to rewetting in continuous cereal and legume rotation soils of semi-arid Sub-Saharan Africa, Soil Biology and Biochemistry, Volume 39, Issue 7, July 2007, Pages 1512-1517, ISSN 0038-0717, DOI: 10.1016/j.soilbio.2006.12.033.
(http://www.sciencedirect.com/science/article/B6TC7-4N0XM50-3/2/95eeb6d899099fc459e8542dc0aa66dd)
Abstract:
A 20-day incubation experiment with continuous cereal (CC) versus cereal legume (CL) rotation soils of two semi-arid Sub-Saharan sites (Fada-Kouare in Burkina Faso, F, and Koukombo in Togo, K) were carried out to investigate the effects of rewetting on soil microbial properties. Site- and system-specific reactions of soil microorganisms were observed on cumulative CO2 production, adenylates (ATP, ADP, and AMP), microbial biomass C and N, ergosterol, muramic acid and glucosamine. Higher values of all parameters were found in the CL rotation soils and in both soils from Fada-Kouare. While the inorganic N concentration showed only a system-specific response to rewetting, the adenylate energy charge (AEC) showed only a site-specific response. ATP recovered within 6 h after rewetting from ADP and AMP due to rehydration of microorganisms and not due to microbial growth. Consequently, no N seemed to be immobilized by microorganisms and all NO3 in the soil was immediately available to the plants. The fungal cell-membrane component ergosterol was three (CC) and five (CL) times larger at Fada than in the respective soils at Koukombo. The concentrations of the bacterial cell-wall component muramic acid were by 20% and of mainly fungal glucosamine by 10% larger in the CL rotation soils than in the CC soils. This indicates long-shifts in the microbial community structure.
Keywords: Adenylates; AEC; Ergosterol; Glucosamine; Muramic acid; Microbial biomass; CO2 evolution rate

Stefano Bocchi, Annamaria Castrignano, Identification of different potential production areas for corn in Italy through multitemporal yield map analysis, Field Crops Research, Volume 102, Issue 3, 20 June 2007, Pages 185-197, ISSN 0378-4290, DOI: 10.1016/j.fcr.2007.03.012.
(http://www.sciencedirect.com/science/article/B6T6M-4NNPH5J-1/2/8a2f2ffc075fcc07a44e1433ec060cb3)
Abstract:
In order to optimize production factors, farmer has to know production variability and its origin at both the farm level and the field level. Improving Nitrogen management for cereal crops, which need high amounts of the element during the whole production cycle requires, as precision agriculture states, that within-field variability is accurately identified and interpreted. This is particularly difficult in those situations where agronomically significant variability is detected and even in small fields, as is generally the situation in some European countries.
The present study is aimed at defining an integrated methodology to process production data which, through the combined use of hardware (GPS, grain sensor) and software (GIS, geostatistics) allows for acquisition, analysis and representation of information related to the variation of production potential within the field.
Data on grain yield and 1000-grain weight obtained during a 4-year period from a corn (Zea mays L.) field were acquired and analysed to study spatial and temporal variability through geostatistical techniques.
Synthetic maps of attitude and stability of production were obtained by combining individual production maps in a GIS environment. These results may prove to be very useful to identify isomanagement areas in precision agriculture.
Keywords: Precision agriculture; Spatial and temporal variation; Geostatistics; Yield map; Educational research farm

Esther Velazquez, Water trade in Andalusia. Virtual water: An alternative way to manage water use, Ecological Economics, Volume 63, Issue 1, 15 June 2007, Pages 201-208, ISSN 0921-8009, DOI: 10.1016/j.ecolecon.2006.10.023.
(http://www.sciencedirect.com/science/article/B6VDY-4MM8BJ9-1/2/81d2dd48b6fd9d5cff0b6a8e6c0b9e03)
Abstract:
The main idea of this paper is to analyse the relationships between the productive process and the commercial trade with water resources used by them. For that, the first goal is to find out, by means of the estimation of virtual water, the exported crops which have the highest water consumption. Similarly, we analyse the crops that are imported and therefore, might contribute to save water. The second objective is to put forward new ways to save water by means of the virtual water trade.
This first conclusion contradicts not only the comparative advantages theory but also the environmental sustainability logic. The previous conclusion is derived from the great exports of water via potatoes and vegetables, and also via citrus fruit and orchards; and, on the other hand, from the imports, such as cereals and arable crops, with lower water requirements. The second conclusion affirms as Andalusia utilises large amounts of water in its exports, and in turn, it does not produce goods with low water requirements, the potential saving would be very significant if the terms of our trade were the other way round. We are convinced that the agricultural sector must modify the use of water to a great extent in order to reach significant water savings and an environmental sustainability path.
Keywords: Virtual water; Water trade; Water use; Andalusia

Ping-an XIANG, Yan ZHOU, Huang HUANG, Hua ZHENG, Discussion on the Green Tax Stimulation Measure of Nitrogen Fertilizer Non-Point Source Pollution Control - Taking the Dongting Lake Area in China as a Case, Agricultural Sciences in China, Volume 6, Issue 6, June 2007, Pages 732-741, ISSN 1671-2927, DOI: 10.1016/S1671-2927(07)60106-0.
(http://www.sciencedirect.com/science/article/B82XG-4P48RF7-F/2/b61a1071d3777e7619450498871a7e90)
Abstract: Abstract
A study on designing the tax of nitrogen fertilizer can provide a new method for controlling nitrogen fertilizer non-point source pollution. The tax design of nitrogen fertilizer was discussed by utilizing the external theory and the demand elasticity theory. The results indicated that the coefficient of price elasticity of nitrogen fertilizer demand is -0.21, which instructed that the market demand is in lack of elasticity in the short period and the impact of nitrogen fertilizer manufacturers is subtle. The 11 counties (cities and boroughs) in the Dongting Lake area in China, where the farmland nitrogen application surpassed the average ecological fertilization dosage, is listed to the taxation scope of nitrogen fertilizer tax. The environment loss will reduce 0.07 hundred million RMB yuan and the revenue will increase 0.89 hundred million RMB yuan in the country after levying on nitrogen fertilizer. The loss, which was brought by the decreasing food supplies production, will be 0.58 hundred million RMB yuan and the net social benefit will be 0.38 hundred million RMB yuan following revenue collection. The variation scope of the increasing expenditure of farmers will range from 0.95 to 1.49%. The variation scope of the income of farmers will range from -8.41 to 6.44%. The 5 areas, Yunxi Borough, Junshan Borough, Hanshou County, Jinshi City, and Ziyang Borough, had an increase in food supplies production after the revenue collection. The environment loss will reduce 0.01 hundred million RMB yuan and the revenue will increase 0.16 hundred million RMB yuan in the country after levying on nitrogen fertilizer. The economic benefits, which was brought by the increasing cereals production, will be 0.67 hundred million RMB yuan and the net social benefit will be 0.84 hundred million RMB yuan after revenue collection. The variation scope of the increasing expenditure of farmers will range from 0.95 to 1.06%. The variation scope of the increasing income of farmers will range from 0.69 to 6.44%. Considering the

entire social welfare, taxation of nitrogen fertilizer will have more advantages than disadvantages in the Dongting Lake area.
Keywords: nitrogen fertilizer; non-point source pollution; tax; Dongting Lake area

Prabhu Pingali, Westernization of Asian diets and the transformation of food systems: Implications for research and policy, Food Policy, Volume 32, Issue 3, June 2007, Pages 281-298, ISSN 0306-9192, DOI: 10.1016/j.foodpol.2006.08.001.
(http://www.sciencedirect.com/science/article/B6VCB-4KXDWRD-1/2/fd68b41e7b99394181d133c447a6db7b)
Abstract:
Rapid economic and income growth, urbanization, and globalization are leading to a dramatic shift of Asian diets away from staples and increasingly towards livestock and dairy products, vegetables and fruit, and fats and oils. While the diversification of diets away from the traditional dominance of rice with rising incomes is expected and observed, current food consumption patterns are showing signs of convergence towards a Western diet. The diet transition is characterized by increased consumption of: wheat; temperate fruit and vegetables and high protein and energy dense food. Globalization and the consequent global interconnectedness of the urban middle class, is the driving force behind the convergence of diets. The rapid spread of global supermarket chains and fast food restaurants is reinforcing the above trends.
The growing demand for diet diversity cannot be met solely by the traditional food supply chain. It requires the modernisation of the food retail sector, and the vertical integration of the food supply chain, in effect linking the consumers' plate to the farmers' plow. As a consequence, Asian agriculture is on an irreversible path leading away from its traditional pre-occupation with cereal crop production, especially rice, towards a production system that is becoming increasingly commercialized and diversified.
This paper describes the determinants and trends in the diversification and Westernization of Asian diets. Implications of the evolving demand trends for food supply and retail systems are presented. The paper discusses the prospects for small farmer participation in the emerging food supply system, with a particular emphasis on Asian rice production systems. Finally, the paper considers emerging challenges for food policy, small holder welfare, and agricultural research and development priorities.
Keywords: Diet transition; Westernization; Globalization; Food systems; Vertical integration; Asian rice systems

Jennifer P. Taylor, Vianne Timmons, Roberta Larsen, Fiona Walton, Janet Bryanton, Kim Critchley, Mary Jean McCarthy, Nutritional Concerns in Aboriginal Children Are Similar to Those in Non-Aboriginal Children in Prince Edward Island, Canada, Journal of the American Dietetic Association, Volume 107, Issue 6, June 2007, Pages 951-955, ISSN 0002-8223, DOI: 10.1016/j.jada.2007.03.008.
(http://www.sciencedirect.com/science/article/B758G-4NT2RT8-G/2/1fc7df787f511aa1e27d502e4fb9f6cf)
Abstract: Objective
To assess food consumption among aboriginal children living on Mi'kmaq reserves in Prince Edward Island, Canada.Design
Data were collected as part of a larger study of health perceptions and behaviors in Mi'kmaq children and youth ages 1 to 18 years. Food consumption was assessed using a self-administered food frequency questionnaire during an in-home interview.Subjects/setting
Fifty-five children living on a reserve (53% of total population) ages 9 to 18 years.Statistical analyses performed
The number of servings of milk products, vegetables and fruit, and snack foods/beverages was calculated by adding the responses to the frequency of consumption of foods assessed in each

group. [chi]2 analysis was used to assess differences in food consumption according to sex and age.Results
Only one child reported consuming the recommended minimum of five vegetables and fruit daily (Canada's Food Guide to Healthy Eating, 1992) (mean [+/-standard deviation]=2.8+/-1.1 servings). Twenty-five (49%) of the children consumed three or more servings of milk products daily (mean=2.6+/-1.3 servings). Approximately half of the children had three or more snack foods/beverages daily (mean=3.1+/-2.2 servings). Younger children (grades 4 to 6) consumed more cereal, peanut butter, and yogurt than older children. There were no significant differences in food consumption between boys and girls.Conclusions
Our findings are consistent with past reports in aboriginal children. However, except for higher consumption of french fries, results are similar to recent surveys of other Prince Edward Island school children, suggesting a province-wide rather than cultural health issue.

Demosthenes B. Panagiotakos, Christos Pitsavos, Yannis Skoumas, Christodoulos Stefanadis, The Association between Food Patterns and the Metabolic Syndrome Using Principal Components Analysis: The ATTICA Study, Journal of the American Dietetic Association, Volume 107, Issue 6, June 2007, Pages 979-987, ISSN 0002-8223, DOI: 10.1016/j.jada.2007.03.006.
(http://www.sciencedirect.com/science/article/B758G-4NT2RT8-N/2/a1867cf5798e91ab4528ad513669f704)
Abstract: Background
Dietary habits have been associated with the prevalence of the metabolic syndrome.Objective
The associations between foods or food patterns and the characteristics of the metabolic syndrome were evaluated.Design
Cross-sectional survey.Subjects
During 2001 to 2002, 1,514 men (aged 18 to 87 years) and 1,528 women (aged 18 to 89 years) without any clinical evidence of cardiovascular disease were randomly enrolled, from the Attica region in Greece.Main outcome measures
Dietary habits were evaluated using a semiquantitative, food frequency questionnaire. Characteristics of the metabolic syndrome (ie, blood pressure, waist circumference, glucose, triglycerides, and high-density lipoprotein cholesterol) were also measured.Statistical analysis
Principal components analysis was applied to extract dietary patterns from 22 foods or food groups. Multivariate regression analysis evaluated the associations between the extracted dietary patterns and characteristics of the metabolic syndrome.Results
Six components were derived explaining 56% of the total variation in intake. Component 1 was characterized by the consumption of cereals, fish, legumes, vegetables, and fruits (explained variation 19.7%); component 2 was characterized by the intake of potatoes and meat (explained variation 11.7%), component 6 was characterized by alcohol intake (explained variation 4.8%), whereas the other components were mainly characterized by consumption of dairy and sweets. After adjusting for various confounders, component 1 was inversely associated with waist circumference, systolic blood pressure, triglycerides, positively associated with high-density lipoprotein cholesterol levels, and inversely with the likelihood of the metabolic syndrome (odds ratio [OR] 0.87, 95% confidence interval [CI] 0.79 to 0.97), whereas components 2 and 6 were positively correlated with the previous indexes, and the likelihood of having the metabolic syndrome (OR 1.13, 95% CI 1.05 to 1.21 and OR 1.26, 95% CI 1.21 to 1.33).Conclusions
A dietary pattern that includes cereals, fish, legumes, vegetables, and fruits was independently associated with reduced levels of clinical and biological markers linked to the metabolic syndrome, whereas meat and alcohol intake showed the opposite results.

Jorgen E. Olesen, Lars J. Munkholm, Subsoil loosening in a crop rotation for organic farming eliminated plough pan with mixed effects on crop yield, Soil and Tillage Research, Volume 94, Issue 2, June 2007, Pages 376-385, ISSN 0167-1987, DOI: 10.1016/j.still.2006.08.015.

(http://www.sciencedirect.com/science/article/B6TC6-4KYY3JD-3/2/f3c98d296e4d3a5f9f2f5bb506128a95)
Abstract:
Compacted subsoil may reduce plant root growth with resulting effects on plant uptake of water and nutrients. In organic farming systems subsoil loosening may therefore be considered an option to increase nutrient use. We investigated the effect of subsoil loosening with a paraplow to ca. 35 cm depth within a four-crop rotation in an organic farming experiment at Foulum (loamy sand) and Flakkebjerg (sandy loam) in Denmark. In each of the years 2000-2003, half of four plots per site were loosened in the autumn bearing a young grass-clover crop (mixture of Lolium perenne L., Trifolium repens L. and Trifolium pratense L.) established by undersowing in spring barley (Hordeum vulgare L.). The grass-clover was grown for another year as a green manure crop and was followed by winter wheat (Triticum aestivum L.), lupin (Lupinus angustifolius L.):barley and spring barley in the following 3 years. On-land ploughing was used for all cereal and pulse crops. Penetration resistance was recorded in all crops, and the results clearly showed that subsoil loosening had effectively reduced the plough pan and that the effect lasted at least for 3.5 years. Measurements of wheat root growth using minirhizotrons at Foulum in 2002/2003 did not show marked effects of subsoil loosening on root frequency in the subsoil. Subsoil loosening resulted in reduced growth and less N uptake of the grass-clover crop in which the subsoil loosening was carried out, probably due to a reduced biological nitrogen (N) fixation resulting from a smaller clover proportion. This had a marked effect on the growth of the succeeding winter wheat. Negative effect of subsoil loosening on yield of winter wheat and spring barley was observed without manure application, whereas small positive yield effect of subsoil loosening was observed in crops with a higher N supply from manure. Yield decrease in winter wheat was observed in years with high winter rainfall. There was no significant effect of subsoiling on grain yield of the lupin:barley crops, although subsoiling had a tendency to increase crop growth and yield during dry summers. Our results suggest that subsoil loosening should not be recommended in general under Danish conditions as a measure to ameliorate subsoil compaction.
Keywords: Subsoil loosening; Subsoiling; Root growth; Yield; Nitrogen uptake; Organic farming

Mohammad Shafi, Jehan Bakht, Mohammad Tariq Jan, Zahir Shah, Soil C and N dynamics and maize (Zea may L.) yield as affected by cropping systems and residue management in North-western Pakistan, Soil and Tillage Research, Volume 94, Issue 2, June 2007, Pages 520-529, ISSN 0167-1987, DOI: 10.1016/j.still.2006.10.002.
(http://www.sciencedirect.com/science/article/B6TC6-4MFCVSK-1/2/e8e73e2d26e71d7bf68e9fc912c34558)
Abstract:
This paper presents the results of irrigated rotation experiment, conducted in the North West Frontier Province (NWFP), Pakistan, during 1999-2002 to evaluate effects of residues retention, fertilizer N and legumes in crop rotation on yield of maize (Zea mays L.) and soil organic fertility. Chickpea (Cicer arietinum L) and wheat (Triticum aestivum L) were grown in the winters and mungbean (Vigna radiata) and maize in the summers. Immediately after grain harvest, above-ground residues of all crops were either completely removed (-residue), or spread across the plots and incorporated by chisel plough by disc harrow and rotavator (+residue). Fertlizer N rates were nil or 120 kg ha-1 for wheat and nil or 160 kg ha-1 for maize. Our results indicated that post-harvest incorporation of crop residues significantly ($p < 0.05$) increased the grain and stover yields of maize during both 2000 and 2001. On average, grain yield was increased by 23.7% and stover yield by 26.7% due to residue incorporation. Residue retention also enhanced N uptake by 28.3% in grain and 45.1% in stover of maize. The soil N fertility was improved by 29.2% due to residue retention. The maize grain and stover yields also responded significantly to the previous legume (chickpea) compared with the previous cereal (wheat) treatment. The legume treatment boosted grain yield of maize by 112% and stover yield by 133% with 64.4% increase in soil N fertility.

Similarly, fertilizer N applied to previous wheat showed considerable carry over effect on grain (8.9%) and stover (40.7%) yields of the following maize. Application of fertilizer N to current maize substantially increased grain yield of maize by 110%, stover yield by 167% and soil N fertility by 9.8% over the nil N fertilizer treatment. We concluded from these experiments that returning of crop residues, application of fertilizer N and involvement of legumes in crop rotation greatly improves the N economy of the cropping systems and enhances crop productivity through additional N and other benefits in low N soils. The farmers who traditionally remove residues for fodder and fuel will require demonstration of the relative benefits of residues return to soil for sustainable crop productivity.
Keywords: Maize; N; C; Crop residues; Cropping systems

Tomasz Kulik, Agnieszka Pszczolkowska, Gabriel Fordonski, Jacek Olszewski, PCR approach based on the esyn1 gene for the detection of potential enniatin-producing Fusarium species, International Journal of Food Microbiology, Volume 116, Issue 3, 30 May 2007, Pages 319-324, ISSN 0168-1605, DOI: 10.1016/j.ijfoodmicro.2007.02.003.
(http://www.sciencedirect.com/science/article/B6T7K-4N5CX4H-7/2/67dd88739d339f1a37c0ca0d94d41130)
Abstract:
Fusarium head blight (FHB) is a disease of small-grain cereals and corn caused by a complex of fungal species of the genus Fusarium. The disease reduces the yield and quality of seeds and results in the accumulation of various mycotoxins which cause a variety of toxic effects on humans and livestock. Beauvericin (BEA) and enniatins (ENs) are a group of toxins with antimicrobial, insecticidal and phytotoxic activities produced mainly by F. avenaceum, F. poae and F. tricinctum. In this study, primer sets were designed that were targeted to esyn1 gene homologs encoding multifunctional enzyme enniatin synthetase. Primers used in multiplex PCR amplified products from the FHB species reported to produce (ENs) and/or BEA. The use of the marker developed on asymptomatic wheat seed samples originating from Northern and Southern Poland demonstrated that all samples were positive for the presence of potential enniatin-producing Fusarium species.
Keywords: Fusarium head blight; Fusarium species; Enniatins; Beauvericin; PCR; esyn1 gene; Diagnosis; Detection

A.B.G. Leek, J.J. Callan, P. Reilly, V.E. Beattie, J.V. O'Doherty, Apparent component digestibility and manure ammonia emission in finishing pigs fed diets based on barley, maize or wheat prepared without or with exogenous non-starch polysaccharide enzymes, Animal Feed Science and Technology, Volume 135, Issues 1-2, 15 May 2007, Pages 86-99, ISSN 0377-8401, DOI: 10.1016/j.anifeedsci.2006.03.024.
(http://www.sciencedirect.com/science/article/B6T42-4KGPPDB-1/2/b208cd235b1a0eddd5a0cf725ed1b946)
Abstract:
A 3x2 factorial-design experiment was conducted with finishing pigs to examine the effect of cereal type (barley, maize or wheat) and a non-starch polysaccharide enzyme supplement (endo-1,3(4)-[beta]-glucanase and endo-1,4-[beta]-xylanase) on apparent nutrient digestibility, nitrogen (N) balance and manure ammonia (NH3-N) emission. Diets were formulated to contain similar concentrations of digestible energy and lysine, sulphur amino acids, threonine and tryptophan. After a 14-day dietary adaptation period, urine and faeces were collected from 24 boars (four boars per treatment, 61 kg initial live weight), housed in metabolism crates. NH3-N emission was measured over 10 days using a laboratory scale procedure. The procedure consisted of a sealed vessel containing 2 kg slurry, vacuum pump and three impingers in series per sample. The coefficient of total tract apparent digestibility (CTTAD) of dry matter (DM), gross energy (GE) and N digestibilities were higher in wheat-based diets than maize- or barley-based diets ($P<0.01$) while the CTTAD of NDF was lower in barley-based diets than maize and wheat-based diets ($P<0.001$).

Enzyme inclusion had no effect on the CTTAD's of DM, GE, NDF or N. A lower proportion of N intake was excreted as faecal N in the wheat-based diets than the barley- or maize-based diets (P<0.001) and as ammoniacal N in barley-based diets than in maize- or wheat-based diets (P<0.01). There was a significant cerealxenzyme interaction (P<0.01) in the urine:faeces N excretion ratio. Enzyme supplementation increased the urine:faeces N excretion ratio in barley-based diets (P<0.05), but decreased the ratio in wheat-based diets (P<0.01) whilst the maize-based diet was unaffected. During manure storage (0-240 h), NH3-N emission was affected by a cerealxenzyme interaction (P<0.01). Enzyme supplementation increased NH3-N emission in the barley-based diet and decreased NH3-N emission in the wheat-based diet. In conclusion, ammonia emission from the manure of finishing pigs is affected by the use of cereal types differing in the concentration of [beta]-glucan and arabinoxylans and exogenous non-starch polysaccharide enzyme supplementation.
Keywords: Enzymes inclusion; Nutrient digestibilities; Ammonia; Cereal grains; Pig manure

G.G. Mateos, E. Lopez, M.A. Latorre, B. Vicente, R.P. Lazaro, The effect of inclusion of oat hulls in piglet diets based on raw or cooked rice and maize, Animal Feed Science and Technology, Volume 135, Issues 1-2, 15 May 2007, Pages 100-112, ISSN 0377-8401, DOI: 10.1016/j.anifeedsci.2006.07.006.
(http://www.sciencedirect.com/science/article/B6T42-4KRY8VM-1/2/65ef773f9435ef467607ce975245b0b8)
Abstract:
An experiment was conducted to investigate the influence of the main cereal (maize and rice), heat-processing of the cereal (HP; raw and cooked) and the inclusion of cooked oat hulls (OH; 0 and 20 g/kg) in the diet on coefficient of total tract apparent digestibility of major dietary components (CTTAD) and productive performance of piglets weaned at 21 days. Each treatment was replicated six times and the trial lasted for 35 days. From 21 to 49 days of age piglets were fed their respective experimental complex diets and from 49 to 56 days they received a common starter diet. The CTTAD was determined at 33, 43 and 49 days and productive performance was measured at 35, 49 and 56 days of age. Gross energy (GE), organic matter (OM) and ether extract (EE) digestibilities were higher for rice- than for maize-based diets (P<0.001 for GE and OM and P<0.05 for EE) but digestibility of crude protein was not affected by the cereal used. Heat processing improved CTTAD of all dietary components examined (P<0.01). The CTTAD of OM was lower for diets containing 20 g OH/kg than for control diets (P<0.01) but the opposite effect was observed for EE digestibility (P<0.05). From 21 to 49 days of age piglets fed rice had higher feed intake (580 versus 491; P<0.001) and average daily gain (388 versus 332; P<0.001) than piglets fed maize. The differences observed were maintained until the end of the trial. Neither HP of the cereal nor OH inclusion affected any productive trait. It is concluded that the inclusion of rice in substitution of maize in pre-starter feeds for piglets improves diet digestibility and growth performance; HP of the cereal improves diet digestibility but not growth performance and the inclusion of moderate levels of OH to low fibre diets has minor effects on diet digestibility and productive performance of young pigs.
Keywords: Maize; Rice; Oat hulls; Heat processing; Piglets; Nutrient digestibility

V.M.R. Pires, C.M.A. Fontes, L.M.A. Ferreira, C.I.P.D. Guerreiro, L.F. Cunha, J.P.B. Freire, The effect of enzyme supplementation on the true ileal digestibility of a lupin based diet for piglets, Livestock Science, Volume 109, Issues 1-3, 10th International Symposium on Digestive Physiology in Pigs, Denmark 2006, Part 2, 15 May 2007, Pages 57-59, ISSN 1871-1413, DOI: 10.1016/j.livsci.2007.01.060.
(http://www.sciencedirect.com/science/article/B7XNX-4MXSSCB-1/2/3c3f4b908fc9eebda69bc5d096c0adac)
Abstract:

A trial involving 24 weaned piglets was conducted to evaluate the effect of two alpha-galactosidases, associated or not with a cellulase and hemicellulase enzyme mixtures, for improving the nutritive value of a cereal-Lupinus albus based diet. Enzyme supplementation was unable to improve apparent ileal digestibility of crude protein and true ileal digestibility of amino acids. However, ileal digestibility of NDF tended to increase with enzyme supplementation, suggesting a residual hemicellulase activity in both [alpha]-galactosidases mixtures under analysis.
Keywords: Piglet; Lupin; Enzymes; Digestibility

T.N. Nortey, J.F. Patience, J.S. Sands, R.T. Zijlstra, Xylanase supplementation improves energy digestibility of wheat by-products in grower pigs, Livestock Science, Volume 109, Issues 1-3, 10th International Symposium on Digestive Physiology in Pigs, Denmark 2006, Part 2, 15 May 2007, Pages 96-99, ISSN 1871-1413, DOI: 10.1016/j.livsci.2007.01.092.
(http://www.sciencedirect.com/science/article/B7XNX-4MY11CS-J/2/f9699affdc35914b697f23033054d9e9)
Abstract:
Value-added processing of cereals produces high-value fractions for food and bio-processing application and by-products that are used in animal nutrition to reduce feed costs. Wheat by-products contain arabinoxylans that might limit nutrient digestibility. Effects of xylanase supplementation (0 or 4375 U/kg feed) on energy digestibility were studied in a wheat control and by-product diets (30% millrun, middlings, shorts, screenings, and bran) in a 2 x 6 factorial arrangement. The wheat control diet was formulated to contain 3.34 Mcal digestible energy (DE)/kg and 2.8 g apparent digestible lysine/Mcal DE, and included 0.4% chromic oxide as a marker for digestibility. Twelve ileal-cannulated pigs (32.5 +/- 2.5 kg) were each fed seven of 12 diets. Faeces and then digesta were each collected for 2 d, and diet digestibility values are reported. Wheat had higher ileal and total-tract energy digestibility than by-products ($P < 0.01$). Xylanase improved energy digestibilities for by-products ($P < 0.001$) but not for wheat. Among by-products, ileal energy digestibility was lowest for middlings (62%), then bran < screenings < millrun, and highest for shorts (66%). Xylanase improved ($P < 0.05$) ileal energy digestibility of millrun by 19% to 76%. Total-tract energy digestibility of millrun improved from 72 to 79% (similar to wheat) with xylanase ($P < 0.05$). In summary, xylanase improved energy digestibility in the selected wheat by-product diets, indicating that arabinoxylans in wheat by-products limit nutrient digestibility.
Keywords: Energy digestibility; Pig; Wheat by-product; Xylanase

P. Christensen, V. Glitso, D. Pettersson, B. Wischmann, Fibre degrading enzymes and Lactobacillus plantarum influence liquid feed characteristics and the solubility of fibre components and dry matter in vitro, Livestock Science, Volume 109, Issues 1-3, 10th International Symposium on Digestive Physiology in Pigs, Denmark 2006, Part 2, 15 May 2007, Pages 100-103, ISSN 1871-1413, DOI: 10.1016/j.livsci.2007.01.097.
(http://www.sciencedirect.com/science/article/B7XNX-4N08V7N-B/2/4747e0980188687c08d8fc3a0306f9ca)
Abstract:
The effect of fibre degrading enzymes in combination with Lactobacillus plantarum on feed viscosity and pH and on solubilisation of non-starch polysaccharides (NSP) was studied in vitro using diets composed of cereals and soybean meal. The diet was incubated over time up to 24 h as liquid feed or liquid feed added L. plantarum and in addition both feeds were treated without or with fibre degrading enzymes.
Spontaneous fermentation developed in the liquid feed without L. plantarum and became noticeable after a period of 6 to 8 h, when pH began to drop. From 8 to 24 h there was a slow but steady reduction in pH down to a level of about pH 4.3. This development was irrespective of

enzyme supplementation level. The L. plantarum treatment had already reached a pH of 4.2 after 8 h and a pH of 3.6 after 24 h.
The viscosity was reduced with supplementation with a high enzyme dose (6000 FXU and 600 FBG per kg diet), compared to the control diet (without enzymes). Treatment with L. plantarum (1.8 x 1011 CFU/kg feed) increased the viscosity over time, even with enzyme supplementation, compared to the control treatment.
Diets without and with enzyme supplementation and pre-treated as dry feed (control), liquid feed (incubated for 8 h) or liquid feed fermented with L. plantarum (incubated for 24 h), were subjected to an in vitro digestion procedure. Both pre-treatment as liquid feed and enzyme supplementation lead to a reduction in dry matter and in the insoluble NSP fraction during digestion in comparison with the control based on the original dry feed.
It may be concluded that enzyme supplementation to liquid or fermented feed may cause a reduction in the insoluble dietary fibre content as well as a reduction in feed viscosity, while the pH is not influenced.
Keywords: Liquid feed; Fermented feed; Lactobacillus plantarum; Enzyme supplementation; In vitro

A. Serena, M.S. Hedemann, K.E. Bach Knudsen, Feeding high fibre diets changes luminal environment and morphology in the intestine of sows, Livestock Science, Volume 109, Issues 1-3, 10th International Symposium on Digestive Physiology in Pigs, Denmark 2006, Part 2, 15 May 2007, Pages 115-117, ISSN 1871-1413, DOI: 10.1016/j.livsci.2007.01.105.
(http://www.sciencedirect.com/science/article/B7XNX-4MYFG5R-N/2/ff7b5c7e9925f74f2ba6160317d1875c)
Abstract:
Sows were fed three diets varying in type and level of dietary fibre (DF). The low fibre diet (LF; 17% DF) was based on wheat and barley. In the two high DF diets (HF1, high in soluble DF and HF2, high in insoluble DF; ~ 44% DF), the cereal part of the diet was substituted with different co-products (sugar beet pulp, potato pulp, pectin residue, pea hull, brewer's spent grain, and seed residue). The diets were fed for a four-week period to 12 sows (4 for each diet). Sows were stunned 4 h post-feeding, and digesta and tissue samples were collected from various parts of the small and large intestines. The carbohydrate load to the large intestine was 538-539 g/d when feeding the high DF diets and 190 g/d when feeding diet LF. Feeding sows the high DF diet containing large proportion of soluble DF resulted in a lower dry matter content of digesta (23 contra 28%), a higher tissue weight (2.9 contra 2.0 kg), and a higher crypt depth (492 contra 330 [mu]m) and area (23,201 contra 15,751 [mu]m2) in the colon compared with the low DF diet. In conclusion, increasing the amount of DF in the diet for sows resulted in an increased amount of digesta entering the large intestine which influences the functional properties of digesta. Furthermore, a high DF diet with a high proportion of soluble DF increases tissue weight, crypt depth and crypt area in the midcolon compared to a low fibre diet.
Keywords: Co-products; Carbohydrates; Luminal environment; Morphology; Sows

A. Serena, H. Jorgensen, K.E. Bach Knudsen, The absorption of lactic acid is more synchronized with the absorption of glucose than with the absorption of short-chain fatty acids -- A study with sows fed diets varying in dietary fibre, Livestock Science, Volume 109, Issues 1-3, 10th International Symposium on Digestive Physiology in Pigs, Denmark 2006, Part 2, 15 May 2007, Pages 118-121, ISSN 1871-1413, DOI: 10.1016/j.livsci.2007.01.107.
(http://www.sciencedirect.com/science/article/B7XNX-4MY11CS-N/2/02bc5cd954f9708dbb29c1724f13a7e7)
Abstract:
Sows were fed one of three diets varying in level and type of dietary fibre (DF). A low DF diet (LF; 17% DF) based on wheat and barley and two generic high DF diets (HF1, high in soluble DF and

HF2, high in insoluble DF; ~ 41% DF) where the cereals were substituted with co-products (sugar beet pulp, potato pulp, pectin residue, pea hull, brewer's spent grain and seed residue (ray grass)) from the vegetable food and agro industries. Six sows were fitted with a catheter in the portal vein and the mesenteric artery and a flow probe around the portal vein. The sows were fed 2 kg/d of the three experimental diets in a repeated 3 x 3 crossover design. Blood samples were collected the last day in each period at - 120, - 60, 0, 15, 30, 45, 60, 90, 120 and then at 60-min intervals up to 600 min after feeding. Although lactic acid (LA) is formed by microbial fermentation, the absorption profile of LA was more comparable with the absorption profile of glucose than with that of other SCFA.
Keywords: Absorption; Lactic acid; Glucose; Short-chain fatty acids

J. Kamphues, I. Bruning, S. Papenbrock, A. Mo[beta]eler, P. Wolf, J. Verspohl, Lower grinding intensity of cereals for dietetic effects in piglets?, Livestock Science, Volume 109, Issues 1-3, 10th International Symposium on Digestive Physiology in Pigs, Denmark 2006, Part 2, 15 May 2007, Pages 132-134, ISSN 1871-1413, DOI: 10.1016/j.livsci.2007.01.120.
(http://www.sciencedirect.com/science/article/B7XNX-4N4S13N-1/2/a67cab75612896f51c64678711bc5f2a)
Abstract:
The grinding intensity of cereals as ingredients of pelleted diets has various effects on pigs' health and performance. Feeding a coarsely ground diet (62.2% of particles > 1 mm; 10% < 0.4 mm) to piglets resulted in significantly higher starch contents in the hindgut chyme and increased counts of gram positive bacteria, but had no significant effect on dry matter (DM) digestibility. The combination of coarse grinding and addition of 1.2% potassium diformate (pdf) to the diet led to interesting effects in piglets infected experimentally with Salmonella Derby (single oral dose of 4.4 x 1010 cfu per piglet). In spite of the same infectious dosage in all piglets a marked reduction of Salmonella counts was found in chyme of piglets (sacrificed 4-6 h after experimental infection) when the coarsely ground diet including pdf was fed. It seems that coarse grinding of ingredients could have numerous dietetic advantages: reducing risks of Salmonella infection (faster elimination) as well as praebiotic effects in the hindgut by favouring gram positive bacteria like lactobacilli or gram positive cocci. Therefore, grinding intensity is worth to be reconsidered.
Keywords: Diet; Particle size; Grinding intensity; Potassium diformate; Piglets; Salmonella

L. Lahaye, Y. Riou, B. Seve, The effect of grinding and pelleting of wheat and maize on amino acids true ileal digestibility and endogenous losses in growing pigs, Livestock Science, Volume 109, Issues 1-3, 10th International Symposium on Digestive Physiology in Pigs, Denmark 2006, Part 2, 15 May 2007, Pages 138-140, ISSN 1871-1413, DOI: 10.1016/j.livsci.2007.01.123.
(http://www.sciencedirect.com/science/article/B7XNX-4N0XTFR-F/2/061d2b41ef6f5cf987e2cbc119c85e46)
Abstract:
Two experiments were performed in order to test the effects of grinding and pelleting wheat (experiment 1) or maize (experiment 2) on amino acids (AA) standardized (SID) and true (TID) ileal digestibility. Basal ileal endogenous losses (IEL), used to calculate SID from apparent digestibility, were determined by feeding a protein-free diet. Total IEL required to calculate TID were estimated as the difference between total and dietary losses determined according to the isotope dilution technique using 15N-labeled crops. Wheat and maize were ground to compare two different mean particle sizes (d50 500 [mu]m and 1000 [mu]m). Then, a fraction of the 500-[mu]m mash was further pelleted through two dies of different thicknesses (16 vs. 20 mm for wheat and 16 vs. 24 mm for maize), holes diameter 4 mm in both cases. Cereals were incorporated in 4 isoproteic diets either in mash form (fine vs. coarse mash) or in pelleted form (thin vs. thick die). In experiment 1, wheat was associated with rapeseed meal diets, while in experiment 2, maize was associated with soybean meal. The reduction of wheat particle size affected neither AA SID nor

TID. In contrast, the pelleting treatment significantly improved protein and most AA SID and TID. In addition, total IEL of protein and several AA were significantly reduced when the thicker die was used. Numeric improvements of protein and AA SID were observed with reduction of maize particle size and this was associated with a significant decrease in total IEL so that TID was not modified. Further improvements of AA SID and TID occurred with pelleting of maize, without significant effect on IEL regardless of die thickness.
Keywords: Amino acids; Ileal digestibility; Endogenous losses; Wheat; Maize; Pig

A. Wilfart, Y. Jaguelin-Peyraud, H. Simmins, J. Noblet, J. van Milgen, L. Montagne, A step-wise in vitro method to estimate kinetics of hydrolysis of feeds, Livestock Science, Volume 109, Issues 1-3, 10th International Symposium on Digestive Physiology in Pigs, Denmark 2006, Part 2, 15 May 2007, Pages 179-181, ISSN 1871-1413, DOI: 10.1016/j.livsci.2007.01.139.
(http://www.sciencedirect.com/science/article/B7XNX-4MYMT9M-B/2/923e11bbdf7098b8c50d55dc6328ec3b)
Abstract:
Nutritional feed values are currently based on aggregate criteria such as the ileal or faecal digestibility. Digestibility is the result of two competing processes: digestion and passage. In order to develop mechanistic models of digestion to be used for feed evaluation, both processes have to be quantified. The aim of this study was to determine the hydrolysis kinetics of main constituents (organic matter, N and starch) in wheat, barley, wheat bran and soybean meal, using a three-step, enzymatic in vitro method mimicking digestion in the stomach, small and large intestine of pigs. Kinetics of hydrolysis (i.e. solubilisation of feed constituents) was modelled using an exponential segmented model estimating the extent and rate of digestion in each digestive segment. Digestion of organic matter of soybean meal occurred mainly in the stomach (67% vs. < 30% for other feeds) resulting from an efficient protein hydrolysis at this site. Organic matter of cereals was mainly digested in the small intestine (55%), as a result of starch digestion. Fractional digestion rates of organic matter were higher in the stomach than in the small intestine (20-35 vs. 2-15%/min). The potential digestibility of organic matter was nearly 87% for wheat and soybean meal, 78% for barley and 61% for wheat bran, which correspond to typical in vivo digestibility values. The results of the present study allow characterising different feeds with the objective to model the digestion process in pigs.
Keywords: Digestion; Pig; In vitro method; Feed

B.P. Garry, M. Fogarty, T.P. Curran, J.V. O'Doherty, Effect of cereal type and exogenous enzyme supplementation in pig diets on odour and ammonia emissions, Livestock Science, Volume 109, Issues 1-3, 10th International Symposium on Digestive Physiology in Pigs, Denmark 2006, Part 2, 15 May 2007, Pages 212-215, ISSN 1871-1413, DOI: 10.1016/j.livsci.2007.01.119.
(http://www.sciencedirect.com/science/article/B7XNX-4N08V7N-9/2/23b4ad707dbdafd69fcfa97e43df0310)
Abstract:
A 2 x 2 factorial experiment was conducted to investigate the interaction between cereal type (wheat vs. barley) and exogenous enzyme supplementation (with or without) on odour concentration and ammonia emissions in grower-finisher pigs. The enzyme supplement used contained Endo-1, 3 (4)-[beta]-glucanase (EC 3.2.1.6) and Endo-1, 4-[beta]-xylanase (E.C 3.2.1.8). The diets were formulated to contain similar levels of digestible energy and lysine. The experimental treatments were as follows: (1) wheat-based diet, (2) wheat-based diet containing a [beta]-glucanase and [beta]-xylanase mixed enzyme supplement, (3) barley-based diet and (4) barley-based diet containing a [beta]-glucanase and [beta]-xylanase mixed enzyme supplement. The diets were offered to the pigs for 4 weeks and this was repeated 4 times (n = 4). Odour and ammonia emissions were measured on days 9, 11, 14, 16, 21 and 23 of each experimental period. Odour samples were collected in 20-litre Nalophan bags and analysed for odour concentration

using an ECOMA Yes/No Olfactometer. Ammonia concentrations were measured using Drager tubes. There was a cereal x enzyme interaction in odour emission rates ($P < 0.05$) and in ammonia emissions ($P < 0.01$). The addition of an enzyme supplement increased odour emissions and had no effect on ammonia emissions in the barley-based diet. The enzyme supplementation had no effect on odour but decreased ammonia emissions in the wheat based diet.
Keywords: Pigs; Enzymes; Cereals; Odour; Ammonia

H.D. Poulsen, Phosphorus availability in feed phosphates determined by regression, Livestock Science, Volume 109, Issues 1-3, 10th International Symposium on Digestive Physiology in Pigs, Denmark 2006, Part 2, 15 May 2007, Pages 247-250, ISSN 1871-1413, DOI: 10.1016/j.livsci.2007.01.140.
(http://www.sciencedirect.com/science/article/B7XNX-4N0XTFR-G/2/f124b052b489dca2aa531db3e06df2af)
Abstract:
Due to environmental concern a lot of effort has been dedicated to improve the utilisation of phytate phosphorus (P) in cereals and seeds. Consequently, microbial phytases are added to pig diets at the expense of feed phosphates. However, there is still a need for inclusion of feed phosphate, especially in diets for young piglets and lactating sows in order to meet their P requirement. This creates a demand for feed phosphates with a high P availability. Fourteen feed phosphates, including two newly developed monocalcium phosphates (MCP), were tested in this experiment. For each source, a series of 5 diets was prepared by inclusion of increasing amounts of either MCP or MSP. These diets were offered to pigs kept in metabolism crates (6 pigs on each of the 5 diets). After 5 days adaptation, total collection of faeces and urine was performed for 7 days. P availability in each source was determined by regression of the net absorption of P on P-intake. The experiment revealed that MSP had the highest availability (79%) and the availability of all the tested phosphates varied between 50 and 79%. The new MCPs proved to be 71 and 75% available.
Keywords: Pigs; Feed phosphates; Digestibility; Total collection; Regression method

H.D. Poulsen, K. Blaabjerg, D. Feuerstein, Comparison of different levels and sources of microbial phytases, Livestock Science, Volume 109, Issues 1-3, 10th International Symposium on Digestive Physiology in Pigs, Denmark 2006, Part 2, 15 May 2007, Pages 255-257, ISSN 1871-1413, DOI: 10.1016/j.livsci.2007.01.135.
(http://www.sciencedirect.com/science/article/B7XNX-4N0XTFR-C/2/c07ab300b0c9bee6645320af0dbc0733)
Abstract:
Phytases catalyse the hydrolysis of phytate rendering phosphorus (P) available for absorption. Endogenous plant phytases are to some extent present in cereals (depending on species and varieties) while microbial phytases are added to cereal based diets to increase the digestibility of phytate bound P. The present study compared two different microbial phytases. The basal diet was composed of wheat, barley, soybean and rapeseed meal without feed phosphate. The diet was initially expanded, pelleted at 90 [degree sign]C and crumbled. Phytases were added at 250, 500 and 750 FTU kg- 1 diet (Aspergillus niger; Phytase 1) and 375 and 750 FYT kg- 1 diet (Peniophora lycii; Phytase 2). The experiment comprised 6 treatment groups of 6 pigs each kept in metabolism crates and fed one of the 5 test diets or a diet with no added microbial phytase. The diets were fed for 12 days, 5 days for adaptation and 7 days for total collection of faeces and urine. Phosphorus digestibility of the basal diet averaged 43% and increased to 55, 61 and 66% following addition of 250, 500 and 750 FTU/kg of Phytase 1 and 54 and 60% following addition of 375 and 750 FYT/kg of Phytase 2, respectively. In conclusion, equivalent effects were obtained when Phytase 2 was given at 1.5 times the doses of Phytase 1.
Keywords: Pigs; Phytate; Phytases; Digestibility; Wheat-barley-soybean-rapeseed based diet

Atilio J. Barneix, Physiology and biochemistry of source-regulated protein accumulation in the wheat grain, Journal of Plant Physiology, Volume 164, Issue 5, 3 May 2007, Pages 581-590, ISSN 0176-1617, DOI: 10.1016/j.jplph.2006.03.009.
(http://www.sciencedirect.com/science/article/B7GJ7-4JXPS07-8/2/6b29188868982f9dead14ec46ab2e358)
Abstract: Summary
Wheat is unique among cereals for the baking qualities of its flour, which are dependent upon the type and concentration of its proteins. As a consequence, the grain protein concentration (GPC) is one of the main determinants of wheat international market price.
More than 50-70% of the final grain N is accumulated before flowering and later remobilized to the grain, N fertilization being the common practice used to produce high GPC. However, after incremental additions of N fertilizer, GPC reaches a maximum and then remains constant, without any increase in N uptake or remobilization by the crop, thus decreasing the efficiency of N fertilizer.
Although, the genetic and molecular mechanisms that regulate N uptake by the roots are being clarified quickly, the regulation and physiology of N transport from the leaves to the grain remains less clear. In this review, the possible regulatory points involved in N transport to the grain and the difficulties for increasing GPC are discussed.
It has been demonstrated that protein synthesis in the grain is source-limited, and that the grain can accumulate protein limited only by the amino acids provided by the phloem. It has also been shown that there is no limitation in the amino acid/sugar ratios that can be exported to the phloem. On the other hand, uptake transporters are depressed when the plant concentration of some amino acids, such as glutamine, is high. It has also been shown that a high N supply increases cytokinins concentration, preventing leaf senescence and proteolysis.
Based on this information, it is postulated that there are two main regulatory points during grain filling when plant N status is ample. On the one hand, the N uptake transporters in the roots are depressed due to the high amino acids concentration in the tissues, and N uptake is low. On the other, a high amino acids concentration keeps the cytokinins level high, repressing leaf protein degradation and decreasing amino acid export to the phloem. As a consequence, GPC cannot be increased despite the ample N supply.
Keywords: Amino acids export; Grain protein concentration; N remobilization; Triticum aestivum L.; Wheat

J.J. Onate, I. Atance, I. Bardaji, D. Llusia, Modelling the effects of alternative CAP policies for the Spanish high-nature value cereal-steppe farming systems, Agricultural Systems, Volume 94, Issue 2, May 2007, Pages 247-260, ISSN 0308-521X, DOI: 10.1016/j.agsy.2006.09.003.
(http://www.sciencedirect.com/science/article/B6T3W-4M4CNBC-1/2/82f0645e0ec58dadd9e60dd84a4c6d7d)
Abstract:
The latest reform of the European Common Agricultural Policy (CAP) raised concerns regarding the future of low-productivity farming systems, which are often those most worthy of environmental conservation. In Spain, the conservation of the cereal-steppe avifauna, a community of European importance, relies on the continuity of low-intensity cereal systems and traditional cultivation patterns. In this interdisciplinary study we compare the effects of alternative support mechanisms on the economic output of representative farm types in one of the most remarkable cereal-steppe systems in Spain. Our results show a significant reduction of gross profit margins under the new CAP mechanisms in comparison to the previous support system and a derived risk of activity cessation. Consequent foreseeable changes in the activity patterns, such as farming abandonment or concentration of land by remaining farmers and intensification, would imply a deterioration of the current habitat structure for birds. We then consider the economic effects of

implementing an agri-environmental scheme specifically designed for conserving the local cereal-steppe avifauna. Our results show that the application of this scheme could significantly contribute to prevent activity cessation and hence related undesired changes, enhancing at the same time the quality for birds of the farmed habitat in the area.
Keywords: Cereal systems; CAP reform; Steppe birds; Agri-environmental schemes; Spain

V. Alary, A. Nefzaoui, M. Ben Jemaa, Promoting the adoption of natural resource management technology in arid and semi-arid areas: Modelling the impact of spineless cactus in alley cropping in Central Tunisia, Agricultural Systems, Volume 94, Issue 2, May 2007, Pages 573-585, ISSN 0308-521X, DOI: 10.1016/j.agsy.2007.02.003.
(http://www.sciencedirect.com/science/article/B6T3W-4NB38MN-1/2/72abaa49c771bdc1da8ac56f313beceb)
Abstract:
The arid and semi-arid areas of North Africa are becoming deserts. Most of the research and development projects in these areas aim at developing alternative technologies to reduce land degradation and favour sustainable economic activities. The `spineless cactus-alley cropping system' is an interesting alternative in the low rainfall areas of North Africa. This system limits land degradation by the use of perennial crops, produces cheap and drought resistant sources of feed, and favours biomass production in the inter spaces. The important question is how to promote the adoption of this technology. A bio-economic model has been developed to identify the conditions of development of the `spineless cactus-alley cropping system' in an agro-pastoral community of Central Tunisia. Scenarios relating to different types of institutional support, either monetary or informational, were analysed. The results revealed larger cash flow, more livestock and less cereal cultivation on marginal land. Adoption of the technology is clearly favoured by public financial support and also largely by transmission of information on the expected yield of the system. The findings suggest that extension services play a crucial role in creating awareness among farmers of the impact of technology in terms of yields and income diversification.
Keywords: Cactus; Arid area; Technology adoption; Bio-economic model; Agro-pastoral systems; Tunisia

Marta Heroldova, Josef Bryja, Jan Zejda, Emil Tkadlec, Structure and diversity of small mammal communities in agriculture landscape, Agriculture, Ecosystems & Environment, Volume 120, Issues 2-4, May 2007, Pages 206-210, ISSN 0167-8809, DOI: 10.1016/j.agee.2006.09.007.
(http://www.sciencedirect.com/science/article/B6T3Y-4M69J90-1/2/4726509f1f96e14293c273127146d365)
Abstract:
Small mammal communities were snaptrapped for six years in agricultural landscapes to establish their relationship to various crop habitats in southern Moravia, Czech Republic. The presence of 14 small mammals was documented; 77% of the community found in crops consisted of three rodents, namely Microtus arvalis, Apodemus microps and A. sylvaticus, whereas in woody habitats, 89% of the community was represented by Clethrionomys glareolus, Apodemus flavicollis and A. sylvaticus. In permanent habitats (windbreaks, small woods and fallow land), the community was more abundant and diversified. Among the crop fields, the lowest abundance was found in cereal fields whereas the lowest diversity was observed in alfalfa. Soil-cultivating practices affected abundances especially in sugar beat and maize. Seasonal variation in numbers was lowest in forest and fallow land. Species richness decreased from spring and summer to autumn and winter in annual crops (cereal, maize, sugar beet and other crops), increased in alfalfa and fallow land, and remained relatively stable in windbreaks and forests. Based on similarity indices, two groups of small mammal communities were identified: one for field crops and another for permanent habitats. The fallow land assemblages in spring and summer were more similar to field crop species assemblages and in autumn and winter to permanent habitats one. Trophic

requirements of small mammals and the food supply available in the various habitats are discussed.
Keywords: Abundance; Agro-ecosystem habitat; Insectivores; Rodents

Johannes Ravn Jorgensen, Lise C. Deleuran, Bernd Wollenweber, Prospects of whole grain crops of wheat, rye and triticale under different fertilizer regimes for energy production, Biomass and Bioenergy, Volume 31, Issue 5, May 2007, Pages 308-317, ISSN 0961-9534, DOI: 10.1016/j.biombioe.2007.01.001.
(http://www.sciencedirect.com/science/article/B6V22-4NC5SXG-1/2/558b62a7c809e750fc7276dc3756e2d0)
Abstract:
Cereal grain yield and biomass production are affected by fertilizer application strategies. In order to quantify the performance of wheat, rye and triticale cultivars for use as energy crops, field experiments with either modified phosphorus-potassium or potassium applications were designed at two locations in Denmark over a 3-year period. Five wheat cultivars (`Astron', `Herzog', `Kosack', `Kraka' and `Ure'), two winter rye cultivars (the population cultivar `Motto' and the hybrid cultivar `Marder') and the triticale cultivar `Alamo' were selected. The grain and straw fractions were analysed for biomass, ash and contents of nitrogen (N), K, Cl, sulphur (S) and Na.
Dry matter yields varied between 11.5 and 15.9 t ha-1 at the two locations. Triticale and rye had a higher total dry matter yield than wheat, even at lower inputs of N fertilizer. Thus, the constant high yield of rye and triticale is an advantage for biomass for energy purposes. The mineral content of the grain fraction changed only little between years and locations. By contrast, large variations in the analysed ions in the straw fraction between years and locations were observed. The use of K fertilizers resulted in a significantly increased concentration of K in the straw. However, this increased concentration was eliminated in years with high precipitation in the final 3 weeks before harvest, where substantial amounts of K, Cl and S were removed. The results are discussed in relation to the possible use of grain crops for energy production.
Keywords: Bioenergy; Biofuels; Mineral composition; Cereals; Cultivars

Song Shuling, Ma Xiaodong, Li Chongjiu, Multi-residue determination method of pesticides in leek by gel permeation chromatography and solid phase extraction followed by gas chromatography with mass spectrometric detector, Food Control, Volume 18, Issue 5, May 2007, Pages 448-453, ISSN 0956-7135, DOI: 10.1016/j.foodcont.2005.12.001.
(http://www.sciencedirect.com/science/article/B6T6S-4J9MSSM-2/2/2e638fade85f522f180876c07c6dd1bc)
Abstract:
The paper describes a multi-residue determination method for 102 pesticides in leek. The preparation of samples included extraction by acetone and dichloromethane and cleaned up by gel permeation chromatography and solid phase extraction (SPE) tube. The target analytes were determined by gas chromatography-mass spectrometric detector with selected ions mode (GC-MS/SIM). The method was validated by fortified at the level 0.02-0.20 mg/kg in leek. The average recoveries of all analytes were between 70% and 113%, and standard deviations were below 13%. The limit of quantitation (LOQ) for most analytes was below 0.01 mg/kg. The method was used for other vegetables like spinach, cereal, capsicum, cucumber, tomato, eggplants, etc. For those matrixes, the same concentrations were fortified and got accepted recoveries and LOQ.
Keywords: Pesticide; Multi-residue; Leek

Elisabeth Roca, Bertrand Broyart, Valerie Guillard, Stephane Guilbert, Nathalie Gontard, Controlling moisture transport in a cereal porous product by modification of structural or formulation parameters, Food Research International, Volume 40, Issue 4, Physical Properties VII

- Food Structure and Functionality, May 2007, Pages 461-469, ISSN 0963-9969, DOI: 10.1016/j.foodres.2006.07.015.
(http://www.sciencedirect.com/science/article/B6T6V-4M1CYX2-3/2/0d34d5c18cd0891f7bcc8b0590a41358)
Abstract:
Equilibrium and dynamic water sorption properties of sponge cakes with varying porosity (86-52%) and fat content (0-0.30 g/g d.b.) were determined using a water vapour sorption microbalance. Contrary to porosity, addition of fat decreased equilibrium moisture contents. The effective moisture diffusivity (Deff) was identified from a numerical solution of Fick's second law, taking into account an external mass transfer coefficient and the swelling of the solid matrix. Deff increased from 1.61 to 8.67 x 10-10 m2/s with moisture content, reached a threshold at moisture content 0.15 g/g d.b. and then decreased until water saturation. Deff decreased from 8.67 to 2.97 x 10-10 m2/s with decreasing porosity. This effect was attributed to a change of water diffusion mechanism, from predominant vapour to liquid. Deff decreased from 8.67 to 2.12 x 10-10 m2/s with increasing fat content. Addition of fat had an effect on the water diffusion in two ways, decreasing porosity (sagging of the foam) and increasing tortuosity.
Keywords: Effective moisture diffusivity; Water sorption isotherm; Porosity; Fat content; Sponge cake

Miriam Friedemann, Enterobacter sakazakii in food and beverages (other than infant formula and milk powder), International Journal of Food Microbiology, Volume 116, Issue 1, 1 May 2007, Pages 1-10, ISSN 0168-1605, DOI: 10.1016/j.ijfoodmicro.2006.12.018.
(http://www.sciencedirect.com/science/article/B6T7K-4MTC6CS-C/2/9407638f014948e471422ec0d5f0d8fd)
Abstract:
The ubiqitous microorganism Enterobacter sakazakii is a rare contaminant of infant formula and may cause severe systemic infection in neonates. So far, other food is not known to cause E. sakazakii-infections. The scarce information about the ecology of E. sakazakii and the uncertainty concerning the source of infection in children and adults warrant a summary of the current knowledge about the presence of this opportunistic microorganism in food other than infant formula. This review systematizes publications on the presence of E. sakazakii in food and beverages until June 2006. Food other than infant formula has been rarely investigated for the presence of E. sakazakii. Nevertheless, this microorganism could be isolated from a wide spectrum of food and food ingredients. E. sakazakii was isolated from plant food and food ingredients like cereal, fruit and vegetables, legume products, herbs and spices as well as from animal food sources like milk, meat and fish and products made from these foods. The spectrum of E. sakazakii-contaminated food covers both raw and processed food. The kind of processing of E. sakazakii-contaminated food was not restricted to dry products. Fresh, frozen, ready-to-eat, fermented and cooked food products as well as beverages and water suitable for the preparation of food, were found to be contaminated by E. sakazakii. Although E. sakazakii-contaminated food do not have general public health significance, measures for prevention should consider the presence of E. sakazakii in food, food ingredients, their processing and preparation as possible source of contamination, colonization or infection.
Keywords: Enterobacter sakazakii; Animal food; Vegetable food; Drinking water

T. Lucas, D. Le Ray, F. Mariette, Kinetics of water absorption and solute leaching during soaking of breakfast cereals, Journal of Food Engineering, Volume 80, Issue 2, May 2007, Pages 377-384, ISSN 0260-8774, DOI: 10.1016/j.jfoodeng.2005.11.006.
(http://www.sciencedirect.com/science/article/B6T8J-4MBT1H0-1/2/864e65b048e77f91c795bce27ea25dbc)
Abstract:

Cross mass transfer including water entrance and solute loss from Rice Crispies were characterised and underlying mechanisms are proposed. Various techniques were tested, and conventional techniques involving phase separation, weighing and oven-drying for determination of water content showed wide variability due to the delicate operation of phase separation. A non-destructive, non-invasive NMR method was also developed. Special care was paid to the contribution of non-aqueous protons to the liquid signal from hydrated Rice Crispies. The kinetics of water absorption obtained from NMR relaxation amplitudes were within the range of those obtained from conventional techniques. It was also possible to monitor solute leaching from the relaxation rates of protons from the immersion water.
Keywords: NMR; Hydration; Rehydration; Rice Crispies

Sune Eriksson, Patrik Karlsson, Margareta Tornqvist, Measurement of evaporated acrylamide during heat treatment of food and other biological materials, LWT - Food Science and Technology, Volume 40, Issue 4, May 2007, Pages 706-712, ISSN 0023-6438, DOI: 10.1016/j.lwt.2006.03.006.
(http://www.sciencedirect.com/science/article/B6WMV-4JWMXSV-1/2/fdbe9d571ea07e09525a81bac7f3fd8d)
Abstract:
It is established that acrylamide could be formed during heating of food products. In the present work we have studied whether the formed acrylamide could evaporate from food at elevated temperatures used in cooking (>160 [degree sign]C) or used in determination of dry matter in laboratory analysis (ca. 105 [degree sign]C). It was demonstrated that acrylamide evaporates from food samples during both cooking and temperatures used for drying. Up to ca. 4 [mu]g/m3 could be measured above the fry pan during frying of potato. In parallel we have also studied whether acrylamide could be formed and evaporate during the elevated temperatures of 65-130 [degree sign]C used for dry matter determinations in other types of samples containing biological material, like agricultural and environmental samples. It was found that acrylamide is formed during conditions for drying of soil, sediment and silage samples, as well as cereals, animal feed, etc. After drying, levels of acrylamide up to about 100 [mu]g/kg were found, e.g. in samples of sediment and sludge. The measurements showed in the food, agricultural and environmental samples tested a minor fraction, roughly estimated to be 0.15-7.2% of the formed acrylamide evaporates at the used elevated temperatures.
Keywords: Acrylamide; Food; Air; XAD-7 adsorbent; LC-MSMS

D. Sola-Oriol, E. Roura, D. Torrallardona, Pig preference for cereal based diets, relationship with their digestibility and physical properties, Livestock Science, Volume 108, Issues 1-3, 10th International Symposium on Digestive Physiology in Pigs, Denmark 2006, Part 1, 1 May 2007, Pages 190-193, ISSN 1871-1413, DOI: 10.1016/j.livsci.2007.01.052.
(http://www.sciencedirect.com/science/article/B7XNX-4N0GJN4-H/2/f0c78c66ef269f40d3b271556625d5bc)
Abstract:
One of the most important challenges in pig farming is to overcome the initial anorexia of the pig at weaning. Since the use of palatable ingredients should facilitate the initiation of feeding at weaning, we have previously conducted a series of trials to measure the preference of pigs for different cereals. Preference is driven by odour and taste, but the physical and post-ingestive properties of the cereals could also have an effect. The present trial aims to study the relationship between the preferences for diets with 60% of rice, barley, sorghum or oats and their digestibility and physical properties. We measured the ileal and faecal digestibilities of dry matter, organic matter, and crude protein, and the proximal GIT emptying (from the flow of digesta through the ileal cannula) for 12 h after feeding. Particle size profile, viscosity, swelling and water retention capacity and texture (hardness, fragility, chewing effort and stickiness) of the four diets, were also measured. Pearson's correlation coefficients with feed preference were statistically significant (P <

0.05) for particle size profile and texture of the feeds. They tended to be significant ($P < 0.1$) for ileal digesta viscosity, faecal dry matter digestibility and proximal GIT emptying rate. Additional studies of palatability for cereals should consider these parameters in order to confirm this.
Keywords: Cereal; Palatability; Texture; Digestibility; Pigs

N. Canibe, B.B. Jensen, Fermented liquid feed and fermented grain to piglets- effect on gastrointestinal ecology and growth performance, Livestock Science, Volume 108, Issues 1-3, 10th International Symposium on Digestive Physiology in Pigs, Denmark 2006, Part 1, 1 May 2007, Pages 198-201, ISSN 1871-1413, DOI: 10.1016/j.livsci.2007.01.095.
(http://www.sciencedirect.com/science/article/B7XNX-4MY6TD0-3/2/866390cf27788ddb5f8aad711329fff9)
Abstract:
A study was carried out to determine the microbial and nutritional characteristics of dry feed, liquid feed containing fermented liquid cereal grain, and fermented liquid compound feed, and their effect on gastrointestinal ecology and growth performance of piglets. Three dietary treatments were designed: dry feed (DRY); fermented liquid cereal grain feed (FLG); and fermented liquid feed (FLF). The FLF was prepared by removing three times daily 50% of the mixture (feed and water) stored in a tank at 20 [degree sign]C and replacing it with an equal amount of fresh feed and water. The FLG was similarly prepared but fermenting only the cereals (barley and wheat) and adding the remaining ingredients immediately before feeding. One hundred and twenty weaners were fed the diets during 6 weeks from weaning. The dietary content of lysine (g/100 g protein) was 6.01 in the DRY diet, 6.21 in the FLG diet, and 5.46 in the FLF diet. Feeding piglets with the FLG diet resulted in a higher density of yeasts, a higher concentration of ethanol in the GIT, and a change of the bacterial population of the stomach compared to feeding FLF. The FLG group had a numerically higher daily feed intake and daily body weight gain compared to the FLF group, but the values were not significant. Feeding liquid feed containing fermented liquid cereal grains as a means of avoiding microbial degradation of free amino acids in the feed and increasing feed intake by improving palatability seems promising.
Keywords: Digestive tract; Fermented Cereals; Growth; Liquid diets; Microbial Flora; Weaners

A. Sterk, J.M.A.J. Verdonk, A.J. Mul, B. Soenen, M.L. Bezencon, M. Frehner, R. Losa, Effect of xylanase supplementation to a cereal-based diet on the apparent faecal digestibility in weanling piglets, Livestock Science, Volume 108, Issues 1-3, 10th International Symposium on Digestive Physiology in Pigs, Denmark 2006, Part 1, 1 May 2007, Pages 269-271, ISSN 1871-1413, DOI: 10.1016/j.livsci.2007.01.077.
(http://www.sciencedirect.com/science/article/B7XNX-4MYFG5R-J/2/cb0a95a7d61425baf1873985b367976b)
Abstract:
The effect of supplementing a cereal-based diet with xylanase on the apparent faecal digestibility was investigated in weanling piglets (9.7 kg body weight). Xylanase supplementation increased the apparent faecal digestibility coefficients of crude protein, crude fat, crude fibre, organic matter, nitrogen free extract (NFE) and nonstarch polysaccharides (NSP). The increased apparent faecal digestibility coefficients resulted in a higher energy value of the cereal-based diet supplemented with the xylanase.
Keywords: Digestibility; Enzyme; Piglet; Supplementation; Xylanase

Sheng Li, David A. Lobb, Michael J. Lindstrom, Tillage translocation and tillage erosion in cereal-based production in Manitoba, Canada, Soil and Tillage Research, Volume 94, Issue 1, May 2007, Pages 164-182, ISSN 0167-1987, DOI: 10.1016/j.still.2006.07.019.
(http://www.sciencedirect.com/science/article/B6TC6-4M2WNVP-2/2/94dc445e75caa6eee1d2bc243e84efb4)

Abstract:
Tillage erosion is a potential contributor to the total soil erosion occurring within cultivated fields. No study has been carried out on tillage erosion associated with cereal-based production systems, which are the predominant form of crop production in the Canadian Prairies. Previous tillage translocation studies have focused on primary tillage implements (i.e. mouldboard and chisel ploughs), with slope gradient normally assumed to be the only factor that affects tillage translocation. Currently, there is a lack of information available with regards to the effect of secondary tillage and seeding implements and of slope curvature toward total tillage translocation and erosion. In this study, 77 plots were established within a field site in southern Manitoba, Canada to examine tillage translocation caused by four tillage implements: air-seeder, spring-tooth-harrow, light-cultivator and deep-tiller. Together, these four implements create a typical conventional tillage sequence for cereal-based production in Canadian Prairies. We determined that secondary tillage implements could be as erosive as primary tillage implements. In addition, the erosivity of the air-seeder was comparable to that of the deep-tiller, the primary tillage implement, when seeding was conducted shortly after the light-cultivator. In the majority of cases, tillage translocation could be explained by slope gradient alone, confirming that slope gradient is the main factor driving tillage translocation. However, slope curvature also significantly affected tillage translocation and should be used for future modeling.
Keywords: Tillage translocation; Tillage erosion; Modeling; Slope curvature; Secondary tillage; Seeding; Cereal-based production

Bram Govaerts, Mariela Fuentes, Monica Mezzalama, Julie M. Nicol, Jozef Deckers, Jorge D. Etchevers, Benjamin Figueroa-Sandoval, Ken D. Sayre, Infiltration, soil moisture, root rot and nematode populations after 12 years of different tillage, residue and crop rotation managements, Soil and Tillage Research, Volume 94, Issue 1, May 2007, Pages 209-219, ISSN 0167-1987, DOI: 10.1016/j.still.2006.07.013.
(http://www.sciencedirect.com/science/article/B6TC6-4KSVFV1-1/2/2192a84452755f96fc6b90865517212e)
Abstract:
Tropical and subtropical highlands of the world have been densely populated and intensively cropped. Agricultural sustainability problems resulting from soil erosion and fertility decline have arisen throughout this agro-ecological zone. We assessed practices that would sustain higher and stable yields for wheat (Triticum aestivum L.) and maize (Zea mays L.) in this region. A long-term experiment (randomized complete block) was started in 1991 under rainfed conditions in the volcanic highlands of central Mexico (2240 m a.s.l.;19.31[degree sign]N, 98.50[degree sign]W; Phaeozem). Our objective was to determine infiltration, soil moisture content, root diseases and nematode populations at the end of 12 years of 16 management treatments from a factorial arrangement of: (1) four rotations (monocropping and rotation of maize and wheat), (2) two tillage (conventional tillage [CT] and zero tillage [ZT]) and (3) two crop residue management practices (residue retention and removal). Water infiltration and soil moisture levels were greater under ZT when residue was left in the field then when residue was removed. Higher infiltration rates and favourable moisture dynamics supported up to 30% yield increase. A significantly higher incidence of root rot was found in monoculture of maize under ZT than CT. Residue retention significantly increased maize root rot incidence compared to residue removal. Rotation of maize and wheat decreased the incidence of maize root rot up to 30%. In general, the incidence of root disease was lower in wheat (up to 3 on a scale of 7) than in maize (up to 3.93 on a scale of 4) for all treatment. In maize, both non-parasitic and parasitic nematodes increased under ZT; however, in wheat no effect of tillage was seen. Incidence of root rot and parasitic nematode populations were not correlated with yield. Although root diseases may have affected crop performance, they affected yield less than other critical plant growth factors such as infiltration and water availability. Both environmental conditions and microflora played a key role in the biology and expression of soil

pathogens. In the semi-arid and rainfed subtropical highlands of central Mexico, positive effects were observed with zero tillage, crop rotations and crop residue retention, compared with common farming practices.
Keywords: Conservation agriculture; Tillage; Crop rotation; Residue management; Triticum aestivum; Zea mays; Root rot; Cereal nematodes; Infiltration; Zero tillage

Scott N. Johnson, Xiaoxian Zhang, John W. Crawford, Peter J. Gregory, Iain M. Young, Egg hatching and survival time of soil-dwelling insect larvae: A partial differential equation model and experimental validation, Ecological Modelling, Volume 202, Issues 3-4, 10 April 2007, Pages 493-502, ISSN 0304-3800, DOI: 10.1016/j.ecolmodel.2006.11.013.
(http://www.sciencedirect.com/science/article/B6VBS-4MJS092-2/2/a3f14974947c6858a87edf9538f16897)
Abstract:
Insect herbivores that have soil-dwelling larval stages usually lay eggs directly or indirectly into the soil. Following egg hatch, emergent larvae must locate host plant roots to avoid starvation and this represents the most vulnerable part of the life cycle. We present a model for this aspect of the life cycle, specifically modelling the egg development rate and survival time of the clover root weevil, Sitona lepidus. The model is based on a partial differential equation, developed from age-structure models that are widely used in ecology. The model incorporates stochastic random variation caused by environmental fluctuation and genetic variation in a population, and treats chronological time and biological age as two independent variables. The average developmental rate and the impact of randomness are described by a first-order and a second-order derivative term, respectively. The significance of this model is that it can combine two biological events (egg development and larval survival time) into a single functional event, a potentially important feature for soil-dwelling insects because their concealed habitat does not permit all biological events to be observed. The model was tested against experimental observations of egg development and larval survival time under different soil conditions, firstly by considering egg development and larval survival time as independent biological events and secondly by combining both into a single functional event. Model simulations and experimental observations were in close agreement in all cases. To further test whether the model could be applied to other insect taxa and incorporate more than two biological events, we compared model simulations with published experimental results for the cereal leaf beetle (Oulema duftschmidi). Simulations of egg hatching and the larval development through several instars compared favourably with all experimental observations, demonstrating that the model has multiple applications.
Keywords: Embryo; Modelling; Root-feeding; Soils; White clover

Jascha I. Leenhouwers, Menno ter Veld, Johan A.J. Verreth, Johan W. Schrama, Digesta characteristiscs and performance of African catfish (Clarias gariepinus) fed cereal grains that differ in viscosity, Aquaculture, Volume 264, Issues 1-4, 6 April 2007, Pages 330-341, ISSN 0044-8486, DOI: 10.1016/j.aquaculture.2007.01.003.
(http://www.sciencedirect.com/science/article/B6T4D-4MVF4TX-2/2/5563ea84974a9665061d4708914f063a)
Abstract:
Inclusion of cereal grains in fish diets may induce changes in digesta characteristics with possible consequences for fish performance. Especially viscosity characteristics of the dietary ingredients may induce these changes. The aim of this study was to investigate effects of dietary cereal grains (maize, wheat, barley, rye) differing in viscosity on digesta characteristics (viscosity, dry matter and volatile fatty acids), nutrient digestibility and performance (feed intake and growth) in African catfish. We hypothesized that increased dietary viscosity will induce changes in digesta characteristics that are associated with reduced nutrient digestibility and growth performance. Five experimental diets were formulated by adding grains to a basal diet to obtain a range of dietary

viscosities, increasing in the order of: 1) 400 g kg- 1 maize (M-40); 2) 400 g kg- 1 wheat (W-40); 3) 400 g kg- 1 barley (B-40); 4) 200 g kg- 1 maize and 200 g kg- 1 rye (M-20/R-20); 5) 400 g kg- 1 rye (R-40). The diets were assigned to 12 tanks with 50 fish each. Feed intake during satiation feeding did not differ between dietary groups (P = 0.46). Growth performance differed between dietary treatments (P = 0.04), but showed no decreasing trend with increasing dietary viscosity. Digesta viscosity in the proximal intestine differed between dietary treatments (P < 0.001) and increased with increasing dietary viscosity. Dry matter content of the distal digesta differed significantly between groups (P < 0.001) and was lowest for fish fed the most viscous diets (M-20/R-20 and R-40). Total volatile fatty acid concentrations in the distal intestine did not significantly differ between dietary groups (P = 0.48), but were numerically highest for fish fed the R-40 diet. Digestibility of protein and fat differed significantly between dietary groups (protein: P = 0.05; fat: P = 0.003). Fish fed the R-40 diet had the lowest digestibility for protein and fat and also the lowest plasma cholesterol concentrations. Digestibility of total non-starch polysaccharides (NSP) varied considerably between dietary groups (P = 0.03). Fish fed the W-40 diet had the lowest NSP digestibility (4.0%), which suggests that the NSP fraction of wheat was hardly utilized by the intestinal microbiota. Moderately positive NSP digestibilities for the M-40 (48.4%) and M-20/R-20 (55.5%) groups indicated that African catfish could utilize NSP derived from maize reasonably well. In conclusion, dietary inclusion of viscous grains increases digesta viscosity in African catfish. Intestinal fermentation activity, digesta dry matter content and nutrient digestibility seem to be affected beyond a certain threshold for viscosity. Changes in digesta characteristics are not accompanied by reduced fish performance.
Keywords: African catfish; Cereal grains; Non-starch polysaccharides; Digesta; Viscosity; Fermentation

A.M. Lambo-Fodje, M. Leeman, K.-G. Wahlund, M. Nyman, R. Oste, H. Larsson, Molar mass and rheological characterisation of an exopolysaccharide from Pediococcus damnosus 2.6, Carbohydrate Polymers, Volume 68, Issue 3, 5 April 2007, Pages 577-586, ISSN 0144-8617, DOI: 10.1016/j.carbpol.2006.06.037.
(http://www.sciencedirect.com/science/article/B6TFD-4MMFJ39-1/2/e569a16f2885e4340ee933368a7cb7a2)
Abstract:
The molar mass and rheological properties of an exopolysaccharide (EPS) from Pediococcus damnosus 2.6 were investigated. The molar mass was determined by asymmetrical flow field-flow fractionation coupled with multiangle light scattering and refractive index detection. The EPS was observed to be a flexible chain polymer with a molar mass value of 4 x 106 g mol-1. Heating the sample at 80 [degree sign]C for 10 min caused a shift to lower hydrodynamic radius. The rheological behaviour of the EPS was compared to that of a commercial cereal [beta]-glucan (0.359 x 106 g mol-1). The maximum storage modulus, for EPS solution was lower than that for the cereal [beta]-glucan at all concentrations, while the relaxation time, tG'=G'' was higher. The was reduced on heating the EPS solution at 80 [degree sign]C for 10 min, likely indicating some conformational changes. Three-dimensional models of the polymers revealed some differences in intramolecular hydrogen bonds. The EPS molecule had a ropy nature in solution and this could make it suitable for usage as a thickener in food systems.
Keywords: Exopolysaccharide; Pediococcus damnosus 2.6; Molar mass; Root mean square radius; Polydispersity; Loss modulus; Storage modulus

A. Hemmings, S.D. McBride, C.E. Hale, Perseverative responding and the aetiology of equine oral stereotypy, Applied Animal Behaviour Science, Volume 104, Issues 1-2, April 2007, Pages 143-150, ISSN 0168-1591, DOI: 10.1016/j.applanim.2006.04.031.
(http://www.sciencedirect.com/science/article/B6T48-4K42DF1-2/2/ee10f9a2e9b929eeb89555cddb18086f)

Abstract:
Research suggests that environmentally-induced (spontaneous) stereotypies arise from dysregulation of the basal ganglia. Basal ganglia dysfunction can also expresses itself as aberrations in learning task performance. As a result, several studies have demonstrated a strong link between inappropriate repeat responding within an extinction learning paradigm and stereotypy performance. In contrast to this, research into the oral equine stereotypy crib-biting has suggested that the aetiology of this behaviour stems from visceral discomfort as a result of the acidic consequences of eating cereal-based concentrate where, crib-biting is potentially a means of producing additional alkaline saliva to counteract the effect. If crib-biting is an artifact of nutritional and not basal ganglia dysfunction, crib-biting horses should not display the additional aforementioned signs of basal ganglia dysfunction. The aim of this study, therefore, was to test this hypothesis by recording the behavioural response of crib-biting and control animals within an extinction-learning paradigm.
Ten control and 10 stereotypy (crib-biting) horses of similar breed (Thoroughbred and Thoroughbred cross) and sex (control: 5 male [gelding], 5 female; stereotypy: 6 male, 4 female) were shaped to press a 15 cm x 15 cm square button mounted vertically at 1.5 m from the floor in response to a conditioned stimulus (CS) (electronic buzzer [30 Db] and a yellow light bulb [50 W]. All subjects were then placed under extinction conditions whereby button presses following CS delivery would yield no food reward. The following four recordings made: (1) the number of trials to total extinction (zero responses within or outside of the 15 s window of opportunity), (2) the number of trials to extinction within the 15 s window of opportunity, (3) the number of button presses to total extinction and (4) the number of trials taken to re-establish criterion.
Crib-biting horse required significantly more unreinforced trials ($P < 0.01$) and overall button presses ($P < 0.01$) to reach extinction criterion compared to control animals. Thus, crib-biting horses demonstrated characteristics of increased perseveration suggesting alterations in basal ganglia physiology. These results tend to dissuade from the hypothesis that crib-biting is a method of producing additional saliva to ameliorate visceral discomfort, but studies combined might suggest that visceral discomfort has an important role to play in the alteration of basal ganglia activity that then manifests itself behaviourally as oral stereotypy.
Keywords: Crib-biting; Stereotypy; Perseverance

K.J. Walker, C.N.R. Critchley, A.J. Sherwood, R. Large, P. Nuttall, S. Hulmes, R. Rose, J.O. Mountford, The conservation of arable plants on cereal field margins: An assessment of new agri-environment scheme options in England, UK, Biological Conservation, Volume 136, Issue 2, April 2007, Pages 260-270, ISSN 0006-3207, DOI: 10.1016/j.biocon.2006.11.026.
(http://www.sciencedirect.com/science/article/B6V5X-4MY6N8P-1/2/3247d50661d493aeb7e5bb121bd4e6be)
Abstract:
Agri-environment (AE) schemes aim to arrest declines in arable biodiversity through cereal field margin management options. We evaluated the effectiveness of uncropped cultivated margins (UCM), spring fallow (SF) and cropped conservation headlands with (CH) or without fertiliser inputs (CH(NF)) in sustaining plant species diversity and rare species, in England, UK. Sampling was stratified at 1 m, 3 m and 5 m from the edge of the margin and in eight regions to assess environmental influences on species composition. Species diversity, including rare species, was highest on UCM, followed by SF and CH(NF) margins. Diversity was generally lower on cropped margins due to competition from the crop. Fertilised CH margins were the least diverse option and were similar to cereal crop controls. Species diversity was greatest at the edge of all except UCM margins and there was a strong latitudinal decline in overall diversity and rare species. AE management accounted for more variation in species composition than habitat context, physical/climatic variables, soil properties or region. At cropped sites, there was overlap between margin type and other variables but soil properties explained less variation. At uncropped sites,

management and physical/climate variables explained most variation but soil properties were more important than at cropped sites. These findings confirm that AE schemes are effective in conserving arable plants, including rare species, across a variety of landscape types. More precise geographical targeting, improved control of competitive species and research on the habitat requirements of rare species will improve the overall efficacy of schemes in the future.
Keywords: Conservation headlands; Rare arable plants; Summer fallow; Uncropped cultivated margins; Variation partitioning

Mpho W. Phoofolo, Kristopher L. Giles, Norman C. Elliott, Quantitative evaluation of suitability of the greenbug, Schizaphis graminum, and the bird cherry-oat aphid, Rhopalosiphum padi, as prey for Hippodamia convergens (Coleoptera: Coccinellidae), Biological Control, Volume 41, Issue 1, April 2007, Pages 25-32, ISSN 1049-9644, DOI: 10.1016/j.biocontrol.2006.12.017.
(http://www.sciencedirect.com/science/article/B6WBP-4MSHY0P-3/2/e2150d28224de4dab9af5a06d554b56f)
Abstract:
The nutritive value of two cereal aphid species, Schizaphis graminum and Rhopalosiphum padi, for Hippodamia convergens development was compared as pure- and mixed-species diets and as suboptimum and ad libitum quantities. Comparisons were based on the following daily aphid quantities and combinations: 4 mg R. padi, 4 mg S. graminum, 3:1 mg mixture of R. padi and S. graminum, 2:2 mg mixture of R. padi and S. graminum, 1:3 mg mixture of R. padi and S. graminum, ad libitum R. padi, and ad libitum S. graminum. Preimaginal survival levels of H. convergens were high across all treatments and were neither influenced by aphid species, daily amounts of aphids, nor the mixtures supplied to the larvae. There was no diet effect on the sex ratio of individuals that developed to adulthood. Only the development time of fourth instars was significantly influenced by the larval prey regimes. Fourth instars fed ad libitum aphids had shorter development times that did not vary between aphid species. However, among the suboptimal aphid levels, fourth instars that fed on higher proportions of R. padi had longer development times. Both diet and gender of developing larvae had individual and interactive effects on the body size of adult H. convergens. Under ad libitum aphids feeding on R. padi resulted in smaller females whereas males showed no difference. Our results suggest that both R. padi and S. graminum are essential prey for H. convergens development with S. graminum being relatively more suitable than R. padi.
Keywords: Schizaphis graminum; Rhopalosiphum padi; Hippodamia convergens; Suboptimal prey levels; Cereal aphids; Predator; Prey suitability; Nutritive value; Biological control

David P. Livingston III, Kyujung Van, Ramaswamy Premakumar, Shyamalrau P. Tallury, Eliot M. Herman, Using Arabidopsis thaliana as a model to study subzero acclimation in small grains, Cryobiology, Volume 54, Issue 2, April 2007, Pages 154-163, ISSN 0011-2240, DOI: 10.1016/j.cryobiol.2006.12.004.
(http://www.sciencedirect.com/science/article/B6WD5-4MRG0C9-1/2/9326d40f9828e1736e1807bc2256bbcb)
Abstract:
The suitability of using Arabidopsis as a model plant to investigate freezing tolerance was evaluated by observing similarities to winter cereals in tissue damage following controlled freezing and determining the extent to which Arabidopsis undergoes subzero-acclimation. Plants were grown and frozen under controlled conditions and percent survival was evaluated by observing re-growth after freezing. Paraffin embedded sections of plants were triple stained and observed under light microscopy. Histological observations of plants taken 1 week after freezing showed damage analogous to winter cereals in the vascular tissue of roots and leaf axels but no damage to meristematic regions. The LT50 of non-acclimated Arabidopsis decreased from about -6 [degree sign]C to a minimum of about -13 [degree sign]C after 7 days of cold-acclimation at 3

[degree sign]C. After exposing cold-acclimated plants to -3 [degree sign]C for 3 days (subzero-acclimation) the LT50 was lowered an additional 3[degree sign]C. Defining the underlying mechanisms of subzero-acclimation in Arabidopsis may provide an experimental platform to help understand winter hardiness in economically important crop species. However, distinctive histological differences in crown anatomy between Arabidopsis and winter cereals must be taken into account to avoid misleading conclusions on the nature of winter hardiness in winter cereals.
Keywords: Arabidopsis; Cold-acclimation; Freezing tolerance; Winter hardiness; Gene regulation; Subzero-acclimation; Nuclear pycnosis; Nucleolus; Phloem; Oat (Avena sativa); Winter cereals

P. Martiniello, Biochemical parameters in a Mediterranean soil as effected by wheat-forage rotation and irrigation, European Journal of Agronomy, Volume 26, Issue 3, April 2007, Pages 198-208, ISSN 1161-0301, DOI: 10.1016/j.eja.2006.09.009.
(http://www.sciencedirect.com/science/article/B6T67-4M936WF-1/2/cf339280c751ad1c4a0d333f51584e34)
Abstract:
Crop rotations induce changes in yield production and in properties of topsoil. In a typical Mediterranean topsoil in southern Italy, 6-year durum wheat-forage rotation experiments were conducted from 1991 to 1996 under different water regimes to ascertain the effect of rotations on crop yield and soil properties. The following rotations were investigated under irrigated and rainfed treatments: 6-year continuous wheat (Triticum durum Desf.) (cW), wheat after 3 year of meadow (AW), meadow after 3 year continuous wheat (WA), wheat after 3 year of continuous annual binary mixture (BW) and annual binary mixture after 3 year continuous wheat (WB). After 6 years of cropping, was investigated the effect of rotations and irrigation on biochemical soil parameters (organic carbon (Corg), total nitrogen (Ntot), microbial biomass (Bc), soil respiration (SR), metabolic quotient (qCO2), fluorescein diacetate hydrolysis (FDAH), acid and alkaline phosphomonoesterase (respectively, acP and alP) and arylsulfatase (aryS)). Irrigation increased the dry biomass yield of all crops by 31.6%. Dry biomass of rotation AW and BW was, respectively, 18.8% and 8.8% higher than cW under irrigation and 17.1% and 12.9% higher under rainfed condition. Cereal grain yield under irrigation was 30.4%, 25.8% and 25.6% higher than rotations cW, AW and BW, respectively, for the rainfed condition. The results indicated that cW in comparison to AW and BW, under both irrigated conditions, stressed all biochemical compounds. In other crop rotations, irrigation over rainfed reduced the content of Corg, Ntot and Bc in the soil. The relationships between biochemical and enzyme compounds under irrigated condition presented higher number of statistical significant r-values than rainfed. Significant correlations of alP and FDAH parameters with wheat dry matter under both condition of irrigation. The WA and WB rotations increased biochemical parameters under both irrigated conditions. The large amount of biochemical compounds of the WA and WB rotation left in the soil enhance aerial crop yields and not reduced the content of Corg parameter, in the durum wheat cultivation in Mediterranean environment.
Keywords: Crop rotation; Durum wheat; Forage crop; Irrigation; Soil biochemical property

M.R. Jahansooz, I. A.M. Yunusa, D.R. Coventry, A.R. Palmer, D. Eamus, Radiation- and water-use associated with growth and yields of wheat and chickpea in sole and mixed crops, European Journal of Agronomy, Volume 26, Issue 3, April 2007, Pages 275-282, ISSN 1161-0301, DOI: 10.1016/j.eja.2006.10.008.
(http://www.sciencedirect.com/science/article/B6T67-4MFK46W-1/2/f95da7ae9b73232499161f7e1c8c1411)
Abstract:
A renewed interest in mixed cropping for its potential to boost yields through increased capture and use of solar radiation and soil-water by the component species. This led to the present study, in which we assessed the performance of wheat and chickpea, grown as sole crops or mixed at

half their sole crop populations for their capacity to capture and use solar radiation and soil-water. Trials were conducted in the drought season of 1994 and with or without supplementary irrigation in an average rainfall season of 1995. For the rainfed crops in both years, there was no advantage of mixed crops over wheat grown as a sole crop (wheat-s) either in terms of green area index (GAI), fraction of photosynthetically active radiation intercepted by the canopy (iPAR), dry matter (DM) or grain yield produced. The lack of a yield advantage of mixed cropping was associated with poor canopy development and low yielding capacity of chickpea; it was unable to compensate for its reduced population density in the mixture. Grain yield for chickpea in the mixed crop (chickpea-m) averaged just 29% that of its sole crop (chickpea-s), whereas wheat grown in mixture (wheat-m) produced 72% the yield for wheat-s. Supplementary irrigation from early spring onwards in 1995 increased yield for chickpea-m by 44% over that of chickpea-s, while yield for wheat-m fell to 65% that for wheat-s. Every millimetre of irrigation water increased yield by 10.0, 3.8 and 12.5 kg ha-1 for wheat-s, mixed crop and chickpea-s, respectively. Mixed cropping did not affect the time taken by either wheat or chickpea to attain maximum growth rate, flowering or maturity. The land equivalent ratio (LER) based on grain yields for wheat-chickpea intercropping were 1.01 in 1994, 1.02 without irrigation in 1995, and 1.10 with irrigation in 1995. Neither radiation-use-efficiency nor water-use-efficiency was improved by mixed cropping compared with wheat-s. The poor performance of the mixed crop was ascribed to its poor canopy development early in the season, especially by the chickpea that resulted in low iPAR and transpiration. It is concluded that there was no advantage of growing wheat and chickpea in mixed crops in southern cereal belts of Australia if total biomass or grain yield is the primary purpose.
Keywords: Evapotranspiration; Transpiration; Soil evaporation; Dry matter production; Grain yield; Land equivalent ratio (LER); Radiation-use-efficiency; Water-use-efficiency; Irrigation

Mikhail A. Semenov, Peter D. Jamieson, Pierre Martre, Deconvoluting nitrogen use efficiency in wheat: A simulation study, European Journal of Agronomy, Volume 26, Issue 3, April 2007, Pages 283-294, ISSN 1161-0301, DOI: 10.1016/j.eja.2006.10.009.
(http://www.sciencedirect.com/science/article/B6T67-4MD9KHN-2/2/4468067e135275e740a4dd43d3693543)
Abstract:
Cereal producers are under pressure to increase yields and maintain profitability against a background of environmental constraints and high fertiliser costs. The production of high yields requires high inputs of N, and excessive N can lead to pollution of watercourses. This provides an incentive for the maximisation of nitrogen use efficiency (NUE), defined as grain yield per unit available soil N from all sources. Routes to the improvement of NUE may be through selection of an appropriate environment for the crop, better management or crop genetic improvement. However, the relative importance of these choices is poorly understood. Here we have used a modelling approach to quantify the effects of these factors on NUE. We performed an analysis using the Sirius wheat simulation model for a range of N treatments at two contrasting European sites: Rothamsted, UK and Seville, Spain. Several simple crop traits were selected for sensitivity analysis of NUE. These included traits controlling wheat development, determining sizes of N storage pools in the plant and traits responsible for uptake-efficiency of roots for water and N. We used Sirius because it is based on simple, mechanistic descriptions of wheat phenology and nitrogen uptake and redistribution, which makes it possible to link model cultivar parameters with simple physiological traits. Our analysis showed that weather and N management are the source of large variations in NUE. At Rothamsted, where water was not a limiting factor, N treatments produce more variation in NUE (~51%) than weather (~32%). At Seville, where water is limited, weather was responsible for larger variation in NUE (for a shallow soil and low N treatment up to ~100%) compared with ~40% for N treatments. Two traits (leaf [N] and phyllochron) out of six showed potential for improvement of NUE. A decrease in leaf [N] increased NUE by 10-15%, when N was limiting, but for high N supply the effect on NUE was negligible. Increasing phyllochron to

delay flowering produced up to 15% increase in NUE at Rothamsted, but no increase at Seville. Our analysis demonstrated that a crop simulation model is a powerful tool for deconvoluting complex traits in wheat. This may facilitate genetic and subsequent genomics research by focusing experiments only on those wheat traits that are identified by the modelling study as the most promising.
Keywords: Crop modelling; Sirius; Complex trait; Sensitivity analysis

Markus J. Brandt, Sourdough products for convenient use in baking, Food Microbiology, Volume 24, Issue 2, 3rd International Symposium on Sourdough, 3rd International Symposium on Sourdough, April 2007, Pages 161-164, ISSN 0740-0020, DOI: 10.1016/j.fm.2006.07.010.
(http://www.sciencedirect.com/science/article/B6WFP-4KV8TC5-1/2/4ed856f6161ed90636f3ea6848662240)
Abstract:
Sourdough fermentations require a specific knowledge on the effects of process parameters, raw materials and micro-organisms in order to obtain a specific, reproducible sourdough and bread quality. This knowledge is not necessarily available in bakeries. Sourdough starter cultures, either active sourdoughs (Reinzuchtsauerteig) or freeze-dried micro-organisms are used to start sourdough fermentation with the required micro-flora. As sourdough fermentation is a labour-intensive and a time-consuming process, a growing demand for convenient products arised early. First organic acids (lactic acid, acetic acid, citric acid) and mixtures thereof came in use. These agents were used directly without or in combination with a sourdough; however, flavour and taste of the resulting breads were unsatisfactory. Based on modified and optimized traditional sourdough processes, dried, pasty and liquid sourdoughs were developed. Companies which produce such ready-to-use products, claim for a convenient, direct production of baked goods in constant quality, in combination with all advantages of a biological sourdough fermentation, e.g. flavour and taste, fresh keeping and prolonged microbial shelf-life. Currently, a broad variety of sourdough products with different fermented cereals is available on the market. In order to obtain a stable product, it is a necessity to inactivate the sourdough micro-biota by e.g. pasteurization, drying or autosterilization.
Keywords: Sourdough fermentation; Sourdough starter; Sourdough flavour and taste

Xinshen Diao, Alejandro Nin Pratt, Growth options and poverty reduction in Ethiopia - An economy-wide model analysis, Food Policy, Volume 32, Issue 2, April 2007, Pages 205-228, ISSN 0306-9192, DOI: 10.1016/j.foodpol.2006.05.005.
(http://www.sciencedirect.com/science/article/B6VCB-4KD5C38-1/2/40bb4a4ea47bb8fbf534d88490d46c17)
Abstract:
This study focuses on which agricultural subsectors are important in Ethiopia's economic growth and poverty reduction and what kind of agricultural and nonagricultural growth is needed to achieve the millennium development goal of halving the incidence of poverty by 2015. A spatially disaggregated, economy-wide model was developed, enabling the analysis of growth and poverty reduction linkages at national and regional levels using national household surveys, agricultural sample surveys, geographic information systems, and other national and regional data. The study reveals that agriculture can play a central role in decreasing poverty and increasing growth in Ethiopia. Within the agriculture, growth in cereals and other staple crops should receive priority. Agricultural growth also requires concurrent investments in roads and other market conditions. At the subnational level, similar growth rates within agricultural subsectors have different effects on poverty, necessitating regionally based strategies for growth and poverty reduction.
Keywords: Growth and poverty reduction; Food security; Ethiopia

Iwona Kihlberg, Einar Risvik, Consumers of organic foods - value segments and liking of bread, Food Quality and Preference, Volume 18, Issue 3, April 2007, Pages 471-481, ISSN 0950-3293, DOI: 10.1016/j.foodqual.2006.03.023.
(http://www.sciencedirect.com/science/article/B6T6T-4KF1HKM-1/2/7c5746f7adfe63a7e691493fe92bcee5)
Abstract:
Five, quite different white pan breads were chosen from twelve samples using Principal Component Analysis. Milling, baking, sensory assessment and sample preparation are described in [Kihlberg, I., Ostrom, A., Johansson, L., & Risvik, E. (2006). Sensory qualities of plain white pan bread - influence of farming system, year of harvest and baking technique. Journal of Cereal Science, 43(1), 15-30]. A consumer acceptance test was conducted on 184 consumers of organic products in two age groups, [less-than-or-equals, slant]30 and >30 years. The selected breads were tasted and scored for liking. Subsequent to the tasting, the consumers responded to a questionnaire including a complete set of the 56 Schwartz values and 10 statements related to issues of specific interest. Results confirmed the main groups of the near universal structure of values suggested by Schwartz and revealed different segments among organic consumers. Consumption frequency was also related to the values. Consumer groups differed significantly in values and in liking of breads. Among the most liked breads were both organic and conventional breads. The majority of consumers considered that organic food tastes better than conventional and that consumption of organic bread should increase. Moreover, about 50% declared that they would not buy an organic food product that was appreciably higher in price than a corresponding conventional food product.
Keywords: Organic consumers; Values; Food acceptance; Liking of food; Wheat; Bread; Consumer test

A. Zinedine, C. Juan, J.M. Soriano, J.C. Molto, L. Idrissi, J. Manes, Limited survey for the occurrence of aflatoxins in cereals and poultry feeds from Rabat, Morocco, International Journal of Food Microbiology, Volume 115, Issue 1, 1 April 2007, Pages 124-127, ISSN 0168-1605, DOI: 10.1016/j.ijfoodmicro.2006.10.013.
(http://www.sciencedirect.com/science/article/B6T7K-4MSHT3S-1/2/7be21c8d6514dc13b52936d5e2bdbd4d)
Abstract:
Fifty eight (58) samples of cereals for human consumption (20 corn flour, 17 wheat flour) and poultry feeds (n = 21) purchased from popular markets of Rabat in Morocco were analyzed for aflatoxins (AF) by HPLC with immunoaffinity column (IAC) clean-up and fluorimetric detection. The incidence of AF in corn, wheat flour and poultry feeds was about 80, 17.6 and 66.6% respectively. High contamination levels were found in corn and poultry feeds samples. Levels of contamination of analyzed samples with AFB1 ranged from 0.23 to 11.2, 0.03 to 0.15 and 0.05 to 5.38 ng/g for corn, wheat and poultry feeds respectively. Results showed also that the contamination of 10% of samples of corn was higher than the limit set by EU regulations for AFB1 and total AF. This is the first report on the determination of AF in corn, wheat and poultry feeds from Morocco by HPLC and IAC.
Keywords: Aflatoxins; Cereals; Poultry feeds; Morocco

Christophe Matthys, Ilse Pynaert, Willem De Keyzer, Stefaan De Henauw, Validity and Reproducibility of an Adolescent Web-Based Food Frequency Questionnaire, Journal of the American Dietetic Association, Volume 107, Issue 4, April 2007, Pages 605-610, ISSN 0002-8223, DOI: 10.1016/j.jada.2007.01.005.
(http://www.sciencedirect.com/science/article/B758G-4NB7HBK-N/2/74340a7c3dd07d55c7196c62dff9d789)
Abstract: Objective

To assess the validity and reproducibility of a newly developed, cost-effective, and easy to administer, Web-based food frequency questionnaire (FFQ) for the dietary assessment of adolescents.Design
Cross-sectional validation of a Web-based FFQ, which contained 15 food groups (water; soft drinks, including fruit juice and diet soft drinks; alcoholic beverages; soup; milk and milk products; fruit; sweet and savory snacks/fillings; sauces and fat spreads; breakfast cereals; bread; cheese, fish/eggs/meat; pasta/rice; vegetables; and potatoes). Reference data for validation were 3-day estimated food records. Analyses were done for all participants and for consumers only (consumer in both Web-based FFQ and food record).Subjects/Setting
A selected group of adolescents (12 to 18 years of age, n=104) from participating secondary schools in Ghent, Belgium.Results
For all participants, the measured intakes of water, fruit, breakfast cereals, fish/eggs/meat, pasta/rice, and potatoes were not significantly different between the two methods. The Spearman correlation for all foods was on average 0.38 (ranging from 0.20 for pasta/rice to 0.64 for breakfast cereals). When analyzed for consumers only, the Web-based FFQ showed significantly lower estimates for soft drinks, sweet and savory snacks/fillings, sauces and fat spreads, cheese, pasta/rice, and vegetables. The average Spearman correlation for all foods collectively was 0.30. When reproducibility of the Web-based FFQ was assessed, the average Spearman correlation coefficient for all foods collectively was 0.62.Conclusions
Most questions on the 15 food groups had acceptable reproducibility, whereas validation only showed reliable intakes for water, fruit, bread, and fish/eggs/meat. This Web-based FFQ could be a start for development of dietary assessment methods in public health nutrition contexts.

M. Anguita, J. Gasa, M. Nofrarias, S.M. Martin-Orue, J.F. Perez, Effect of coarse ground corn, sugar beet pulp and wheat bran on the voluntary intake and physicochemical characteristics of digesta of growing pigs, Livestock Science, Volume 107, Issues 2-3, April 2007, Pages 182-191, ISSN 1871-1413, DOI: 10.1016/j.livsci.2006.09.016.
(http://www.sciencedirect.com/science/article/B7XNX-4M94177-1/2/47cea06376a68ebd6955969ea8bfe596)
Abstract:
The aim of this work was to evaluate the influence of a coarse ground cereal and two fibrous ingredients incorporated in the diet on the physicochemical properties of digesta and productive parameters of pigs during the first stage of the growing period. A total of 96 pigs (initial body weight, BW, 15 kg) were distributed into four experimental treatments: the control diet (CT) consisted of corn, barley and soybean meal milled to pass through a 2.5 mm screen; the coarse corn diet (CC) was prepared by milling the corn to a coarser particle size (4.0 mm screen); the sugar beet pulp diet (SBP) and the wheat bran diet (WB) were prepared by replacing some of the corn for sugar beet pulp (80 g/kg) or wheat bran (100 g/kg) respectively, in order to contain a higher amount of non-starch polysaccharides (NSP). Three experimental periods were considered (7, 21 and 42 days) during which body weight (BW) and voluntary feed intake were assessed. At the end of each period eight animals per diet were slaughtered. Weight of the gastrointestinal tract and its compartments (full and empty) was recorded and the contents were sampled. Digesta samples were analysed for water concentration, water retention capacity (WRC), ammonia and short-chain fatty acids concentration (SCFA). Histological study of the proximal colon tissues was also performed. In general, the different parameters evaluated showed differences between the experimental periods, but few interactions were recorded. Animals fed CC, SBP and WB diets presented a lower feed intake ($P <= 0.009$) compared to CT fed animals. Compared to the control diet, coarse grinding of corn provoked an increase in the colonic digesta content ($P = 0.032$). Similarly, animals fed the SBP diet compared to CT animals, showed an increase in the contents ($P = 0.009$) of hindgut, and in the concentration of water in the digesta ($P <= 0.011$). Compared to CT diet the SBP diet lowered the ammonia concentration in the hindgut contents ($P <= 0.045$) and

increased the concentration of SCFA in the distal colon (P <= 0.025). Animals fed the SBP diet also showed a lower number of lymphoid nodes in the colonic mucosa compared to the other diets (P <= 0.043). Minor modifications were observed associated with the incorporation of wheat bran in the diet, but colonic water from WB fed animals showed a tendency to increase cytolytic capacity. The results confirm major changes in the voluntary intake and physicochemical properties of digesta as affected by the incorporation in the diet of a fibrous ingredient or coarse grinding of cereals.
Keywords: Growing pigs; Dietary fibre; Physicochemical properties; Cytolysis

R. Naga Amrutha, P. Nataraj Sekhar, Rajeev K. Varshney, P.B. Kavi Kishor, Genome-wide analysis and identification of genes related to potassium transporter families in rice (Oryza sativa L.), Plant Science, Volume 172, Issue 4, April 2007, Pages 708-721, ISSN 0168-9452, DOI: 10.1016/j.plantsci.2006.11.019.
(http://www.sciencedirect.com/science/article/B6TBH-4MNHVCM-1/2/a7f6f66c6692d2fcfd6dd1286c6ee3b2)
Abstract:
Potassium (K+) is an important macronutrient and the most abundant cation in higher plants which plays a key role in various cellular processes. Its accumulation from soil and its distribution throughout diverse plant tissues is mediated by transporter proteins. In plants, different transport systems are known to be involved in the uptake and release of K+ from the cells. Though most of the information about the putative K+ transporters and their phylogenetic relationships is available in Arabidopsis, it is not the best model for plants with agronomic applications. Recent completion of rice genome sequencing project offered the opportunity to make an inventory of all putative K+ transporter proteins. More than 5% of the rice genome appears to encode membrane transport proteins. Unfortunately, several hundreds of putative transporter proteins have not yet been assigned to any families or subfamilies or functions. Therefore, phylogenetic relationships of many K+ transporters in rice are analyzed since rice is considered as a model plant because of its high degree of co-linearity with other cereals. Phylogenetic analysis of all K+ transporters in rice revealed that they fall into five major branches. Phylogenetic trees of each family define the evolutionary relationships of the members to each other. In each family, closely related isoforms and separate subfamilies existed, indicating possible redundancies and specialized functions. The HAK family is represented by 26 genes and formed the tightest and most distinct branch in the phylogenetic tree. Around 14 genes with conserved P-loop were found in K+ channel family out of which 11 genes belong to 1P/6TM (Shaker-type), and three genes to the 2P/4TM (ORK-type). On searching rice genome, it was found that nine genes belonged to Trk family. In rice, K+/H+ antiporter family is represented by a single gene. Comparative analysis of rice K+ channels with that of Arabidopsis, wheat and maize revealed that while cereals are closely related, Arabidopsis appeared quite distant from rice.
Keywords: Potassium; Ion transporters; Salt stress; Oryza sativa; Genome analysis

P. Caparra, F. Foti, M. Scerra, M.C. Sinatra, V. Scerra, Solar-dried citrus pulp as an alternative energy source in lamb diets: Effects on growth and carcass and meat quality, Small Ruminant Research, Volume 68, Issue 3, April 2007, Pages 303-311, ISSN 0921-4488, DOI: 10.1016/j.smallrumres.2005.11.015.
(http://www.sciencedirect.com/science/article/B6TC5-4J44076-1/2/627b61280cdf37a3620bb9696051e317)
Abstract:
Twenty-seven Italian Merino male lambs, equally divided into three groups, were used to evaluate the effects of the dietary incorporation of citrus pulp dried by exploiting solar energy (solar-dried citrus pulp, SDCP) on growth and carcass and meat quality. The diet consisted of oat hay and concentrate, with a hay/concentrate ratio of 30/70. The concentrates of the SDCP-0, SDCP-30 and

SDCP-45 groups were formulated to incorporate 0, 30 and 45% of SDCP, respectively, as partial replacement of cereal grain. The lambs were slaughtered after 80 days of feeding (at 150 days of age) and carcass and some meat quality parameters were measured. No significant differences were found in final live-weights and average daily gains among the groups. Lambs in the SCP-45 group showed impaired ($P < 0.001$) feed conversion efficiency, lower ($P < 0.05$) carcass weight and lower ($P < 0.05$) dressing percentage compared with the other two groups. The majority of SDCP-45 carcasses (88.9%) fell within the bis-grid EU system (light carcasses weighing <=13 kg), while most SDCP-0 (66.7%) and SDCP-30 (77.8%) carcasses fell within the SEUROP system (heavy carcasses weighing >13 kg). The bis-grid EU carcass classification highlighted how all carcasses produced an ideal meat colour and fatness, while the SEUROP grid carcass classification showed good carcass conformation and optimal fatness in the SDCP-0 and SDCP-30 groups. Carcass compactness was found to be significantly higher ($P < 0.05$) in groups SDCP-0 and SDCP-30 compared to group SDCP-45. The histological dissection of the pelvic limb evidenced a higher ($P < 0.01$) adiposity in the SDCP-0 and SDCP-30 groups. Chemical analysis of meat did not differ significantly among the groups. Physical analysis of the meat showed higher ($P < 0.05$) redness value and higher ($P < 0.05$) chroma value in the SDCP-0 and SDCP-30 groups. Based on the results of the present study it may be concluded that SDCP can be incorporated in concentrate mixtures for fattening lambs at levels equal to 30% without adverse effects both in growth and slaughter performances as well as in carcass and meat quality and, at this replacement level, it appears also to be economically convenient.
Keywords: Citrus pulp; Lamb; Growth; Carcass quality; Meat quality

N.R. Hulugalle, T.B. Weaver, L.A. Finlay, J. Hare, P.C. Entwistle, Soil properties and crop yields in a dryland Vertisol sown with cotton-based crop rotations, Soil and Tillage Research, Volume 93, Issue 2, April 2007, Pages 356-369, ISSN 0167-1987, DOI: 10.1016/j.still.2006.05.008.
(http://www.sciencedirect.com/science/article/B6TC6-4K8S5GN-2/2/d2be2a62545e002a6c70d2dc23dff2b4)
Abstract:
Information on the effects of growing cotton (Gossypium hirsutum L.)-based crop rotations on soil quality of dryland Vertisols is sparse. The objective of this study was to quantify the effects of growing cereal and leguminous crops in rotation with dryland cotton on physical and chemical properties of a grey Vertisol near Warra, SE Queensland, Australia. The experimental treatments, selected after consultations with local cotton growers, were continuous cotton (T1), cotton-sorghum (Sorghum bicolor (L.) Moench.) (T2), cotton-wheat (Triticum aestivum L.) double cropped (T3), cotton-chickpea (Cicer arietinum L.) double cropped followed by wheat (T4) and cotton-wheat (T5). From 1993 to 1996 land preparation was by chisel ploughing to about 0.2 m followed by two to four cultivations with a Gyral tyne cultivator. Thereafter all crops were sown with zero tillage except for cultivation with a chisel plough to about 0.07-0.1 m after cotton picking to control heliothis moth pupae. Soil was sampled from 1996 to 2004 and physical (air-filled porosity of oven-dried soil, an indicator of soil compaction; plastic limit; linear shrinkage; dispersion index) and chemical (pH in 0.01 M $CaCl_2$, organic carbon, exchangeable Ca, Mg, K and Na contents) properties measured. Crop rotation affected soil properties only with respect to exchangeable Na content and air-filled porosity. In the surface 0.15 m during 2000 and 2001 lowest air-filled porosity occurred with T1 (average of 34.6 m3/100 m3) and the highest with T3 (average of 38.9 m3/100 m3). Air-filled porosity decreased in the same depth between 1997 and 1998 from 45.0 to 36.1 m3/100 m3, presumably due to smearing and compaction caused by shallow cultivation in wet soil. In the subsoil, T1 and T2 frequently had lower air-filled porosity values in comparison with T3, T4 and T5, particularly during the early stages of the experiment, although values under T1 increased subsequently. In general, compaction was less under rotations which included a wheat crop (T3, T4, T5). For example, average air-filled porosity (in m3/100 m3) in the 0.15-0.30 m depth from 1996 to 1999 was 19.8 with both T1 and T2, and 21.2 with T3, 21.1 with T4 and 21.5 with T5.

From 2000 to 2004, average air-filled porosity (in m3/100 m3) in the same depth was 21.3 with T1, 19.0 with T2, 19.8 with T3, 20.0 with T4 and 20.5 with T5. The rotation which included chickpea (T4) resulted in the lowest exchangeable Na content, although differences among rotations were small. Where only a cereal crop with a fibrous root system was sown in rotation with cotton (T2, T3, T5) linear shrinkage in the 0.45-0.60 m depth was lower than in rotations, which included tap-rooted crops such as chickpea (T4) or continuous cotton (T1). Dispersion index and organic carbon decreased, and plastic limit increased with time. Soil organic carbon stocks decreased at a rate of 1.2 Mg/ha/year. Lowest average cotton lint yield occurred with T2 (0.54 Mg/ha) and highest wheat yield with T3 (2.8 Mg/ha). Rotations which include a wheat crop are more likely to result in better soil structure and cotton lint yield than cotton-sorghum or continuous cotton.
Keywords: Farming system; Cropping system; Soil quality; Clay; Dryland; Wheat; Sorghum; Chickpea; Halpustert; Compaction

G. Gyssels, J. Poesen, A. Knapen, W. Van Dessel, J. Leonard, Effects of double drilling of small grains on soil erosion by concentrated flow and crop yield, Soil and Tillage Research, Volume 93, Issue 2, April 2007, Pages 379-390, ISSN 0167-1987, DOI: 10.1016/j.still.2006.05.014.
(http://www.sciencedirect.com/science/article/B6TC6-4KCPV08-1/2/fa85fbfdc1d7585828ce976c07ea2f14)
Abstract:
Soil erosion on agricultural land and its detrimental environmental and economical effects has aroused increased interest among both the research and policy-making communities. The call for erosion control measures adapted to local farming practices is high, especially in Europe where farmers are reluctant to adopt soil conservation techniques. This study investigates a new technique for controlling concentrated flow erosion rates in the loess belt of central Belgium: i.e. double drilling of cereals in zones of concentrated flow. Cross-sectional areas of erosion channels as well as crop yield parameters in single- and double-drilled zones were compared. The technique is based on the combined effect of the increased density of plant shoots and roots for reducing soil loss. Results indicate that double drilling can reduce soil loss through concentrated flow by 25% on average and by up to 40% under optimal conditions. No net change in wheat grain yield was observed, and farmers who participated in the experiments were satisfied with the results and the easy application of the technique. Globally, benefits were larger than costs. However, the effectiveness of the technique in reducing soil loss by concentrated flow erosion seems to be topographically restricted. For positions in the landscape with a contributing drainage area larger than ca. 0.75 ha, the effectiveness of double drilling can be doubted. Double drilling should therefore be regarded as one possibility amongst others to reduce concentrated flow erosion rates in farmers' fields.
Keywords: Soil erosion; Soil conservation; Concentrated flow; Vegetation; Roots; Double drill; Management

Peter R. Shewry, Marcela Baudo, Alison Lovegrove, Stephen Powers, Johnathan A. Napier, Jane L. Ward, John M. Baker, Michael H. Beale, Are GM and conventionally bred cereals really different?, Trends in Food Science & Technology, Volume 18, Issue 4, April 2007, Pages 201-209, ISSN 0924-2244, DOI: 10.1016/j.tifs.2006.12.010.
(http://www.sciencedirect.com/science/article/B6VHY-4MTK94C-5/2/abf1f13a4c768152ed43018745502495)
Abstract:
Concerns over the safety of GM crops have led to detailed comparisons of their composition and performance with those of conventionally bred crops, under both field and glasshouse conditions. Such studies of wheat have shown that it is possible to develop GM lines which are substantially equivalent to conventional varieties. This information is important to inform the debate on the future development of GM food crops.

Anil Gunaratne, Harold Corke, Influence of unmodified and modified cycloheptaamylose ([beta]-cyclodextrin) on transition parameters of amylose-lipid complex and functional properties of starch, Carbohydrate Polymers, Volume 68, Issue 2, 21 March 2007, Pages 226-234, ISSN 0144-8617, DOI: 10.1016/j.carbpol.2006.12.017.
(http://www.sciencedirect.com/science/article/B6TFD-4MMWHJ5-3/2/39fc4d42cbd111898bb7b8e4d1e3261f)
Abstract:
Functional characteristics of starches from cereal, tuber, and root were studied in the presence of [beta]-cyclodextrin and hydroxypropyl [beta]-cyclodextrin. Both cyclodextrin compounds significantly increased swelling factor, amylose leaching, and solubility of cereal starches while tuber and root starches were less affected. Gelatinization enthalpy in cereal starches was slightly decreased in the presence of [beta]-CD and HP[beta]-CD but in tuber and root starches was not affected. Both [beta]-CD and HP[beta]-CD decreased dissociation energy of native (wheat, maize, and rice) and synthesized (amylose-lysophosphatidylcholine and amylose-stearic acid) amylose-lipid complex. Reformation of native amylose-lipid complex in cereal starches was decreased by both [beta]-CD and HP[beta]-CD. Only in cereal starches the presence of [beta]-CD and HP[beta]-CD during starch pasting result in early swelling and decreased pasting temperature. Both cyclodextrins did not inhibit [alpha]-amylase. The results were consistent with the disruption of amylose-lipid complex within the starch granules by both cyclodextrins by complexing with starch lipids, affecting a range of functional properties of starch.
Keywords: [beta]-Cyclodextrin; Hydroxypropyl [beta]-cyclodextrin; Amylose-lipid complex

Surya Kant, Pragya Kant, Herman Lips, Simon Barak, Partial substitution of NO3- by NH4+ fertilization increases ammonium assimilating enzyme activities and reduces the deleterious effects of salinity on the growth of barley, Journal of Plant Physiology, Volume 164, Issue 3, 7 March 2007, Pages 303-311, ISSN 0176-1617, DOI: 10.1016/j.jplph.2005.12.011.
(http://www.sciencedirect.com/science/article/B7GJ7-4JHMRMC-8/2/a7eb49c7ea20012b8217bf4f908f634b)
Abstract: Summary
Productivity of cereal crops is restricted in saline soils but may be improved by nitrogen nutrition. In this study, the effect of ionic nitrogen form on growth, mineral content, protein content and ammonium assimilation enzyme activities of barley (Hordeum vulgare cv. Alexis L.) irrigated with saline water, was determined. Leaf and tiller number as well as plant fresh and dry weights declined under salinity (120 mM NaCl). In non-saline conditions, growth parameters were increased by application of NH4+/NO3- (25:75) compared to NO3- alone. Under saline conditions, application of NH4+/NO3- led to a reduction of the detrimental effects of salt on growth. Differences in growth between the two nitrogen regimes were not due to differences in photosynthesis. The NH4+/NO3- regime led to an increase in total N in control and saline treatments, but did not cause a large decrease in plant Na+ content under salinity. Activities of GS (EC 6.3.1.2), GOGAT (EC 1.4.1.14), PEPC (EC 4.1.1.31) and AAT (EC 2.6.1.1) increased with salinity in roots, whereas there was decreased activity of the alternative ammonium assimilation enzyme GDH (EC 1.4.1.2). The most striking effect of nitrogen regime was observed on GDH whose salinity-induced decrease in activity was reduced from 34% with NO3- alone to only 14% with the mixed regime. The results suggest that the detrimental effects of salinity can be reduced by partial substitution of NO3- with NH4+ and that this is due to the lower energy cost of N assimilation with NH4+ as opposed to NO3- nutrition.
Keywords: Ammonium assimilation; Barley; Hordeum vulgare; Nitrogen fertilization; Salinity

Xingyi Guo, Jiandong Bao, Longjiang Fan, Evidence of selectively driven codon usage in rice: Implications for GC content evolution of Gramineae genes, FEBS Letters, Volume 581, Issue 5, 6 March 2007, Pages 1015-1021, ISSN 0014-5793, DOI: 10.1016/j.febslet.2007.01.088.
(http://www.sciencedirect.com/science/article/B6T36-4N0XM57-4/2/c3fdf88e94aa5c8b4cac4c4f34993ab2)
Abstract:
Two gene classes characterized by high and low GC content have been found in rice and other cereals, but not dicot genomes. We used paralogs with high and low GC contents in rice and found: (a) a greater increase in GC content at exonic fourfold-redundant sites than at flanking introns; (b) with reference to their orthologs in Arabidopsis, most substitution sites between the two kinds of paralogs are found at 2- and 4-degenerate sites with a T --> C mode, while A --> C and A --> G play major roles at 0-degenerate sites; and (c) high-GC genes have greater bias and codon usage is skewed toward codons that are preferred in highly expressed genes. We believe this is strong evidence for selectively driven codon usage in rice. Another cereal, maize, also showed the same trend as in rice. This represents a potential evolutionary process for the origin of genes with a high GC content in rice and other cereals.
Keywords: Codon usage; Selection; GC content evolution; Oryza sativa

Shigeru Takahashi, Muhuddin R. Anwar, Wheat grain yield, phosphorus uptake and soil phosphorus fraction after 23 years of annual fertilizer application to an Andosol, Field Crops Research, Volume 101, Issue 2, 5 March 2007, Pages 160-171, ISSN 0378-4290, DOI: 10.1016/j.fcr.2006.11.003.
(http://www.sciencedirect.com/science/article/B6T6M-4MHPBS9-1/2/6355c26880a4cf98cc00fc405b537ac0)
Abstract:
A field experiment was conducted on an Andosol to evaluate wheat (Triticum aestivum L.) yield, P and N uptake and soil P fraction after long-term fertilization (no fertilizer, NPK, NP, NK and PK treatments). Application rates of N, P and K fertilizers were 100, 65 and 83 kg ha-1 year-1 by ammonium sulfate, superphosphate, and potassium chloride, respectively. Phosphorus fertilization was critical for grain yield since the NK treatment did not increase yield compared with no fertilizer treatment. Agronomic efficiency of P was greater than agronomic efficiency of N, although apparent recovery of P and N were 17 and 53%, respectively. Combination application of fertilizer P and N resulted in the greatest grain yield over 23-year cultivation. Interaction impact on grain yield between P and N ranged from 71 to 109%, and was greater than the values for cereals in the earlier works. The N/P ratios of wheat decreased by P application and increased by N application. The N/P ratios in NPK and NP treatments were higher than the values attaining maximum yield for cereal crops reported by other works.
Increase in soil available P in the treatments with P application was modest after 23-year fertilization. Total inorganic P (Pi), Ca-Pi + Al-Pi + Fe-Pi, increased in the treatments with P application at 0-15 cm. Total Pi was greater at 0-15 cm depth than at 30-50 cm depth. Although apparent recovery of fertilizer P (Ca-Pi as superphosphate) was less than 20%, soil Ca-Pi was very low even in the treatments with P application. This meant that unutilized fertilizer P did not remain in the form of Ca-Pi. In contrast to inorganic P, there was no significant difference in total organic P (Po), Ca-Po + Al-Po + Fe-Po, among the treatments and soil depths. Regardless of fertilizer treatments, Al-Pi was the predominant form at 0-15 cm depth and Al-Pi concentrations were similar to Fe-Pi concentrations at 30-50 cm depth. On the other hand, Fe-Po was greater than Al-Po at 0-15 cm depth. Difference in inorganic P at 0-15 cm depth demonstrated that unutilized fertilizer P was transformed mainly to Al-Pi followed by Fe-Pi. However, wheat seemed to absorb P from Al-Pi and Fe-Pi modestly.
Keywords: Fractionation; Long-term experiment; Phosphorus; Wheat

Ian J. Bingham, Jonathan Blake, M. John Foulkes, John Spink, Is barley yield in the UK sink limited?: I. Post-anthesis radiation interception, radiation-use efficiency and source-sink balance, Field Crops Research, Volume 101, Issue 2, 5 March 2007, Pages 198-211, ISSN 0378-4290, DOI: 10.1016/j.fcr.2006.11.005.
(http://www.sciencedirect.com/science/article/B6T6M-4MM260K-1/2/2521b549730e1f2d7522d7f7cb2cce09)
Abstract:
Source or sink limitation of grain filling in cereals is often inferred from experiments in which the source:sink ratio is manipulated by shading, defoliation or grain removal. However, interpretation of this type of experiment is usually qualitative rather than quantitative in nature and the extent of any imbalance between the source and sink is not known. The objectives of the current work were: (1) to provide a detailed analysis of radiation interception, radiation-use efficiency (RUE) and carbohydrate storage reserves in winter barley in order to quantify the potential supply of photosynthates for grain filling; (2) to estimate the variation in source-sink balance between environments. Field experiments were conducted on cv Pearl at six sites in the UK and over 3 years. Crops were grown under a comparable husbandry regime at each site and received a full fertilizer and crop protection programme. When the cumulative interception of post-anthesis photosynthetically active radiation (PAR) was plotted against the increase in biomass to determine RUE, the pattern of response differed between sites and years; for some site/years the response was linear, for others it was non-linear where RUE decreased during the latter stages of grain filling. The extent and statistical significance of non-linearity was determined from the quadratic term of fitted 2nd order polynomials. There was no significant association between climatic variables, such as temperature, radiation or rainfall, and the value of the quadratic term of RUE. Neither could non-linearity of RUE be explained in terms of the shedding of leaf tissue during canopy senescence. There were weak associations ($r2 < 0.3$) between the extent of non-linearity and green area index (GAI), above-ground biomass, and specific leaf N, at ear emergence (Zadoks GS 59). A much stronger relationship ($r2 = 0.63$) was found between the source:sink ratio (green area per grain) at GS 59 and non-linearity of RUE. These results suggest that a major factor leading to the reduction in RUE during the second half of grain filling at some sites was feedback inhibition from a limited sink capacity. This conclusion is supported by a fairly strong positive association between RUE non-linearity and the apparent contribution of stem carbohydrate reserves to grain yield ($r2 = 0.47$). The potential assimilate supply for grain filling was estimated as (maximum post-anthesis RUE x PAR intercepted) + stem soluble carbohydrate reserves at GS 59. The potential supply exceeded the measured yield at all sites except one implying that crops were predominantly sink limited. The size of the excess, which is a measure of the relative source-sink balance during grain filling, differed widely between site/years.
Keywords: Barley; Feedback inhibition; Grain-filling; Radiation-use efficiency; Source; Sink

Thierry Dutoit, Elise Buisson, Eric Gerbaud, Philip Roche, Thierry Tatoni, The status of transitions between cultivated fields and their boundaries: ecotones, ecoclines or edge effects?, Acta Oecologica, Volume 31, Issue 2, March-April 2007, Pages 127-136, ISSN 1146-609X, DOI: 10.1016/j.actao.2006.03.010.
(http://www.sciencedirect.com/science/article/B6VR3-4N0PG2T-1/2/1bfe1d2e2fd3a6618b768049c09cca35)
Abstract:
Since the beginning of the 20th century, the concepts of ecotones, ecoclines and edge effects have been discussed from a theoretical point of view. However, there have been very few experimental tests of these ideas, which are sometimes radically different. This study presents data from field experimental researches and determines the status of transitions between cereal fields and grazed grasslands. Five study sites were chosen in Southern France because they were included in agri-environmental schemes aimed at conserving arable weeds and dry grassland

species. In total, 128 quadrats of 1 m2 were sampled on replicated transects running through transition zones. There was no significant increase of species-richness but there were changes in the botanical composition from cereal fields to grassland. These experimental results confirmed the opinion of Van der Maarel, E. (1990. Ecotones and ecoclines are different. J. Veg. Sci. 1, 135-138) that an ecotone is poorer in species than the adjacent ecosystems, as only a few species can adapt to the typical environmental factors in this zone. The transition zones studied rather reflected an edge effect than a real ecotone following the definition of Odum, E.P. (1971. Fundamentals of Ecology, 3e ed. W.B. Saunders Company, Philadelphie). In our case, when the transition zone between the two adjacent ecosystems is managed as a 'constraint ecotone' following Vanpeene-Bruhier's, S. (1998. Transformations des paysages et dynamique de la biodiversite vegetale. Les ecotones, un concept cle pour l'etude des vegetations post-culturales. L'exemple de la commune d'Aussois (Savoie). These de Doctorat de l'ENGREF; CEMAGREF de Grenoble) definition, sheep grazing allowed the weed flora to colonise grassland boundaries via the gaps created by livestock trampling. These results are then discussed for the biological conservation of threatened arable weeds in agricultural landscapes.
Keywords: Agri-ecosystems; Arable weeds; Conservation; Edge effect; Restoration

F. Bartolini, G.M. Bazzani, V. Gallerani, M. Raggi, D. Viaggi, The impact of water and agriculture policy scenarios on irrigated farming systems in Italy: An analysis based on farm level multi-attribute linear programming models, Agricultural Systems, Volume 93, Issues 1-3, March 2007, Pages 90-114, ISSN 0308-521X, DOI: 10.1016/j.agsy.2006.04.006.
(http://www.sciencedirect.com/science/article/B6T3W-4K7FJNR-1/2/ffad6de19fc5b7a2d1627d74bba9ad31)
Abstract:
The objective of this paper is to evaluate the impacts of agriculture and water policy scenarios on the sustainability of selected irrigated farming systems in Italy, in the context of the forthcoming implementation of the directive EC 60/2000. Directive EC 60/2000 (Water Framework Directive) is intended to represent the reference norm regulating water use throughout Europe. Five main scenarios were developed reflecting aspects of agricultural policy, markets and technologies: Agenda 2000, world market, global sustainability, provincial agriculture and local community. These were combined with two water price levels, representing stylised scenarios for water policy. The effects of the scenarios on irrigated systems were simulated using multi-attribute linear programming models representing the reactions of the farms to external variables defined by each scenario. The output of the models consists of economic, social and environmental indicators aimed at quantifying the impact of the scenarios on different aspects of sustainability relevant for irrigated farming systems. Five Italian irrigated farming systems were considered: cereal, rice, fruit, vegetables and citrus. The results show the diversity of irrigated systems and the different effects that water pricing policy may produce depending on the agricultural policy, market and technological scenarios. They also highlight a clear trade-off between socio-economic sustainability and environmental (water, nitrogen, pesticide) sustainability. Water pricing will have, in most cases, less impact than agricultural markets and policy scenarios, though it appears to be an effective instrument for water regulation in the least intensive irrigated systems considered. This emphasises the need for a differentiated application of the Water Framework Directive at the local level as well as a more careful balance of water conservation, agricultural policy and rural development objectives.
Keywords: Water Framework Directive; Common Agricultural Policy; Irrigation; Multi-Attribute Analysis; Linear programming; Sustainability indicators

Sabine Gruber, Wilhelm Claupein, Fecundity of volunteer oilseed rape and estimation of potential gene dispersal by a practice-related model, Agriculture, Ecosystems & Environment, Volume 119, Issues 3-4, March 2007, Pages 401-408, ISSN 0167-8809, DOI: 10.1016/j.agee.2006.08.007.

(http://www.sciencedirect.com/science/article/B6T3Y-4M33VRK-1/2/8c1c42ed55784adb0df9a6d999eec108)
Abstract:
Oilseed rape volunteers were able to flower and to set seed in winter wheat and winter barley. The flowering period of the volunteers coincided with the flowering of related wild species which are potential crossing partners, but there was only a short period of synchrony with the flowering period of the sown oilseed rape. Consequently, cross-pollination of volunteers with wild species and sown oilseed rape can potentially occur, even if the number of fertile hybrid offspring is predicted to be small. The number of seeds/volunteer in cereal crops was about 10% of the usual seed number of sown oilseed rape. There were several factors causing this loss, particularly hares which heavily damaged volunteer oilseed rape in cereals. A maximum of 1 GM seed/m2 returned to the soil seed bank from oilseed rape volunteers in winter cereals.
The seed productivity of oilseed rape volunteers in sown oilseed rape reached 45% of the sown oilseed rape crop. In a low-risk scenario (low volunteer density, low seed persistence), less than 0.1 GM seed/m2 returned to the soil seed bank. In a high-risk scenario (high volunteer density, high seed persistence), 519 GM seeds set by volunteers would replenish the soil seed bank. As a result of outcrossing an additional 0.4 GM seeds (low-risk: low outcrossing rate, low seed persistence) or 339 GM seeds (high-risk: high outcrossing rate, high seed persistence) set by conventionally bred oilseed rape would also enter the soil seed bank. The EU legislation limit for defining crop seeds as non-GM of 0.9% GM content, would be exceeded in both scenarios, but the low-risk scenario was only shortly beyond the threshold. The number of seeds entering the soil seed bank in high risk-situations can be reduced by measures to reduce seed persistence, such as delayed post-harvest tillage.
Keywords: Brassica napus; Gene flow; Genetically modified; Soil seed bank; Volunteers; Outcrossing; Modelling

P.R. Westerman, A. van Ast, T.J. Stomph, W. van der Werf, Long-term management of the parasitic weed Striga hermonthica: Strategy evaluation with a population model, Crop Protection, Volume 26, Issue 3, Weed Science in Time of Transition, March 2007, Pages 219-227, ISSN 0261-2194, DOI: 10.1016/j.cropro.2006.01.017.
(http://www.sciencedirect.com/science/article/B6T5T-4M3RNVW-2/2/8e97129d10e1a0f20c385bdb8e10d6b0)
Abstract:
To increase sorghum yields in areas in Africa that are heavily infested with the root parasite Striga hermonthica, crop varieties are being bred whose roots emit fewer exudates that stimulate S. hermonthica seeds to germinate. Because S. hermonthica has a persistent seedbank, it is important to anticipate the long-term effects of such breeding efforts on the seedbank dynamics. This study reports the results of analyses conducted with a population model for S. hermonthica based on existing and earlier published models and data. The essential innovation is an explicit modelling of density-dependent feedback, which was included at different points in the life cycle. Sensitivity analyses showed that density-dependence reduced the impact on the equilibrium seedbank density of life cycle parameters at stages preceding the density-dependent process. The implication is that intervention early in the parasite life cycle through, for instance, breeding for low exudate emission of the cereal host, carries the risks of maintaining or increasing S. hermonthica seedbanks, and selection for S. hermonthica populations responsive to the new varieties. Only crop varieties with very low production of germination-stimulant will be effective in the long run. The best breeding strategy is to select for crop varieties that inhibit S. hermonthica development or growth at stages later in the life cycle or that affect the parasite at multiple stages simultaneously. The most effective management strategy is to use control measures that cause a reduction in seed production, viability of newly produced seed, or seed survival in the soil, or to use a combination of measures that affect the parasites at multiple stages. Despite considerable

knowledge gaps regarding the basic demography of S. hermonthica, the model proved useful in identifying points in the S. hermonthica life cycle that are of particular interest for designing intervention strategies. In-depth studies on the demography of S. hermonthica and on the location(s) of density-dependence in the parasite's life cycle are needed.
Keywords: Density-dependent feedback; Long-term effects; Striga hermonthica; Seedbank; Resistance

J. Sauerborn, D. Muller-Stover, J. Hershenhorn, The role of biological control in managing parasitic weeds, Crop Protection, Volume 26, Issue 3, Weed Science in Time of Transition, March 2007, Pages 246-254, ISSN 0261-2194, DOI: 10.1016/j.cropro.2005.12.012.
(http://www.sciencedirect.com/science/article/B6T5T-4MBCB74-1/2/6bc218b15baf14c8bfa0fa0e4b0b0347)
Abstract:
In contrast to normal weeds, parasitic plants inflict fitness costs by withdrawing water, minerals, and photosynthates from the host. Host-derived material is mainly transferred through straw-like intrusions into the host's vascular tissue. Theoretically, resources are unlimited for parasitic weeds unless the host is killed. Frequent occurrence of host crops in agro-ecosystems results in favourable reproduction conditions for parasitic angiosperms, which makes them competitive species. Since parasitic weeds have similar nutritional requirements as their hosts, the damage inflicted by a parasitic plant is often directly proportional to its biomass. Agriculturally important genera are Cuscuta, Alectra, Orobanche, and Striga attacking principal crops like cereals, legumes, and vegetables. Cuscuta species occur nearly worldwide, while the geographical distribution of the economically important species of Alectra and Striga is centred in Africa, but they also occur in parts of India and China. Crop damaging Orobanche species are found in the Mediterranean region, in South and East Europe, and West Asia. Both Orobanche and Striga are likely to spread with host distribution, density, and climatic change.
Contrary to normal weeds, most of the damage to the host is done before the parasitic weed emerges above the soil. Therefore, control methods should focus on reducing soil seed bank and interfere with the parasite's early developmental stages. Because of the close interconnection between the parasitic weed and its host, herbicidal control is difficult since herbicides cannot selectively distinguish between the species. The high specificity of many organisms (fungi, bacteria, arthropods), feeding exclusively on selected hosts, in our case parasitic weeds, can be considered an advantage because these organisms may work as biocontrol agents where other weed control options have failed.
Keywords: Biological control; Parasitic weeds; Orobanche spp.; Striga spp.; Fusarium spp.

Karl-Heinz Dammer, Gerhard Wartenberg, Sensor-based weed detection and application of variable herbicide rates in real time, Crop Protection, Volume 26, Issue 3, Weed Science in Time of Transition, March 2007, Pages 270-277, ISSN 0261-2194, DOI: 10.1016/j.cropro.2005.08.018.
(http://www.sciencedirect.com/science/article/B6T5T-4M4TNDT-2/2/ba79286f153c7504fdbfbb2bf0dbac36)
Abstract:
An important step towards application of variable herbicide rates is the development of online sensors for detecting weeds. Field trials were conducted with a sensor-controlled field sprayer from the year 2000 to 2003 in cereals and pea. The aim was to quantify the influence of the real-time application of variable herbicide rates on the amount of herbicides used, grain yield and late weed infestation. In 13 field trials average herbicide savings of 24.6% were achieved (cereals: 22.8%, pea: 27.9%), and compared with conventional application on average no yield reduction was caused by sensor-based herbicide application. When late weed infestation was checked shortly before harvest, no differences in weed density were observed between areas with reduced and areas with standard dosage.

Keywords: Variable-rate spraying; Herbicides; Sensor; Cereals; Pea

J.T. O'Donovan, R.E. Blackshaw, K.N. Harker, G.W. Clayton, J.R. Moyer, L.M. Dosdall, D.C. Maurice, T.K. Turkington, Integrated approaches to managing weeds in spring-sown crops in western Canada, Crop Protection, Volume 26, Issue 3, Weed Science in Time of Transition, March 2007, Pages 390-398, ISSN 0261-2194, DOI: 10.1016/j.cropro.2005.09.018.
(http://www.sciencedirect.com/science/article/B6T5T-4MBC4SD-1/2/615108300dda131ac924a3a7503ebde1)
Abstract:
In western Canada, the move to integrated weed management (IWM) with reduced dependence on herbicides is being driven by low crop prices, weed resistance to herbicides, and environmental concerns. A rational step when implementing IWM is to determine if herbicide application is required in the first place. Crop yield loss models have been developed to assist with this decision. However, the weed economic threshold will be influenced considerably by management practices. Field studies showed that enhancing crop competitiveness through planting competitive varieties at relatively high seeding rates and through strategic fertilizer placement including sub-surface banded or point-injected nitrogen can reduce the impact of weeds on crop yield and the amount of weed seed entering the soil seed bank. Enhancing crop competitiveness also improved herbicide performance, especially when herbicides were applied at reduced doses. The inclusion of an early-cut silage crop in a rotation dramatically reduced wild oat (Avena fatua L.) populations in barley (Hordeum vulgare L.) while growing sweet clover (Melilotus officinalis (L.) Lam) as a green manure in rotation with cereal and oilseed crops showed tremendous potential to suppress weeds. Other studies demonstrated that weed management should not be considered in isolation since it can influence the severity of alternative pests, for example, damage due to Delia spp. in canola (Brassica napus L.). Further studies are required to examine the cumulative long-term effects of integrating the various weed management practices on all components of the crop ecosystem including weeds, diseases and insects.
Keywords: Brassica campestris L.; Competitive crop varieties; Crop seeding rate; Crop silage; Hordeum vulgare L.; Meliolotus officinalis L.; Strategic fertilizer placement; Triticum aestivum L.; Weed competition; Weed economic thresholds

Raj Gupta, Ashok Seth, A review of resource conserving technologies for sustainable management of the rice-wheat cropping systems of the Indo-Gangetic plains (IGP), Crop Protection, Volume 26, Issue 3, Weed Science in Time of Transition, March 2007, Pages 436-447, ISSN 0261-2194, DOI: 10.1016/j.cropro.2006.04.030.
(http://www.sciencedirect.com/science/article/B6T5T-4M93692-1/2/d3c90aec5fe6f6acb92ee485b8cb42d9)
Abstract:
Rice and wheat are the staple food crops occupying nearly 13.5 million hectares of the Indo-Gangetic plains (IGP) of South Asia covering Pakistan, India, Bangladesh and Nepal. These crops contribute more than 80% of the total cereal production and are critically important to employment and food security for hundreds of millions of rural families. The demand for these two cereals is expected to grow between 2% and 2.5% per annum until 2020, requiring continued efforts to increase productivity while ensuring sustainability. Starting from the 1960s, expansion of area and intensification of rice-wheat productions system based on the adoption of Green Revolution (GR) technologies, incorporating the use of high-yielding varieties, fertilizers and irrigation, led to increased production and productivity of both these crops. However, continued intensive use of GR technologies in recent years has resulted in lower marginal returns and, in some locations to salinization, overexploitation of groundwater, physical and chemical deterioration of the soil, and pest problems. This paper presents findings from recent research on resource conservation technologies involving tillage and crop establishment options that are enabling farmers to sustain

productivity of intensive rice-wheat systems. Field results show that the resource conserving technologies, an exponent of conservation agriculture, improve yields, reduce water consumption, and reduce negative impacts on the environmental quality. The paper considers contributions of innovative inter-institutional collaboration in international agricultural research and socio-economic changes in the IGP countries that led to rapid development and adoption of these technologies by farmers.
Keywords: Crop establishment; RCT; Rice; Tillage; Water; Wheat

B.G. Osborne, R.J. Henry, M.D. Southan, Assessment of commercial milling potential of hard wheat by measurement of the rheological properties of whole grain, Journal of Cereal Science, Volume 45, Issue 2, March 2007, Pages 122-127, ISSN 0733-5210, DOI: 10.1016/j.jcs.2006.07.005.
(http://www.sciencedirect.com/science/article/B6WHK-4M2WP2K-1/2/c42dd633941e7c187521eb065189d62a)
Abstract:
The single-kernel characterisation system (SKCS) 4100 instrument has previously been shown to provide in situ measurements of the rheological properties of the bran and endosperm layers of wheat, otherwise only possible following their isolation by dissection or machining. The current study has confirmed that endosperm maximum stress (endosperm strength (ES) as measured using the SKCS 4100 correlates highly (r=0.898) with compressive strength (maximum stress, [sigma]max) measurements performed on specimens of endosperm tissues of known dimensions, isolated from different subsamples of the same bulk wheat samples. This provides a means of scaling the stress axis of the crush-response profile plots to the Instron scale (MPa) so that the SKCS endosperm stress/strain curves for hard wheat, soft wheat and durum can be compared with Instron results presented in the literature. In addition, a simple method for the measurement of ES and stiffness, using the SKCS 4100, has been developed. The method has been shown to rank wheat samples according to their performance when processed on a 650 kg/h pilot mill. The criterion against which the SKCS-derived rankings were compared was the Milling Quality Index, which uses both the percentage flour extraction and Branscan speck count measurements.
Keywords: Genomics; Milling quality; Grain rheology; Wheat

S. Shobana, N.G. Malleshi, Preparation and functional properties of decorticated finger millet (Eleusine coracana), Journal of Food Engineering, Volume 79, Issue 2, March 2007, Pages 529-538, ISSN 0260-8774, DOI: 10.1016/j.jfoodeng.2006.01.076.
(http://www.sciencedirect.com/science/article/B6T8J-4JRVB1M-2/2/52ad75c01e953ea5aae2823a57cb9131)
Abstract:
The food uses of finger millet are confined to flour based products because, it has not been possible to decorticate the millet similar to other cereals. This is mainly due to the highly floury endosperm. But, it was observed that, the hydrothermal treatment to the millet hardens the endosperm texture and enables its decortication. Accordingly, the optimal conditions for the hydrothermal treatment and also for decortication of the millet were determined. Equilibrating the millet to 33 +/- 2% moisture content and steaming the same for about 20 min at atmospheric pressure followed by drying to 12 +/- 2% moisture content enhanced the hardness of the millet kernel from 1.1 +/- 0.2 to 7.1 +/- 0.5 kg/cm2 and enabled its decortication. Among the various cereal pearlers and decorticators, horizontal carborundum disc mill was most suitable and incipient moist conditioning the millet improved the decortication efficiency. The decorticated millet contained 6.3 +/- 0.6 g protein, 0.9 +/- 0.2% fat, 14.7 +/- 1.8% dietary fibre, 0.180 +/- 0.015% calcium and 0.109 +/- 0.01% phosphorus. The polyphenols and phytate phosphorus content of the decorticated millets were lower by 74.7% and 39.8%, respectively, as compared to the native millet. The decorticated millet could be cooked as discrete grains similar to rice to soft edible

texture within 5 min which was not possible hitherto. The pasting and the dough properties and also some of the functional characteristics of the product indicated its versatility for diversified food uses.
Keywords: Cooking characteristics; Decortication; Endosperm texture; Finger millet; Hydrothermal treatment

Jessica E. Mulligan, Geoffrey W. Greene, Marjorie Caldwell, Sources of Folate and Serum Folate Levels in Older Adults, Journal of the American Dietetic Association, Volume 107, Issue 3, March 2007, Pages 495-499, ISSN 0002-8223, DOI: 10.1016/j.jada.2006.12.001.
(http://www.sciencedirect.com/science/article/B758G-4N49TJ8-X/2/430a9658c26664f4734b2db251f81e7e)
Abstract:
This study examined dietary folate intake in 173 older adults. A subsample (n=128) also provided data about folic acid from vitamin/mineral supplements and serum folate. Subjects were community-dwelling men and women 60 years of age and older. Overall, this sample had healthful dietary patterns with adequate dietary folate. Mean dietary intake converted to dietary folate equivalents (DFE) was 464 [mu]g DFE/day. However, 20% (n=36) had inadequate and 2% (n=3) had high dietary DFE (>1,000 [mu]g DFE/day). A subsample (n=128) completed a dietary supplement questionnaire and biochemical assessment of folate. Adding folic acid from vitamin/mineral supplements to dietary folate (total DFE), intake increased to 766 [mu]g DFE/day; 13% (n=16) had inadequate, 75% (n=95) had adequate, and 13% (n=13) had high total DFE. No subject with low total DFE reported supplement use, but 94% (n=39) with high total DFE intake did so. In the subsample, all subjects had acceptable serum folate levels (mean serum folate=28.0+/-13.8 ng/mL [63.5+/-31.3 nmol/L]). In conclusion, vitamin/mineral supplements should be included in nutrition assessment of older adults. Older adults may be at risk for inadequate folate intake if their energy intake is low, they do not take a vitamin/mineral supplement, or are not consuming fortified cereals. However, older adults may be at risk for excess folic acid intake if they consume both a supplement and fortified cereals.

Stephanie van Weyenberg, Johan Buyse, Geert P.J. Janssens, Digestibility of a complete ration in horses fed once or three times a day and correlation with key blood parameters, The Veterinary Journal, Volume 173, Issue 2, March 2007, Pages 311-316, ISSN 1090-0233, DOI: 10.1016/j.tvjl.2005.08.011.
(http://www.sciencedirect.com/science/article/B6WXN-4HVW8NC-1/2/666ada63aaa5ab6554e71310d467897b)
Abstract:
To determine the influence of feeding frequency on apparent digestibility and blood metabolites in horses, four geldings were fed a complete ration either once (at 08:00 h) or three times a day (at 08:00, 13:00 and 18:00 h). Horses were provided with a mixture of cereals and chopped alfalfa hay at maintenance level for energy supply, 344 kJ/kg BW0.75 on a daily basis. After three weeks' adaptation, total amounts of faeces and urine were collected for five days, using collection harnesses. Serial blood samples were taken at -30, -15, 0, 5, 15, 30, 45, 60, 90, 120, 180, 240, 300, 360, 480 and 600 min after feeding and analysed for glucose, l-lactate, triglycerides (TG), non-esterified free fatty acids (NEFA) and triiodothyronine (T3).
Apparent digestibility coefficients of dry matter (DM), crude protein (CP), ether extract (EE), crude fibre (CF), ash and nitrogen-free extract (NFE) were not significantly different ($P > 0.05$) between the two feeding frequencies. Basal plasma glucose, plasma glucose curves and other plasma blood metabolites were not affected by meal frequency. The horses fed the whole ration in one morning feeding did not consume the entire meal at once, but spared feed for ingestion throughout the day, which may explain the lack of effect. Feeding frequency did not affect plasma glucose response (area under curve :AUC) ($P = 0.705$), but AUC (glucose) was negatively correlated with

CP (R2 = 0.76; P = 0.005) and CF digestibility (R2 = 0.61; P = 0.022). Further research is needed to clarify whether different endocrine responses or differences in passage rate can explain these correlations.
Keywords: Feeding frequency; Blood metabolites; Glucose; Horses

Riccardo Bommarco, Sascha O. Firle, Barbara Ekbom, Outbreak suppression by predators depends on spatial distribution of prey, Ecological Modelling, Volume 201, Issue 2, 24 February 2007, Pages 163-170, ISSN 0304-3800, DOI: 10.1016/j.ecolmodel.2006.09.012.
(http://www.sciencedirect.com/science/article/B6VBS-4MBC02X-1/2/e4f5fd36fbe376fc1517fd4d8e6d8cc9)
Abstract:
The capacity of a predator population to suppress a prey population that varies in abundance and spatial distribution is explored in a lattice simulation model. The model is based on empirically derived parameters for particular species. Within season predation by Pterostichus cupreus (Coleoptera: Carabidae) of varying densities and distributions of the prey Rhopalosiphum padi (Homoptera: Aphididae) in spring cereals was simulated. From these spatially explicit simulations prey population suppression was found to be largely dependent on the spatial distribution of the prey. A possible mechanism was that high degrees of prey aggregation provided refuge for the prey that, when aggregated, escaped detection by P. cupreus. In contrast, P. cupreus was found to efficiently suppress incipient outbreaks for evenly distributed prey populations, even at high prey densities. A higher predator density compensated for the lowered control ability of the predators for highly aggregated prey populations and hastened the decline of the prey population.
Keywords: Aphididae; Rhopalosiphum padi; Carabidae; Pest control; Foraging behavior

Pirjo Peltonen-Sainio, Ari Rajala, Duration of vegetative and generative development phases in oat cultivars released since 1921, Field Crops Research, Volume 101, Issue 1, 20 February 2007, Pages 72-79, ISSN 0378-4290, DOI: 10.1016/j.fcr.2006.09.011.
(http://www.sciencedirect.com/science/article/B6T6M-4MBBYTG-1/2/cd71ffc1501420e77e36acc32224ba57)
Abstract:
Genetic yield improvements in oat (Avena sativa L.) cultivars grown at high latitudes have resulted from marked changes in harvest index and yield components. This study was designed to investigate whether such changes have entailed alterations in duration of different developmental phases: vegetative, generative and grain filling phases and pre-anthesis generative sub-phases such as pre-fertile, pre-abortion, fertile pre-abortion, fertile and abortion sub-phases. We tested 14 oat cultivars released between 1921 and 1988 and 6 breeding lines. Ten randomly sampled plants of each oat entry were collected every 3-4 d (18 times) from seedling emergence until pollination, and apical developmental stages were determined on the most advanced spikelet. Cumulated degree-days (Cdd) for each critical developmental stage and component phases were determined (5 [degree sign]C as a base temperature). At each measurement the number of leaves, green leaves and tillers on main shoot, apex length (mm) and height to the uppermost node, and stipule (cm) were recorded. Phyllochron ([degree sign]C d leaf-1) and relative elongation rates (RER) for height characterising traits were calculated. Grain filling was the only period altered by breeding, while no consistent effects on duration of vegetative and generative pre-anthesis phases and sub-phases were detected. Different developmental phases were interrelated: in some cases cultivars with similar duration of pre-anthesis phase, however, differed in duration of some pre-anthesis sub-phases. Their duration was not, however, consistently associated with measured growth and yield parameters. Likely long days that make the northern growing conditions exceptional and unique, substantially narrowed the differences among oat entries in duration of different developmental phases, thereby making their role also less critical in yield determination contrary to the situation in the main global temperate cereal production regions.

Keywords: Apex; Developmental phase; Double-ridge; High latitude; Long day; Oat; Phenology; Phyllochron; Tillering; Year of release; Yield; Yield components

Javier Polo, Carmen Rodriguez, Jesus Rodenas, Salvador Morera, Neus Saborido, Use of spray-dried animal plasma in canned chunk recipes containing excess of added water or poultry fat, Animal Feed Science and Technology, Volume 133, Issues 3-4, 15 February 2007, Pages 309-319, ISSN 0377-8401, DOI: 10.1016/j.anifeedsci.2006.04.008.
(http://www.sciencedirect.com/science/article/B6T42-4K5HWG3-1/2/909d158ae48f6d26e37c73cfbc1c24d1)
Abstract:
Spray-dried animal plasma (SDAP) and wheat gluten (WG) are common ingredients in canned pet food. In addition to providing amino acids and energy these ingredients are used because of their technological properties such as gel strength, water retention capacity and fat emulsification. In cat foods (strict carnivore) SDAP (an animal protein) is more palatable than WG (a cereal protein).
The purpose of the study was designed to evaluate the effect on physical and chemical characteristics of increasing inclusion of water or poultry fat in a chunck recipe containing either SDAP or WG. Inclusion of SDAP was 15 g/kg while WG was included at 20 g/kg. Water was increased replacing chicken carcass from 170 to 450 g/kg in the formula resulting in a linear reduction in dry matter, protein and ash content. A similar reduction in texture (measured as hardness) of the chunck was observed with increased water addition. However, the reduction in texture was less in the SDAP formula (y = 11.268 (S.E. = 0.453) - 0.015x (S.E. = 0.001); r2 = 0.981) compared to that of the WG formula (y = 9.578 (S.E. = 0.428) - 0.013x (S.E. = 0.001); r2 = 0.979). Water loss, measured as liquid exudates from the chunk, increased as the level of water addition to the recipe increased. However, water loss was less ($P<0.05$) in the SDAP formula compared to that of the WG formula.
Similar results were observed when chicken carcass was replaced by poultry fat from 0 to 350 g/kg, resulting in a linear reduction in protein and ash content but not in moisture of the chunk recipe. Texture of the chunk was reduced with increasing level of added fat while the reduction was less in the SDAP recipe (y = 8.437 (S.E. = 0.268) - 0.008x (S.E. = 0.001); r2 = 0.957) compared to the WG recipe (y = 7.652 (S.E. = 0.340) - 0.009x (S.E. = 0.001); r2 = 0.951). Viscosity of the raw emulsion before cooking was similar in both trials for the SDAP and WG recipes.
Palatability of the SDAP and WG formulas were compared in a 2 days test with cats. On first choice SDAP was chosen by 69% of the cats while WG was chosen by 31% of the cats ($P<0.05$). Total food intake was similar for the SDAP and WG diets.
Keywords: Spray-dried animal plasma; Canned petfood; Texture; Excess added water; Excess poultry fat; Palatability

T. Steiner, R. Mosenthin, B. Zimmermann, R. Greiner, S. Roth, Distribution of phytase activity, total phosphorus and phytate phosphorus in legume seeds, cereals and cereal by-products as influenced by harvest year and cultivar, Animal Feed Science and Technology, Volume 133, Issues 3-4, 15 February 2007, Pages 320-334, ISSN 0377-8401, DOI: 10.1016/j.anifeedsci.2006.04.007.
(http://www.sciencedirect.com/science/article/B6T42-4K48M6G-1/2/7bc3a84efe43205d4e2fb631d6467ac8)
Abstract:
Samples of legume seeds, cereals and cereal by-products (n = 113) grown in south-western Germany and originating from different cultivars and harvest years were analyzed for phytase activity, total phosphorus (P) and phytate P. Phytase activities determined by means of a direct incubation method were lowest in legume seeds and oats (262-496 U/kg dry matter), intermediate in cereals (except oats) (2323-6016 U/kg DM) and highest in cereal by-products (9241-9945 U/kg

DM). However, the application of an extraction procedure for the determination of phytase activities in legume seeds resulted in values below the detection limit of 50 U/kg. On average, about 0.67 of total P in legume seeds, cereals and their by-products is bound to phytate. There was a significant influence ($P<0.001$) of harvest year (1998-2000) on phytate P contents in wheat. Furthermore, total P and phytate P concentrations differed ($P<0.05$) between different cultivars of wheat. Moreover, phytase activities differed ($P=0.023$) between different cultivars of barley. Total P and phytate P concentrations were highly correlated in legume seeds ($r = 0.95$) and cereal by-products ($r = 0.96$) and, to a smaller extent, in cereals ($r = 0.66$). Milling of cereal grains to bran and flour revealed that phytase activity, total P and phytate P are highly concentrated ($P<0.001$) in the outer grain layers of cereals. The influence of preservation of intact legume seeds with propionic acid over a period of 4, 8 or 12 weeks resulted only in a marginal decrease in phytase activity. Due to high native phytase activities in cereals (except oats) and their by-products these feedstuffs may contribute substantially to the gastrointestinal hydrolysis of phytate in non-ruminant animals, whereas the contribution of native phytases originating from legume seeds in terms of improving the availability of plant P seems to be rather limited.
Keywords: Phytase; Phosphorus; Phytate; Legume seeds; Cereals; By-products

Jorgen E. Olesen, Elly M. Hansen, Margrethe Askegaard, Ilse A. Rasmussen, The value of catch crops and organic manures for spring barley in organic arable farming, Field Crops Research, Volume 100, Issues 2-3, 1 February 2007, Pages 168-178, ISSN 0378-4290, DOI: 10.1016/j.fcr.2006.07.001.
(http://www.sciencedirect.com/science/article/B6T6M-4KNKBVK-1/2/138738b0f03a10b15f2e03c4f3aa62b9)
Abstract:
The effect of nitrogen (N) supply and weeds on grain yield of spring barley was investigated from 1997 to 2004 in an organic farming crop rotation experiment in Denmark on three different soil types varying from coarse sand to sandy loam. Two experimental factors were included in the experiment in a factorial design: (1) catch crop (with and without), and (2) manure (with and without). The crop rotation included grass-clover as a green manure crop. Animal manure was applied as slurry in rates corresponding to 40% of the N demand of the cereal crops.
Application of 50 kg NH4-N ha-1 in manure (slurry) increased average barley grain DM yield by 1.0-1.3 Mg DM ha-1, whereas the use of catch crops (primarily perennial ryegrass) increased grain DM yield by 0.2-0.4 Mg DM ha-1 with the smallest effect on the loamy sand and sandy loam soils and the greatest effect on the coarse sandy soil. Model estimations showed that the average yield reduction from weeds varied from 0.2 to 0.4 Mg DM ha-1 depending on weed species and density. The yield effects of N supply were more predictable and less variable than the effects of weed infestation. The infestation level of leaf diseases was low and not a significant source of yield variation.
The apparent recovery efficiency of N in grains (N use efficiency, NUE) from NH4-N in applied manure varied from 29 to 38%. The NUE of above-ground N in catch crops sampled in November prior to the spring barley varied from 16 to 52% with the largest value on the coarse sandy soil and the smallest value on the sandy loam soil. A comparison of grain yield levels obtained at the different locations with changes in soil organic matter indicated a NUE of 21-26% for soil N mineralisation, which is smaller than that for the mineral N applied in manure. However, this estimate is uncertain and further studies are needed to quantify differences in NUE from various sources of N.
The proportion of perennial weeds in total biomass increased during the experiment, particularly in treatments without manure application. The results show that manure application is a key factor in maintaining good crop yields in arable organic farming on sandy soils, and in securing crops that are sufficiently competitive against perennial weeds.

Keywords: Organic farming; Nitrogen; Nitrogen use efficiency; Weeds; Grain yield; Catch crop; Cover crop; Crop residues

Pirjo Peltonen-Sainio, Arjo Kangas, Yrjo Salo, Lauri Jauhiainen, Grain number dominates grain weight in temperate cereal yield determination: Evidence based on 30 years of multi-location trials, Field Crops Research, Volume 100, Issues 2-3, 1 February 2007, Pages 179-188, ISSN 0378-4290, DOI: 10.1016/j.fcr.2006.07.002.
(http://www.sciencedirect.com/science/article/B6T6M-4KNMB35-1/2/f406bf1c8d301f69570eddaf5d9f2212)
Abstract:
Multi-location data collected over 30 years in Finland on major cereal crops (spring barley, oat and wheat, and winter wheat and rye) provide an opportunity to characterise variation, interrelation and relative importance of the grain yield determining components, grain number per square meter (GNO) and single grain weight (SGW). In addition to evaluating differences among cereal crops in yield determination, changes among different age groups (AG) were compared. Field experiments were carried out in 1970-2001 at 25 locations in Finland. Grain yield was recorded (at 15% moisture) and SGW (mg) and GNO (number m-2) determined. Frequencies of different GNO and SGW combinations were analysed for all crops and component means in different yield groups as well as among four AGs. In most cases GNO dominated SGW, representing the major yield component determining grain yield. GNO was highly responsive to favourable growth conditions. The change in GNO was especially high when recurrent, relatively low yield groups were compared, while at higher yields the role of SGW became increasingly important, but did not exceed that of GNO. The degree of GNO domination varied according to crop. Increased grain yield in spring oat and winter rye was associated with higher numbers of set grain, while spring barley and winter wheat responded to yield favouring conditions also through higher SGW. Despite GNO dominated SGW due to its responsiveness to growing conditions, its role in yield improvement was not obvious when the entries (n >= 30) were classified into four AGs. Improvements in grain yield derived from AG were associated with crop-specific GNO and/or SGW changes.
Keywords: Barley; Cereal; Compensation; Cultivar; Grain; Grain set; Grain weight; Oat; Plant breeding; Rye; Wheat; Yield; Yield component

Cristina Ugarte, Daniel F. Calderini, Gustavo A. Slafer, Grain weight and grain number responsiveness to pre-anthesis temperature in wheat, barley and triticale, Field Crops Research, Volume 100, Issues 2-3, 1 February 2007, Pages 240-248, ISSN 0378-4290, DOI: 10.1016/j.fcr.2006.07.010.
(http://www.sciencedirect.com/science/article/B6T6M-4KV3XTJ-1/2/91b90baf9117f2b702d7fc2cf45d37ab)
Abstract:
In temperate cereals are commonly accepted that determination of grain number (GN) and grain weight (GW) scarcely overlap during the crop cycle. However, the assumption that GW is determined exclusively after anthesis needs to be critically reviewed in the light of reports published over the few years where temperature treatments imposed before anthesis decreased GW of bread wheat. Although these evidences suggest that both GW and GN could be affected by environmental conditions before anthesis little is known about the effect of pre-anthesis temperature on these two main yield components in wheat, barley and triticale at field conditions. In addition, the effect of temperature on GW and GN at different stages prior to anthesis has been scarcely evaluated. The objectives of the current study were: (i) to evaluate the overall response, and specific differences, of GN and GW to pre-anthesis temperature, and (ii) to study the effect of different timings of high temperature at pre-anthesis on GN and GW in wheat, barley and triticale. Three fully irrigated field experiments were carried out in three successive seasons. At each

season, a wheat, barley and triticale high yielding cultivar was evaluated at three temperature regimes: control, and two timings of heating before anthesis. During the first and second seasons, the timings of heating were booting-anthesis and heading-anthesis. In the thirst season, the timings were beginning of stem elongation-booting and booting-anthesis. Plots were arranged in a split-plot design with three replicates, where the main plot was assigned to thermal regime and the sub-plots to crop species. To apply heat, transparent chambers equipped with thermostatically controlled electric heaters were used. The thermal regime was controlled by sensors connected to a temperature regulator and recorded using data loggers. Temperature within the chambers was stable across developmental stages, crops, and seasons; it averaged 5.5 [degree sign]C higher than air temperature. Thermal treatments consistently reduced grain yield ($p < 0.05$), the magnitude of the effect ranged between 5 and 52%. The highest effect was found when temperature increased during stem elongation (yield decrease: 46%), lowest when treatments were imposed during heading-anthesis (15%) and intermediate for treatments imposed during booting-anthesis (27%). Most effects of thermal treatments on yield were due to parallel effects on GN. However, thermal treatments significantly ($p < 0.05$) decreased GW during the three seasons. The most effecting treatment on GW was when the crops were heated during the B-A period, i.e. GW decreased up to 23%.
Keywords: Grain yield; Grain weight; Wheat; Barley; Triticale; Temperature

K.V. Dhima, A.S. Lithourgidis, I.B. Vasilakoglou, C.A. Dordas, Competition indices of common vetch and cereal intercrops in two seeding ratio, Field Crops Research, Volume 100, Issues 2-3, 1 February 2007, Pages 249-256, ISSN 0378-4290, DOI: 10.1016/j.fcr.2006.07.008.
(http://www.sciencedirect.com/science/article/B6T6M-4KV2RRH-2/2/89fde349cc94f62034520bc54bf77261)
Abstract:
A 2-year field study was conducted using common vetch (Vicia sativa L.), wheat (Triticum aestivum L.), triticale (xTriticosecale Wittmack), barley (Hordeum vulgare L.), and oat (Avena sativa L.) pure stands as well as two common vetch-cereal mixtures for silage with each of the above four cereals in two seeding ratios (i.e., vetch:cereal 55:45 and 65:35, based on seed numbers) to determine the competition among the different species and the economics of each intercropping system. Intercropping systems were assessed on the basis of several existing intercropping indices such as land equivalent ratio (LER), relative crowding coefficient (RCC or K), aggressivity (A), competitive ratio (CR), actual yield loss (AYL), monetary advantage index (MAI), and intercropping advantage (IA). The LER and K values were greater for the common vetch-wheat (55:45) and the common vetch-oat (65:35) mixtures indicating that in these systems, there was an advantage of intercropping for exploiting the resources of the environment. A similar trend to that of LER and K was also observed for AYL. The aggressivity, CR and partial AYL values were greater for barley and oat than for wheat and triticale, whereas the corresponding values for common vetch were lower in mixtures with barley and oat than in mixtures with wheat and triticale. These findings indicate that barley and oat were more competitive partners than wheat and triticale as common vetch was affected more in mixtures with these two crops. The highest MAI and IA values were recorded for the common vetch-wheat (55:45) and the common vetch-oat (65:35) mixtures indicating that these intercropping systems were the most profitable.
Keywords: Forage; Intercropping; LER; Mixture; Monetary advantage

S. Neethirajan, C. Karunakaran, D.S. Jayas, N.D.G. White, Detection techniques for stored-product insects in grain, Food Control, Volume 18, Issue 2, February 2007, Pages 157-162, ISSN 0956-7135, DOI: 10.1016/j.foodcont.2005.09.008.
(http://www.sciencedirect.com/science/article/B6T6S-4HH81D9-2/2/15348e198051fe610da5e9ca601141f3)
Abstract:

Cereal grains are the major source of food for humans and most domesticated animals. In many developing countries, overall post-harvest losses of cereals and legumes of about 10-15% are fairly common. Consumption of cereals and legumes by pests such as insects during storage and microbial spoilage or contamination may make these totally inedible. On farms, manual samples, traps, and probes have been used to determine the presence of insects. Manual inspection, sieving, cracking-floatation and Berlese funnels are being used at present to detect insects in grain handling facilities. These methods are not efficient and are time consuming. Acoustic detection, carbon dioxide measurement, uric acid measurement, near-infrared spectroscopy, and soft X-ray method have the potential for use at the industry level to detect insects in grain samples as their usefulness has been demonstrated in the research laboratories. Researchers have developed image analysis programs to automatically scan X-ray images to detect insect infestations. The use of near-infrared (NIR) spectroscopy has been investigated to detect hidden insects in wheat kernels. X-ray and NIR spectroscopy methods are cost prohibitive and current NIR instrumentation requires complex operating procedures and calibrations. The advantages and limitations of these insect detection methods are evaluated and the advantages of one technique over the other are described in this paper.
Keywords: Insect detection; Insect trap; Pheromones; Acoustical method; Electrical conductance; Berlese funnel; NIR spectroscopy; Machine vision; X-ray imaging

Juan E. Reyes, Jose M. Bastias, Manuel R. Gutierrez, Maria de la O. Rodriguez, Prevalence of Bacillus cereus in dried milk products used by Chilean School Feeding Program, Food Microbiology, Volume 24, Issue 1, February 2007, Pages 1-6, ISSN 0740-0020, DOI: 10.1016/j.fm.2006.04.004.
(http://www.sciencedirect.com/science/article/B6WFP-4JX9MPH-1/2/b12339af2b36bcaefe53c9988e4b6d16)
Abstract:
The prevalence of Bacillus cereus, in a total of 381 samples of dried milk products (milk with rice, milk substitute, milk powder, milk-cereal-rice, pudding milk, flan, and mousse) used by the Chilean School Feeding Program, was investigated. The potential of 94 selected isolates of B. cereus to produce diarrhoeal enterotoxin (by the BCET-RPLA test) in BHI culture, as well as the ability of enterotoxigenic-strains to grow at psychrotrophic temperatures were also verified. B. cereus was found in 175 of 381 of the samples analysed (45.9%), reaching levels from 3.0 to 104 spores g-1. As expected, the higher prevalence and counts were observed in those products that contained whole rice, cereals and pulses extruded, and food additives. Of the 94 isolates of B. cereus tested for diarrhoeal enterotoxin production, 28 (29.8%) were positive, and none of these was able to grow at [less-than-or-equals, slant]7 [degree sign]C. The prevalence of B. cereus in dried milk products analysed was fairly high, although it was present in low number. However, as they were composed to a large extent of enterotoxigenic mesophilic strains, the potential risk for the safety of reconstituted products held at improper temperature should not be neglected.
Keywords: Bacterial contamination; Bacillus cereus; Dried milk products

Timothy Johns, Pablo B. Eyzaguirre, Biofortification, biodiversity and diet: A search for complementary applications against poverty and malnutrition, Food Policy, Volume 32, Issue 1, February 2007, Pages 1-24, ISSN 0306-9192, DOI: 10.1016/j.foodpol.2006.03.014.
(http://www.sciencedirect.com/science/article/B6VCB-4K4WH8H-1/2/70357023333a34b4d0577eac102bbeac)
Abstract:
Biofortification, the focus of the HarvestPlus program of the Consultative Group on International Agriculture Research (CGIAR), represents a potentially powerful tool to increase dietary intake of essential nutrients in staple foods. This paper evaluates the compatibility of biofortification with the preferred option of dietary diversification and its potential impacts on the agricultural biodiversity

essential for long term sustainability. In poor countries, biofortification requires increasing public investment in agricultural research and infrastructure for success. Rather than cereal commodities, biofortification for developing countries should focus on vegetatively propagated species or in improving quality of coarse cereals, as well as fodders. Community participatory approaches that identify local food resources with nutritional, agronomic and economic advantages to small-scale farmers could complement and set targets for biofortification as one of many approaches to alleviate nutritional deficiencies. Furthermore using agricultural biodiversity to reinforce dietary diversity can help situate biofortification within the larger context of sustainable food-based approaches. In this light, this paper evaluates specific biofortification interventions from environmental, sociocultural, political, economic, ethical, and biomedical perspectives.
Keywords: Biodiversity; Biofortification; Biotechnology; Dietary diversity; Malnutrition; Micronutrients; Plant genetic resources

A.W. Aregba, J.-P. Nadeau, Comparison of two non-equilibrium models for static grain deep-bed drying by numerical simulations, Journal of Food Engineering, Volume 78, Issue 4, February 2007, Pages 1174-1187, ISSN 0260-8774, DOI: 10.1016/j.jfoodeng.2005.12.030.
(http://www.sciencedirect.com/science/article/B6T8J-4J90VS5-1/2/be747f56e4e098fe1558bc142045ca5b)
Abstract:
Non-equilibrium models of the grain stationary deep-bed drying are derived from the theoretical analysis of the physics of the drying process and consist of a set of four nonlinear partial differential equations describing, respectively, the moisture balance, air energy balance, grain energy balance and thin-layer drying rate. In these models, many authors simplify the physical description by neglecting the accumulation terms from the energy and moisture balance equations without a relevant justification. This simplification may reduce the complexity and computational time but depending of drying conditions can also reduce models' accuracy. Accurate modelling of the drying process is a determining factor both for designing the drier, and for optimising its operation.
In this paper, we use two non-equilibrium models to design two grain deep-bed drying computer codes. In the first, model 1, derived by Bakker-Arkema et al. [Bakker-Arkema, F. W., Bickert, W. G., & Patterson, R. J. (1967). Simultaneous heat and mass transfer during the cooling of a deep-bed of biological products under varying inlet air conditions. Journal of Agricultural Engineering Research, 12, 297-307] and also presented by Brooker et al. [Brooker, D. B., Bakker-Arkema, F. W., & Hall, C. W. (1974). Drying cereal grains. Westport, CT: AVI], the accumulation terms are kept, in the second, model 2, as assumed by these authors, these terms are neglected. Both models are discretized by second order semi-implicit schemes. We use these codes to simulate wheat static bed drying and we compare their predictions. We show that the transfer time, defined as the ratio of the bed height and the drying air velocity, and inlet air temperature and humidity are the main parameters which affect the behaviour of the deviation between the predictions of these models. We investigate the conditions allowing one to neglect the accumulation terms as in the model 1.
Keywords: Grain; Deep-bed drying; Drying models; Computer simulations; Drying code

D. Indrani, R. Sai Manohar, Jyotsna Rajiv, G. Venkateswara Rao, Alveograph as a tool to assess the quality characteristics of wheat flour for parotta making, Journal of Food Engineering, Volume 78, Issue 4, February 2007, Pages 1202-1206, ISSN 0260-8774, DOI: 10.1016/j.jfoodeng.2005.12.032.
(http://www.sciencedirect.com/science/article/B6T8J-4KGG1G3-1/2/46b9e3cb5bcb5fe1b2cea16ff11d6e23)
Abstract:

Studies were carried out to assess the relationship between alveograph characteristics and parotta making quality of wheat flours. Twenty-five commercial wheat flour samples were analysed for their chemical, alveograph and parotta making characteristics. The correlation co-efficient data indicated that among the chemical characteristics of wheat flours, ash content was found to be highly correlated to alveograph index of swelling, G (r = -0.838, P [less-than-or-equals, slant] 0.001), gluten content and sodium dodecyl sulphate (SDS) sedimentation value to the maximum over pressure, P (r = 0.951 and r = 0.875, P [less-than-or-equals, slant] 0.001), and to shear force (r = 0.954 and r = 0.840, P [less-than-or-equals, slant] 0.001). Among alveograph characteristics, P was highly correlated to shear force of parrotta (r = 0.938, P [less-than-or-equals, slant] 0.001). Average abscissa at rupture, L to spread ratio (r = 0.754, P [less-than-or-equals, slant] 0.001). Curve configuration ratio, P/L to all the physical and sensory characteristics of parotta at 1% level. G is correlated to spread ratio (r = 0.914, P [less-than-or-equals, slant] 0.001), texture (r = 0.928, P [less-than-or-equals, slant] 0.001), layers (r = 0.934, P [less-than-or-equals, slant] 0.001) and overall quality score (r = 0.931, P [less-than-or-equals, slant] 0.001). Deformation energy of dough, W is correlated to spread ratio (r = 0.825, P [less-than-or-equals, slant] 0.001), texture (r = 0.892, P [less-than-or-equals, slant] 0.001), layers (r = 0.901, P [less-than-or-equals, slant] 0.001) and overall quality score (r = 0.872, P [less-than-or-equals, slant] 0.001) indicating that alveograph G and W values could be considered as the indicators of the overall quality of parotta.
Keywords: Indian traditional products; Parotta; Alveograph; Wheat flour quality

Priya Deshmukh-Taskar, Theresa A. Nicklas, Su-Jau Yang, Gerald S. Berenson, Does Food Group Consumption Vary by Differences in Socioeconomic, Demographic, and Lifestyle Factors in Young Adults? The Bogalusa Heart Study, Journal of the American Dietetic Association, Volume 107, Issue 2, February 2007, Pages 223-234, ISSN 0002-8223, DOI: 10.1016/j.jada.2006.11.004.
(http://www.sciencedirect.com/science/article/B758G-4MX54V0-C/2/ccccc7cb6b9789efb1c8d2ecb3abf39b)
Abstract: Objective
To examine if food group consumption varies by differences in socioeconomic, demographic, and lifestyle factors in young adults from a semirural setting in Louisiana.Design
Cross-sectional.Subjects
Young adults (n=1,266, 74% European American, 26% African American; 39% men, 61% women) aged 20 to 38 years, enrolled in the Bogalusa Heart Study.Measures
Food group consumption was assessed by a food frequency questionnaire. Socioeconomic (eg, income and education), demographic (eg, age, sex, and ethnicity), and lifestyle (eg, marital status and physical activity) information was obtained by a self-administered questionnaire and the subjects were stratified according to these groups.Statistical Analyses
Analysis of covariance (adjusted for covariates) was used to detect differences in the mean servings of food groups consumed per day between the various socioeconomic, demographic, and lifestyle groups.Results
Compared to income <=$15,000, those with an income >$45,000 had lower consumption of burgers/sandwiches (P<0.05) and those with income levels from $30,001 to $45,000 had lower consumption of mixed dishes (P<0.05). Intake of cereals/breads (P<0.05), dairy products (P<0.01), fruits/100% fruit juices (P<0.001), and vegetables (P<0.001) was higher in subjects with >12 years of education. European-American men consumed more servings of dairy products (P<0.05) and sweetened beverages (P<0.05) than African-American men. European-American women consumed more servings of dairy products (P<0.05), vegetables (P<0.05), and fats (P<0.05) than African-American women. African Americans (men and women) consumed more servings of fruits/100% fruit juices (P<0.0001) than European Americans (men and women), respectively. Married individuals consumed more servings of snacks/desserts (P<0.05), but fewer servings of alcoholic beverages (P<0.0001) than those who were unmarried. Active individuals

consumed more servings of fruits/100% fruit juices (P<0.05) and fewer servings of burgers/sandwiches (P<0.05) than inactive individuals.Conclusions
These findings suggest that food group consumption varies by socioeconomic, demographic, and lifestyle factors in young adults from a semirural setting. Food and nutrition professionals who encounter diverse populations need to consider the influence of income, education, sex, ethnicity, marital status, and physical activity on food consumption patterns when planning diets, nutrition education programs, and interventions for young adults.

P.G. Hatfield, S.L. Blodgett, T.M. Spezzano, H.B. Goosey, A.W. Lenssen, R.W. Kott, C.B. Marlow, Incorporating sheep into dryland grain production systems: I. Impact on over-wintering larva populations of wheat stem sawfly, Cephus cinctus Norton (Hymenoptera: Cephidae), Small Ruminant Research, Volume 67, Issues 2-3, February 2007, Pages 209-215, ISSN 0921-4488, DOI: 10.1016/j.smallrumres.2005.10.002.
(http://www.sciencedirect.com/science/article/B6TC5-4HK5SSK-2/2/150ff32cd9258ce7d4e2bb0565ba6c9a)
Abstract:
Wheat stem sawfly (WSS), Cephus cinctus Norton (Hymenoptera: Cephidae) is the most damaging insect pest to Montana's $ 1 billion dollar per year grain industry. Current WSS control methods are either expensive, reduce wheat yields, or are not effective. Our objective was to compare burning, grazing, tilling, trampling and clipping wheat stubble fields on over-wintering WSS larval populations. Treatments were evaluated in three experiments using a randomized complete block design and four replications at each site. Eight, six, and two sites were used for Experiments 1, 2, and 3, respectively. Contrast statements were used to make pre-planned comparisons among treatments. For Experiment 1, treatments were fall tilled, fall grazed, spring grazed, fall and spring combined (Fall/Spr) grazed, and an untreated control. Five mature ewes were confined with electric fence to 111 m2 plot for 24 h in the fall and spring grazed treatments resulting in a stocking rate of 452 sheep d/ha. For Fall/Spr, the stocking rate was 904 sheep d/ha. For Experiment 2, treatments were fall grazed, fall burned, fall tilled, and an untreated control. In Experiment 3, treatments were fall trampled, spring trampled, Fall/Spr trampled, hand clipped to a stubble height of 4.5 cm, and an untreated control. Trampled treatments were done at the same stocking rates as grazing treatments but sheep were muzzled to prevent intake. Wheat stem sawfly larval numbers were collected in the fall and spring, pre- and post-treatment, respectively, by collecting all plant material from three, 0.46 m lengths of row and counting the number of live larvae present. In Experiment 1, WSS mortality was greater ($P < 0.01$) for the mean of all grazed treatments (68.4%) than either control (43%) or tilled (47%) plots. Mortality did not differ ($P = 0.75$) between fall (67%) and spring (64%) grazed plots but was greater ($P = 0.02$) for Fall/Spr (74%). In Experiment 2, larva mortality was greater ($P < 0.01$) for fall grazed (63%) than burned plots (52%). In Experiment 3, WSS mortality was greater ($P < 0.01$) for the mean of all trampling treatments (57%) than either control (33%) or clipped (32%) plots. Mortality did not differ ($P > 0.25$) between fall (54%) and spring trampling (47%) but was greater ($P = 0.01$) for Fall/Spr (70.6%). No differences ($P > 0.25$) were detected for WSS mortality when grazing was compared to trampling. These results indicate the potential for using grazing sheep to control wheat stem sawfly infestations in cereal grain production systems.
Keywords: Wheat stem sawfly control; Sheep grazing; Tillage; Burning; Trampling

P.G. Hatfield, H.B. Goosey, T.M. Spezzano, S.L. Blodgett, A.W. Lenssen, R.W. Kott, C.B. Marlow, Incorporating sheep into dryland grain production systems: III. Impact on changes in soil bulk density and soil nutrient profiles, Small Ruminant Research, Volume 67, Issues 2-3, February 2007, Pages 222-231, ISSN 0921-4488, DOI: 10.1016/j.smallrumres.2005.10.003.
(http://www.sciencedirect.com/science/article/B6TC5-4HK04MR-1/2/3fa58643b59cd47940ddc888469e3913)

Abstract:
Changes in soil bulk density and soil nutrient profiles are a major concern of dryland grain producers considering grazing sheep on cereal stubble fields. Our objective was to compare burned, grazed, tilled, trampled and clipped wheat stubble fields on changes in soil bulk density and soil nutrient profiles. Treatments were evaluated in a series of three experiments using a randomized complete block design and four replications at each site. Contrast statements were used to make pre-planned comparisons among treatments. For Experiment 1, treatments were fall tilled, fall grazed, spring grazed, fall and spring combined (Fall/Spr) grazed, and an untreated control. Five mature ewes were confined with electric fence to a 111 m2 plot for 24 h for fall and spring grazed plots resulting in a stocking rate of 452 sheeps d/ha. For Fall/Spr, the stocking rate was 904 sheeps d/ha. For Experiment 2, treatments were fall grazed, fall burned, fall tilled, and an untreated control. In Experiment 3, treatments were fall trampling by sheep, spring trampling by sheep, fall and spring combined (Fall/Spr) trampling by sheep, hand clipping to a stubble height of 4.5 cm, and an untreated control. Trampling treatments were done at the same stocking rates as grazing treatments but sheep were muzzled to prevent intake. In Experiment 1, post-treatment organic matter tended to be greater ($P = 0.09$) in the mean of the grazed treatments than control plots. In all of the experiments, change in soil bulk density, and soil nutrient profiles did not consistently differ ($P > 0.07$) among treatments in any manner that would suggest a detrimental impact of grazing sheep on small grain residue. These results indicate a strong potential for grazing sheep on grain stubble without adversely impacting soil bulk density or nutrient profiles.
Keywords: Soil bulk density; Grazing sheep; Tillage; Burning; Trampling

Charlotte Grootaert, Jan A. Delcour, Christophe M. Courtin, Willem F. Broekaert, Willy Verstraete, Tom Van de Wiele, Microbial metabolism and prebiotic potency of arabinoxylan oligosaccharides in the human intestine, Trends in Food Science & Technology, Volume 18, Issue 2, February 2007, Pages 64-71, ISSN 0924-2244, DOI: 10.1016/j.tifs.2006.08.004.
(http://www.sciencedirect.com/science/article/B6VHY-4M3BC5C-6/2/e11d89dcb3e1103e921ea8d3242483c1)
Abstract:
Arabinoxylans (AX) are the main non-starch polysaccharides found in many cereal grains and are part of dietary fibre. They consist of [beta]-(1,4)-linked d-xylopyranosyl residues to which arabinofuranosyl moieties are attached. They are degraded in the colon by specific intestinal bacteria possessing AX-degrading enzymes. Although some health effects of AX are documented, the effects of their hydrolysis products, the arabinoxylan oligosaccharides (AXOS), are less studied. Many oligosaccharides exert prebiotic activities and there are indications that xylo-oligosaccharides consisting of [beta]-(1,4)-linked d-xylopyranosyl residues show strong bifidogenic effects. Therefore, the in-depth study of the prebiotic potential of AXOS and the intestinal microbiota involved in their transformation processes is warranted.

Jason A. Able, Peter Langridge, Andrew S. Milligan, Capturing diversity in the cereals: many options but little promiscuity, Trends in Plant Science, Volume 12, Issue 2, February 2007, Pages 71-79, ISSN 1360-1385, DOI: 10.1016/j.tplants.2006.12.002.
(http://www.sciencedirect.com/science/article/B6TD1-4MV1H84-2/2/3ac19482ecc37cf73c51954cbb69dac9)
Abstract:
It is generally recognized by geneticists and plant breeders alike that there is a need to further improve the ability to capture and manipulate genetic diversity. The effective harnessing of diversity in traditional breeding programmes is limited and, therefore, it is vital that meiotic recombination can be manipulated given that it plays a pivotal role in generating diversity. With the advent of a wider range of genomics technologies, our understanding of meiotic processes should increase rapidly. Although comparative genetics has been useful, particularly in the broader grass

family, the development of physical maps, long-range sequencing and transcript profiles promises to unravel the complexities of genomes as large or larger than wheat. Highlighting the most significant findings to date, this review pools the knowledge on these tools and reproductive processes.

Xin Mei Feng, Thomas Ostenfeld Larsen, Johan Schnurer, Production of volatile compounds by Rhizopus oligosporus during soybean and barley tempeh fermentation, International Journal of Food Microbiology, Volume 113, Issue 2, 25 January 2007, Pages 133-141, ISSN 0168-1605, DOI: 10.1016/j.ijfoodmicro.2006.06.025.
(http://www.sciencedirect.com/science/article/B6T7K-4KJDWND-1/2/2126af06dd222cb9db18597e462c0e85)
Abstract:
Rhizopus oligosporus Saito can ferment soybeans or cereal grains to tempeh, a sliceable cake with improved nutritional properties. Volatiles produced by different R. oligosporus strains grown on malt extract agar (MEA), barley and soybean were investigated. The effect of co-cultivation with Lactobacillus plantarum on the production of volatiles was also studied. Volatile compounds were collected in situ by headspace diffusion and identified by GC-MS. The ten R. oligosporus strains that had different colony morphologies on MEA produced very similar volatile profiles, except for slight variations among the minor volatile compounds (e.g. sesquiterpenes). Likewise, practically no differences in volatile profiles were observed between three of the strains grown on soybeans. In contrast, the R. oligosporus volatile profile on soybean was different from that on barley from the same strain. Co-cultivation with L. plantarum did not influence volatile production by R. oligosporus. The dominant compounds produced on all three substrates were ethanol, acetone, ethyl acetate, 2-butanone, 2-methyl-1-propanol, 3-methyl-1-butanol and 2-methyl-1-butanol. Acetaldehyde and 2-methyl-propanal were also produced on MEA and barley, while 2-pentanone, methyl acetate, 2-butanol and 3-methyl-3-buten-1-ol were observed on soybeans. Ethanol, 2-methyl-1-butanol and 3-methyl-1-butanol were the most abundant volatile compounds produced on MEA and barley, while 2-butanone was the dominant volatile metabolite on soybean. The mushroom odour compounds, 3-octanone and 1-octen-3-ol, were only detected from soybean and soybean tempeh.
Keywords: Rhizopus oligosporus; Lactobacillus plantarum; Volatile compounds; Gas chromatography (GC); Mass spectrometry (MS); Tempeh; Aroma; Odour

G.J. Rebetzke, R.A. Richards, N.A. Fettell, M. Long, A.G. Condon, R.I. Forrester, T.L. Botwright, Genotypic increases in coleoptile length improves stand establishment, vigour and grain yield of deep-sown wheat, Field Crops Research, Volume 100, Issue 1, 4 January 2007, Pages 10-23, ISSN 0378-4290, DOI: 10.1016/j.fcr.2006.05.001.
(http://www.sciencedirect.com/science/article/B6T6M-4K5JBR3-1/2/295ff23f38dbd14b685a97ac41365d6c)
Abstract:
Timely sowing is critical for achieving high grain yields in winter cereals. However, inadequate seed-zone moisture for germination commonly delays sowing to reduce biomass and subsequent yield in semi-arid environments. Sowing deep to reach soil moisture is often avoided by growers of Rht-B1b and Rht-D1b semi-dwarf wheat as these wheat show poor emergence when sown deep. Their reduced cell elongation associated with insensitivity to endogenous gibberellins, results in shorter coleoptiles and smaller early leaf area. Alternative dwarfing genes responsive to endogenous gibberellins (e.g. Rht8) are available for use in wheat breeding. These reduce plant height without affecting coleoptile length and offer potential to select longer coleoptile wheat for deep sowing. Nine semidwarf (Rht8, Rht-B1b, and Rht-D1b) and seven tall (rht) wheat genotypes were sown at depths of 50, 80 and 110 mm at three locations in 2 or 3 years. Coleoptile lengths measured in a growth cabinet at four temperatures (11, 15, 19 and 23 [degree sign]C) were

strongly correlated with coleoptile length (rp = 0.77-0.79**) and plant number (rp = 0.49*-0.79**) in deep-sown plots in the field. Furthermore, differences in coleoptile length were genetically correlated with greater numbers of emerged seedlings (rg = 0.97**), shallower crown depth (-0.58**), greater seedling leaf area (0.59**) and seedling biomass (0.44*). Wheat containing the Rht-B1b or Rht-D1b dwarfing genes produced significantly (P < 0.01) shorter coleoptiles (97 mm) than both Rht8 (118 mm) and tall (117 mm) wheat. In turn, compared with emergence from 50 mm depth, the Rht-B1b and Rht-D1b wheat produced significantly fewer seedlings at 110 mm sowing depth (-62%) than either Rht8 (-41%) or tall (-37%) wheat. Effects of deep sowing early in the season were maintained with reductions in spike number and biomass at both anthesis and maturity. Kernel number was also reduced with deep sowing leading to reductions in grain yield. Over all entries, genotypic increases in plant number were associated with increases in fertile spike (rg = 0.61**) and kernel number (0.21*), total biomass (0.26*) and grain yield (0.28*). Reduction in spike number and grain yield with deep sowing was smallest for the Rht8 (-18 and -10%) and rht (-15 and -7%) wheat, and largest for the Rht-B1b/D1b (-39 and -16%) wheat. Plant height and coleoptile length were independent among Rht8 and tall wheat genotypes. This study demonstrates the importance of good seedling emergence in achieving high wheat yields, and the potential use of alternative dwarfing genes such as Rht8 in development of long coleoptile, reduced height wheat suitable for deep sowing.
Keywords: Deep sowing; Breeding; Harvest index; Establishment; Spike and tiller number; Rht8; Alternative dwarfing genes

David G. Stevenson, Atanu Biswas, Jay-lin Jane, George E. Inglett, Changes in structure and properties of starch of four botanical sources dispersed in the ionic liquid, 1-butyl-3-methylimidazolium chloride, Carbohydrate Polymers, Volume 67, Issue 1, 2 January 2007, Pages 21-31, ISSN 0144-8617, DOI: 10.1016/j.carbpol.2006.04.010.
(http://www.sciencedirect.com/science/article/B6TFD-4K48M7G-4/2/15d9de7bb4f5f60e4f083ffcdaa9e18a)
Abstract:
Ionic liquid (IL) has gained industry attention, especially in green chemistry. Researchers have utilized IL for dispersing cellulose, but no report using IL for other polysaccharides. In this study, corn, rice, wheat and potato starches were dispersed in hot water (DIHW) or IL, 1-butyl-3-methylimidazolium chloride and morphology, amylopectin molecular weight (APMw) and thermal properties (TP) were analyzed. For starch DIHW, corn and potato had gelatinized aggregates, whereas rice and wheat had granular clumps. Starch heat-dispersed in IL (HDIIL) had clumps composed of < 1 [mu]m diameter particles. Starch DIHW had little effect on APMw. Cereal starches had APMw greatly reduced by HDIIL (4-6 peaks observed). Potato amylopectin was degraded less by IL (two peaks) probably because charged phosphomonoesters covalently bonded to imidazolium rings or repelled IL chloride ions and large granule size impeded IL penetration, reducing reaction efficiency. TP showed potato starch incompletely gelatinized by HDIIL.
Keywords: Starch; Ionic liquid; Amylopectin; Imidazolium; Structure; Molecular weight; Green chemistry

M.A. Bolinder, H.H. Janzen, E.G. Gregorich, D.A. Angers, A.J. VandenBygaart, An approach for estimating net primary productivity and annual carbon inputs to soil for common agricultural crops in Canada, Agriculture, Ecosystems & Environment, Volume 118, Issues 1-4, January 2007, Pages 29-42, ISSN 0167-8809, DOI: 10.1016/j.agee.2006.05.013.
(http://www.sciencedirect.com/science/article/B6T3Y-4K7WHWY-1/2/acc91f094dcaadd404869c67ae781788)
Abstract:

The current interest in characterizing, predicting and managing soil C dynamics has focused attention on making estimates of C inputs to soil more accurate and precise. Net primary productivity (NPP) provides the inputs of carbon (C) in ecosystems and determines the amount of photosynthetically fixed C that can potentially be sequestered in soil organic matter. We present a method for estimating NPP and annual C inputs to soil for some common Canadian agroecosystems, using a series of plant C allocation coefficients for each crop type across the country. The root-derived C in these coefficients was estimated by reviewing studies reporting information on plant shoot-to-root (S:R) ratios (n = 168). Mean S:R ratios for annual crops were highest for small-grain cereals (7.4), followed by corn (5.6) and soybeans (5.2), and lowest for forages (1.6). The review also showed considerable uncertainty (coefficient of variation for S:R ratios of ~50% for annual crops and ~75% for perennial forages) in estimating below-ground NPP (BNPP) in agroecosystems; uncertainty was similar to that for Canadian boreal forests. The BNPP (including extra-root C) was lower for annual crops (~20% of NPP) than for perennial forages (~50%). The latter was similar to estimates for relative below-ground C allocation in other Canadian natural ecosystems such as mixed grasslands and forests. The proposed method is easy to use, specific for particular crops, management practices, and driven by agronomic yields. It can be readily up-dated with new experimental results and measurements of parameters used to quantify the accumulation and distribution of photosynthetically fixed C in different types of crops.
Keywords: Roots; C inputs; C allocation; Uncertainty; Agroecosystems; Natural ecosystems

Grzegorz Orlowski, Joanna Czarnecka, Winter diet of reed bunting Emberiza schoeniclus in fallow and stubble fields, Agriculture, Ecosystems & Environment, Volume 118, Issues 1-4, January 2007, Pages 244-248, ISSN 0167-8809, DOI: 10.1016/j.agee.2006.05.026.
(http://www.sciencedirect.com/science/article/B6T3Y-4K8S5DT-5/2/cae8fec8aad90d28c03311a37a59590e)
Abstract:
An analysis of droppings collected in winter on unused fields in SW Poland (fallow, stubble of root crop, vegetable and cereal) showed that the base of the reed bunting Emberiza schoeniclus diet were seeds of annual weed species: Chenopodium album (74.06% of all recorded seed species), Amaranthus retroflexus (16.05%), Setaria viridis (9.50%), Stellaria media (0.21%), Fumaria officinalis (0.01%). The share of dominant weed species in the diet of reed bunting wintering on particular types of fields varied markedly. In the droppings from fallows and cereal stubbles, C. album clearly dominated (respectively, 88.60 and 66.12%). The highest proportion of A. retroflexus and S. viridis was detected in the diet of birds staying on root crop stubbles (respectively, 45.56 and 23.90%). The most diverse food composition was found in the case of birds feeding on root crops and the least diverse on fallows.
Keywords: Reed bunting; Diet composition; Annual weeds; Crop management; Set-aside; Winter habitats

Andras Baldi, Sandor Farago, Long-term changes of farmland game populations in a post-socialist country (Hungary), Agriculture, Ecosystems & Environment, Volume 118, Issues 1-4, January 2007, Pages 307-311, ISSN 0167-8809, DOI: 10.1016/j.agee.2006.05.021.
(http://www.sciencedirect.com/science/article/B6T3Y-4K9C534-1/2/958c1bb49a2e749392e1ee84dd86add6)
Abstract:
Agricultural intensification presents a major threat to European biodiversity. This generalisation is largely based on studies from western and northern Europe. Here it is shown that the development of agriculture in a post-socialist country (Hungary) was marked by sudden changes, e.g., a 10-fold increase of fertiliser consumption in the late 1960s as a result of decision-making in the socialist command economic structures, and similar decreases after the collapse of socialism in the 1990s. Hungarian populations of two characteristic farmland species, the brown hare (Lepus europaeus)

and grey partridge (Perdix perdix) are analysed and their collapse over the past four decades is related to agricultural data on production from FAO statistics. This decline was found to be negatively correlated with most measures of agricultural intensification (cereal and milk yields, number of machinery), and positively with cattle density. Multiple regression analyses of intensification measures indicated a similar pattern, although cattle density was not included into the models. Interestingly, farmland diversity in the models was negative predictor of population sizes. The sudden changes in agriculture were not indicated in the population trends of the two species. Probably, the relationship between agricultural intensification and small game species decline may not be as simple as correlation analyses indicated.
Keywords: Brown hare; Grey partridge; Agri-enviromental program; Socialist agriculture; History

D. Jozefiak, A. Rutkowski, B.B. Jensen, R.M. Engberg, Effects of dietary inclusion of triticale, rye and wheat and xylanase supplementation on growth performance of broiler chickens and fermentation in the gastrointestinal tract, Animal Feed Science and Technology, Volume 132, Issues 1-2, 1 January 2007, Pages 79-93, ISSN 0377-8401, DOI: 10.1016/j.anifeedsci.2006.03.011.
(http://www.sciencedirect.com/science/article/B6T42-4JRVDXD-B/2/93b29a52f11cda31558cf1873bd723c9)
Abstract:
An experiment was performed over a period of 5 weeks with 576 one-day-old cockerels (Cobb 500), which were randomly divided into 6 experimental groups (12 replicate cages with 8 birds/cage). The objective of the experiment was to estimate whether different grain types (wheat, rye or triticale) and exogenous xylanase inclusion influence the performance and the gastrointestinal ecosystems of broiler chickens as regards intestinal viscosity, pH as well as the concentration of short-chain fatty acids (SCFA) and lactic acid (LA). The rye-based diets resulted in the poorest production results followed by wheat and triticale-based diets. Ileal viscosity decreased in the range: rye (140 cps), triticale (6.1 cps) and wheat (2.5 cps). Xylanase supplementation reduced ileal viscosity significantly only in birds fed with rye. The cereal type influenced the fermentation process in the broiler gastrointestinal tract more than the xylanase supplementation. The total concentration of organic acids was highest in the caeca, followed by the crop, ileum and gizzard. Lactic acid concentrations were highest in the content of the crop followed by ileum, gizzard and caeca. Propionate was only detected in caecal contents, whereas butyrate was also found in small amounts in the contents of the crop of birds from all treatments. The concentrations of acetate, butyrate and total organic acid concentration in caecal contents of chickens receiving the rye-based diets were lower than in birds fed the other cereals ($P<0.001$). Enzyme supplementation reduced the relative weight of the caeca in rye-fed birds ($P=0.001$).
Keywords: Broiler chickens; Dietary fiber; Non-starch polysaccharides; Fermentation; Short-chain fatty acids

Katrine Pontoppidan, Dan Pettersson, Ann-Sofie Sandberg, The type of thermal feed treatment influences the inositol phosphate composition, Animal Feed Science and Technology, Volume 132, Issues 1-2, 1 January 2007, Pages 137-147, ISSN 0377-8401, DOI: 10.1016/j.anifeedsci.2006.03.008.
(http://www.sciencedirect.com/science/article/B6T42-4JRVDXD-9/2/221b5b1bf28bf7c96447dc3c9cabda4d)
Abstract:
The content and composition of inositol phosphate phosphorus (InsP-P) in maize, wheat, barley and heat treated soybean meal, rapeseed meal and sunflower meal was determined by high-performance ion chromatography (HPIC). Approximately 0.88-0.96 of the InsP-P in the feedstuffs was present in the inositol hexaphosphate (InsP6) form, whereas the rest was in the inositol pentaphosphate (InsP5) form and for oilseeds a very small amount was present as inositol

tetraphosphate (InsP4). Rapeseed differed from this pattern by having as much as 300 and 60 g InsP4-P/kg of the total InsP-P pool. The effect of pelleting (90 [degree sign]C) and extrusion cooking (130-140 [degree sign]C, 6.5 MPa) on the composition of InsP-P was investigated. Neither treatment had any major effect on the total content of InsP-P in the feedstuffs. However, as indicated by the statistically significant effects on the proportion of the inositol phosphates, extrusion cooking shifted the inositol phosphates from InsP6-P towards InsP5-P both in cereals (P=0.002) and in oilseeds (P<0.001), which show a slight degradation of phytate during this treatment. The degradation of InsP6 to InsP5 appeared to be unspecific with regard to isomers in all feedstuffs, indicating that the degradation was non-enzymatic, i.e. a result of the high temperature and pressure during the extrusion cooking. The degradation of InsP6 in the feedstuffs during extrusion is too limited to have any nutritional effect on the availability of phosphorous and minerals.
Keywords: Phytate; Inositol phosphate; Phosphorus; Pelleting; Extrusion cooking

A.P. Hearty, S.N. McCarthy, J.M. Kearney, M.J. Gibney, Relationship between attitudes towards healthy eating and dietary behaviour, lifestyle and demographic factors in a representative sample of Irish adults, Appetite, Volume 48, Issue 1, January 2007, Pages 1-11, ISSN 0195-6663, DOI: 10.1016/j.appet.2006.03.329.
(http://www.sciencedirect.com/science/article/B6WB2-4M4CVH3-1/2/e2da65226b05b35e2d867083f8c46c60)
Abstract:
Attitudes towards healthy eating were explored according to dietary, lifestyle and socio-demographic correlates in a random sample of 1256 Irish adults. Data were obtained from an Irish cross-sectional survey (1997-1999). A self-administered questionnaire was used to obtain attitudinal information. Food consumption was estimated using a 7-d food diary. A majority of the sample had a positive attitude or motivation towards their healthy eating behaviour. Those who perceived their own eating habits to be healthy were more likely to comply with current dietary guidelines than those who did not. Females, increasing age, higher social class, tertiary education, non-smokers, lower body-weights and increased recreational activity were associated with a lower odds ratio (OR) for having a negative attitude towards their healthy eating behaviour. An increased intake (g/d) of breakfast cereals, vegetables, fruit and poultry dishes were associated with decreased OR for negative attitudes towards their healthy eating behaviour, while an increased intake of high-calorie beverages (g/d) was associated with an increased OR. It can be concluded that attitudes or motivation towards eating healthily was related to measured dietary and lifestyle behaviour in this sample. Future research is warranted to devise appropriate methods of instituting attitude change towards dietary behaviour in certain subgroups of the population.
Keywords: Attitudes; Motivation; Dietary behaviour; Health behaviour; Socio-demographics; Ireland

Maria J. Pascual-Villalobos, Benjamin Rodriguez, Constituents of Musa balbisiana seeds and their activity against Cryptolestes pusillus, Biochemical Systematics and Ecology, Volume 35, Issue 1, January 2007, Pages 11-16, ISSN 0305-1978, DOI: 10.1016/j.bse.2006.08.004.
(http://www.sciencedirect.com/science/article/B6T4R-4M21T6V-1/2/82095a61324f40bbd88355245ecf8927)
Abstract:
The chloroform and acetone extracts of the seeds of Musa balbisiana Colla (Musaceae) and four of its constituents were assayed in the diet for toxicity against the flat grain beetle (Cryptolestes pusillus Schoherr). A mixture of fatty esters of phytol and the flavan (+)-epiafzelechin showed a significant growth inhibition and toxicity against this economically important pest of stored cereals. The LD50 was 6.3% for the most active compound, (+)-epiafzelechin.

Keywords: Musa balbisiana; Musaceae; Secondary metabolites; (+)-Epiafzelechin; Cryptolestes pusillus; Toxicity; Insect growth inhibition

D. Moret, J.L. Arrue, M.V. Lopez, R. Gracia, Winter barley performance under different cropping and tillage systems in semiarid Aragon (NE Spain), European Journal of Agronomy, Volume 26, Issue 1, January 2007, Pages 54-63, ISSN 1161-0301, DOI: 10.1016/j.eja.2006.08.007.
(http://www.sciencedirect.com/science/article/B6T67-4M3BGVW-2/2/629b0f9f5f723467ac38bd1d12ece7c7)
Abstract:
Winter barley is the major crop on semiarid drylands in central Aragon (NE Spain). In this study we compared, under both continuous cropping (BC) (5-6-month fallow) and a crop-fallow rotation (BF) (16-18-month fallow), the effects of three fallow management treatments (conventional tillage, CT; reduced tillage, RT; no-tillage, NT) on the growth, yield and water use efficiency (WUE) of winter barley during three consecutive growing seasons in the 1999-2002 period. Daily precipitation measurements and monthly measurements of soil water storage to a depth of 0.7 m were used to calculate crop water use (ET) and its components. The average growing season precipitation was 195 mm. Above-ground dry matter (DM) and corresponding WUE were high in years with high effective rainfalls (>10 mm day-1) either in autumn or spring. However, the highest values of WUE for grain yield were mainly produced by effective rainfalls during the time from stem elongation to harvest. Despite the similarity in ET for the three tillage treatments, NT provided the lowest DM production, corresponding to a higher soil water loss by evaporation and lower crop transpiration (T), indicated by the lowest T/ET ratio values found under this treatment. No clear differences in crop yield were observed among the tillage treatments in the study period. On average, and regardless of the type of tillage, BF provided the highest values of DM and WUE and yielded 49% more grain than BC. These differences between cropping systems increased when water-limiting conditions occurred in the early stages of crop growth, probably due to the additional soil water storage under BF at sowing. Although no significant differences in precipitation use efficiency (PUE) were observed between BC and BF, PUE was higher under the BC system, which yielded 34% more grain than the BF rotation when yields were adjusted to an annual basis including the length of the fallow. The crop yield under BF was not dependent on the increase in soil water storage at the end of the long fallow. In conclusion, this study has shown that, although conventional tillage can be substituted by reduced or no-tillage systems for fallow management in semiarid dryland cereal production areas in central Aragon, the practice of long-fallowing to increase the cereal crop yields is not longer sustainable.
Keywords: Barley; Fallow; Conservation tillage; Dryland farming; Water use efficiency

Nathalie Cayot, Sensory quality of traditional foods, Food Chemistry, Volume 102, Issue 2, EFFoST 2005 Annual Meeting: Innovations in traditional foods, 2007, Pages 445-453, ISSN 0308-8146, DOI: 10.1016/j.foodchem.2006.10.016.
(http://www.sciencedirect.com/science/article/B6T6R-4MGVPK8-2/2/bcb1bf9ce2de698e85d65551daa431f4)
Abstract:
It is generally admitted that the expression `traditional food' refers to a product with specific raw materials, and/or with a recipe known for a long time, and/or with a specific process.
Industrialization of food production, European laws on food safety and even the development of innovative products necessitate the characterization of the typical sensory characteristics of these traditional products.
Numerous are the sensory studies made on wine, cheese or cereal products. Different strategies can be used for such studies, depending on the aim of the study: olfactometry to determine key-aroma compounds in local wines, texture profiling for pressed cheeses, tracing aroma compounds brought by the various raw materials or generated by the different unit operations of a process.

More than that, the perception of the sensory characteristics of a product is related not only to its intrinsic characteristics. This short review evidences that the mastery of food products implies to integrate all the steps of their production and marketing, from the raw materials to the consumer.
Keywords: Traditional foods; Sensory; PGI; PDO; Bread; Cheese; Wine; Flavour

Pernille N. Jensen, Jens Risbo, Oxidative stability of snack and cereal products in relation to moisture sorption, Food Chemistry, Volume 103, Issue 3, 2007, Pages 717-724, ISSN 0308-8146, DOI: 10.1016/j.foodchem.2006.09.012.
(http://www.sciencedirect.com/science/article/B6T6R-4M6S050-1/2/aa58d6d125776fb992e0f8ca4411e108)
Abstract:
A collection of snack and cereal products including peanuts, pork scratchings, a mixture of rolled oat and wheat from muesli and oatmeal have been characterized in terms of the relationship between storage humidity and stability against lipid oxidation. The products were stored above various saturated salt solutions in an atmosphere corresponding to ambient air. The development of free radicals, hexanal and water content was monitored during the storage. For oatmeal, muesli-mixture and pork scratchings an optimal humidity existed at which the oxidation rate constant was minimal. Furthermore, the humidity was concluded to be an important packaging parameter for oatmeal and muesli as a large difference between minimal and maximal oxidation rate constant was observed. The optimal humidity with respect to oxidative stability did not coincide with the BET-monolayer value. The radical content was very dependent of the relative humidity as an increased humidity resulted in decreased radical content.
Keywords: Peanuts; Pork scratchings; Oatmeal; Muesli; Water activity; Humidity; Lipid oxidation; Sorption isotherm

Stefano Comai, Antonella Bertazzo, Lucia Bailoni, Mirella Zancato, Carlo V.L. Costa, Graziella Allegri, The content of proteic and nonproteic (free and protein-bound) tryptophan in quinoa and cereal flours, Food Chemistry, Volume 100, Issue 4, 2007, Pages 1350-1355, ISSN 0308-8146, DOI: 10.1016/j.foodchem.2005.10.072.
(http://www.sciencedirect.com/science/article/B6T6R-4J556BJ-2/2/8a92cf0b4b182bb127bb3cb109d9d492)
Abstract:
The content of proteic and nonproteic (free and protein-bound) tryptophan and of proteins in quinoa, wheat, rice, maize, barley, oat, rye, spelt, sorghum and millet flours was determined. Protein content and proteic tryptophan of quinoa were similar to that of wheat and spelt, but higher than in other cereals. Free tryptophan in quinoa flour showed values similar to those of wheat, oat and sorghum Kalblank, lower than those of barley, spelt and pearl millet, but higher than in rice, maize, rye, sorghum DK 34 - Alabama hybrid. In addition, nonproteic tryptophan appears bound both to water soluble proteins and to proteins soluble at pH 8.9. The results are discussed regarding the importance of the nonprotein tryptophan fraction, the only one able to enter the brain, that is more easily absorbed, so guarantees a greater amount available for uptake by the central nervous system.
Keywords: Quinoa; Cereals; Proteic tryptophan; Free tryptophan; Protein-bound tryptophan

M.L. Sudha, R. Vetrimani, K. Leelavathi, Influence of fibre from different cereals on the rheological characteristics of wheat flour dough and on biscuit quality, Food Chemistry, Volume 100, Issue 4, 2007, Pages 1365-1370, ISSN 0308-8146, DOI: 10.1016/j.foodchem.2005.12.013.
(http://www.sciencedirect.com/science/article/B6T6R-4J32HFP-3/2/bb43386fa349fe41510e9b02ff774647)
Abstract:

Demand for health oriented products such as sugar-free, low calorie and high fibre products is increasing. One such recent trend is to increase the fibre content in food products to overcome health problems such as hypertension, diabetes, and colon cancer, among others. Consumption of high fibre products consisting of indigestible cellulose, hemicellulose, lignin and gums have several health benefits. Apart from these benefits, [beta]-glucan-rich fibres have the benefit of reducing the absorption of glucose. Fibre sources from wheat, rice, oat and barley were used to study their influence on rheological characteristics of wheat flour dough and biscuit making quality. Ash, total protein and dietary fibre content of bran samples ranged between 4% and 10%, 12% and 14% and 20.4% and 49.5%, respectively. Farinograph characteristics of the wheat flour-bran blends showed increase in water absorption from 60.3% to 76.3% with increase in the level of bran from 0% to 40%. The resistance to extension values as well as extensibility of the dough decreased with increase in the bran level. The spread ratio of the biscuits prepared from wheat, rice and oat bran blends decreased from 8.38 to 7.52, whereas the same increased to 9.3 for biscuits prepared from barley bran blends. The breaking strength values of biscuits ranged between 1.34 and 3.83 kg. Highly acceptable biscuits could be obtained by incorporating 30% of oat bran or 20% of barley bran in the formulation.
Keywords: Cereal fibre; Rheological characteristics; Dietary fibre and Biscuit

Nathalie Cayot, Sensory quality of traditional foods, Food Chemistry, Volume 101, Issue 1, 2007, Pages 154-162, ISSN 0308-8146, DOI: 10.1016/j.foodchem.2006.01.012.
(http://www.sciencedirect.com/science/article/B6T6R-4JDVP74-5/2/41891622a6c795e7b7083d0d56ebd2f4)
Abstract:
It is generally admitted that the expression `traditional food' refers to a product with specific raw materials, and/or with a recipe known for a long time, and/or with a specific process.
Industrialization of food production, European laws on food safety and even the development of innovative products necessitate the characterization of the typical sensory characteristics of these traditional products.
Numerous are the sensory studies made on wine, cheese or cereal products. Different strategies can be used for such studies, depending on the aim of the study: olfactometry to determine key-aroma compounds in local wines, texture profiling for pressed cheeses, tracing aroma compounds brought by the various raw materials or generated by the different unit operations of a process.
More than that, the perception of the sensory characteristics of a product is related not only to its intrinsic characteristics.
This short review evidences that the mastery of food products implies to integrate all the steps of their production and marketing, from the raw materials to the consumer.
Keywords: Traditional foods; Sensory; PGI; PDO; Bread; Cheese; Wine; Flavour

Guadalupe Garcia-Llatas, Maria Jesus Lagarda, Fernando Romero, Pedro Abellan, Rosaura Farre, A headspace solid-phase microextraction method of use in monitoring hexanal and pentane during storage: Application to liquid infant foods and powdered infant formulas, Food Chemistry, Volume 101, Issue 3, 2007, Pages 1078-1086, ISSN 0308-8146, DOI: 10.1016/j.foodchem.2006.03.007.
(http://www.sciencedirect.com/science/article/B6T6R-4K2SKF7-7/2/921781a37c867b6281e0a75223d5d7f0)
Abstract:
The determination of two secondary lipid oxidation compounds (hexanal and pentane) in liquid infant foods using a headspace solid-phase microextraction gas chromatographic (HS-SPME-GC) method has been developed and validated.
The HS-SPME analytical conditions (fibre position, equilibration and sampling times) were selected. The analytical parameters of the method (linearity: hexanal from 2.48 to 84.78 ng/g,

pentane from 6.21 to 79.55 ng/g; precision: hexanal - 2.87%, pentane - 2.34-3.46%; recovery: hexanal - 106.60%, pentane - 95.39%; detection limit: hexanal - 3.63 ng and pentane - 4.2 ng) demonstrate the usefulness of the method.
Once optimized, the method was applied to liquid infant foods based on milk and cereals, and to powdered adapted and follow-up milk-based infant formulas (IF), stored for four and seven months. In all cases the hexanal content was higher in IF than in milk-cereal based infant foods. No pentane was found in IF.
Keywords: Hexanal; Pentane; Liquid infant foods; HS-SPME-GC determination; Lipid oxidation

Lourdes Bosch, Amparo Alegria, Rosaura Farre, Gonzalo Clemente, Fluorescence and color as markers for the Maillard reaction in milk-cereal based infant foods during storage, Food Chemistry, Volume 105, Issue 3, 2007, Pages 1135-1143, ISSN 0308-8146, DOI: 10.1016/j.foodchem.2007.02.016.
(http://www.sciencedirect.com/science/article/B6T6R-4N5CXN6-7/2/b3061fa475a8fab3a89f34b17100b98b)
Abstract:
Free and total fluorescence compounds and color formation were measured in three different milk-cereal based infant foods stored at 25, 30 and 37 [degree sign]C for 9 months to evaluate the advanced and final stages of the Maillard reaction. Milk-cereal infant foods containing honey (B) or fruits (C) had fluorescent values higher than sample (A) without them. This difference could be ascribed to the higher monosaccharide (fructose and/or glucose) content of (B) and (C), which could increase susceptibility to the Maillard reaction. However, for color increase ([Delta]E), no significant differences ($p < 0.05$) among the three types of samples were found. During the storage period, a gradual increase in fluorescence and color was observed, and statistically significant differences among the three temperatures studied were detected, the values being greater at 37 [degree sign]C than at 30 [degree sign]C and 25 [degree sign]C.
Keywords: Fluorescence; Color; Maillard reaction; Milk-cereal based infant foods; Storage

R. Shyama Prasad Rao, G. Muralikrishna, Structural characteristics of water-soluble feruloyl arabinoxylans from rice (Oryza sativa) and ragi (finger millet, Eleusine coracana): Variations upon malting, Food Chemistry, Volume 104, Issue 3, 2007, Pages 1160-1170, ISSN 0308-8146, DOI: 10.1016/j.foodchem.2007.01.015.
(http://www.sciencedirect.com/science/article/B6T6R-4MWXR0M-K/2/661294fe1d9b81e609a165fc56bd822b)
Abstract:
Water-soluble feruloyl arabinoxylans (feraxans), isolated from native and malted (96 h) rice (Oryza sativa) and ragi (Eleusine coracana) grains, were fractionated on DEAE-cellulose, followed by purification on Sephacryl S-300 and the homogeneity was ascertained by high performance size exclusion chromatography, cellulose acetate and capillary electrophoresis. Structural characterization of the purified polysaccharides by methylation, followed by GLC-MS, and also by 1H NMR and 13C NMR spectroscopy, indicated very high branching and presence of high amounts of O-2 substituted xylans. The amount of O-2, 3 disubstituted xylopyranosyl residues and the arabinose:xylose ratio was higher in malt feraxans. All feraxan samples consumed almost equal amounts of periodate (4.02-4.30 [mu]mol/mg). High amount of xylose (~40%), as identified by Smith degradation, further substantiated the high branching of feraxans. A model is presented depicting the structure of water-soluble feraxans from rice and ragi and their changes upon malting.
Keywords: Arabinoxylan; Cereals; Ferulic acid; Malting; Ragi; Structure

Thi Thanh Thuy Nguyen, Jean-Pierre Guyot, Christele Icard-Verniere, Isabelle Rochette, Gerard Loiseau, Effect of high pressure homogenisation on the capacity of Lactobacillus plantarum A6 to

ferment rice/soybean slurries to prepare high energy density complementary food, Food Chemistry, Volume 102, Issue 4, 2007, Pages 1288-1295, ISSN 0308-8146, DOI: 10.1016/j.foodchem.2006.07.020.
(http://www.sciencedirect.com/science/article/B6T6R-4M4TP0H-1/2/9db893e84929a443bc9abf678464a4af)
Abstract:
New bioprocesses to prepare high energy density (HED) gruels for complementary young child feeding are being developed based on the ability of amylolytic lactic acid bacteria (ALAB) to modify the rheological characteristics of cereal-based slurries, provided appropriate pretreatment are applied. Gelatinisation is a common pre-treatment which could be implemented to enhance the action of amylases, and has been successfully used in a former study (Nguyen, T. T. T., Loiseau, G., Icard-Verniere, C., Rochette, I., Treche, S., & Guyot, J.-P. (2007). Effect of fermentation by amylolytic lactic acid bacteria in process combinations on characteristics of rice/soybean slurries: a new method to prepare high energy density complementary foods for young children. Food Chemistry, 100, 623-631.) in combination with ALAB to prepare from a blend of rice/soybean flours semi-liquid fermented HED gruels with a high dry matter (DM) content (23-32%). In this study, it is shown that a mild pre-heating treatment which consists in suspending a rice/soybean flour blend in hot water (70 [degree sign]C) combined with high pressure homogenisation (HPH) can substitute gelatinisation before fermentation by the ALAB Lactobacillus plantarum A6 to prepare HDE gruels after cooking of the fermented slurry. As an alternative, allowing better condition of handling and storage, spray drying can be applied to such pre-heated HPH treated fermented slurries to obtain fermented flours which can be used further to prepare HDE gruels.
Keywords: Gruel; Rice; Soybean; Energy density; High pressure homogenisation; Fermentation; Amylolytic bacteria; Spray drying

Sara Perales, Reyes Barbera, M Jesus Lagarda, Rosaura Farre, Availability of iron from milk-based formulas and fruit juices containing milk and cereals estimated by in vitro methods (solubility, dialysability) and uptake and transport by Caco-2 cells, Food Chemistry, Volume 102, Issue 4, 2007, Pages 1296-1303, ISSN 0308-8146, DOI: 10.1016/j.foodchem.2006.07.019.
(http://www.sciencedirect.com/science/article/B6T6R-4M0BHRV-B/2/56695a5c3fb8fe705c502f76c9b10d9b)
Abstract:
Iron solubility, dialysability and transport and uptake (retention + transport) by Caco-2 cells as indicators of iron availability have been estimated in the in vitro gastrointestinal digests of infant foods (adapted, follow-up and toddler milk-based formulas and fruit juices containing milk and cereals (FMC)). Low correlation coefficients (in all cases R-squared [less-than-or-equals, slant] 37.1%) were obtained between iron solubility or dialysability versus transport or uptake efficiency - a fact emphasizing the importance of incorporating Caco-2 cell cultures to in vitro systems in order to adapt the conditions to those found in in vivo assays. The highest uptake efficiency corresponded to FMC (25.6-26.1%) and toddler formulas (32.1-41.9%), the samples with the highest ascorbic acid contents and ascorbic acid/iron molar ratios. In addition, the toddler formulas contained caseinphosphopeptides with the cluster sequence SpSpSpEE, representing the binding site for minerals. In adapted formulas, greater iron uptake efficiency was obtained for the formulation containing ferrous lactate (22.7%) versus ferrous sulfate (4.7%).
Keywords: Iron bioavailability; Infant foods; Simulated digestion; Caco-2 cells

Cristina Delgado-Andrade, Jose A. Rufian-Henares, Francisco J. Morales, Lysine availability is diminished in commercial fibre-enriched breakfast cereals, Food Chemistry, Volume 100, Issue 2, 2007, Pages 725-731, ISSN 0308-8146, DOI: 10.1016/j.foodchem.2005.10.031.
(http://www.sciencedirect.com/science/article/B6T6R-4HVF12C-3/2/dd1dfeb35dc3ddcb162962de3f9bde44)

Abstract:
Furosine is a heat-induced marker for thermal treatment in foodstuffs and is directly related to the loss of lysine availability. Furosine was analysed in 60 commercial breakfast cereals in order to assess the protein nutritional value. Samples were hydrolysed with 7.95 M HCl at 110 [degree sign]C for 23 h, clarified by solid-phase extraction and furosine quantified by ion-pairing HPLC. Statistical analyses were applied according to the type of cereal (corn, wheat, rice or mixture), the addition of cocoa powder, sugar content, dietary fibre and protein content, physical form of the product, as well as the consumers for whom they are intended (adults or infants). Data showed a statistically significant effects of protein content, added-dietary fibre and physical form of the samples (flakes/puffed) on the level of furosine present in commercial breakfast cereals. The higher the protein content in the formulation, the higher were the furosine levels, regardless of the protein source. Significantly higher furosine levels were found in puffed commercial breakfast cereals. Fibre-enriched commercial breakfast cereals showed the most marked reduction of nutritional properties.
Keywords: Maillard reaction; Breakfast cereals; Furosine; Available lysine

Yemisi A. Adebowale, Isaac A. Adeyemi, Aladesanmi A. Oshodi, Keshavan Niranjan, Isolation, fractionation and characterisation of proteins from Mucuna bean, Food Chemistry, Volume 104, Issue 1, 2007, Pages 287-299, ISSN 0308-8146, DOI: 10.1016/j.foodchem.2006.11.050.
(http://www.sciencedirect.com/science/article/B6T6R-4MYFG29-1/2/72fbd1638d9cf8af2f2926cac1b3004e)
Abstract:
The chemical composition and fractional distribution of protein isolates prepared from species of Mucuna bean were studied. Using six different extraction media, the yield of protein based on the Kjeldahl procedure varied from 8% to 34%, and the protein content varied from 75% to 95%. When the yields were high, the colour of the isolates generally tended to be dark and unsatisfactory. Hence, the use of chemical treatments and high pressure processing were explored.
The solubility maxima for the protein isolates in water were found to occur at pH values of 2.0 and 11.0, while the pH corresponding to minimum solubility (i.e. isoelectric region) occurred at pH values of 4.0 and 5.0. The total essential amino acid in the isolates ranged from 495 to 557 mg g-1 protein, which compares favourably with the recommended level for pre-school and school children. Methionine and cysteine were the limiting amino acids. A key nutritional attribute of the protein isolates was its high lysine content. The isolate can therefore complement cereal-based foods which are deficient in lysine.
The proteins mainly consisted of albumins, glutelins and globulins. Prolamins were only present in trace concentration (<0.3%). Gel filtration chromatograms of the isolates indicated the presence of major protein fractions with molecular weights of 40 and 15 kDa, while gel electrophoresis (SDS-PAGE) indicated a major broad zone with molecular weights of 36 +/- 7 and 17.3 +/- 3 kDa.
Keywords: Mucuna species; Protein isolate; Isoelectric precipitation; Protein fractions

Mary Ellen Camire, Michael P. Dougherty, Jack L. Briggs, Functionality of fruit powders in extruded corn breakfast cereals, Food Chemistry, Volume 101, Issue 2, 2007, Pages 765-770, ISSN 0308-8146, DOI: 10.1016/j.foodchem.2006.02.031.
(http://www.sciencedirect.com/science/article/B6T6R-4JMM5X7-3/2/985760e80041618e1942b138d48f7309)
Abstract:
Consumer interest in naturally colored foods such as breakfast cereals is growing. Degermed white cornmeal, sucrose, citric acid and dehydrated fruit powder (blueberry, cranberry, Concord grape and raspberry) were mixed in 84.3%:14.3%:0.4%:1.0% proportions, then extruded in a laboratory-scale twin-screw extruder. Feed rate was 255 g/min; water was pumped at a rate of 12.5 g/min; screw speed was 175 rpm. Cooking temperature during extrusion was generally <130

[degree sign]C. Samples were cut into small spheres and dried to 5% moisture. Cereals were stored at room temperature in opaque bags. The control samples were lighter and less red than the fruit cereals. Soluble phenolics and anthocyanins were higher in the fruit cereals. At three and six weeks of storage, fruit cereals had smaller levels of hexanal, as measured by gas chromatography of headspace of ground cereals. Although anthocyanins from fruit powders survive extrusion and retain some antioxidant activity, the levels used in this study may have been too low. Higher levels of fruit will increase production costs, but the expense may be offset by the more attractive and functional cereals that result.
Keywords: Extrusion; Anthocyanin; Antioxidant activity; Fruit

Arwa Mustafa, Per Aman, Roger Andersson, Afaf Kamal-Eldin, Analysis of free amino acids in cereal products, Food Chemistry, Volume 105, Issue 1, 2007, Pages 317-324, ISSN 0308-8146, DOI: 10.1016/j.foodchem.2006.11.044.
(http://www.sciencedirect.com/science/article/B6T6R-4MSY8PF-2/2/90e97f9d32b71e0ec0ce6c6e187e55c9)
Abstract:
Free amino acids were extracted from cereal products using 50% ethanol to prevent solubilization of polysaccharides and other viscous polymers and to avoid starch gelatinization. The extracts were analyzed by GC after ion-exchange solid phase extraction and chloroformate derivatization using Ez-Faast technology (Phenomenex). Free amino acids in cereal products could be analyzed within 1 h of extraction and determination, with good separation between peaks and repeatable retention times. Relative correction factor for each amino acid was established. The matrix did not affect the results and the method was repeatable for most of the amino acids (coefficient of variation was in the order of 10%). Different fractions and products of wheat, rye, oats and barely were analyzed. The bran contained more free amino acids than did the other analysed fractions of cereals. Fermentation seemed to consume free asparagine and aspartic acid and to use or release other amino acids.
Keywords: Free amino acids analysis; Cereal fractions; Cereal products; Fermentation; Baking; Gas chromatography

Sreeramaiah Hemalatha, Kalpana Platel, Krishnapura Srinivasan, Zinc and iron contents and their bioaccessibility in cereals and pulses consumed in India, Food Chemistry, Volume 102, Issue 4, 2007, Pages 1328-1336, ISSN 0308-8146, DOI: 10.1016/j.foodchem.2006.07.015.
(http://www.sciencedirect.com/science/article/B6T6R-4M0BHRV-8/2/97d501dd5aa87206d8f00ce77bee8604)
Abstract:
Several cereals and pulses commonly consumed in India were screened for zinc and iron contents and their bioaccessibility in the same was determined by equilibrium dialysis employing an in vitro simulated digestion procedure. Zinc content of cereals ranged from 1.08 mg/100 g in rice to 2.24 mg/100 g in sorghum. Zinc content of pulses was between 2.03 mg/100 g (whole chickpea) and 2.68 mg/ 100 g (decorticated chickpea). Iron content of cereals ranged from 1.32 mg% in rice to 6.51 mg% in sorghum, while that of pulses ranged from 3.85 mg% in decorticated green gram to 6.46 mg% in black gram. Dialyzability of zinc from pulses (27-56%) was generally higher than that from cereals (5.5-21.4%). Dialyzabilities of iron were almost similar from both cereals and pulses examined and were 4.13-8.05% in cereals and 1.77-10.2 % in pulses. A significant negative correlation between inherent phytate content and zinc dialyzability value was inferred in the case of pulses. Phytic acid content of the cereals had a significant negative influence on iron dialyzability. Inherent calcium had a negative influence on zinc dialyzability in cereals. Tannin did not have any significant influence on zinc or iron dialyzabilities from cereals and pulses. While both insoluble and soluble fractions of the dietary fibre generally interfered with zinc dialyzability, the insoluble fraction alone had this effect on iron dialyzability. The lower collective negative influence

of the inherent factors on zinc dialyzability from pulses is consistent with their higher concentrations in these grains, relative to cereals. The negative correlation of inherent phytic acid with zinc and iron dialyzabilities was supported by enhanced dialyzabilities of these minerals upon partial removal of phytate from the grains by treatment with fungal phytase.
Keywords: Zinc; Iron; Cereals; Pulses; Bioaccessibility; Inherent factors

Robert Kovacs, Aron Beni, Roland Karosi, Csilla Sogor, Jozsef Posta, Investigation of chromium content in foodstuffs and nutrition supplements by GFAAS and determination of changing Cr(III) to Cr(VI) during baking and toasting bread, Food Chemistry, Volume 105, Issue 3, 2007, Pages 1209-1213, ISSN 0308-8146, DOI: 10.1016/j.foodchem.2007.02.030.
(http://www.sciencedirect.com/science/article/B6T6R-4N5TNGF-1/2/64e809f542c8a9430f9de5163129e9a9)
Abstract:
In our work the chromium content of foodstuffs, spices, beverages and nutrition supplements was determined. We set out to determine in what quantity these satisfy the organism's daily chromium requirement. We wanted to get an answer about to the question if a sportsman wants to plan his diet from the chromium consumption point of view, does he believe that the data given satisfy the necessary essential amount of chromium content. The results obtained were compared to data published by other authors and data can be found in the Internet. These data do not only differ significantly from the results obtained by us, but from each other as well. At present there is no available literature data to us demonstrating whether toxic chromium compounds can occur from the natural Cr(III) content of cereal milling products used when baking and toasting bread, that is why we considered examining it.
Keywords: Foodstuff; Bread; Chromium; GFAAS

G. Dongowski, Interactions between dietary fibre-rich preparations and glycoconjugated bile acids in vitro, Food Chemistry, Volume 104, Issue 1, 2007, Pages 390-397, ISSN 0308-8146, DOI: 10.1016/j.foodchem.2006.11.053.
(http://www.sciencedirect.com/science/article/B6T6R-4MVDVSK-1/2/89fa7eb6fd66fee8d70111deef0bc3ea)
Abstract:
Binding in small intestine and excretion of bile acids constitute a major hypocholesterolemic pathway. Interactions between different types of commercial and laboratory-made dietary fibres and glycoconjugated bile acids were investigated in vitro at pH 5.0 and 6.5. The interactions were greater at the lower pH and with dihydroxy-bile acids. Digested cereal products (barley, oat, rye and wheat flour; oat bran), alcohol-insoluble substances from apples, strawberries, rowan berries, carrots, white cabbage, red beets and sugar beet pulp, as well as arabinoxylan, bound 1.21-1.77 [mu]mol bile acids/100 mg of preparation at pH 5.0. Novelose bound approximately 0.65 [mu]mol bile acids/100 mg. Carob fibre had the highest binding capacity (1.83-1.96 [mu]mol bile acids/100 mg) whereas cellulose had no effect. Besides the source and chemical composition, the bile acid binding correlated especially well with the presence of three-dimensional cell wall structures of the tested preparations but less well with the proportions of soluble and insoluble dietary fibre.
Keywords: Dietary fibre; Cereals; Fruits; Vegetables; Bile acid binding; In vitro

S. Chethan, N.G. Malleshi, Finger millet polyphenols: Optimization of extraction and the effect of pH on their stability, Food Chemistry, Volume 105, Issue 2, 2007, Pages 862-870, ISSN 0308-8146, DOI: 10.1016/j.foodchem.2007.02.012.
(http://www.sciencedirect.com/science/article/B6T6R-4N3WYRS-1/2/c0dd38a2fcb6994496aca20182e3b156)
Abstract:

Finger millet, one of the minor cereals, is known for several health benefits and some of the health benefits are attributed to its polyphenol contents. Investigations of suitable solvents for extraction of polyphenols and their stability, during changes of pH and temperature, were carried out. Histochemical examination of the millet kernels, and also analysis of the seed coat and the endosperm fractions of the millet for the polyphenol contents, revealed that nearly 90% of the polyphenols were concentrated in the seed coat tissue. In view of that, the polyphenol contents of the seed coat fraction of the millet were extracted with different polar and non-polar solvents, and it was observed that 1% HCl-methanol was very effective for extraction of the millet polyphenols. Accordingly, the polyphenols were extracted with acidic methanol and the polyphenols obtained were examined for pH and temperature stability. The phenolic contents (6.4 +/- 1.0%) of the extract remained constant at highly acidic to near neutral pH (6.5) but decreased gradually to 2.5 +/- 0.3% as the alkalinity increased to pH 10. The increase in pH resulted in precipitation of some of the extracted matter, and this increased from 4 +/- 0.5% to 40 +/- 3% of the extracted matter, as the pH increased from 1 to 10. But, the polyphenol contents of the extract were stable to the changes in the temperature of the extract. Fractionation of the polyphenols extracted by high performance liquid chromatography (HPLC) showed that the analytes were derivatives of benzoic acid (gallic acid, proto-catechuic acid, and p-hydroxy benzoic acid) and cinnamic acid (p-coumaric acid, syringic acid, ferulic acid and trans-cinnamic acid). However, in a highly alkaline condition (pH 10) of the extract, only gallic acid and proto-catechuic acid were detected.
Keywords: Finger millet; Polyphenols; Histochemistry; pH stability; Fractionation by HPLC

Rennan G.O. Araujo, Fabio de S. Dias, Samuel M. Macedo, Walter N.L. dos Santos, Sergio L.C. Ferreira, Method development for the determination of manganese in wheat flour by slurry sampling flame atomic absorption spectrometry, Food Chemistry, Volume 101, Issue 1, 2007, Pages 397-400, ISSN 0308-8146, DOI: 10.1016/j.foodchem.2005.10.024.
(http://www.sciencedirect.com/science/article/B6T6R-4HR76RR-7/2/5bcc1ec2b30ca7630503620256c1df68)
Abstract:
The wheat is one of the cereals more consumed in the human food in all worlds. In the form of flour it is used for preparation of breads, cookies, pizzas, cakes, and etc. This way, the knowledge of the mineral content this cereal and its flour is very important. Considering it, methods for determination of metals in these matrices are opportune and several papers have been performed. In this paper, a slurry sampling flame atomic absorption spectrometric method for the determination of manganese in wheat flour is proposed. The optimization step was performed using univariate methodology involving the variables: nature and concentration of the acid solution for slurry preparation, sonication time and sample mass.
The established experimental conditions after optimization recommend a sample mass of 0.5 g, 2.0 mol L-1nitric acid solution and a sonication time of 15 min.
This method allows the determination of manganese in wheat flour using the standard calibration technique, with a detection limit of 0.13 [mu]g g-1, and a precision, expressed as relative standard deviation (RSD) of 3.5% (n = 10) for a manganese content of about 7.6 [mu]g g-1 and using a wheat flour mass of 0.5 g. The accuracy was confirmed by analyzing of three certified reference materials of rice flours.
The proposed method was applied for the determination of manganese in seven samples of wheat flour acquired in supermarkets from Salvador City, Brazil. In these, the manganese content varied of 5.2 and 7.6 [mu]g g-1. The results showed no significant differences with those obtained after complete digestion of these samples and manganese determination also using FAAS.
Keywords: Slurry sampling; Wheat flour; Manganese determination; FAAS

Mohana Kumari, Asna Urooj, N. Narayan Prasad, Effect of storage on resistant starch and amylose content of cereal-pulse based ready-to-eat commercial products, Food Chemistry,

Volume 102, Issue 4, 2007, Pages 1425-1430, ISSN 0308-8146, DOI: 10.1016/j.foodchem.2006.10.022.
(http://www.sciencedirect.com/science/article/B6T6R-4MD95BV-B/2/cb9981e9afc9241fbadf0c141004e5fa)
Abstract:
A wide range of ready-to-eat (RTE) foods, with varied shelf life are commercially available to meet the increasing demand for convenience foods, both by the Armed Forces and the public at large. The study evaluated the effect of storage on the resistant starch (RS) and amylose content of selected ready-to-eat (RTE) cereal-pulse based processed foods viz., pongal, khara bhath, dal fry, bisibele bhath, rajmah and kesari bhath, developed by Defence Food Research Laboratory, Mysore. RS was quantified directly in the residues obtained after removing digested starch in simulated physiological conditions. Nutrient composition and carbohydrate profile of the foods were also analyzed. The carbohydrate profile indicated low amounts of sugars, except in case of kesari bhath. The total starch content ranged from 14.5 to 24 g% while amylose ranged from 1.2 to 7.2 g%, respectively. The total and resistant starch in the RTE foods varied depending on the ingredients used and type of processing. Foods containing higher amylose content were found to have maximum increases in RS content after storage. Storage at ambient conditions resulted in significant increases ($p < 0.05$) in RS and TS content of RTE foods. The findings reveal that the RTE foods studied hitherto contained appreciable quantities of RS, which further increased on storage.
Keywords: Processed foods; Resistant starch; Amylose; Storage

Carole Marques, Ludovic D'auria, Patrice D. Cani, Chiara Baccelli, Raoul Rozenberg, Nike L. Ruibal-Mendieta, Geraldine Petitjean, Dominique L. Delacroix, Joelle Quetin-Leclercq, Jean-Louis Habib-Jiwan, Marc Meurens, Nathalie M. Delzenne, Comparison of glycemic index of spelt and wheat bread in human volunteers, Food Chemistry, Volume 100, Issue 3, 2007, Pages 1265-1271, ISSN 0308-8146, DOI: 10.1016/j.foodchem.2005.10.003.
(http://www.sciencedirect.com/science/article/B6T6R-4HPK90X-2/2/dc45b0c85b26bfbe8f49f7f3f7c3688b)
Abstract:
The assessment of the glycemic index (GI) seems to be an important parameter to take into account in order to better understand the physiologic effects of foods with high carbohydrate levels. Among cereals, which are major sources of carbohydrates, spelt (Triticum spelta L.) has been considered as particularly interesting from a nutritional point of view. The aim of this study was to evaluate in vivo the GI of white spelt bread in healthy subjects. The wheat (Triticum aestivum L.) white bread was used as reference food. To avoid differences in the production of both breads, spelt and wheat breads were baked under the same controlled conditions. Results showed that the glycemic profile of spelt white bread was not different from that of wheat white bread (GI of 93 +/- 9). The area under the glycemic curve significantly and negatively correlated to fasting glycemia and carbohydrate intake during evening meals preceding the test. In conclusion, the glycemic response to spelt bread was similar to that of wheat bread. However, in order to avoid more inter-individual variability, our data supports the importance to propose standardised carbohydrate content for the last meal before evaluating the GI of food.
Keywords: Glycemic index; Spelt; Wheat; Bread; Evening meal

Belma Giray, Gozde Girgin, A. Basak Engin, Sevtap Aydin, Gonul Sahin, Aflatoxin levels in wheat samples consumed in some regions of Turkey, Food Control, Volume 18, Issue 1, January 2007, Pages 23-29, ISSN 0956-7135, DOI: 10.1016/j.foodcont.2005.08.002.
(http://www.sciencedirect.com/science/article/B6T6S-4H6XKW5-1/2/f7b6310ca554edd7070bb58584531bbd)
Abstract:

Aflatoxins (AFs), the secondary metabolites produced by species of Aspergilli, specifically Aspergillus flavus and Aspergillus parasiticus, have harmful effects on humans, animals, and crops that result in illnesses and economic losses. Wheat that is susceptible to these fungi infections through its growth, harvest, transport, and storage, is the most important staple food in Turkey. Therefore, this study has been undertaken to determine the AFB1, AFB2, AFG1, AFG2 levels by HPLC in forty-one wheat samples grown and consumed in some regions of Turkey. The concentrations of total AFs in the wheat samples were determined to be ranging from 10.4 to 643.5 ng/kg. Fiftynine percent of the samples were found to be positive for total AFs. The percentage of positive samples for AFB1, AFB2, AFG1, and AFG2 were 42, 12, 37, and 12%, respectively. Although the detected levels are under the permitted levels for AFs in cereals, these amounts should be considered in regard to overall daily exposure to mycotoxins.
Keywords: Aflatoxin; Wheat; HPLC; Turkey

T. Katsumata, T. Suzuki, H. Aizawa, E. Matashige, Photoluminescence evaluation of cereals for a quality control application, Journal of Food Engineering, Volume 78, Issue 2, January 2007, Pages 588-590, ISSN 0260-8774, DOI: 10.1016/j.jfoodeng.2005.10.029.
(http://www.sciencedirect.com/science/article/B6T8J-4HVDN0D-3/2/8e52c60933577f2db9980649011178b6)
Abstract:
Visible light photoluminescence (PL) peaking at around [lambda] = 460 nm is observed from cereals, such as rice, wheat, barley, millet, flour, corn starch, peanut, under illumination of ultra-violet light at [lambda] = 365 nm. Peak intensity of PL varies with variety and source of the specimens. Distribution of PL intensity over two dimensional PL image of a cereal with a single variety and a single source is found to be fitted with a Gaussian curve. Visible light PL is suggested to be potentially useful technique for the non-destructive and quick evaluation of the cereals and other starchy products.
Keywords: Photoluminescence; Cereal; Quality control; Non-destructive evaluation

L.K. Assie, F. Francis, N. Gengler, E. Haubruge, Response and genetic analysis of malathion-specific resistant Tribolium castaneum (Herbst) in relation to population density, Journal of Stored Products Research, Volume 43, Issue 1, 2007, Pages 33-44, ISSN 0022-474X, DOI: 10.1016/j.jspr.2004.12.001.
(http://www.sciencedirect.com/science/article/B6T8Y-4KVXPPM-1/2/2506fcc4dac9e8e422e9ebdd624a989b)
Abstract:
Extensive use of malathion for pest control on stored cereals has resulted in worldwide resistance in red flour beetles, Tribolium castaneum. In this paper we investigate population density effects on the malathion-specific resistance in PRm, a strain from the Philippines, in an integrated resistance management framework. Two populations of malathion-specific resistant (PRm) and a malathion-susceptible strain of T. castaneum were bred at different densities: low (4 adults/g) and high (12 adults/g) density on wheat plus brewer's yeast in the laboratory. After eight generations, slopes of probit regression lines and LC50 values were used to monitor the effect of insect rearing density on the progression of malathion-specific resistance. The LC50 of the malathion-susceptible strain (Asm) did not change significantly during selection while LC50s varied for both the high-density and low-density lines of PRm, the LC50 of malathion ranged from 27.51 to 34.06 and from 21.14 to 29.39 [mu]g malathion cm-2 for high and low density, respectively.
More than 33 generations were required to achieve a 10-fold increase of resistance for the low-density line compared to only 17 generations for the high-density line. Calculations from published formulae suggested that the malathion-specific resistance of both high- and low-density lines was under monofactorial control, with complete dominance.

The data showed that environmental factors such as population density differences in insect rearing and development may influence the heritability of resistance. Furthermore, the variability in results published worldwide on resistance emphasises the need to standardize test conditions across laboratories.
Keywords: Tribolium castaneum; Malathion; Heritability; Insecticide resistance; Population density

Yong Lin Ren, Daphne Mahon, Evaluation of 35S-residues in grains and grain fractions fumigated with 35S-labelled carbonyl sulfide, Journal of Stored Products Research, Volume 43, Issue 4, 2007, Pages 356-361, ISSN 0022-474X, DOI: 10.1016/j.jspr.2006.10.001.
(http://www.sciencedirect.com/science/article/B6T8Y-4N08X39-2/2/0d7725a4151f894d721118c14f6f2a98)
Abstract:
35S-labelled carbonyl sulfide (CO35S) was used to measure the amount of sorbed 35S residues and converted 35S residues in grains and grain fractions after fumigation with CO35S. Hard wheat, soft wheat, paddy rice, brown rice, polished rice, sorghum, maize, canola, barley, oats and peas were exposed for 4 days to 50 mg L-1 of CO35S with a total radioactivity of 20 mCi. After exposure, the samples were aired. The levels of 35S residues varied with extraction solvent, e.g. 0.003-0.02 mg (COS equivalents) kg-1 (grain) in chloroform extractions and 0.09-0.38 mg kg-1 in water extractions. More than 90% of 35S (COS equivalents) residues were in the water extractions. The total radioactivity determined by scanning radiation images (fluorescent image) of extractions and sectioned commodities ranged from 0.1 to 0.4 mg kg-1. The radiation image shows that more than 90% of 35S residues were located or distributed in the embryo, testa, pericarp and husk, and that the 35S was still slowly desorbing from grains after 2 days aeration.
Keywords: Fumigation; Cereals; Legumes; Oilseeds; Carbonyl sulfide; 35S-labelled carbonyl sulfide; 35S residue

Jozef Fornal, Tomasz Jelinski, Jadwiga Sadowska, Stanislaw Grundas, Jan Nawrot, Anna Niewiada, Jerzy R. Warchalewski, Wioletta Blaszczak, Detection of granary weevil Sitophilus granarius (L.) eggs and internal stages in wheat grain using soft X-ray and image analysis, Journal of Stored Products Research, Volume 43, Issue 2, 2007, Pages 142-148, ISSN 0022-474X, DOI: 10.1016/j.jspr.2006.02.003.
(http://www.sciencedirect.com/science/article/B6T8Y-4JT8DKV-1/2/aab7fdbd18d81efba192ad425797b295)
Abstract:
In order to prevent grain mass and quality losses, rapid methods for early detection of insect infestation of cereal grain during trade and storage are urgently needed. Amongst many options, the soft X-ray method using roentgenograms is one of the most frequently applied. It has been shown that when some corrections for working parameters of the equipment used are made and some modification of the digital image analysis introduced, the soft X-ray method is suitable for accurate detection of granary weevil eggs laid in wheat kernels if at least 5 days after oviposition have elapsed.
Keywords: Wheat grain; Granary weevil; Sitophilus granarius; Eggs; X-ray detection; Digital image analysis; Algorithm

S. Mohan, S.S. Sivakumar, S.R. Venkatesh, G.S.V. Raghavan, Penetration of polyethylene sheets coated with protein-enriched pea flour solution by two stored-product insects, Journal of Stored Products Research, Volume 43, Issue 2, 2007, Pages 202-204, ISSN 0022-474X, DOI: 10.1016/j.jspr.2006.01.002.
(http://www.sciencedirect.com/science/article/B6T8Y-4MY6N6K-1/2/dfec54244e936cb90fb66bbeef075c83)
Abstract:

Adults of Sitophilus oryzae (L.) and Rhyzopertha dominica (F.) penetrated polyethylene sheets (0.0635 mm thickness) coated with protein-enriched pea flour solution (water pH 8.5-9.0) at 0 (control), 1 and 5% levels, but did not penetrate the sheets coated with a 10% concentration. The potential of using protein-enriched pea flour in the manufacture of insect-proof factory impregnated plastic sheeting is discussed.
Keywords: Polyethylene sheet; Coating; Pea protein; Sitophilus; Rhyzopertha; Cereal; Wheat

D. Moret, I. Braud, J.L Arrue, Water balance simulation of a dryland soil during fallow under conventional and conservation tillage in semiarid Aragon, Northeast Spain, Soil and Tillage Research, Volume 92, Issues 1-2, January 2007, Pages 251-263, ISSN 0167-1987, DOI: 10.1016/j.still.2006.03.012.
(http://www.sciencedirect.com/science/article/B6TC6-4K66DN0-1/2/51c7c0ff7704075687ca8903a57e1a9d)
Abstract:
In Central Aragon, winter cereal is sown in the autumn (November-December), commonly after a 16-18 months fallow period aimed at conserving soil water. This paper uses the Simple Soil-Plant-Atmosphere Transfer (SiSPAT) model, in conjunction with field data, to study the effect of long fallowing on the soil water balance under three tillage management systems (conventional tillage, CT; reduced tillage, RT; and no-tillage, NT). This was on the assumption that soil properties would remain unchanged during the entire fallow season. Once the model was validated with data obtained before primary tillage implementation, the differences between simulated and observed soil water losses for the CT and RT treatments could be interpreted as the direct effect of the soil tillage system. The model was calibrated and validated in a long-term tillage experiment using data from three contrasting long-fallow seasons over the period 1999-2002, where special attention was paid to predicting soil hydraulic properties in the pre-tillage conditions. The capacity of the model to simulate the soil water balance and its components over long fallowing was demonstrated. Both the fallow rainfall pattern and the tillage management system affected the soil water budget and components predicted by the model. The model predicted that about 81% of fallow seasonal rainfall is lost by evaporation in long-fallow periods with both a dry autumn in the first year of fallow and a rainfall above normal in spring. Whereas, when the fallow season is characterised by a wet autumn during the first year of fallow the model predicted a decrease in soil water evaporation and an increase in water storage and deep drainage components. In this case, the predicted water lost by evaporation was higher under NT (64%) than under RT (56%) and CT (44%). The comparison between measured and simulated soil water loss showed that the practice of tillage decreased soil water conservation in the short term. The long-term analysis of the soil water balance showed that, in fallow periods with a wet autumn during the first year of fallow, the soil water loss measured under CT and RT was moderately greater than that predicted by the model.
Keywords: Water balance; Modelling; Soil water conservation; Tillage management; Long-fallowing

Richard L. Jinks, Ian Willoughby, Corinne Baker, Direct seeding of ash (Fraxinus excelsior L.) and sycamore (Acer pseudoplatanus L.): The effects of sowing date, pre-emergent herbicides, cultivation, and protection on seedling emergence and survival, Forest Ecology and Management, Volume 237, Issues 1-3, 15 December 2006, Pages 373-386, ISSN 0378-1127, DOI: 10.1016/j.foreco.2006.09.060.
(http://www.sciencedirect.com/science/article/B6T6X-4M7VB44-6/2/5126bd3c7ab5988a90e0eb0eb0ae5933)
Abstract:
Direct seeding is an alternative method to conventional planting for woodland establishment that has several potential advantages. This study reports the effects of sowing date, pre-emergent herbicides, and cultivation and protection on the emergence and survival of direct-sown ash

(Fraxinus excelsior L.) and sycamore (Acer pseudoplatanus L.) on three sites in southern England situated on former pasture and arable land, and on a windblown site in beech (Fagus sylvatica L.) woodland. Few seedlings emerged at the woodland site probably due to excessive seed predation by small mammals. At the other sites, the effects of sowing date on emergence reflected seasonal variation in soil moisture content and temperature. Periods of soil waterlogging in seed beds during winter resulted in greatly reduced seedling emergence of early sown seeds, and seedling emergence of both species ceased once the daily maximum soil temperature exceeded 25 [degree sign]C, which was in late April in this study. Analysis of the thermal time requirements for complete emergence of both species under the recorded soil-temperature regime suggested that the latest sowing date that would allow emergence before soil temperatures were too high was the beginning of March. Ash seedlings were particularly vulnerable to freezing injury after spring frosts that occurred during the seedling emergence period in one experiment. This study also confirmed earlier work identifying the potential of the herbicides napropamide, pendimethalin, and isoxaben for use on direct seeded ash and sycamore, and the results show the importance of adequate vegetation management for maintaining seedling survival and growth. For winter sowing, protecting seed beds with fleece was found to enhance seedling establishment, but reduced subsequent seedling survival after the protection was removed. Compared with cultivated soil, direct-drilling tree seed between the stubble of preceding cereal crop had no effect on seedling emergence, and increased seedling survival.
Keywords: Direct seeding; Direct sowing; Seedling emergence; Seedling mortality; Soil temperature; Thermal time; Pre-emergence herbicides

Sean M. Tibbetts, Joyce E. Milley, Santosh P. Lall, Apparent protein and energy digestibility of common and alternative feed ingredients by Atlantic cod, Gadus morhua (Linnaeus, 1758), Aquaculture, Volume 261, Issue 4, 11 December 2006, Pages 1314-1327, ISSN 0044-8486, DOI: 10.1016/j.aquaculture.2006.08.052.
(http://www.sciencedirect.com/science/article/B6T4D-4KV8461-1/2/2c4d5409038861999c22738fe789b3f1)
Abstract:
Studies were conducted with Atlantic cod, Gadus morhua (L.), to determine the apparent digestibility coefficients (ADCs) of protein and energy and the digestible energy (DE) content in feed ingredients widely available in Canada. We also tested the assumption of 'independency' used in digestibility studies. The feed ingredients included two fish meals (herring, anchovy), three crustacean by-product meals (whole krill, crab, shrimp), two animal by-product meals (poultry by-product, hydrolyzed feather), six oilseed meals (soybean, soy protein concentrate, soy protein isolate, canola, canola protein concentrate, flaxseed), two pulse meals (white lupin, pea protein concentrate) and two cereal grain meals (corn gluten, wheat gluten). Protein ADCs were high for wheat gluten meal (99.9%), soy protein concentrate (98.6%), soy protein isolate (97.4%), whole krill meal (96.3%), herring meal (93.3%), soybean meal (92.3%), anchovy meal (92.2%), pea protein concentrate (89.8%), white lupin meal (89.7%), crab meal (89.4%), canola protein concentrate (88.8%) and corn gluten meal (86.3%); mid-range for poultry by-product meal (80.2%) and canola meal (76.0%); and low for shrimp meal (66.7%), hydrolyzed feather meal (62.4%) and flaxseed meal (50.2-55.0%). Energy ADC was high for whole krill meal (96.3%), wheat gluten meal (95.4%), soy protein concentrate (94.9%), herring meal (92.8%), soy protein isolate (92.1%), soybean meal (88.1%) and anchovy meal (86.4%); mid-range for canola protein concentrate (83.3%), corn gluten meal (82.7%), crab meal (82.4%), pea protein concentrate (76.7%) and white lupin meal (75.3%); and low for poultry by-product meal (71.0%), canola meal (60.6%), hydrolyzed feather meal (58.9%), shrimp meal (41.4%) and flaxseed meal (21.2-37.4%). From the protein ADC data, results clearly showed that the basal diet and test feed ingredients were digested independently of one another in nearly all cases, the only exceptions being for those diets containing test ingredients of very high (> 99%, wheat gluten) or very low (< 67%, hydrolyzed

feather and flaxseed) protein ADCs. In the case of DE, the basal diet and test feed ingredients were digested independently in all test diets without exception.
Keywords: Cod; Digestibility; Marine by-products; Animal by-products; Plant proteins

Miguel Jurado, Covadonga Vazquez, Sonia Marin, Vicente Sanchis, M. Teresa Gonzalez-Jaen, PCR-based strategy to detect contamination with mycotoxigenic Fusarium species in maize, Systematic and Applied Microbiology, Volume 29, Issue 8, 4 December 2006, Pages 681-689, ISSN 0723-2020, DOI: 10.1016/j.syapm.2006.01.014.
(http://www.sciencedirect.com/science/article/B7GVX-4JCSK3H-1/2/b9a22769546d3aa7362fb860cef14866)
Abstract:
Contamination of cereals with mycotoxigenic species of Fusarium is an important source of trichothecenes, fumonisins and other mycotoxins which cause serious diseases in human and animals. In addition, these species are phytopathogenic and produce severe losses in cereal yield. Methods for early detection of these Fusarium species are crucial to prevent toxins entering the food chain and are a useful tool in disease management practices. We have developed an integrated protocol for diagnosis of mycotoxigenic Fusarium contamination in maize which can also be used for other cereals. The protocol consisted in an easy and rapid DNA extraction from maize samples (grain and germ), and subsequent group-specific polymerase chain reaction (PCR) assays for genus Fusarium, Gibberella fujikuroi complex, and trichothecene-producing species of Fusarium, that orientate the search of the critical species. We have additionally developed a PCR assay for the identification of F. proliferatum. The primers were designed on the basis of IGS sequence (Intergenic Spacer of rDNA), a multi-copy region in the genome that permits to enhance the sensitivity of the assay in comparison with PCR assays based on single-copy sequences. The suitability of the protocol and the relative efficacy of single and multi-copy sequence-based PCR assays have been tested in a wide range of fumonisin-contaminated maize samples.
Keywords: Mycotoxins; Trichothecenes; Fumonisins; Fusarium; Fusarium proliferatum; Gibberella fujikuroi; Cereals; Maize; PCR

J.L. Gonzalez-Andujar, C. Fernandez-Quintanilla, J. Izquierdo, J.M. Urbano, SIMCE: An expert system for seedling weed identification in cereals, Computers and Electronics in Agriculture, Volume 54, Issue 2, December 2006, Pages 115-123, ISSN 0168-1699, DOI: 10.1016/j.compag.2006.08.002.
(http://www.sciencedirect.com/science/article/B6T5M-4KYY3HM-1/2/5e4d4486117c917f3a825e68d3d8062c)
Abstract:
Identification of weed seedlings is a difficult task. An expert system to help farmers and extension workers to identify weed species in cereals has been developed. The expert system uses a hierarchical classification and a mix of the text description, photographs and artistic pictures. The system is supported by a data base containing information about 41 weed species and 128 colour images. The expert system was evaluated following the conventional expert system evaluation methodologies. Results of the validation indicated that non-expert users were able to make identification using the expert system. A total of 149 identifications were performed and 63% were identified correctly. The erroneous identifications tended to cluster around monocot species; especially Avena sterilis, Lolium rigidum, Phalaris ssp. and Bromus sterilis were misidentified. Results of the validation process and the writing suggestions provided by the participants were used to implement improvements in the system. The program can be used as an identification tool for farmers and technicians and for educational purposes.
Keywords: Expert systems; Seedling weed identification; Cereals; Knowledge base

Ewa Gondek, Piotr P. Lewicki, Antiplasticization of cereal-based products by water. Part II: Breakfast cereals, Journal of Food Engineering, Volume 77, Issue 3, Special Section: CHISA 2004 (pp. 379-471), December 2006, Pages 644-652, ISSN 0260-8774, DOI: 10.1016/j.jfoodeng.2005.07.023.
(http://www.sciencedirect.com/science/article/B6T8J-4H396X6-2/2/a6533ffa4cb4e0dbb3b5345b46d29b92)
Abstract:
Corn and wheat bran flakes were equilibrated to different water activities and subjected to compression in bulk. Relationship between both force and work of compression and water activity was analyzed using Peleg's and Fermi's equations. Scanning electron microphotographs were used to analyze microscopic structure of flakes.
In both analyzed flakes an antiplasticizing effect of water was observed. Beyond water activity 0.6-0.7 plasticizing effect of water was noticed. In the antiplasticizing range of water activities response of flakes to compressing force was related to microstructure of the material. Relationship between both the force and work of compression and water activity in corn flakes was curvilinear and could not be approximated by the Fermi's equation. Corn flakes showed rather homogenous porous structure with continuous air cell wall matrix. Influence of water activity on both the force and work of compression in wheat bran flakes was well described by the Fermi's equation. The flakes showed microstructure with many discontinuities and resembling agglomerate. The antiplasticizing effect of water was less evident than that in corn flakes and the compression either force or work changed little with water activity until a critical value was reached.
Keywords: Compression force; Compression work; Plastic flow; Critical water activity; Microstructure; Corn flakes; Wheat bran flakes

E.O. Cuevas-Rodriguez, N.M. Verdugo-Montoya, P.I. Angulo-Bejarano, J. Milan-Carrillo, R. Mora-Escobedo, L.A. Bello-Perez, J.A. Garzon-Tiznado, C. Reyes-Moreno, Nutritional properties of tempeh flour from quality protein maize (Zea mays L.), LWT - Food Science and Technology, Volume 39, Issue 10, December 2006, Pages 1072-1079, ISSN 0023-6438, DOI: 10.1016/j.lwt.2005.07.003.
(http://www.sciencedirect.com/science/article/B6WMV-4H2G0D9-1/2/5243adb806681fe6e1306dc7af478c2a)
Abstract:
The objective of this investigation was to evaluate physico-chemical and nutritional properties of tempeh flour from a quality protein maize (QPM). In comparison to untreated QPM, the QPM tempeh flour showed a higher (P[less-than-or-equals, slant]0.05) gelatinization temperature (81.7 vs 73.9 [degree sign]C), and resistant starch (4.24 vs 1.9 g/100 g dry flour), and a lower (P[less-than-or-equals, slant]0.05) gelatinization enthalpy (1.94 vs 2.74 J/g) and total starch content (56.9 vs 62.6 g/100 g dry flour). The essential amino acids (EAAs) content of raw QPM flour was improved by the solid-state fermentation process. The contents of His, Ile, and Leu increased (P[less-than-or-equals, slant]0.05) in 0.81, 0.52, and 1.46 g/100 g protein, respectively. The total sulphur and total aromatic EAAs increased (P[less-than-or-equals, slant]0.05) in 0.55 and 3.45 g/100 g protein, respectively. In untreated QPM flour, the first and second limiting EAAs were Lys and Trp, with EAAs score of 0.72. First and second limiting EAAs in QPM tempeh flour were Trp and Lys, with an EAAs score of 0.84. The SSF process increased (P[less-than-or-equals, slant]0.05) nutritional indicators as follows: protein efficiency ratio (PER) from 1.78 to 2.10, calculated PER from 1.43 to 1.74, and protein digestibility corrected amino acid score from 0.55 to 0.83. It is concluded that based mainly on its nutritive value, fermented flour may be considered for the fortification of widely consumed cereal-based food product (tortillas, bread, cookies, atoles).
Keywords: Nutritional; Quality protein maize; Tempeh

Nelly Blair, R.D. Faulkner, A.R. Till, G.J. Crocker, Long-term management impacts on soil C, N and physical fertility: Part III: Tamworth crop rotation experiment, Soil and Tillage Research, Volume 91, Issues 1-2, December 2006, Pages 48-56, ISSN 0167-1987, DOI: 10.1016/j.still.2005.11.003.
(http://www.sciencedirect.com/science/article/B6TC6-4HPKBMG-2/2/6b5979236100f82554a7f93b31478052)
Abstract:
Degradation of soil structure can lead to increased risk of run-off and soil erosion, and therefore, it is necessary to implement management practices that are more sustainable and will enhance and rehabilitate soils while increasing food production. The impact of small-grain rotations grown with legumes, fallow and continuously on total C (CT), labile C (CL), non-labile C (CNL), total N (NT), aggregation expressed as mean weight diameter (MWD) and infiltration determined as unsaturated hydraulic conductivity (Kunsat) were examined in a long-term rotation trial established in 1966 on a Black Earth (Pellic Vertisol) and a Red Clay (Chromic Vertisol) soil near Tamworth, in New South Wales, Australia. The results were compared with an adjacent uncropped pasture on each soil type. Cropping reduced all C fractions, NT, MWD and Kunsat on both soils, which were further degraded when long fallowing was included in the rotation. CL decreased by 70% with long fallow in the Red Clay and by 78% in the Black Earth compared with the adjacent pasture, while MWD decreased by 61% in the Red Clay and 91% in the Black Earth. Rotation of cereals with legumes resulted in smaller decreases in C fractions, NT, MWD and Kunsat when compared with pasture. Rotation with lucerne (Medicago sativa) resulted in 41% higher CL, 45% higher MWD and 87% higher Kunsat (10 mm tension) than long fallow on the Red Clay soil and 65, 126 and 43% higher on the Black Earth soil. There were strong positive correlations of soil C fractions and NT with MWD for both soil types. Similar significant relationships were found for all C fractions and NT with Kunsat (10 mm tension) for the Red Clay soil, but not for the Black Earth. Rotations with forage legumes can limit declines in C fractions, NT, MWD and Kunsat when cropping these soils and has potential to increase soil sustainability.
Keywords: Crop rotations; Carbon fractions; Nitrogen; Soil structure; Infiltration

W.J. Wang, R.C. Dalal, Carbon inventory for a cereal cropping system under contrasting tillage, nitrogen fertilisation and stubble management practices, Soil and Tillage Research, Volume 91, Issues 1-2, December 2006, Pages 68-74, ISSN 0167-1987, DOI: 10.1016/j.still.2005.11.005.
(http://www.sciencedirect.com/science/article/B6TC6-4HV7494-1/2/58744c55fc4e5d3839f79afe345a2549)
Abstract:
Conservation farming practices are often considered effective measures to increase soil organic C (SOC) sequestration and/or to reduce CO2 emissions resulting from farm machinery operation. The long-term CO2 mitigation potentials of no-till (NT) versus conventional till (CT), stubble retention (SR) versus stubble burning (SB) and N fertilisation (NF) versus no N application (N0) as well as their interactions were examined on a Vertosol (Vertisol) in semi-arid subtropical Queensland, Australia by taking into account their impacts on SOC content, crop residue C storage, on-farm fossil fuel consumption and CO2 emissions associated with N fertiliser application. The experimental site had been cropped with wheat (Triticum aestivum L.) or barley (Hordeum vulgare L.) with a summer fallow for 33 years.
Where NT, SR or NF was applied alone, no significant effect on SOC was found in the 0-10, 10-20 and 0-20 cm depths. Nonetheless, the treatment effects in the 0-10 cm depth were interactive and maximum SOC sequestration was achieved under the NT + SR + NF treatment. Carbon storage in crop residues decreased substantially during the fallow period, to a range between 0.4 Mg CO2-e ha-1 under the CT + SB + NF treatment and 2.4 Mg CO2-e ha-1 under the NT + SR + N0 treatment (CO2-e stands for CO2 equivalent). The cumulative fossil fuel CO2 emission over 33 years was estimated to be 2.2 Mg CO2-e ha-1 less under NT than under CT systems. Cumulative

CO2 emissions from N fertiliser application amounted to 3.0 Mg CO2 ha-1. The farm-level C accounting indicated that a net C sequestration of 4.5 Mg CO2-e was achieved under the NT + SR + NF treatment, whilst net CO2 emissions ranging from 0.5 to 6.0 Mg CO2-e ha-1 over 33 years occurred under other treatments.
Keywords: Carbon; Greenhouse; No-till; Tillage; Stubble retention; Nitrogen; Carbon sequestration; Global change

T.A. Basamba, E. Barrios, E. Amezquita, I.M. Rao, B.R. Singh, Tillage effects on maize yield in a Colombian savanna oxisol: Soil organic matter and P fractions, Soil and Tillage Research, Volume 91, Issues 1-2, December 2006, Pages 131-142, ISSN 0167-1987, DOI: 10.1016/j.still.2005.11.010.
(http://www.sciencedirect.com/science/article/B6TC6-4J6W6X1-1/2/a9c23e1dc30b58f2416bbfcaec4eb924)
Abstract:
Soil organic matter (SOM) and phosphorus (P) fractions play a key role in sustaining the productivity of acid-savanna oxisols and are greatly influenced by tillage practices. In 1993, a long-term experiment on sustainable crop rotation and ley farming systems was initiated on a Colombian acid-savanna oxisol to test the effects of grain legumes, green manures, intercrops and leys as possible components that could increase the stability of systems involving annual cereal crops. Five agropastoral treatments (maize monoculture--MMO, maize-soybean rotation--MRT, maize-soybean green manure rotation--MGM, native savanna control--NSC and maize-agropastoral rotation--MAP) under two tillage systems (no till-NT and minimum tillage-MT) were investigated. The effects of NT and MT on SOM and P fractions as well as maize grain yield under the five agropastoral treatments were evaluated. Results showed that soil total C, N and P were generally better under no-till as compared to minimum-tilled soils. While P fractions were also generally higher under no-till treatments, SOM fractions did not show any specific trend. Seven years after establishment of the long-term ley farming experiment (5 years of conventional tillage followed by 2 years alternative tillage systems), MT resulted into moderately higher maize grain yields as compared to NT. The MGM rotation treatment had significantly higher values of maize yield under both tillage systems (4.2 Mg) compared to the NSC (2.3 Mg ha-1). Results from this study indicate that the rotational systems (maize-soybean green manure and maize-pastures) improved the soil conditions to implement the no-till or minimum tillage systems on Colombian savanna oxisol.
Keywords: Soil organic matter fractions; Phosphorus fractions; Savanna; Legumes; Tillage; Maize yield

G.-W. Rathke, T. Behrens, W. Diepenbrock, Integrated nitrogen management strategies to improve seed yield, oil content and nitrogen efficiency of winter oilseed rape (Brassica napus L.): A review, Agriculture, Ecosystems & Environment, Volume 117, Issues 2-3, November 2006, Pages 80-108, ISSN 0167-8809, DOI: 10.1016/j.agee.2006.04.006.
(http://www.sciencedirect.com/science/article/B6T3Y-4K4WMJB-1/2/9a6e2b5e6647cc157d93ddc159d84469)
Abstract:
Winter oilseed rape (Brassica napus L.) is the dominant oilseed crop in northern Europe. Generally, it requires high amounts of nitrogen (N) but is characterized by low N-efficiency, which is defined as produced seed dry weight per unit of accumulated N-fertilizer. Consequently, there is a strong need to resume all the relevant information on N in relation to cropping of winter oilseed rape and environmental impact to improve the efficiency of rape production. To enhance the productivity of winter oilseed rape cropping, integrated N-management strategies are needed including optimized N-supply due to varied crop rotations or fertilization, best soil and crop management practices. This paper reviews various N-management strategies in relation to seed

yield and N-efficiency of winter oilseed rape. Comparing different previous crops, winter oilseed rape yielded considerably lower after cereal crops than following legumes. The seed yield is not only affected by the position within the crop rotation but also by the length of the break between two winter oilseed rape crops and type of cultivar. The use of N-efficient cultivars with reduced N-demand led to lower N-balance surpluses. Since the optimal N-treatment varies with cultivar, year and site condition, the maximum quantity of N-fertilizer for highest seed yield are discussed. A comparison of N-fertilizers reveals that N-fertilizers work different due to their chemical composition. Moreover, rate of N-recovery varies among methods and timing of N-application. Adjusted to the timing of optimum N-demand of the crop, timing of N-doses effectively increases production efficiency of winter oilseed rape. Apart from these integrated N-management strategies soil cultivation, seeding, application of plant protection agents and plant growth regulators as well as soil fertilization and harvesting are closely interacting with N-efficiency of winter oilseed rape. Altogether, amount and timing of N-fertilizer as well as cultivar selection had the strongest influence on productivity followed by smaller effects due to previous crop and type of fertilizer. Using N-efficient management strategies like choice of variety, form and timing of N-application adapted to site conditions, a remarkable reduction in fertilizer N-demand (up to 50% of fertilizer input) is possible leading to lower N-balance surpluses in winter oilseed rape production, thus minimizing environmental pollution.
Keywords: Nitrogen (N) management strategies; Seed yield; Oil content; N-efficiency; Winter oilseed rape

A.J. Duncan, Abdur Rahman, D.W. Miller, P. Frutos, I.J. Gordon, Atiq-ur Rehman, Ataullah Baig, Farman Ali, I.A. Wright, Transhumance livestock production in the Northern Areas of Pakistan: Nutritional inputs and productive outputs, Agriculture, Ecosystems & Environment, Volume 117, Issues 2-3, November 2006, Pages 195-204, ISSN 0167-8809, DOI: 10.1016/j.agee.2006.04.003.
(http://www.sciencedirect.com/science/article/B6T3Y-4JW7WKD-1/2/3f3f1993e1ca9b5b0c50b4d955d52d79)
Abstract:
The Northern Areas of Pakistan form a mountainous, semi-arid region in which subsistence mixed farming is the predominant economic activity for the majority of the population, which numbers around 1 million. Following a period of relative isolation, construction of the Karakoram Highway and the ensuing development activity have been catalysts for rapid infrastructural and social change over the last two decades. In the study reported here, feed resources for the livestock enterprise, which is largely made up of cattle, goats and sheep, were studied in detail over the course of a single winter feeding season. Productive outputs including liveweight change, milk production and reproductive performance were also quantified over a full year. The aim of the study was to provide a quantitative description of the system and to assess the extent to which proximity to a major highway influenced livestock husbandary. Six villages across the region were selected for study as part of a 2 x 3 factorial design with one village per cell of the study design. Factors consisted of two geographical transects and three agro-ecological zones. Transects were the Karakoram Highway (KKH) transect which enjoyed relatively good transport infrastructure and the Gilgit Ghizer Region (GGR) transect where infrastructure was more limited. Agro-ecological zones were the single, transitional and double cropping zones. One village per transect from each of the three main agro-ecological zones was chosen for study with 6-7 households within each village studied. Results showed that feed resources per household did not vary significantly according to transect or zone but cattle numbers per household were higher in the GGR transect than in the KKH transect indicating a heavier reliance on subsistence livestock production in this transect. Live weight and body condition of livestock in the Northern Areas changed markedly over the annual cycle. Losses of live weight were in the order of 10% over winter while summer gains during the summer season averaged 35% of initial live weight. There were differences between transects, with animals in the KKH gaining less weight in summer but showing higher milk yield (in

cattle) and better reproductive performance. The results indicate a typical system of smallholder livestock production with heavy reliance on cereal by-products, a mix of livestock species and a relative scarcity of stored feed resources relative to overall livestock holdings. This study also suggests that proximity to the main highway running through the Northern Areas is associated with a reduced but more feed-efficient livestock production system.
Keywords: Livestock system; Pakistan; Productivity; Smallholder; Nutrient supply

P.J. Van Soest, Rice straw, the role of silica and treatments to improve quality, Animal Feed Science and Technology, Volume 130, Issues 3-4, 1 November 2006, Pages 137-171, ISSN 0377-8401, DOI: 10.1016/j.anifeedsci.2006.01.023.
(http://www.sciencedirect.com/science/article/B6T42-4JVSWMV-1/2/d31bc1d3a68b7ba048f8616791c9f8a4)
Abstract:
Rice straw is unique relative to other cereal straws in being low in lignin and high in silica. Unlike other cereal straws taller varieties of rice straws tend to be leafy while the leaves are less digested than stems. This may contribute to higher straw value with rice yield. There is genetic variation in straw quality but has not been exploited and tends to be smaller than environmental variation. Effort in plant breeding has been to develop short varieties with higher grain yield. This development has reduced straw quantity but not nutritive value. The relationship between plant genetics and silica metabolism is virtually uninvestigated, although reviews from plant physiology indicate it is a major factor.
Silica and lignin in that order are the primary limiting factors in rice straw quality. Silicon is a nutrient element which has been overlooked largely because of its assumed inertness, but also because of its geochemical abundance that so greatly exceeds its metabolic use by plants and animals. Silicon is involved in several major roles in rice: carbohydrate synthesis, grain yield, phenolic synthesis and plant cell wall protection. These vectors interact with each other to eliminate statistical association of silica and lignin with straw digestibility when varieties are compared. Yield of grain is highly related to silica content of straw, which reflects soil availability. There are no detailed studies on rice straw lignin. Most papers reporting lignin contents in rice straw have used acid-detergent lignin by either the sulfuric acid or permanganate versions. There are undoubtedly soluble phenolics in rice straw that need investigation. The effects of ammonia and urea on silica is to crack the silicified cuticular layer. Silica is not dissolved by these reagents in contrast to the action of sodium hydroxide.
Treatments on rice straw follow those applied to other lignified materials. In order of frequency of reports, urea followed by ammonia with comparatively fewer papers on sodium hydroxide, steam and pressure treatments or exploded by pressure release, and only one or two papers on acid treatments and white rot fungi. There are reports on animal supplementation and a few growth studies with young animals. Field surveys in India and the southeast Asian countries only report the use of urea, although it appears less efficient than ammonia. Farmer acceptance is related to their perceptions on costs, labor, equipment, health, safety, i.e. the exposure to ammonia vapor, economic and other social factors. The various papers reporting treatments have used animal digestion trials; a variety of in sacco, in vitro digestions with rumen organisms or cellulase, some in combination with pepsin digestion or neutral-detergent extraction. Gas production from in vitro rumen fermentation has also been used. Results are expressed mainly on dry matter basis and fewer reports on organic matter. Results are difficult to compare and standardization of procedures is badly needed. However, most treatments with ammonia and urea show some increase in digestibility and intake where measured in in vivo trials. In vitro and in sacco evaluations tend to overestimate improvement in digestibility.
Keywords: Rice straw; Silica; Digestibility; Quality; Treatments

J.A. Dyer, R.L. Desjardins, An Integrated Index of Electrical Energy Use in Canadian Agriculture with Implications for Greenhouse Gas Emissions, Biosystems Engineering, Volume 95, Issue 3, November 2006, Pages 449-460, ISSN 1537-5110, DOI: 10.1016/j.biosystemseng.2006.07.013.
(http://www.sciencedirect.com/science/article/B6WXV-4KVXHRC-1/2/ba7d3677be7472a9d00befecc5c076f4)
Abstract:
Electricity is fundamental to many farm chores. In this paper quantitative indices of electrical energy use were developed which reflect direct on-farm decisions for measures that farmers can adopt to reduce their greenhouse gas (GHG) emissions. With commonly available historical agricultural records as inputs, the indices allowed extrapolation backward in time with the same analytical methods as used for current energy use estimates. Each index was derived from one or more literature sources dealing with energy use in operations associated with different farming systems. Development focused on six major Canadian farm types, including two for crop production systems and four for livestock. The scale of application is national with required inputs being populations of pigs, poultry, beef and dairy cows, and crop production for small grain cereals, grain maize and canola, and greenhouse floor area.
The indices were initially compared to the 1996 Farm Energy Use Survey (FEUS) of Canada and were within 5% of the FEUS electrical energy value. The integrated index was then converted to equivalent CO2 emissions for comparison with two independent sources CO2 emissions from farm energy. It agreed more closely with the 2004 Energy Use Data Handbook from Natural Resources Canada than with the 1999 Health of our Air report by Agriculture and Agri-food Canada, but was between these two sources. The comparisons of CO2 emissions took account of energy use for household as well as farm operations. The impact of the changing share of electrical energy generated by fossil fuel, rather than by nuclear or hydro-power plants was also considered. Between 1996 and 2001 Canadian farm and household use of electrical energy resulted in GHG emissions from 1[middle dot]8 to 2[middle dot]4 Tg of CO2, while use for farm operations only (household excluded) remained at 1[middle dot]1 Tg from the 1980s to 2001 when electrical generation by fossil fuel was fixed at 1996 levels. The integrated index is well within the required accuracy to be a useful tool for reporting on the Kyoto Protocol.

C. Pekrun, P.J.W. Lutman, A. Buchse, A. Albertini, W. Claupein, Reducing potential gene escape in time by appropriate post-harvest tillage--Evidence from field experiments with oilseed rape at 10 sites in Europe, European Journal of Agronomy, Volume 25, Issue 4, November 2006, Pages 289-298, ISSN 1161-0301, DOI: 10.1016/j.eja.2006.06.006.
(http://www.sciencedirect.com/science/article/B6T67-4KHC3H3-1/2/4d695234228ef283385fcfefc491bd57)
Abstract:
Persistence of oilseed rapeseed in soil can result in weed problems but also reduce oil quality of following rape crops or result in unwanted gene escape which is particularly relevant in the context of genetically modified oilseed rape. In this paper data from 13 field experiments at sites in England, Austria and Germany are presented where tillage operations were tested that potentially reduce the build-up of a seed bank. In the majority of experiments seed losses were artificially simulated by broadcasting ca. 10,000 freshly ripened rapeseed m-2 onto cereal stubbles. Oilseed rapeseedlings in autumn, the seed bank in winter-spring and yields of the following crop winter wheat were assessed as a function of tillage regime. During summer and autumn 19-70% of the seeds germinated and emerged. This part of the population was killed by following tillage operations or herbicide applications. However, 0-29%, in moist years 0-5%, of the initially broadcasted seeds developed dormancy and remained ungerminated in the soil until the following winter-spring.
Delaying incorporation of the seeds by leaving the stubble untouched for up to 4 weeks resulted in a reduced seed bank in almost every case. Also, repeated stubble tillage compared to an early

single stubble tillage operation resulted in a smaller seed bank. The type of primary tillage (ploughing versus non-inversion cultivation) had no clear effect. No relation was found between the number of seedlings in autumn and the size of the seed bank the following winter-spring. Grain yield of the following crop winter wheat was not adversely affected by delayed stubble tillage.
The results indicate that stubble tillage aiming at a reduced seed bank of oilseed rape should focus on conditions avoiding induction of secondary dormancy rather than improving germination conditions. This means that, under the climatic conditions of central and western Europe, the stubble should be left untouched for several weeks after harvest before starting the usual tillage sequence with stubble tillage and ploughing or a non-inversion tillage sequence.
Keywords: Oilseed rape; Post-harvest tillage; Stubble tillage; Volunteer; Seed bank

Jorgen Berntsen, Jorgen E. Olesen, Bjorn M. Petersen, Elly M. Hansen, Long-term fate of nitrogen uptake in catch crops, European Journal of Agronomy, Volume 25, Issue 4, November 2006, Pages 383-390, ISSN 1161-0301, DOI: 10.1016/j.eja.2006.07.006.
(http://www.sciencedirect.com/science/article/B6T67-4KTVP7Y-1/2/1facdedf7de8a0ea10e34cc3dad81911)
Abstract:
The long-term effects of undersowing a ryegrass catch crop in cereals was analysed with the FASSET simulation model. The model was tested on a 28-year field experiment with ryegrass catch crops in spring barley. The experiment included treatments with nitrogen (N) fertiliser rates, catch crop use and timing of tillage. The modelled effects of these treatments generally agreed with observations on crop production, soil carbon, soil nitrogen and nitrate leaching. Both the observations and the simulations predicted a yield increase of 7 kg N ha-1 and an increase in nitrate leaching of 13 kg N ha-1 due to a prehistory of 24 years with continuous use of catch crops compared to a prehistory without catch crops.
A range of scenarios was constructed to evaluate the fate of the reduced nitrate leaching on crop N uptake, N leaching, gaseous emissions and change in soil organic N, and how this fate interacts with soils and climate and management. These scenarios showed that 22-30% of the reduced nitrate leaching was subsequently leached during the following decades after termination of catch crop use. Between 35 and 40% of the reduced nitrate leaching was harvested in cereals. The exact distribution depended primarily on the soil texture. The scenarios showed that effects of catch crops should be evaluated on the long-term rather than consider short-term effects only.
Keywords: Catch crops; Cover crops; Dynamic simulation; Modelling; Nitrate leaching; Residual effects

A. Zinedine, C. Brera, S. Elakhdari, C. Catano, F. Debegnach, S. Angelini, B. De Santis, M. Faid, M. Benlemlih, V. Minardi, M. Miraglia, Natural occurrence of mycotoxins in cereals and spices commercialized in Morocco, Food Control, Volume 17, Issue 11, November 2006, Pages 868-874, ISSN 0956-7135, DOI: 10.1016/j.foodcont.2005.06.001.
(http://www.sciencedirect.com/science/article/B6T6S-4GSJR29-1/2/002ee3fadface32d067df0982c7440bd)
Abstract:
Sixty samples of cereals (20 of corn, 20 of barley, and 20 of wheat) and 55 samples of spices (14 of paprika, 12 of ginger, 14 of cumin, and 15 of pepper) purchased from popular markets of Rabat and Sale in Morocco were analyzed for mycotoxins.
Cereals samples were all analyzed for ochratoxin A (OTA). The average levels of contamination were 1.08, 0.42, and 0.17 [mu]g/kg for corn, wheat, and barley, respectively. Samples of corn were also analyzed for zearalenone (ZEA) and fumonisin B1 (FB1) the average contaminations were 14 and 1930 [mu]g/kg, respectively. Co-occurrence of OTA, FB1, and ZEA was also checked. Spices samples were analyzed only for aflatoxins (AFs) and the average contaminations found for aflatoxin B1 (AFB1) were 0.09, 0.63, 2.88 and 0.03 [mu]g/kg for black pepper, ginger, red paprika

and cumin, respectively. The higher level of contamination was found in red paprika (9.68 [mu]g/kg).
The present report is the first one ever drafted on the natural co-occurrence of OTA, FB1 and ZEA in cereals and on the occurrence of AFs in spices from Morocco.
Keywords: Mycotoxins; Occurrence; Morocco

Maria Saarela, Ilkka Virkajarvi, Liisa Nohynek, Anu Vaari, Jaana Matto, Fibres as carriers for Lactobacillus rhamnosus during freeze-drying and storage in apple juice and chocolate-coated breakfast cereals, International Journal of Food Microbiology, Volume 112, Issue 2, 1 November 2006, Pages 171-178, ISSN 0168-1605, DOI: 10.1016/j.ijfoodmicro.2006.05.019.
(http://www.sciencedirect.com/science/article/B6T7K-4KF1HDY-3/2/9d749041af84730925d6476cb5503ad1)
Abstract:
The capability of different fibre preparations to protect the viability and stability of Lactobacillus rhamnosus during freeze-drying, storage in freeze-dried form and after formulation into apple juice and chocolate-coated breakfast cereals was studied. In freeze-drying trials wheat dextrin and polydextrose proved to be promising carriers for the L. rhamnosus strains: both freeze-drying survival and storage stability at 37 [degree sign]C were comparable to the control carrier (sucrose). Using apple fibre and inulin carriers resulted in powders with fairly good initial freeze-drying survival but with poor storage stability at 37 [degree sign]C. When fresh L. rhamnosus cells were added into apple juice (pH 3.5) together with oat flour with 20% [beta]-glucan the survival of the cells was much better at 4 [degree sign]C and at 20 [degree sign]C than with sucrose, wheat dextrin and polydextrose, whereas with freeze-dried cells no protective effect of oat flour could be seen. The stability of freeze-dried L. rhamnosus cells at 20 [degree sign]C was higher in chocolate-coated breakfast cereals compared to low pH apple juice. Similar to freeze-drying stability, wheat dextrin and polydextrose proved to be better carriers than oat flour in chocolate-coated breakfast cereals. Regardless of their differing capability to adhere to fibre preparations the two L. rhamnosus strains studied gave parallel results in the stability studies with different carriers.
Keywords: Lactobacillus rhamnosus; Fibre; Freeze-drying; Stability; Juice; Cereals

J.P. Ferrio, N. Alonso, J. Voltas, J.L. Araus, Grain weight changes over time in ancient cereal crops: Potential roles of climate and genetic improvement, Journal of Cereal Science, Volume 44, Issue 3, November 2006, Pages 323-332, ISSN 0733-5210, DOI: 10.1016/j.jcs.2006.07.013.
(http://www.sciencedirect.com/science/article/B6WHK-4M0BHG3-1/2/7a1d2200ac1b31d5e6d9ef217371ff10)
Abstract:
Inferences of grain weight (GW) for cereals cultivated in the past could be useful to track early agronomic improvements. Though strongly genetically determined, GW also depends on environmental conditions, such as water availability. In the archaeological context, we can estimate GW and plant water status from grain dimensions and carbon isotope discrimination ([Delta]13C), respectively. In this study we attempted to determine the role of environmental changes on the evolution of GW of naked wheat (Triticum aestivum/durum) and hulled barley (Hordeum vulgare) in the Ebro Depression (NE Spain) during the last four millennia. To that end, we examined charred grains from nine archaeological sites, from the Bronze Age (ca. 1950 BCE) to the end of the Middle Ages (XVth century). Estimated GW in archaeological grains (averaging ca. 19.5 mg for both species) was significantly lower than in present rainfed cereals in the area (ca. 35 mg). In contrast, for both species mean [Delta]13C values in archaeological grains were similar to or even greater than in modern material (16.3[per mille sign] and 15.5[per mille sign], respectively). Accordingly, we conclude that the most recent increase in GW cannot be attributed to increased water availability, but probably to empirical breeding efforts which would have started not before the beginning of the CE.

Keywords: Archaeobotany; Carbon isotope discrimination ([Delta]13C); Grain weight; Water availability

Georg Hartmann, Peter Koehler, Herbert Wieser, Rapid degradation of gliadin peptides toxic for coeliac disease patients by proteases from germinating cereals, Journal of Cereal Science, Volume 44, Issue 3, November 2006, Pages 368-371, ISSN 0733-5210, DOI: 10.1016/j.jcs.2006.10.002.
(http://www.sciencedirect.com/science/article/B6WHK-4M6SBG0-3/2/800bc3043aee41c74fe91c958312e55f)
Abstract:
We report the isolation and characterisation of proteases from germinated wheat, rye and barley, and their ability to degrade gliadin peptides toxic for coeliac patients. It is shown for the first time that these proteases cleave these peptides rapidly into non-toxic fragments with less than nine amino acids. These proteases have distinct advantages when compared to bacterial or fungal proteases, and are promising candidates for the detoxification of gluten containing foods and for oral therapy for celiac patients.
Keywords: Coeliac disease; Germination; Cereals; Proteases

Won O. Song, Ock Kyoung Chun, Jean Kerver, Susan Cho, Chin Eun Chung, Sang-Jin Chung, Ready-to-Eat Breakfast Cereal Consumption Enhances Milk and Calcium Intake in the US Population, Journal of the American Dietetic Association, Volume 106, Issue 11, November 2006, Pages 1783-1789, ISSN 0002-8223, DOI: 10.1016/j.jada.2006.08.015.
(http://www.sciencedirect.com/science/article/B758G-4M9NHJD-H/2/9bdbc535170ac3baa117a1ba0b232058)
Abstract: Background
Inadequate intake of calcium-rich foods among US adults and children is a public health concern. Fluid milk is one of the best calcium sources because of its bioavailability and its versatility as both a beverage and a complement to various solid foods. One of the foods commonly consumed with milk is ready-to-eat breakfast cereal (RTEC).Objective
We aimed to establish the association between the intake of RTEC, milk, and calcium within the context of the most current population dietary practices. We hypothesized that RTEC consumption facilitates milk consumption and is associated with adequacy of calcium intake in the US population.Design
The most recent National Health and Nutrition Examination Survey, 1999-2000, data set was used as the source of data for this research.Subjects/setting
US subjects aged 4 years and older (n=7,403), excluding pregnant and/or lactating women. Data were stratified according to sex and age (4 to 8 years, 9 to 13 years, 14 to 18 years, 19 to 30 years, 31 to 50 years, 51 to 70 years, and 71+ years), and then by consumption of breakfast, RTEC, and milk.Statistical analyses performed
SAS (release 8.1, 2000, SAS Institute Inc, Cary, NC) and SUDAAN (release 8.0.2, 2003, Research Triangle Institute, Research Triangle Park, NC) were used to calculate sample weighted means, standard errors, and population percentages. Multiple regression and multiple logistic regression models, with controls for covariates, were used to determine the predictability of total calcium intake from breakfast consumption compared to breakfast nonconsumption, and from inclusion of RTEC and milk in the breakfast meal compared with breakfast meal content without RTEC and milk.Results
RTEC was predominantly consumed at breakfast. Average calcium intake at breakfast was seven times greater when RTEC was consumed with milk than when RTEC was consumed without milk. In multiple regression analyses, breakfast consumption, and milk consumption with or without RTEC all strongly predicted total daily calcium intake ($P<0.05$) while controlling for covariates. The percentage of respondents below the Adequate Intake level for calcium was higher for non-RTEC

breakfast consumers than for RTEC breakfast consumers in all age-sex categories except those older than age 70 years, and girls aged 9 to 13 years.Conclusions
Consumption of RTEC at breakfast was associated with greater daily intake of both milk and calcium in all age and sex groups in the US population.

Len Marquart, Anh-Tram Pham, Lauren Lautenschlager, Michael Croy, Jeffery Sobal, Beliefs about Whole-Grain Foods by Food and Nutrition Professionals, Health Club Members, and Special Supplemental Nutrition Program for Women, Infants, and Children Participants/State Fair Attendees, Journal of the American Dietetic Association, Volume 106, Issue 11, November 2006, Pages 1856-1860, ISSN 0002-8223, DOI: 10.1016/j.jada.2006.08.005.
(http://www.sciencedirect.com/science/article/B758G-4M9NHJD-W/2/bddaf9de27493de1abdef676f013ebab)
Abstract:
Whole-grain foods are important components of healthful diets that may help prevent chronic diseases. Consumer beliefs that influence consumption of whole grains are poorly understood. This analysis surveyed three groups regarding their beliefs about whole-grain foods. The groups were food and nutrition professionals (n=103), health club members (n=103), and individuals representing various consumer segments of the general population, including participants in the Special Supplemental Nutrition Program for Women, Infants, and Children (WIC) and state fair attendees (n=68). Most respondents were aware of the term whole-grain foods, but less often reported that they use the term. Bread and cereal were most often named as examples of whole-grain foods. Lack of processing and use of the entire grain were the major reasons a food was perceived as being a whole-grain food. The major benefit of eating whole grains was reported to be fiber intake. Food and nutrition professionals provided more differentiated responses, whereas WIC/state fair participants had fewer and less elaborate responses. Assessing beliefs about whole grains offers insights to nutrition professionals for encouraging healthful food consumption.

Auvo Sairanen, Hannele Khalili, Perttu Virkajarvi, Concentrate supplementation responses of the pasture-fed dairy cow, Livestock Science, Volume 104, Issue 3, November 2006, Pages 292-302, ISSN 1871-1413, DOI: 10.1016/j.livsci.2006.04.009.
(http://www.sciencedirect.com/science/article/B7XNX-4K7FB4Y-1/2/f6e4ea1c0b8b290a7f1e72675c99a0db)
Abstract:
The aim of this study was to investigate the effects of increasing amounts of cereal-based concentrate on milk production. The study consisted of a series of three separate experiments in which cows were grazed in intensive rotation on timothy-meadow fescue pasture. In Experiment 1, 28 multiparous Holstein-Friesian cows received 0, 3, 6 and 9 kg concentrate in a cross-over designed trial with a fixed daily herbage allowance of 21 kg DM/cow. The energy-corrected milk yield increased linearly 0.84 kg/kg DM ($P < 0.001$), up to the 9 kg concentrate level. The milk fat ($P < 0.001$) and urea ($P < 0.001$) content decreased linearly (0.41 g/kg DM and 0.15 mmol/kg DM, respectively). The milk protein content tended ($P = 0.08$) to increase 0.10 g/kg DM with increasing supplementation.
In Experiment 2, 17 primiparous cows and 28 multiparous cows were used in a randomized-block designed trial with 3, 6 and 9 kg concentrate supplementation and a fixed 25 kg DM herbage allowance. The energy corrected milk yield increased linearly ($P < 0.01$) 0.67 kg/kg DM, whereas the milk urea content decreased linearly ($P < 0.001$) 0.27 mmol/kg DM. The milk protein content increased and the fat content decreased, but these differences were not significant.
In Experiment 3, a cross-over design was used to assess the response to concentrate supplementation of 24 multiparous cows (treatments: 6, 9 and 12 kg; fixed herbage allowance 25 kg DM) and 12 primiparous cows (treatments: 4, 7 and 10 kg; herbage allowance > 25 kg DM). The energy-corrected milk yield of the multiparous cows varied quadratically ($Pquad < 0.001$; 30.0,

32.5 and 32.2 kg for 6, 9 and 12 kg supplementation, respectively). Supplementation linearly decreased the urea ($P < 0.001$) 0.13 mmol/kg DM and fat ($P < 0.001$) 0.46 g/kg DM contents. The milk fat content also varied quadratically, showing the lowest content with the 12 kg level ($Pquad < 0.05$; 37.3, 37.3 and 34.9 g/kg for 6, 9 and 12 kg supplementation, respectively). The energy-corrected milk yield of the primiparous cows increased linearly ($P < 0.001$) 0.54 kg/kg DM up to 10 kg supplementation, whereas the milk urea ($P < 0.001$) and fat contents decreased linearly ($P < 0.01$) by 0.19 mmol/kg DM and 0.61 g/kg DM, respectively.
The results showed that the milk response remained linear up to the 9 kg supplementation level, but the highest level of supplementation resulted in only a marginal increase in milk yield. There was no interaction between season and milk or milk protein yield, which indicates that it is possible to maintain stable grazing conditions during the main grazing season in Nordic latitudes. The results support to some extent the hypothesis that the marginal milk response to supplementation increases with increasing milk production.
Keywords: Dairy cattle; Grazing; Concentrate feeding

C. Cuvelier, A. Clinquart, J.F. Hocquette, J.F. Cabaraux, I. Dufrasne, L. Istasse, J.L. Hornick, Comparison of composition and quality traits of meat from young finishing bulls from Belgian Blue, Limousin and Aberdeen Angus breeds, Meat Science, Volume 74, Issue 3, November 2006, Pages 522-531, ISSN 0309-1740, DOI: 10.1016/j.meatsci.2006.04.032.
(http://www.sciencedirect.com/science/article/B6T9G-4K0C9K9-4/2/309a1ed612e3ba3310465c71fba7b744)
Abstract:
Thirty-six young finishing bulls from three breeds (Belgian Blue, Limousin and Aberdeen Angus) were fattened over five months with finishing diets based either on sugar-beet pulp or on cereals. Nutritional quality traits of meat - fat content and fatty acid composition with emphasis on the n - 6 and n - 3 polyunsaturated fatty acids - along with some organoleptic quality traits were measured. The Belgian Blue bulls had the lowest intramuscular fat content associated with lower saturated and monounsaturated fatty acid contents. The polyunsaturated fatty acid content did not differ to a large extent between the breeds, the Aberdeen Angus bulls showing slightly higher values. Relative to energy intake, the overall contribution of meat to the n - 3 fatty acid recommended intake was small, whatever the breed. By contrast, the contribution of meat to daily fat intake was of greater importance, especially for the Aberdeen Angus bulls. The quality traits of meat varied also according to the breed: compared to the Aberdeen Angus, the Belgian Blue bull meat had the stablest colour, the highest drip and the lowest cooking losses. The meat of Limousin bulls had intermediate characteristics for all the parameters.
Keywords: Finishing bulls; Fat content; Fatty acids; Nutritional quality; Quality traits

Makoto Kimura, Naoko Takahashi-Ando, Takumi Nishiuchi, Shuichi Ohsato, Takeshi Tokai, Noriyuki Ochiai, Makoto Fujimura, Toshiaki Kudo, Hiroshi Hamamoto, Isamu Yamaguchi, Molecular biology and biotechnology for reduction of Fusarium mycotoxin contamination, Pesticide Biochemistry and Physiology, Volume 86, Issue 3, November 2006, Pages 117-123, ISSN 0048-3575, DOI: 10.1016/j.pestbp.2006.02.008.
(http://www.sciencedirect.com/science/article/B6WP8-4JS1MRR-1/2/0cd22cefbe5dd0e8e277cfdda6203a79)
Abstract:
Fusarium head blight (FHB) is a devastating disease of important cereal crops resulting in significant yield loss and mycotoxin contamination. Persistent outbreaks of FHB in Europe and North America have led to various efforts to understand the mechanisms of resistance to this disease and mycotoxin biosynthesis. In this minireview, we summarize basic and applied studies conducted in our laboratories into reducing mycotoxin contamination in FHB.

Keywords: Acetyltransferase; Detoxification; Deoxynivalenol (DON); Estrogenic mycotoxin; Fusarium graminearum; Genetically modified organisms (GMO); Lactonohydrolase; Small grain cereal crops; Trichothecene biosynthesis; Zearalenone degradation

Reuben J. Peters, Uncovering the complex metabolic network underlying diterpenoid phytoalexin biosynthesis in rice and other cereal crop plants, Phytochemistry, Volume 67, Issue 21, November 2006, Pages 2307-2317, ISSN 0031-9422, DOI: 10.1016/j.phytochem.2006.08.009.
(http://www.sciencedirect.com/science/article/B6TH7-4KV2Y7M-7/2/bdfc3cdb2cf072cb56aff34d3a2bbbbc)
Abstract:
Rice (Oryza sativa) is a staple food crop and serves as a model cereal crop plant for scientific study. Phytochemical investigations of the agronomically devastating rice blast disease have identified a number of rice phytoalexins exhibiting significant direct anti-fungal activity against the causative agent, Magneporthe grisea. Current evidence strongly indicates that these phytoalexins, largely a family of labdane-related diterpenoids, are important as general antibiotics, and that similar phytoalexins are produced more broadly throughout the cereal crop family. From the extensive sequence information available for rice it has been possible to functionally identify the genes for the enzymes catalyzing the two consecutive cyclization reactions that initiate biosynthesis of these labdane-related diterpenoid phytoalexins. This has led to several insights into the underlying evolution of diterpene biosynthesis throughout the cereal crop family. The hydrocarbon olefins resulting from cyclization must be further elaborated to form bioactive natural products and, because not much is currently known, necessarily speculative biosynthetic pathways for these processes are presented. Given the significant antibiotic activity of the labdane-related diterpenoid phytoalexins from rice, and the presence of similar secondary metabolism throughout the cereal crop plant family, study of this type of biosynthesis will continue to be an area of active investigation.
Keywords: Oryza sativa; Poaceae; Diterpenoids; Labdane-related diterpenoids; Phytoalexins; Biosynthesis; Terpene synthases

Karen Vancampenhout, Jan Nyssen, Desta Gebremichael, Jozef Deckers, Jean Poesen, Mitiku Haile, Jan Moeyersons, Stone bunds for soil conservation in the northern Ethiopian highlands: Impacts on soil fertility and crop yield, Soil and Tillage Research, Volume 90, Issues 1-2, November 2006, Pages 1-15, ISSN 0167-1987, DOI: 10.1016/j.still.2005.08.004.
(http://www.sciencedirect.com/science/article/B6TC6-4H5MYCD-2/2/9b2d17893edf4518436f298724421d3e)
Abstract:
In the Ethiopian highlands, large-scale stone bund building programs are implemented to curb severe soil erosion. Development of soil fertility gradients is often mentioned as the major drawback of stone bund implementation, as it would result in a dramatic lowering of crop yield. Therefore, the objectives of this study are to assess soil fertility gradients on progressive terraces and their influence on crop yield, in order to evaluate the long-term sustainability of stone bunds in the Ethiopian Highlands.
The study was performed near Hagere Selam, Tigray and comprises (i) measurement of Pav, Ntot and Corg along the slope on 20 representative plots and (ii) crop response measurement on 143 plots. Results indicate that levels of Pav, Ntot and Corg in the plough layer are highly variable between plots and mainly determined by small-scale soil and environmental features, plot history and management. After correcting for this 'plot effect' a significant relationship ($p < 0.01$) was found between the position in the plot relative to the stone bund and levels of Pav and Ntot, which are higher near the lower stone bund, especially on limestone parent material. For Corg and on basalt-derived soils in general no significant relationship was found. Although soil fertility gradients are present, they are not problematic and can be compensated by adapted soil management. Only

in areas where a Calcaric or Calcic horizon is present at shallow depth, care should be taken. Crop Yields increased by 7% compared to the situation without stone bunds, if a land occupation of 8% by the structures is accounted for. Yield increased from 632 to 683 kg ha-1 for cereals, from 501 to 556 kg ha-1 (11%) for Eragrostis tef and from 335 to 351 kg ha-1 for Cicer arietinum.
No negative effects reducing stone-bund sustainability were found in this study. Soil erosion on the other hand, poses a major threat to agricultural productivity. Stone bund implementation therefore is of vital importance in fighting desertification and establishing sustainable agriculture in the Ethiopian highlands.
Keywords: Soil fertility gradients; Slow-forming terraces; Stone bunds; Crop response; Ethiopia

Sung-Ho Lee, Bruce R. Hamaker, Cys155 of 27 kDa maize [gamma]-zein is a key amino acid to improve its in vitro digestibility, FEBS Letters, Volume 580, Issue 25, 30 October 2006, Pages 5803-5806, ISSN 0014-5793, DOI: 10.1016/j.febslet.2006.09.033.
(http://www.sciencedirect.com/science/article/B6T36-4M0BF7X-7/2/6275f4cddb4769360bfd2fe5c02a9152)
Abstract:
Twenty-seven kilodalton [gamma]-zein is a subclass of the maize zein storage proteins and, due to its localization at the protein body periphery, is critical to digestibility characteristics of all zeins. This protein had low in vitro digestibility, presumably due to its high Cys content (7.35 mol%) that is similar to the hard-to-digest analogous sorghum protein, [gamma]-kafirin. Therefore, each of the conserved disulfide-bonded Cys' was mutated to create C144A, C148A, C155A, and C156A maize [gamma]-zein mutants. The C155A showed a remarkable increase in digestibility to proteases - pepsin, chymotrypsin, and trypsin. A high conservation of this Cys among cereal [gamma]-prolamins indicates the utility of this finding.
Keywords: Cereal; Protein; Zein; Cysteine; Digestibility

A.S. Lithourgidis, I.B. Vasilakoglou, K.V. Dhima, C.A. Dordas, M.D. Yiakoulaki, Forage yield and quality of common vetch mixtures with oat and triticale in two seeding ratios, Field Crops Research, Volume 99, Issues 2-3, 30 October 2006, Pages 106-113, ISSN 0378-4290, DOI: 10.1016/j.fcr.2006.03.008.
(http://www.sciencedirect.com/science/article/B6T6M-4JWMT5X-1/2/8c3fe9ce95a66c930f35ef2846011b00)
Abstract:
Mixtures of annual forage legumes with winter cereals for forage production are used extensively in the Mediterranean region. Common vetch (Vicia sativa L.), oat (Avena sativa L.), and triticale (xTriticosecale Wittmack) monocultures as well as mixtures of common vetch with each of the above cereals, in two seeding ratios (55:45 and 65:35), were used to investigate forage yield and quality as well as the effect of intercropping on growth rate of the three species used in the mixtures. Oat and triticale monocultures as well as both common vetch-oat mixtures provided greater forage yield than mixtures of common vetch with triticale and monoculture common vetch. Total relative yield exceeded unity in common vetch-oat (65:35) indicating that at this seeding rate there was an advantage of intercropping in using the environmental resources. Growth rate of common vetch, oat, and triticale in mixtures was lower than that in monocultures. Crude protein content was highest in monoculture common vetch followed by common vetch-oat (65:35). However, quality characteristics such as lignin content, neutral detergent fiber, total digestible nutrients and to a much smaller degree the acid detergent fiber, digestible dry matter, dry matter intake and relative feed value were affected by intercropping. Highest forage quality was achieved when common vetch was grown as a monoculture or when at a high proportion in mixtures, especially with oat. The results showed that mixture of common vetch with oat at the 65:35 seeding ratio achieved a higher forage yield and protein content than the other mixtures studied.
Keywords: Common vetch; Crude protein; Forage; Growth rate; Intercropping; Oat; Triticale

E. Francia, N. Pecchioni, O. Li Destri Nicosia, G. Paoletta, L. Taibi, V. Franco, M. Odoardi, A.M. Stanca, G. Delogu, Dual-purpose barley and oat in a Mediterranean environment, Field Crops Research, Volume 99, Issues 2-3, 30 October 2006, Pages 158-166, ISSN 0378-4290, DOI: 10.1016/j.fcr.2006.04.006.
(http://www.sciencedirect.com/science/article/B6T6M-4K719SW-1/2/c15d75f819e5a935b2e2e78339a1eb13)
Abstract:
In Mediterranean environments, forage production for livestock is both difficult and costly due to erratic rainfall. As an alternative, barley, oat and triticale can be used as dual-purpose autumn-sown cereals, thus serving as winter grazing and grain for feed. The present study was aimed at estimating the influence of different management systems (dual-purpose with one and two grazings, soft-dough harvest for silage, full maturity grain only) on grain yield, forage and whole plant production, and on quality-related traits of barley (Hordeum vulgare L.) and oat (Avena sativa L.). The trials were conducted over 2 years (1998/1999 and 1999/2000) in a Southern Italy Mediterranean environment using a flock of sheep for grazing and mechanically clipping the plots, thus simulating the dual-purpose, to obtain forage samples for analyses.
Effect of the years was not significant, whereas both crops underwent significant reductions of grain yield, harvest index, thousand kernel weight and seeds/m2 in the dual-purpose plots but not in the grain only plots. The most drastic yield reduction was recorded in oat after two grazings by comparison to the ungrazed treatment (2.4 t/ha versus 3.9 t/ha). Grain protein content was not affected by dual-purpose in oat, and it was independent of the number of grazings in barley.
Barley had a higher production of total biomass and milk feed units than oat in the dual-purpose management systems, except for the soft-dough and grain only treatments. In addition, barley reacted positively to both the dual-purpose systems (one and two grazings). More specifically, whole plant biomass increased from 9.6 t/ha when grown for grain only to 13.6 t/ha in the single grazing system, and milk feed units similarly increased, from 7680 to 9216 MFU/ha.
Green forage quality was comparable between the two cereals, even though barley whole plants showed lower fibre content, especially after two grazings.
The soft-dough stage of both crops had better forage quality parameters, nevertheless, the lower biomass yields and total milk feed units (in the case of barley) rendered this system non-profitable for the environment studied.
Barley demonstrated a clear superiority for the dual-purpose systems in Mediterranean Italy and should thus be preferred to oat, except when using oat to interrupt barley monocropping.
Keywords: Barley; Oat; Dual-purpose; Forage; Mediterranean environment

Andrew J. Wade, D. Butterfield, P.G. Whitehead, Towards an improved understanding of the nitrate dynamics in lowland, permeable river-systems: Applications of INCA-N, Journal of Hydrology, Volume 330, Issues 1-2, Hydro-ecological functioning of the Pang and Lambourn catchments, UK - Results from the Lowland Catchment Research (LOCAR) initiative, 30 October 2006, Pages 185-203, ISSN 0022-1694, DOI: 10.1016/j.jhydrol.2006.04.023.
(http://www.sciencedirect.com/science/article/B6V6C-4K48MGB-2/2/e467b8b65d3da3bae0a39fe6216b7a7d)
Abstract: Summary
The Integrated Catchment Model of Nitrogen (INCA-N) was applied to the Lambourn and Pang river-systems to integrate current process-knowledge and available-data to test two hypotheses and thereby determine the key factors and processes controlling the movement of nitrate at the catchment-scale in lowland, permeable river-systems: (i) that the in-stream nitrate concentrations were controlled by two end-members only: groundwater and soil-water, and (ii) that the groundwater was the key store of nitrate in these river-systems. Neither hypothesis was proved true or false. Due to equifinality in the model structure and parameters at least two alternative

models provided viable explanations for the observed in-stream nitrate concentrations. One model demonstrated that the seasonal-pattern in the stream-water nitrate concentrations was controlled mainly by the mixing of ground- and soil-water inputs. An alternative model demonstrated that in-stream processes were important. It is hoped further measurements of nitrate concentrations made in the catchment soil- and ground-water and in-stream may constrain the model and help determine the correct structure, though other recent studies suggest that these data may serve only to highlight the heterogeneity of the system. Thus when making model-based assessments and forecasts it is recommend that all possible models are used, and the range of forecasts compared. In this study both models suggest that cereal production contributed approximately 50% the simulated in-stream nitrate load in the two catchments, and the point-source contribution to the in-stream load was minimal.
Keywords: Water quality; Pollution; Nitrogen; Nitrate; Model; Uncertainty

Tahirou Abdoulaye, John H. Sanders, New technologies, marketing strategies and public policy for traditional food crops: Millet in Niger, Agricultural Systems, Volume 90, Issues 1-3, October 2006, Pages 272-292, ISSN 0308-521X, DOI: 10.1016/j.agsy.2005.12.008.
(http://www.sciencedirect.com/science/article/B6T3W-4JCCM67-1/2/f080733577dabc9deab95ca852f222cd)
Abstract:
New technology introduction in this semiarid region of the Sahel is hypothesized to be made more difficult by three price problems in the region. First, staple prices collapse annually at harvest. Secondly, there is a between year price collapse in good and very good years due to the inelastic demand for the principal staple, millet, and the large changes in supply from weather and other stochastic factors. Thirdly, government and NGOs intervene in adverse rainfall years to drive down the price increases. Marketing strategies were proposed for the first two price problems and a public policy change for the third. To analyze this question at the firm level a farm programming model was constructed. Based upon surveying in four countries, including Niger, farmers state that they have two primary objectives in agricultural production, first achieving a harvest income target and secondly achieving their family subsistence objective with production and purchases later in the year. Farmers are observed selling their millet at harvest and rebuying millet later in the year. So the first objective takes precedence over the second. A lexicographic utility function was used in which these primary objectives of the farmer are first satisfied and then profits are maximized. According to the model new technology would be introduced even without the marketing strategies. However, the marketing strategies accelerated the technology introduction process and further increased farmers' incomes. Of the three marketing-policy changes only a change in public policy with a reduction of the price depressing effect (cereal imports or stock releases) substantially increases farmers' incomes in the adverse years. In developed countries crop insurance and disaster assistance is used to protect farmers in semiarid regions during bad and very bad (disaster) rainfall years. In developing countries finding alternatives to the poverty-nutritional problems of urban residents and poor farmers to substitute for driving down food prices in adverse years could perform the same function as crop insurance in developed countries of facilitating technological introduction by increasing incomes in adverse rainfall years in developed countries.
Keywords: Inventory credit; Marketing strategy; Inorganic fertilizers; Fertility depletion; Farm level programming; Micro-fertilization; Sidedressing

Ana Pospisil, M. Pospisil, B. Varga, Z. Svecnjak, Grain yield and protein concentration of two amaranth species (Amaranthus spp.) as influenced by the nitrogen fertilization, European Journal of Agronomy, Volume 25, Issue 3, October 2006, Pages 250-253, ISSN 1161-0301, DOI: 10.1016/j.eja.2006.06.001.

(http://www.sciencedirect.com/science/article/B6T67-4KD5C41-1/2/e644d2cb359cabac52cc9fb6e09a0f6b)
Abstract:
Amaranth, an alternative cereal, is attracting researchers' attention mainly because of the high nutritional value of its seed, which can be influenced by nitrogen fertilization. The goal of the research carried out on eutric cambisol in Zagreb in the period 2002-2004 was to determine the influence of nitrogen fertilization upon seed yield, seed protein concentration, 1000-seed weight, dry matter content in flowering, plant height and inflorescence length of two grain amaranth varieties belonging to different species: G6 (Amaranthus cruentus L.) and 1008 (Amaranthus hypochondriacus L.) grown in the agroecological conditions of north-western Croatia. As nitrogen fertilization is among the most important factors of high yielding of all field crops, knowledge of the grain amaranth nitrogen requirements has an important role for its efficient production.
Nitrogen was applied before sowing at the rates of 0, 50 and 100 kg ha-1. Application of 50 and 100 kg N ha-1 led to a significant increase of seed yield and 1000-seed weight compared to the control (without nitrogen fertilization) only in the dry 2003. Seed protein concentration was not affected by nitrogen fertilization. A. hypochondriacus L. gave a higher seed yield while A. cruentus L. had a higher 1000-seed weight. Nitrogen fertilization had no influence on the dry matter content in flowering and plant height. Responses of tested species to weather conditions differed with respect to the said agronomic traits. In the years with higher precipitation A. cruentus L. had a higher dry matter content, while a significantly higher dry matter content in flowering was recorded for A. hypochondriacus L. in the dry 2003. In all the three trial years, A. cruentus L. achieved greater plant height and inflorescence length, but the difference was statistically significant only for plant height in 2002. Positive correlations were recorded between plant height and inflorescence length as well as between inflorescence length and seed yield.
Keywords: Grain amaranth; Seed yield; Protein concentration

Julio Arroyo, Juan Carlos Iturrondobeitia, Differences in the diversity of oribatid mite communities in forests and agrosystems lands, European Journal of Soil Biology, Volume 42, Issue 4, October-December 2006, Pages 259-269, ISSN 1164-5563, DOI: 10.1016/j.ejsobi.2006.01.002.
(http://www.sciencedirect.com/science/article/B6VR7-4JDMMW8-1/2/e87bf950614bf65a17a6240748fee2a5)
Abstract:
A field study was conducted in the province of Burgos (Castile, NW of Spain) to assess the role and influence of the different anthropic use of soil on the oribatid mite communities (Acari, Oribatida).
Soil samples from 20 representative soil sites of the Castilian upland steppes, with cultured, pastureland or forest soil uses, were taken in spring and autumn 2000. Thereafter, soil samples were analysed in terms of their mesofaunal biodiversity, measured using the real and relative diversity of the oribatid mite communities.
Collected individuals were identified to species level, being altogether 111 Oribatid species. Results from communities' ordination analysis showed clear gradients based on community variables. One of these was defined by plots with high values of diversity and species richness which correspond to the less anthropic natural soils, mainly oak forest. In contrast, the most anthropic agrosystems soils, including extensive cereal crops, most of them receiving only mineral fertilisation or having human management, were placed in opposite gradients. Differences in biodiversity between crop lands and natural soils were also confirmed by ANOVA. The seasonality, measured in terms of difference between spring and autumn plots, played a minimum role in explaining differences of diversity. Nevertheless autumn diversity values were slightly higher than those of spring, except for crops.
Keywords: Oribatid communities; Diversity; Equitability; Forests; Crop soils; Human action

Miriam Sosa, Guillermo Hough, Sensory acceptability of menus and sweet snacks among children and adults from low- and medium-income households in Argentina, Food Quality and Preference, Volume 17, Issues 7-8, Sixth Rose Marie Pangborn Sensory Science Symposium, October-December 2006, Pages 590-597, ISSN 0950-3293, DOI: 10.1016/j.foodqual.2006.04.001.
(http://www.sciencedirect.com/science/article/B6T6T-4JT83SJ-2/2/6cc98e5ac45ba7bd5d99a2e8d17025e0)
Abstract:
Sensory acceptability of menus and snacks targeted at low-income population in Argentina as a food aid program were measured. Twenty menus (pastas with different sauces, corn-meal, stews, soups, Shepherd's pie and breaded soy hamburger with mashed potatoes) and 15 snacks (flavored milks, rice pudding, cakes, cereals, and cookies) were tested. Three hundred and twenty subjects, balanced over low- and medium-income households, and balanced over youths (11-13 years) and adult women (25-50 years), measured the acceptability of the menus and snacks. Youth and adult medium-income subjects had similar average scores for the menus, while adult low-income subjects had higher average scores for the menus than youth low-income subjects. Some menus were preferred by adults, others by youths and others had similar acceptability. Except for rice pudding for youths, all other snacks received high acceptability scores. In future acceptability studies among low-income populations test location and expectations should receive special attention.
Keywords: Socio-economic; Income; Age; Menu; Sweet snack; Argentina

David Marshall, Mark Stuart, Rick Bell, Examining the relationship between product package colour and product selection in preschoolers, Food Quality and Preference, Volume 17, Issues 7-8, Sixth Rose Marie Pangborn Sensory Science Symposium, October-December 2006, Pages 615-621, ISSN 0950-3293, DOI: 10.1016/j.foodqual.2006.05.007.
(http://www.sciencedirect.com/science/article/B6T6T-4KGPPBD-1/2/a020430d96adc7283926909c98628afc)
Abstract:
Research into food liking among children has shown the importance of colour as a variable [Leon, F., Couronne, T., Marcuz, M. C., & Koster, E. P. (1999). Measuring food liking in children: a comparison of non-verbal methods. Food Quality and Preference 10, 93-100; Lavin, J., & Lawless, H. T. (1998). Effects of color and odor on judgments of sweetness among children and adults. Food Quality and Preference 9, 283-289] but there is little work on how children react to colour in the context of packaging and product categorisation. Attractively coloured packaging may serve to influence children's selection or persuasion in the store [Hutchings, J. B. (2003). Expectations and the food industry: The impact of color and appearance. New York: Kluwer Academic/Plenum Publishers].
The main objective of the study was to determine the role of packaging colour in product selection among preschoolers, by age and gender, across three product categories: cereals, biscuits and drinks. Forty-three preschoolers, 36 girls and 7 boys, aged 3-5-years-old participated in the study. The three product categeories, with logo and brand information obscured, were presented with a range of nine colours. The children were asked to choose one package from each category for themselves, one package from each category for a boy, and one package from each category for a girl. They were then asked why they had chosen the packages and asked about their favourite colour.
The results showed a high correlation between favourite colour and choice of product across the total sample, with lower correlations for individuals. Favourite colours were pink (24%), purple (11.4) yellow and blue (both 9%) and most popular colours were pink (40.9%), followed by purple (15%) and yellow (15%). Correlations were lower when selecting for boys and girls, with younger children more likely to select colours that matched their own preferences.
Keywords: Children; Colour preference; Packaging

Piotr Zapotoczny, Marek Markowski, Katarzyna Majewska, Arkadiusz Ratajski, Henryk Konopko, Effect of temperature on the physical, functional, and mechanical characteristics of hot-air-puffed amaranth seeds, Journal of Food Engineering, Volume 76, Issue 4, October 2006, Pages 469-476, ISSN 0260-8774, DOI: 10.1016/j.jfoodeng.2005.05.045.
(http://www.sciencedirect.com/science/article/B6T8J-4GP7NXB-4/2/212bc412df00e63ac6d6952af2b4b3ca)
Abstract:
Amaranth seeds were puffed with hot air at 290, 330 and 370 [degree sign]C. Selected temperature-dependent properties of raw and puffed amaranth seeds, namely seed size, shape, color, water and fat absorption, resistance to compression and back extrusion energy, were determined. These properties are required for designing apparatus for puffing cereals with hot air. It was postulated that 290 [degree sign]C is the optimum temperature for hot-air-puffing of amaranth seeds. A temperature of 330 [degree sign]C may bring the expected results only when high water-holding capacity of seeds is desirable.
Keywords: Amaranth seeds; Puffing; Color; Physical, functional, and mechanical properties

Barbara Bravin, Donatella Peressini, Alessandro Sensidoni, Development and application of polysaccharide-lipid edible coating to extend shelf-life of dry bakery products, Journal of Food Engineering, Volume 76, Issue 3, October 2006, Pages 280-290, ISSN 0260-8774, DOI: 10.1016/j.jfoodeng.2005.05.021.
(http://www.sciencedirect.com/science/article/B6T8J-4GKW6XB-3/2/534c5ed76e65919e52c74b5640823344)
Abstract:
This study investigated the effect of the deposition process used for film-forming dispersion (spreading and spraying), relative humidity gradient across the film (from 22-65% to 22-85%) and film thickness (15-90 [mu]m) on water vapor permeability (WVP), tensile strength (TS), percentage elongation at breaking (E) and structure of an emulsified edible film composed of corn starch, methylcellulose (MC) and soybean oil. The effectiveness of edible coating in controlling moisture transfer in moisture-sensitive products was evaluated by coating crackers, a low aw-type cereal food. Spread film gave better water vapor barrier and mechanical properties than sprayed film. High atomization pressure and thickness increased film WVP. Atomization pressure of 2 bar and film thickness of 30 [mu]m were identified as optimum for the application of edible coating to bakery products. Coated and uncoated (reference) crackers were stored at 65%, 75% and 85% relative humidity. Moisture uptake and resistance to water vapor transmission (r) were then calculated. Coated crackers had longer shelf-life and higher r than reference at all storage conditions.
Keywords: Edible film; Water vapor permeability; Mechanical properties; Bakery products; Shelf-life

Sevim Sagol, Mahir Turhan, Sedat Sayar, A potential method for determining in situ gelatinization temperature of starch using initial water transfer rate in whole cereals, Journal of Food Engineering, Volume 76, Issue 3, October 2006, Pages 427-432, ISSN 0260-8774, DOI: 10.1016/j.jfoodeng.2005.05.042.
(http://www.sciencedirect.com/science/article/B6T8J-4GSBGGK-2/2/847b5fd7c590483b8c9892e72c3e19eb)
Abstract:
Twelve whole cereal grains (3 soft wheats, 3 hard wheats, 3 dent corns, and 3 rices) were soaked in distilled water at different temperatures (T) between 35 and 95 [degree sign]C for a short period of time (tsoak). In all grains, initial water transfer rate (R) linearly increased with increasing T and abruptly assumed a steeper slope at some T (Tbre). Gelatinization temperature (Tgel) of the

ground samples of the same grains were determined using differential scanning calorimetry (DSC). Tbre values were always close to and higher than Tgel values obtained from DSC (TDSC). Polarized light microscopy (PLM) showed that gelatinization did not take place in the outermost zone of the endosperm of whole grains below Tbre, however it did above Tbre. Depending on TDSC can be taken as the in vitro Tgel and findings of this and previous works, Tbre from the R-T plots (break-point method) was assessed as the in situ Tgel. The principle of the break-point method depends on abruptly changing initial water transfer rate in whole grains upon gelatinization in the outermost zone of the endosperm. In addition to some advantages over the recognized methods invasively determining in vitro Tgel, the break-point method is for determining in situ Tgel of intact starch in whole grains noninvasively.
Keywords: Gelatinization temperature; Soaking; Break-point method

Arkadiusz Malkus, Pi-Fang Linda Chang, Sabina M. Zuzga, Kuang-ren Chung, Jonathan Shao, Barry M. Cunfer, Edward Arseniuk, Peter P. Ueng, RNA polymerase II gene (RPB2) encoding the second largest protein subunit in Phaeosphaeria nodorum and P. avenaria, Mycological Research, Volume 110, Issue 10, October 2006, Pages 1152-1164, ISSN 0953-7562, DOI: 10.1016/j.mycres.2006.07.015.
(http://www.sciencedirect.com/science/article/B7XMR-4M1KP8S-2/2/ee1a9dbf7a9a041396df3f7a7349b78d)
Abstract:
A 5586 bp sequence (accession no. DQ278491), which includes the RNA polymerase II gene (RPB2) encoding the second largest protein subunit (RPB2), was obtained from the wheat biotype Phaeosphaeria nodorum (PN-w) by PCR amplification. The 3841 bp full length RPB2 gene contains two exons and a 52 bp intron, and encodes a complete 1262 amino acid protein. Similar to the C-terminals of the [beta] subunits of prokaryotes and yeast RNA polymerases, the deduced RPB2 protein contained many structural features needed for gene transcription. Based on the phylogenetic analysis with the deduced RPB2 polypeptide sequences, the PN-w was closely related to the maize pathogen Cochliobolus heterostrophus. Size differences were found in the full length RPB2 gene of cereal Phaeosphaeria species, mainly due to differences in intron size. No nucleotide substitutions were found in homothallic P. avenaria f.sp. triticea (Pat1) and barley biotype P. nodorum (PN-b) isolates used in this study. The nucleotide and deduced amino acid sequences of the RPB2 gene in Pat1 were closely related to that in PN-w.
Keywords: Cochliobolus heterostrophus; Enzymes; Plant pathology; Stagnospora nodorum; Stagnospora leaf blotch

K. Anker-Nilssen, E.M. Faergestad, S. Sahlstrom, A.K. Uhlen, Interaction between barley cultivars and growth temperature on starch degradation properties measured in vitro, Animal Feed Science and Technology, Volume 130, Issues 1-2, Starch structure and digestibility: Basic aspects and new research, 30 September 2006, Pages 3-22, ISSN 0377-8401, DOI: 10.1016/j.anifeedsci.2006.01.014.
(http://www.sciencedirect.com/science/article/B6T42-4JGJJ70-1/2/787d6881554d240f346e80be69f7ffef)
Abstract:
Eight 2-row barley cultivars (waxy, normal and high amylose) were grown in controlled environment chambers at 9, 12, 15, 18 and 21 [degree sign]C until maturity. The flour samples were analysed for total starch content, mixed-linked [beta]-glucan content (total, soluble and insoluble), content of protein, fat and neutral detergent fibre (NDF) in addition to the amount of total, free and lipid complexed amylose. A non-ruminant in vitro method was used to analyse the degradation of starch (5-10-15-30-60-90-120-240 min incubation times) from the samples grown at different temperatures. A partial least square (PLS) regression model was made to highlight the flour characteristics that influenced the starch degradation the most. The waxy starches were

degraded faster and to a higher extent than the normal and high amylose starches at all incubation times. At short incubation times the high amylose was not degraded as rapidly as the normal ones, but as incubation time increased, they changed range, and at 240 min incubation time the normal genotypes were degraded to a lesser extent than the high amylose. The amylose-amylopectin ratio was most important regarding starch degradation. The growth temperature influenced the starch degradation considerably; the degradation was negatively correlated to the growth temperature. The PLS regression model showed that the content of total and insoluble [beta]-glucans became increasingly important as the incubation time increased.
Keywords: Barley starch; Growth temperature; Starch degradation; In vitro degradation; [beta]-glucans

A. Stevnebo, S. Sahlstrom, B. Svihus, Starch structure and degree of starch hydrolysis of small and large starch granules from barley varieties with varying amylose content, Animal Feed Science and Technology, Volume 130, Issues 1-2, Starch structure and digestibility: Basic aspects and new research, 30 September 2006, Pages 23-38, ISSN 0377-8401, DOI: 10.1016/j.anifeedsci.2006.01.015.
(http://www.sciencedirect.com/science/article/B6T42-4JBGJ37-1/2/14c38dd1bd56a94dda9589232ba19b26)
Abstract:
Starch structure is considered to have an impact on the rate of starch digestion in cereals, and is therefore an important factor in regard to optimise the starch quality in animal feed. The purpose of the study reported was to investigate the impact of amylose level and starch particle size on starch degradation in vitro. A two-step in vitro method was conducted to degrade starch enzymatically. The method consisted of a pre-incubation in HCl and pepsin, and thereafter an incubation with buffers, porcine pancreatic [alpha]-amylase and amyloglucosidase. Degree of starch hydrolysis was calculated based on free glucose content. Milled grains, isolated starch and A and B granules from barley cultivars with various level of amylose were hydrolysed. Particle size, thermal characteristics and chemical components were determined to characterise the material. Cultivars with low level of amylose had a higher degree of starch hydrolysis than cultivars with normal and high amylose content for all time intervals ($P<0.05$). This was observed both for incubated flour and purified starch. A higher degree of starch hydrolysis was found for normal amylose cultivars compared to high amylose cultivars when incubating flour ($P<0.05$). This difference was not significant for the purified starch fraction. Due to a higher surface area and lower crystallinity, small starch granules were degraded at a higher level than large granules ($P<0.05$), despite a slightly higher amylose content. The range in starch hydrolysis between amylose groups within granule size was similar to the results from incubations with total starch fractions. Low amylose cultivars contained, however, less small granules by volume than the two other amylose groups ($P<0.05$). This indicates that the amylose level and the amylose lipid complex are the limiting factors regarding starch degradation for these barley cultivars.
Keywords: Barley; Starch; Amylose; Particle size distribution; In vitro

Heidi Rudi, Anne Kjersti Uhlen, Odd Magne Harstad, Lars Munck, Genetic variability in cereal carbohydrate compositions and potentials for improving nutritional value, Animal Feed Science and Technology, Volume 130, Issues 1-2, Starch structure and digestibility: Basic aspects and new research, 30 September 2006, Pages 55-65, ISSN 0377-8401, DOI: 10.1016/j.anifeedsci.2006.01.017.
(http://www.sciencedirect.com/science/article/B6T42-4JBGJ37-3/2/fd2ac6343bf33a619bcaf3418edd1d61)
Abstract:
Mono-gastric animals and ruminants require cereal starch with different degradation characteristics because they degrade and utilize starch differently. Characteristics affecting starch

digestion are the amylose/amylopectin ratio, proportion A-/B-starch granules, starch granule shape, crystallinity, lipid content, nature of the protein matrix surrounding starch granules and the overall architecture of the starch granules. These are all characteristics of cereal grain that can vary within species according to genotype, and can be manipulated through plant breeding.
A large collection of barley mutants affecting the endosperm phenotype is available and constitutes an enormous potential resource to improve nutritive values of cereals tailored for different nutritional purposes. In the starchy endosperm, starch biosynthesis is characterised by a committed pathway of different enzyme classes, and all together 14 different isoform classes are found in higher plants with specific functions. A wide genetic variation in starch polymer composition could therefore be obtained by searching for mutations in these genes. However, while the starch biosynthetic pathways are well known, the biosynthetic pathway of [beta]-glucan and the accumulation in endosperm cell walls are poorly understood. Some interesting barley mutants exist that combine low starch synthesis with excessive [beta]-glucans synthesis completely or partly compensating for the decrease in starch formation. Recent knowledge on the biosynthesis of starch together with methods in biotechnology and bioinformatics, molecular genetics and comparative genomics have opened new possibilities to provide a more complete understanding of starch synthesis as well as synthesis of [beta]-glucan.
In this review, knowledge on carbohydrate biosynthesis and the use of new biotechnological methods, are coupled with animal feed science to reveal the potential for optimising feed nutritional value through plant breeding. This can as well be exploited to obtain cereal-based food with less starch and more [beta]-glucan that may be of major importance in low calorie foods for human nutrition.
Keywords: Barley; ADP-glucose pyrophosphorylase; Starch; NIR; [beta]-Glucans; Feed value

Julian Wiseman, Variations in starch digestibility in non-ruminants, Animal Feed Science and Technology, Volume 130, Issues 1-2, Starch structure and digestibility: Basic aspects and new research, 30 September 2006, Pages 66-77, ISSN 0377-8401, DOI: 10.1016/j.anifeedsci.2006.01.018.
(http://www.sciencedirect.com/science/article/B6T42-4J9MSVY-1/2/3dab3a4a2246d47f94bbe01d7df878d7)
Abstract:
Starch is the major energy-yielding ingredient in diets for both pigs and poultry, and its effective digestion will have a major impact on their energy balance; a common presumption is that it is completely digested but, whilst this may well be the case over the entire digestive tract (through excreta and faecal analyses), this is rarely found within the small intestine. Starch disappearance from the large intestine is through microbial fermentation whose products, volatile fatty acids, are not used with the same efficiency of metabolic utilisation in energy-yielding pathways as is glucose (the product of amylolysis in the small intestine). Other consequences of incomplete starch digestion in the small intestine may include excessive large intestinal fermentation leading to diarrhoea and dehydration.
Variations in small versus large intestinal digestibility for starch have not received attention but it should be in future assessments. Starch from peas is digested less well in the small intestine than from cereals. Separation of starch into different categories (rapidly digested, slowly digested and resistant to digestion) could be a useful development.
There is some debate as to whether there is amylase adequacy in the newly hatched chick/post-weaned piglet. However although the activity of [alpha]-amylase may well increase beyond these ages, it is still generally believed that poor digestibility values of starch in young broilers cannot be attributed to inadequate levels of [alpha]-amylase and is more likely to be attributable to extrinsic and/or intrinsic factors. With respect to piglets, there appears to be a link between feed intake and enzyme activity; thus reduced intake (common in the immediate post-weaning period) may be responsible for limited amylase secretion rather than a capacity for amylase synthesis.

There have been numerous studies evaluating the digestibility of starch from wheat in poultry; isolated wheat starch was readily digested in vitro by chick pancreatic [alpha]-amylase, even that from wheat with relatively low apparent metabolizable energy (AME) values. Variations in starch digestibility have, nevertheless, been recorded. Thus, it is not starch per se that is poorly utilised in some samples but other factors within wheat may be reducing starch digestibility. The starch/protein interface in the endosperm of wheat (responsible for the `hard' and `soft' endosperm texture) might be responsible for problems with starch utilisation, but no firm evidence exists for this.
A key recent development has been the emergence of near-isogenic lines which are very similar except for key characteristics. Thus, lines near-isogenic except for hardness have been used to establish that hard wheats are less well digested in poultry than soft ones. Similarly, wheats containing the IBIR rye translocation are less well digested. Such developments have been crucial as the independent effects of hardness and IBIR cannot be established conclusively if there are other unknown factors present. Thus, random variety trials are of no value in investigations of what influences starch digestion. It is possible that the negative effects of the IBIR translocation may be offset by the positive effects of soft endosperm although it is crucial to point out that endosperm texture is a continuum between very hard and very soft, not simply hard and soft.
There have been many attempts to assess starch digestibility in vitro as a means of screening samples. Certainly there has been success in terms of linking in vivo digestibility to rate of in vitro digestibility. However it has been suggested that slowly digested starch will lead to better performance than rapidly digested starch.
Keywords: Starch; Digestibility; Non-ruminants; Region of digestive tract; Cereals; Wheat; Peas; In vitro assessment; Plant breeding

Pekka Huhtanen, Johannes Sveinbjornsson, Evaluation of methods for estimating starch digestibility and digestion kinetics in ruminants, Animal Feed Science and Technology, Volume 130, Issues 1-2, Starch structure and digestibility: Basic aspects and new research, 30 September 2006, Pages 95-113, ISSN 0377-8401, DOI: 10.1016/j.anifeedsci.2006.01.021.
(http://www.sciencedirect.com/science/article/B6T42-4JDMTXW-1/2/02a7587465cfff7d6bd214ec4fec37ab)
Abstract:
The objective of the paper is to review literature concerning the methods used to estimate starch digestibility in different segments of the digestive tract of ruminants and the kinetics of starch digestion. Starch digestibility and site of starch digestion have a profound effect on the amount and profile of substrates absorbed from the digestive tract. The prediction of starch digestibility in the rumen is laborious and also technically difficult because of unrepresentative sampling of digesta from duodenal cannulae. The double-marker technique does not solve the problems related to unrepresentative digesta sampling because any of the particulate markers are not intimately associated with particles rich in starch. Furthermore, physical separation of particles rich in starch and fibre, which is a requisite in applying multiple marker techniques, would be difficult. However, despite problems in the determination of starch flow, the double-marker technique is likely to improve the accuracy of the flow measurements of other components. Mechanistic dynamic models describing digestion and absorption of substrates require reliable estimates of the digestion kinetics of feed components. The in situ technique has been extensively evaluated and used in estimating the digestion rate of starch. Initial particle loss, often described as soluble starch, is the major problem of the technique. Various assumptions have been used for the behaviour of this fraction in the kinetic models. It is also possible that the secondary particle loss during the incubation would overestimate the rate of digestion. Both the patterns of duodenal marker excretion curves and duodenal starch flow strongly suggest that the passage of particles rich in starch do not follow the first-order passage kinetics. This means that the models used to estimate ruminal starch digestibility from the kinetic parameters are incomplete. The published

data suggest that the in situ technique underestimates ruminal starch digestibility for slowly degradable starch sources such as maize and overestimates it for rapidly degradable starch sources such as barley. An advantage of the in vitro methods is that the estimates of starch disappearance are not biased by particle loss. In vitro gas production technique may also be used for estimation of the rate of starch digestion for cereal grains by applying the curve subtraction method; i.e. gas production from the cell wall fraction is subtracted from the total gas production curve. Starch represents the major proportion of cell solubles in cereal grains and even a greater proportion of gas production potential. A requisite of the in vitro techniques in estimating the rate of starch digestion is that the system itself is not limiting.
Keywords: Ruminant; Starch; Digestibility; Digestion kinetics

Joop de Boer, Martine Helms, Harry Aiking, Protein consumption and sustainability: Diet diversity in EU-15, Ecological Economics, Volume 59, Issue 3, 20 September 2006, Pages 267-274, ISSN 0921-8009, DOI: 10.1016/j.ecolecon.2005.10.011.
(http://www.sciencedirect.com/science/article/B6VDY-4HPD3V0-2/2/d9f8e3d839e883f0788e36a4db793117)
Abstract:
In search of viable ways to create more sustainable diets, it is extremely valuable to analyse how people in various countries are supplied with dietary proteins from plant-based and animal-based sources. As a cross-national comparison of food ingredients may easily lead to misleading interpretations, it is crucial to opt for a multidisciplinary approach and to focus on countries that are spread across a bounded geographical area. In the present paper, an overview of diet proteins in the EU-15 member states is presented. As it turns out, the diets are rather diverse but everywhere the same major sources can be distinguished, i.e., meat, cereals and milk. The analysis showed a strong influence of location on protein diets. There are significant differences between, on the one hand, countries with high supplies of protein provided by vegetables and cereals, and, on the other hand, countries with high supplies of protein derived from milk. In this respect, Portugal, Italy and Greece can be contrasted with The Netherlands, Sweden and Finland as the two poles of an axis, with intermediate positions for the other countries. A number of interrelated differences between these countries clearly demonstrated the impacts of ecological, economic and cultural factors on current dietary protein supply. Although it does not make sense to plea simply in favour of turning the clock back, we draw the conclusion that there is room for a diet that is less dependent on meat proteins without going beyond the limits set by nutrition and health. Our results suggest that the East Mediterranean diet of the early 1960s has interesting qualities for the development of options to create more sustainable, healthful diets.
Keywords: Sustainability; Meat; Plant protein; EU-15; Consumption; East Mediterranean diet

Roby Greenwald, M.H. Bergin, Jin Xu, Daniel Cohan, Gerrit Hoogenboom, W.L. Chameides, The influence of aerosols on crop production: A study using the CERES crop model, Agricultural Systems, Volume 89, Issues 2-3, September 2006, Pages 390-413, ISSN 0308-521X, DOI: 10.1016/j.agsy.2005.10.004.
(http://www.sciencedirect.com/science/article/B6T3W-4HR76RM-2/2/40d25b87bc193c5326b8db7020b6f155)
Abstract:
The attenuation of solar radiation by atmospheric aerosols simultaneously decreases the amount of radiation reaching the surface and increases the fraction of radiation which is diffuse. Decreasing the total amount of photosynthetically active radiation (PAR, 400-700 nm) tends to decrease the amount of photosynthesis occurring in plant leaves. Increasing the fraction of PAR which is diffuse allows more PAR to reach shaded leaves and can thus increase the total amount of photosynthesis occurring in a plant canopy. In an attempt to quantify these two radiative influences of aerosols, the CERES crop model [Cereal growth, development and yield. In: Tsuji,

G.Y., Hoogenboom, G., Thornton, P.K. (Eds.), Understanding Options for Agricultural Production. Kluwer Academic Publishers, Dordrecht, Netherlands.] was modified to estimate the impact on yield for maize, wheat, and rice under varying atmospheric conditions. The influence of aerosols on total and diffuse PAR was modeled using the National Center for Atmospheric Research (NCAR) Tropospheric Ultraviolet Visible (TUV) radiation model [UV radiation in the natural and perturbed atmosphere. In: Tevini, M. (Ed.), Environmental Effects of UV (Ultraviolet) Radiation. Lewis Publisher, Boca Raton, Florida.] under both clear skies and overcast skies and again when cloudiness conditions were allowed to vary to reflect actual meteorological conditions. The PAR intensity and diffuse fraction results from the radiation model were applied to existing meteorological data sets. These data sets were then used as input for the CERES model. The CERES model was modified so that plant radiation use efficiency (RUE) fluctuated as a function of the diffuse fraction calculated by the TUV model. Model simulations were performed using many years of meteorological data and different amounts of atmospheric aerosol loading for several different locations around the world. The change in crop yield due to the influence of aerosols was found to be extremely dependent on the magnitude of the increase in radiation use efficiency (RUE) incurred by increasing the diffuse fraction. The influence of aerosols on simulated crop yield was found to be more negative on overcast days since the diffuse fraction is already quite high even in a clean atmosphere. Consequently, the more overcast days there are in a growing season, the more negative is the influence of aerosols. For the most realistic set of model results based on location-specific aerosol loadings and crop-specific assumptions of RUE change, the influence of aerosols is estimated to be -10% on maize yield, +/-5% on wheat yield, and +/-10% on rice yield except for when grown under exceptionally sunny conditions as found in California's central valley, in which case, yields are predicted to increase by up to 30%. Aerosols also tend to decrease plant water stress by reducing soil evaporation and transpiration. When crops are grown under rainfed conditions, this reduction in water loss from evapotranspiration may offset the decrease in the photosynthetic rate and cause aerosols to have a positive influence on final grain yields.
Keywords: Aerosol light scattering; Diffuse light; Radiation use efficiency; Crop simulation; Maize; Rice; Wheat production

J. Eriksen, L. Pedersen, J.R. Jorgensen, Nitrate leaching and bread-making quality of spring wheat following cultivation of different grasslands, Agriculture, Ecosystems & Environment, Volume 116, Issues 3-4, September 2006, Pages 165-175, ISSN 0167-8809, DOI: 10.1016/j.agee.2006.02.004.
(http://www.sciencedirect.com/science/article/B6T3Y-4JGJHXC-3/2/ff0c87ba5a96859313cb8da077705f37)
Abstract:
The influence of sward botanical composition and ley age on grassland residual effects, quality of spring wheat and subsequent nitrate leaching was investigated. Grazed grasslands of different age (1, 2 and 8 production years) and composition (unfertilised grass-clover and fertilised perennial ryegrass) were ploughed and followed by spring wheat and spring barley. For reference, an adjacent field without grassland history but with the same crop sequence in 2002-2003 was treated with increasing quantities of N fertiliser. Yields and N uptake of spring wheat following grasslands always exceeded those of the reference plots with a history of cereal production. The nitrogen fertiliser replacement values of grass-clover and ryegrass were 59-100 and 72-121 kg ha-1, respectively, with the highest values representing the 8-year-old leys. Grain yield and N uptake increased while those for straw decreased with increasing ley age. There were no effects of previous grassland type (grass-clover/ryegrass) on content of protein, starch and gluten, but grassland age significantly influenced protein ($P < 0.05$) and gluten ($P < 0.01$) contents. It is suggested that N mineralisation following the ploughing of older grass leys occurred later than when following the first year ley. The protein and gluten contents of wheat following unfertilised grass-clover corresponded to those following cereals given 125-150 kg N ha-1, but the rheological

properties of the gluten were different to what could be achieved using equivalent quantities of mineral fertiliser. Probably, the slow release of N from decomposition of old grassland gave a better synchrony between N release and plant demand. Nitrate leaching in year 1 after ploughing was significantly influenced by type of grassland ($P < 0.001$) with 10 and 29 kg N ha-1 leached from grass-clover and ryegrass, respectively. Nitrate leaching following ploughing of 1-year-old leys averaged 11 kg N ha-1 which was significantly lower than the 24 kg N ha-1 following 2- or 8-year-old leys. The flow-weighted mean nitrate concentration decreased from 8.5 mg N l-1 in year 1 after grassland cultivation to 4.5 mg N l-1 in year 2. More N was released following ploughing of ryegrass swards and from grasslands of increasing age, but differences were moderate compared to the estimated N-surplus. This indicates that when organic matter in grasslands is partially decomposed and readily mineralisable N used, the remaining organic N is released only very slowly.
Keywords: Bread-making quality; Grassland cultivation; Grass-clover; Nitrate leaching; Residual effect; Ryegrass

Paul F. Donald, Fiona J. Sanderson, Ian J. Burfield, Frans P.J. van Bommel, Further evidence of continent-wide impacts of agricultural intensification on European farmland birds, 1990-2000, Agriculture, Ecosystems & Environment, Volume 116, Issues 3-4, September 2006, Pages 189-196, ISSN 0167-8809, DOI: 10.1016/j.agee.2006.02.007.
(http://www.sciencedirect.com/science/article/B6T3Y-4JKRTF9-2/2/f7492dbc013f9a42983dbeca33dcde09)
Abstract:
Between 1990 and 2000, farmland birds showed a significant decline across Europe, a trend not shared by bird assemblages of other habitats over the same period. Mean trends for each farmland species in the period 1990-2000 were positively correlated with trends over the period 1970-1990, and there was little change in population trajectory for most species over the 30-year period. Of the 58 species classed by an independent assessment as being primarily birds of farmland, 41 showed negative overall mean trends across Europe in 1990-2000, 19 of them significant. There was a significant negative correlation between mean national trends of all farmland species and indices of national agricultural intensity. This relationship strengthened when the 19 declining species were considered alone, and was not apparent when only non-declining species were considered. Population trends of terrestrial non-farmland bird species over the same period were unrelated to agricultural intensity. Trends in farmland bird populations were independent of the proportion of farmland under agri-environment prescriptions. The results support earlier evidence that population trends of farmland birds across Europe can be predicted from gross national agricultural statistics. Substantial changes in agricultural policy, particularly the removal of economic incentives that lead to agricultural intensification, are required if 2010 targets for halting loss of biodiversity are to be met in an enlarged European Union.
Keywords: Population decline; European Union; Agri-environment schemes; Cereal yield; Conservation

I.Y. Dugje, A.Y. Kamara, L.O. Omoigui, Infestation of crop fields by Striga species in the savanna zones of northeast Nigeria, Agriculture, Ecosystems & Environment, Volume 116, Issues 3-4, September 2006, Pages 251-254, ISSN 0167-8809, DOI: 10.1016/j.agee.2006.02.013.
(http://www.sciencedirect.com/science/article/B6T3Y-4JN2NJN-2/2/affd930592f15603074c07adf2d82564)
Abstract:
Parasitism of crop plants by Striga species is a major constraint in the savanna zones of West Africa. Farmers ranked Striga as a leading constraint during a livelihood analysis of 30 communities in northeast Nigeria. A field survey was conducted to ascertain the extent of

infestation by Striga spp. About 935 crop and fallow fields were surveyed across 30 communities in three agro-ecological zones.
Four major Striga species were identified: Striga hermonthica in sorghum or maize; Striga aspera in rice; Striga densiflora in pearl millet and fallow and Striga gesnerioides in cowpea. About 68% of all fields sampled were infested, about 75% of compound fields and 60% of bush fields. The level of infestation was 60% in southern Guinea, 68% in Sudan and 74% in northern Guinea savanna. The level of infestation of cereal fields by S. hermonthica was in the order of Sudan savanna > Northern Guinea > Southern Guinea. Infestation of cowpea with S. gesnerioides was in the order of Northern Guinea savanna > Sudan savanna > Southern Guinea savanna. Across the three ecozones, about 85% of fields planted to maize and sorghum were infested with S. hermonthica and 81% of cowpea fields with S. gesenerioides. S. aspera infested 40-59% of rice fields and S. densiflora infested 27-60% of millet fields and fallow.
Keywords: Striga hermonthica; Striga densiflora; Striga gesnerioides; Striga aspera; Savannas; Maize; Sorghum; Cowpea

Grzegorz Orlowski, Cropland use by birds wintering in arable landscape in south-western Poland, Agriculture, Ecosystems & Environment, Volume 116, Issues 3-4, September 2006, Pages 273-279, ISSN 0167-8809, DOI: 10.1016/j.agee.2006.03.005.
(http://www.sciencedirect.com/science/article/B6T3Y-4JRVFMF-1/2/5e71f27ceeb548690218dab263d0aa67)
Abstract:
The research carried out in SW Poland in winter 2002/2003 showed the presence of birds within 69 (59%) out of 117 studied fields (total surface = 329.3 ha). Birds were totally absent only from two (bare tilled and winter cereals) out of seven studied field types (the other were: cereal and oil-seed rape stubbles, root crop stubbles, vegetable and fruit crops, young and permanent fallows). In all inhabited field types the percentage of occupied fields (hereafter occupancy) ranged from 58 (permanent fallows) to 100% (fruit and vegetable crops). A total of 2256 individuals, belonging to 27 species were recorded. In all habitats the core of bird fauna was formed by the seed-eaters (from 84 to 98% of all birds). The most frequent species was reed bunting Emberiza schoeniclus (occupancy 37%), followed by pheasant Phasianus colchicus (occupancy 21%). The highest average bird density was recorded in fruit and vegetable crops (61.6 +/- 32.7 individuals ha-1), and 20 times lower in permanent fallows. The average number of individuals found within a single field was also highest in fruit and vegetable crops. In permanent fallows, however, the highest share of insectivorous birds (7%) and predators (5%) was recorded.
Keywords: Seed-eating birds; Arable habitats; Stubble fields; Set-aside; Land abandonment; Crop management; Weeds

H. McKay, G.V. Watola, S.D. Langton, S.A. Langton, The use of agricultural fields by re-established greylag geese (Anser anser) in England: A risk assessment, Crop Protection, Volume 25, Issue 9, September 2006, Pages 996-1003, ISSN 0261-2194, DOI: 10.1016/j.cropro.2006.01.010.
(http://www.sciencedirect.com/science/article/B6T5T-4JG5F4R-1/2/ae1cc8a4fa08e22b3cae533b2ce668eb)
Abstract:
Re-established greylag geese are currently increasing at a rate of 12% per annum, are non-migratory and can be observed grazing on agricultural fields. The risk of damage to UK agriculture was, therefore, assessed by counting birds seen feeding on crops during two surveys in Yorkshire, the Midlands and Norfolk, between 1999 and 2002. Numbers were highest and flock sizes greatest during the winter months (October to February). Field use increased with size (area) and proximity to water. During the breeding season (March through May) greylag geese were distributed in small flocks over a greater number of fields. Harvested root crops and grass were the preferred crops,

rather than growing cereals. It seems, therefore, that grazing by re-established greylag geese does not currently have a large impact on agriculture in England. However, cereals are grazed in late winter and spring, often repeatedly, and by large flocks of geese, and there is, therefore, potential for economically significant yield loss should numbers continue to increase in the future.
Keywords: Grazing; Agricultural fields; Survey; Field choice

Marijana Sokolovic, Borka Simpraga, Survey of trichothecene mycotoxins in grains and animal feed in Croatia by thin layer chromatography, Food Control, Volume 17, Issue 9, September 2006, Pages 733-740, ISSN 0956-7135, DOI: 10.1016/j.foodcont.2005.05.001.
(http://www.sciencedirect.com/science/article/B6T6S-4GJVB30-2/2/ac7cc0f02fd7c6a9b1de74fceab9ba7e)
Abstract:
Trichothecene mycotoxins are common contaminants of cereal grains and animal feed worldwide. The toxins are toxic to both human and animals. The objectives of this study were to determine the occurrence of trichothecenes in grains and animal feed in Croatia. Total of 465 samples were collected during the seven-year period (1998-2004) from manufactures and small holders farm storage facilities. The samples were analyzed by thin layer chromatography, which proved to be fast, reliable and inexpensive method. T-2 toxin, diacetoxyscirpenol and deoxynivalenol were detected in 16.8%, 27.6% and 41.2%, respectively. The amount of toxins ranged between 0.05 and 3.4 mg/kg. The majority of animal feed samples was poultry feed. Only small number of it contained T-2 toxin and diacetoxyscirpenol levels greater than the Croatian regulatory levels for poultry feed. Positive samples were in correlation with evidenced clinical symptoms of toxicosis in poultry. Since trichothecenes are frequently isolated from animal feed and grains in Croatia, they could have significant economic and safety implications in animal production.
Keywords: Trichothecenes; Feed; Grains; TLC; Croatia

Thomas F.X. Collins, Robert L. Sprando, Thomas N. Black, Nicholas Olejnik, Robert M. Eppley, Hamida Z. Alam, James Rorie, Dennis I. Ruggles, Effects of zearalenone on in utero development in rats, Food and Chemical Toxicology, Volume 44, Issue 9, September 2006, Pages 1455-1465, ISSN 0278-6915, DOI: 10.1016/j.fct.2006.04.015.
(http://www.sciencedirect.com/science/article/B6T6P-4JXR90G-2/2/2ca014fe6d881276b7bd76affd573fd3)
Abstract:
Zearalenone (ZE), an estrogenic mycotoxin produced by Fusarium graminearum or F. roseum, is one of the most common contaminants of cereal grains world-wide. The objective of this study was to determine the effects of ZE on in utero development of rats. Pregnant female Charles River Sprague-Dawley rats were gavaged once daily with ZE (in corn oil) at doses of 0, 1, 2, 4, or 8 mg/kg body weight on gestation days (GD) 6-19. All females survived to cesarean section on GD 20. At cesarean section, reproductive and developmental parameters were measured and blood was taken for hormone analysis.
Dose-related decreases were seen in maternal feed consumption and body weight gain in all treated groups. Delayed fetal development was linked to maternal toxicity. Fetal body weight was significantly decreased in both sexes in all treated groups. ZE retarded skeletal ossification at 4 and 8 mg/kg. Fetal anogenital index (anogenital distance normalized for body weight) was increased in all treated groups, indicating an androgenic effect of ZE during fetal development. Fetal viability was significantly decreased at 8 mg/kg; significant decreases were observed in number of viable fetuses, and number of litters totally resorbed. At 4 and 8 mg/kg, maternal liver-body weight ratios were significantly increased and organ-brain weight ratios for weights of liver, heart, spleen, kidneys, and ovaries were significantly decreased. Gonadotropins (LH, FSH, and prolactin) and sex steroids (progesterone and estradiol) were analyzed from the blood serum obtained at cesarean section. LH in the 0, 1, 2, and 4 mg/kg groups showed minimal variation, and

slightly increased at 8 mg/kg. FSH was decreased in the 1, 2, and 4 mg/kg groups, but the level at 8 mg/kg was slightly higher than the control level. Prolactin level was not affected at 1 mg/kg, slightly increased at 2 and 4 mg/kg, and significantly increased at 8 mg/kg. Progesterone was decreased at 2, 4, and 8 mg/kg and the decreases were significant at 2 and 4 mg/kg. Estradiol level was not affected at 1 mg/kg, but dose-related decreases were observed at 2, 4, and 8 mg/kg. Only the 8 mg/kg level of estradiol was significantly decreased. In summary, ZE was maternally toxic and fetotoxic but not teratogenic. The increased anogenital distance observed in male and female fetuses was considered a hormonal change rather than a teratologic response. The increased anogenital distance indicated an androgenic effect. Based on the dose-related maternal and fetal toxicity in all treated groups, the NOEL for reproductive and teratogenic effects was less than 1 mg/kg.
Keywords: Zearalenone; Estrogenic mycotoxin; Developmental toxicity; Rat

Charlotte Eklund-Jonsson, Ann-Sofie Sandberg, Marie Larsson Alminger, Reduction of phytate content while preserving minerals during whole grain cereal tempe fermentation, Journal of Cereal Science, Volume 44, Issue 2, September 2006, Pages 154-160, ISSN 0733-5210, DOI: 10.1016/j.jcs.2006.05.005.
(http://www.sciencedirect.com/science/article/B6WHK-4KFV3C9-1/2/865910e3eb0edda33bdf37514a94a9d6)
Abstract:
The effects of different pretreatments on phytate and mineral contents were investigated in whole grain barley and oat tempe fermented with Rhizopus oligosporus. Different varieties of barley and oats were exposed to pretreatments such as pearling, rolling, moistening, autoclaving and soaking before fermentation. Pearling was the most effective pretreatment for reduction of phytate content for both oats and barley. Nevertheless, mineral contents were reduced, and most likely cell wall rich fractions were also reduced by this process. In the first experiments the phytate content reduction in the oats and barley samples were reduced by 74% (3.3 [mu]mol/g, d.m.) and 89% (1.4 [mu]mol/g, d.m.), respectively. However, to improve iron absorption the phytate levels should not exceed 0.5 [mu]mol/g, and further phytate degradation was necessary. Therefore, in the final experiments barley samples were exposed to an optimised process with prolonged soaking at a higher temperature and the pearling residues were returned before fermentation. When the outer layers of the barley kernels were returned before fermentation the phytate content was successfully reduced by 97% to 0.4 [mu]mol/g (d.m.) and Fe and Zn levels were well preserved.
Keywords: Phytate; Tempe; Tempeh; Whole grain; Mineral availability

Kathleen J. Melanson, Theodore J. Angelopoulos, Von T. Nguyen, Margaret Martini, Linda Zukley, Joshua Lowndes, Thomas J. Dube, Justin J. Fiutem, Byron W. Yount, James M. Rippe, Consumption of Whole-Grain Cereals during Weight Loss: Effects on Dietary Quality, Dietary Fiber, Magnesium, Vitamin B-6, and Obesity, Journal of the American Dietetic Association, Volume 106, Issue 9, September 2006, Pages 1380-1388, ISSN 0002-8223, DOI: 10.1016/j.jada.2006.06.003.
(http://www.sciencedirect.com/science/article/B758G-4KV82NX-K/2/d98afc1ef285c5589a1e558052e560d9)
Abstract: Objective
While various weight-management approaches produce weight loss, they may differ in dietary quality. We monitored changes in nutrient intakes in overweight and obese subjects on three different weight-management programs.Design
Randomized clinical trial (pilot study) with two 12-week phases: phase 1, weekly counseling; phase 2, monitoring only.Subjects/setting

One hundred eighty nonsmoking, sedentary overweight and obese adults began this outpatient study; 134 (body mass index [calculated as kg/m2]=30.9+/-2.4; age=42.3+/-1.2 years) were used in analyses.Intervention
Twenty-four weeks of exercise only (control group), hypocaloric diet plus exercise, or hypocaloric diet with fiber-rich whole-grain cereals plus exercise.Main Outcome Measures
At weeks 0, 12, and 24, diet quality was assessed by 3-day food records and body weight was measured.Statistical Analyses Performed
Three-way analysis of variance with repeated measures.Results
The hypocaloric diet with fiber-rich whole-grain cereals plus exercise decreased energy intake more than exercise only (P=0.032). By week 12, the hypocaloric diet with fiber-rich whole-grain cereals plus exercise and the hypocaloric diet plus exercise decreased total fat more than exercise only, which was sustained in the hypocaloric diet with fiber-rich whole-grain cereals plus exercise at 24 weeks (P<0.001). At weeks 12 and 24, the hypocaloric diet with fiber-rich whole-grain cereals plus exercise reduced saturated fat intake more than exercise only. The hypocaloric diet with fiber-rich whole-grain cereals plus exercise increased total fiber, insoluble fiber (both P<0.001), magnesium (P=0.004), and vitamin B-6 (P=0.002) intakes more than the hypocaloric diet plus exercise and exercise only. Calcium and vitamin E intakes were inadequate in all groups. Weight loss was similar in the hypocaloric diet with fiber-rich whole-grain cereals plus exercise and the hypocaloric diet plus exercise.Conclusions
Weight-reduction strategies may be associated with reduced intake of micronutrients, such as calcium and vitamin E. However, a hypocaloric diet with fiber-rich whole-grain cereal is effective for improving or maintaining other aspects of dietary quality during weight loss.

Bakul Dhagat Mehta, Sonali P. Jog, Steven C. Johnson, Pushpalatha P.N. Murthy, Lily pollen alkaline phytase is a histidine phosphatase similar to mammalian multiple inositol polyphosphate phosphatase (MINPP), Phytochemistry, Volume 67, Issue 17, September 2006, Pages 1874-1886, ISSN 0031-9422, DOI: 10.1016/j.phytochem.2006.06.008.
(http://www.sciencedirect.com/science/article/B6TH7-4KGG1TW-3/2/50b84ce845b5fb23e63050be2b4235e8)
Abstract:
Phytic acid is the most abundant inositol phosphate in cells; it constitutes 1-5% of the dry weight of cereal grains and legumes. Phytases are the primary enzymes responsible for the hydrolysis of phytic acid and thus play important roles in inositol phosphate metabolism. A novel alkaline phytase in lily pollen (LlALP) was recently purified in our laboratory. In this paper, we describe the cloning and characterization of LlALP cDNA from lily pollen. Two isoforms of alkaline phytase cDNAs, LlAlp1 and LlAlp2, which are 1467 and 1533 bp long and encode proteins of 487 and 511 amino acids, respectively, were identified. The deduced amino acid sequences contains the signature heptapeptide of histidine phosphatases, -RHGXRXP-, but shares <25% identity to fungal histidine acid phytases. Phylogenetic analysis reveals that LlALP is most closely related to multiple inositol polyphosphate phosphatase (MINPP) from humans (25%) and rats (23%). mRNA corresponding to LlAlp1 and LlAlp2 were expressed in leaves, stem, petals and pollen grains. The expression profiles of LlAlp isoforms in anthers indicated that mRNA corresponding to both isoforms were present at all stages of flower development. The expression of LlAlp2 cDNA in Escherichia coli revealed the accumulation of the active enzyme in inclusion bodies and confirmed that the cDNA encodes an alkaline phytase. In summary, plant alkaline phytase is a member of the histidine phosphatase family that includes MINPP and exhibits properties distinct from bacterial and fungal phytases.
Keywords: Lilium longiflorum; Liliaceae; Easter lily; Pollen grains; Cloning; Alkaline phytase; Recombinant expression; Multiple inositol polyphosphate phosphatase (MINPP)

G.P. Lafond, W.E. May, F.C. Stevenson, D.A. Derksen, Effects of tillage systems and rotations on crop production for a thin Black Chernozem in the Canadian Prairies, Soil and Tillage Research, Volume 89, Issue 2, September 2006, Pages 232-245, ISSN 0167-1987, DOI: 10.1016/j.still.2005.07.014.
(http://www.sciencedirect.com/science/article/B6TC6-4H396XT-3/2/4567748ea48ba03f3d8e58c2f8430d12)
Abstract:
Soil degradation is the single most important threat to global food production and security. Wind and water erosion are the main forms of this degradation, and conservation tillage represents an effective method for controlling this problem. The objective of this study was to quantify the effects of three tillage methods [zero (ZT), minimum (MT) and conventional (CT)] and three four-year crop sequences [spring wheat (Triticum aestivum L.)-spring wheat-winter wheat-fallow; spring wheat-spring wheat-flax (Linum usitatissimum L.)-winter wheat; spring wheat-flax-winter wheat-field pea (Pisum sativum L.] on crop establishment, plant height, seed weight, soil water storage, crop water use, crop water use efficiency and grain yield over a 12-year period under Canadian growing conditions. Plant establishment was not adversely affected by tillage systems or crop sequences except for flax, where a small reduction was observed with ZT and MT. Conservation tillage showed a yield benefit over CT of 7%, 12.5% and 7.4% for field pea, flax and spring wheat grown on cereal stubble, respectively over the 12 years of the study. Much of the yield increase was due to an increase in soil water in the 0-30 cm soil layer with ZT and MT. However, tillage systems had no effect on grain yield for spring wheat grown on fallow and field pea stubble due to a lack of differences in spring soil water content. Flax grown in sequence with cereals only yielded higher than when it was grown in the sequence which included field pea, even though flax was seeded on spring wheat stubble in both cases. Winter wheat yielded higher when grown on flax stubble than on spring wheat stubble. The results indicate that a one-year non-cereal break crop was enough to alleviate the negative effects of consecutive cereal crops on winter wheat. Spring wheat grown on field pea stubble always yielded more than when grown on cereal stubble. A 10% increase in water use efficiency was observed with flax grown with ZT and MT management. Crop sequence improved water use efficiency in flax and spring wheat. Growing spring wheat on field pea stubble as opposed to growing it on cereal stubble resulted in a 10% increase in water use efficiency. Overall, rainfall accounted for 73%, 72%, 67% and 65% of total water used by field pea, flax, winter wheat and spring wheat, respectively. This explains the large year effect as a result of variation in growing (May-August) season precipitation. The non-significant tillage system by year interaction implies that the positive benefits of ZT and MT occur over a wide range of growing conditions, while the absence of a tillage system by crop sequence interaction suggests that knowledge developed under CT management also applies to ZT and MT. The results of this study support the large shifts towards in conservation tillage being observed in the Canadian prairies.
Keywords: Crop rotations; Tillage methods; Soil water storage; Crop water use; Crop water use efficiency; Grain yield; Crop establishment; Flax; Field pea; Wheat

Boskou Dimitrios, Sources of natural phenolic antioxidants, Trends in Food Science & Technology, Volume 17, Issue 9, INTRADFOODS - Innovations in Traditional Foods - EFFoST 2005 conference, September 2006, Pages 505-512, ISSN 0924-2244, DOI: 10.1016/j.tifs.2006.04.004.
(http://www.sciencedirect.com/science/article/B6VHY-4K6CPNC-1/2/0b481aa50fd09bdf720a9a94966862e2)
Abstract:
An important field of research today is the control of `redox' status with the properties of food and food components. Natural antioxidants present in the diet increase the resistance toward oxidative damages and they may have a substantial impact on human health.
Dietary antioxidants such as ascorbates, tocopherols and carotenoids are well known and there is a surplus of publications related to their role in health. Plant phenols have not been completely

studied because of the complexity of their chemical nature and the extended occurrence in plant materials.
Extensively studied sources of natural antioxidants are fruits and vegetables, seeds, cereals, berries, wine, tea, onion bulbs, olive oil and aromatic plants. Attempts are also made to identify and evaluate antioxidants in agricultural by-products, ethnic and traditional products, herbal teas, cold pressed seed oils, exudates resins, hydrolysis products, not evaluated fruits and edible leaves and other raw materials rich in antioxidant phenols that have nutritional importance and/or the potential for applications in the promotion of health and prevention against damages caused by radicals.

J.P. Dahiya, D.C. Wilkie, A.G. Van Kessel, M.D. Drew, Potential strategies for controlling necrotic enteritis in broiler chickens in post-antibiotic era, Animal Feed Science and Technology, Volume 129, Issues 1-2, 4 August 2006, Pages 60-88, ISSN 0377-8401, DOI: 10.1016/j.anifeedsci.2005.12.003.
(http://www.sciencedirect.com/science/article/B6T42-4J2M1RP-1/2/80a883d2a5bada14892bc25349c5730d)
Abstract:
The use of in-feed antibiotics has until now been the main strategy for controlling Clostridium perfringens-associated necrotic enteritis in poultry. But approvals for the inclusion of non-therapeutic antibiotics in poultry feed are fast disappearing worldwide due to fear of development of antibiotic-resistant microbes. Public concern about the threat of antibiotic-resistant pathogens has forced the poultry industry to consider various other alternatives. Strategies to control necrotic enteritis in the absence of antibiotic growth promoters, without resorting to the use of prophylactic or therapeutic treatment, have centered upon dietary and management practices. Among the candidate replacements for antibiotics are competitive exclusion products, probiotics, prebiotics, organic acids, enzymes, plant extracts, hen egg antibodies, bacteriophages and vaccination. Chemical composition of the diet related to cereal grain selection, protein source and amino acid profile may influence disease propensity and consideration of diet chemical composition might be helpful in formulation of poultry diets that reduce the incidence of necrotic enteritis. To date, no single satisfactory non-antibiotic measure against C. perfringens has been identified. Combined with good hygiene management of poultry houses, consideration of diet composition and application of antibiotic alternatives might be effective to some extent in maintaining production and controlling necrotic enteritis. This paper will review some of the potential strategies that are available for controlling necrotic enteritis in broiler chickens without using antibiotic growth promoters.
Keywords: Necrotic enteritis; Clostridium perfringens; Broiler chicken; Antibiotics

M. Anguita, J. Gasa, S.M. Martin-Orue, J.F. Perez, Study of the effect of technological processes on starch hydrolysis, non-starch polysaccharides solubilization and physicochemical properties of different ingredients using a two-step in vitro system, Animal Feed Science and Technology, Volume 129, Issues 1-2, 4 August 2006, Pages 99-115, ISSN 0377-8401, DOI: 10.1016/j.anifeedsci.2005.12.004.
(http://www.sciencedirect.com/science/article/B6T42-4J2KTGN-3/2/834e0df72657eed76d3427c760e2a9ec)
Abstract:
The present study evaluated in vitro the effect of technological processes on four cereal grains: maize, wheat, barley and oats and one legume grain: green seeded pea. Processing included extrusion, cooking and grinding (0.8 and 3.0 mm opening), and the parameters evaluated were starch hydrolysis, content of soluble non-starch polysaccharides (NSP) and physicochemical properties: solubility of dry matter (DM), viscosity of the supernatant and water retention capacity (WRC).

All samples were submitted to an in vitro digestion that consisted of two steps, gastric (G; pepsin; pH 2; 4 h) and small intestine (SI; pancreatin; pH 7; 4 h) simulation. Prior to incubation, particle size was evaluated in all samples by hand sieving and calculated on a weight basis. Total starch and total NSP analyses were performed on raw samples (0.8 mm). Hydrolysis of starch was evaluated by measuring glucose in the supernatant during the course of SI incubation. Soluble NSP were evaluated in the supernatant at the end of SI incubation. Physicochemical properties were evaluated after G and SI incubation.
In raw ingredients (0.8 mm) the hydrolysis of starch at the end of SI incubation (ratio between glucose released in the sample and glucose released in the sample gelatinized) was lower in peas (0.45) than in cereal grains (0.69 in maize; 0.95 in wheat; 0.82 in barley and 0.92 in oats). The highest amounts of soluble NSP were found in barley (19.8 g/kg DM) and oats (13.8 g/kg DM), and were associated with higher viscosities. The WRC in raw samples was positively related to the amount of total NSP after both G ($r2 = 0.847$, $P<0.001$ for 0.8 mm samples) and SI incubation ($r2 = 0.773$, $P<0.001$).
Technological processing increased starch hydrolysis and solubilization of NSP in all ingredients. The extent of the effect was dependent on the ingredient as well as on the severity of the technological process. Component monosaccharides of soluble NSP were differently affected, while glucose was increased by all the processes, arabinose and xylose required the more extreme conditions of extrusion. Contrary to raw samples, WRC of heat treated ingredients showed a negative relation with total NSP content of the sample after G incubation, which turned out to be a positive relation after SI incubation.
It is concluded that technological processing of ingredients promotes higher starch hydrolysis, increases in the amount of soluble NSP and modifications in the physicochemical properties depending on the nature of the feed ingredients.
Keywords: Starch hydrolysis; Soluble non-starch polysaccharides; Physicochemical properties; Technological processes; In vitro digestion

E.M.A. Smaling, J. Dixon, Adding a soil fertility dimension to the global farming systems approach, with cases from Africa, Agriculture, Ecosystems & Environment, Volume 116, Issues 1-2, Nutrient Management in Tropical Agroecosystems, August 2006, Pages 15-26, ISSN 0167-8809, DOI: 10.1016/j.agee.2006.03.010.
(http://www.sciencedirect.com/science/article/B6T3Y-4JVSV8K-1/2/b526732e226df5032fffbc3e2696d189)
Abstract:
The global farming systems (GFS) approach is extended by adding a soil fertility and nutrient management dimension for Africa's forest-based, maize mixed, cereal-root crop mixed, and agro-pastoral millet/sorghum farming systems. Use is made of sustainable livelihood concepts, translated into farmer capitals (natural, physical, financial, human, social), and the indicator-based DPSIR (driving force-pressure-state-impact-response) framework for environmental reporting. State and impact indicators show, for each GFS, levels of nutrient stocks and flows, respectively. In case of nutrient depletion, soils may (i) initially still be fertile enough to provide reasonable and stable yields, (ii) support declining yields, or (iii) support low yields at low fertility level. In the latter case, food security is generally at stake. Response indicators include the level of uptake of improved integrated nutrient management strategies at land user level, and the enforcement of new and enabling pro-agriculture and pro-environment policies. Although the extended GFS have no direct relevance for farm-level interventions, the approach can be used to frame soil fertility research priorities and policies at a regional level.
Keywords: Soil fertility; Nutrient stocks; Nutrient flows; Integrated nutrient management; Farming systems; Indicators; Sub-Saharan Africa

N.D. Tillett, T. Hague, Increasing Work Rate in Vision Guided Precision Banded Operations, Biosystems Engineering, Volume 94, Issue 4, August 2006, Pages 487-494, ISSN 1537-5110, DOI: 10.1016/j.biosystemseng.2006.04.010.
(http://www.sciencedirect.com/science/article/B6WXV-4K8SC1T-2/2/0aab84e335ce7b081b5d1f59ffe33e67)
Abstract:
Concerns over the economic and environmental sustainability of farming are leading to an increased interest in techniques to reduce crop protection inputs by better targeting. One way to improve targeting is through physically aligning treatment devices with crop rows. Manual guidance is a difficult and stressful task due to the high concentration required to maintain acceptable tolerances, typically +/-25 mm. Under normal farm conditions, global positioning system based technologies are unable to reliably offer this performance. Commercial implement guidance systems based on computer vision have demonstrated that the required accuracy can be achieved. However, working width is limited due to the need to match implements with drill or transplanter width in order to avoid misalignment at the interface between bouts.
This paper describes an integrated vision-based system for tracking multiple bouts that has been tested in two example applications. The first was an inter-row hoe for use in cereals with three independently guided 4 m wide sections, each with its own camera, operating on 12 m tramlines. Trials showed that the standard deviation in the lateral position was 10 mm at 10 km h-1. The second exemplar based on a conventional boom sprayer was a precision band sprayer for vegetables spanning five 4 m wide beds. Trials indicated the standard deviation in lateral position was 22 mm at 12 km h-1.

Wen Zhi Jiang, Mn use efficiency in different wheat cultivars, Environmental and Experimental Botany, Volume 57, Issues 1-2, August 2006, Pages 41-50, ISSN 0098-8472, DOI: 10.1016/j.envexpbot.2005.04.008.
(http://www.sciencedirect.com/science/article/B6T66-4GDSF0Y-1/2/8e52bbe94f31c786f84be53cc9794429)
Abstract:
Mn plays an important role in plants. Soil Mn deficiency may markedly limit production of cereals, such as wheat. Wheat crop Mn deficiency can be corrected by application of Mn fertilizer, however, growing wheat cultivars adapted to Mn-deficient soils would represent a long-term solution and sustainable approach to wheat agronomy. The aim of this research was to characterise the physiological basis in Mn efficiency identified among a range of UK wheat cultivars grown in Mn-deficient soil in pot trials. Results demonstrated that the old spring wheat cultivar Maris Butler is Mn-efficient when grown in Mn-deficient conditions in comparison with modern commercial cultivar Paragon. Plants of cv. Maris Butler grown in Mn-deficient soil showed a mean relative dry matter 80% of plants in Mn-sufficient soil, whereas the modern cultivar Paragon gave a relative value of 55%. The Mn efficiency in cv. Maris Butler was shown to be related to an improved internal utilization of Mn, rather than to a higher plant Mn accumulation, which was expressed as an improved efficiency of photosynthetic photosystem II. From this study, it is suggested that cv. Maris Butler could be further examined as a potential genetic resource in future wheat micronutrient efficiency improvement programs aimed at achieving Mn efficiency in wheat. It is also suggested from this study that more than one mechanism has arisen in wheat to confer tolerance to Mn deficiency.
Keywords: Mn efficiency; Wheat cultivar; Mn accumulation; Photosynthetic quantum yield; Chlorophyll fluorescence emission

F. Bekes, S. Kemeny, M. Morell, An integrated approach to predicting end-product quality of wheat, European Journal of Agronomy, Volume 25, Issue 2, Modelling Quality Traits and Their

Genetic Variability for Wheat, August 2006, Pages 155-162, ISSN 1161-0301, DOI: 10.1016/j.eja.2006.04.008.
(http://www.sciencedirect.com/science/article/B6T67-4K5STCW-1/2/2b8e7bc21e43f4755d6716410d7b639b)
Abstract:
One of the most important tasks of cereal science is to relate end-product quality to genes involved in determining certain attributes of quality. It requires a good understanding of the complex nature of quality that can lead to the proper measurements of these attributes. Most of our knowledge about the `genetics of quality' derives from two different experimental approaches: (i) direct measurements of quality traits on samples with systematically altered chemical composition; (ii) relating quality and chemical composition/genetics of large sample populations using statistical methods. An overview on the recent achievements of these two approaches will be given introducing a novel prediction procedure relating the individual and interactive contribution of high molecular weight (HMW-GS) and low molecular weight (LMW-GS) glutenin-subunit alleles to specific dough parameters and end-product quality attributes. The results shown are based on a statistical investigation of more than 3000 samples covering most of the glutenin alleles and allelic combinations appearing in the Australian bread wheat cultivars.
Keywords: Glutenin alleles; Dough properties; Processing attributes; Mathematical model

F. Batifoulier, M.-A. Verny, E. Chanliaud, C. Remesy, C. Demigne, Variability of B vitamin concentrations in wheat grain, milling fractions and bread products, European Journal of Agronomy, Volume 25, Issue 2, Modelling Quality Traits and Their Genetic Variability for Wheat, August 2006, Pages 163-169, ISSN 1161-0301, DOI: 10.1016/j.eja.2006.04.009.
(http://www.sciencedirect.com/science/article/B6T67-4K42BV7-1/2/7acf0de16d860471c3b5a7238a718542)
Abstract:
Whole wheat bread represents an important source of dietary fiber and micronutrients such as minerals and vitamins. The decrease of daily B vitamins (thiamine, riboflavin and pyridoxine) intake could be connected to a decrease of bread consumption and a greater consumption of refined products. The aim of this work was thus to estimate the variability of thiamine, riboflavin and pyridoxine concentrations in wheat and to evaluate if this variability is conserved from the grain to the bread in order to identify wheat cultivars with high nutritional potential. Extraction and analysis of B vitamins by high performance liquid chromatography (HPLC) have been carried out for 49 wheat cultivars (46 bread wheat, 1 durum bread, 2 spelts) grown under the same environmental conditions in nursery plots. Based on grain thiamine concentration, nine cultivars were selected to constitute three groups with low, medium and high grain thiamine concentration and the concentration of B vitamins of their corresponding white and reconstituted flours and white and whole breads was determined. Grains showed a high variability for B vitamin concentrations, ranging from 2.60 to 6.13 [mu]g g-1 dry matter (DM) for thiamine, from 0.48 to 1.06 [mu]g g-1 DM for riboflavin and from 1.45 to 3.16 [mu]g g-1 DM for pyridoxine. After milling, 43%, 67% and 20% of thiamine, riboflavin and pyridoxine were recovered in white flour, compared to 80%, 100% and 95% in reconstituted whole wheat flour, respectively. After bread making, the impoverishment in thiamine and pyridoxine was less pronounced in whole wheat bread (-31% and -37% for thiamine and pyridoxine, respectively) than in white bread (-37% and -62% for thiamine and pyridoxine, respectively). In contrast, riboflavin concentration was two-fold higher in bread than in white flour. The genetic variability of B vitamin concentrations was conserved after milling and bread making, especially for cultivars that have high B vitamin concentrations in whole flour. In conclusion, it appears that B vitamin concentrations of cereal products are also under genetic control, and the variability in B vitamin concentrations is an important factor to take into account for wheat selection.
Keywords: Wheat cultivars; Thiamine; Riboflavin; Pyridoxine; Genetic variability

Hamide Z. Senyuva, Vural Gokmen, Interference-free determination of acrylamide in potato and cereal-based foods by a laboratory validated liquid chromatography-mass spectrometry method, Food Chemistry, Volume 97, Issue 3, August 2006, Pages 539-545, ISSN 0308-8146, DOI: 10.1016/j.foodchem.2005.06.005.
(http://www.sciencedirect.com/science/article/B6T6R-4GSBFRF-5/2/f99118229732d7c092d9e2683cf83f1c)
Abstract:
A simple and rapid method was developed and validated for the determination of acrylamide in potato and cereal-based foods by using a single quadrupole liquid chromatography-mass spectrometry (LC-MS) interfaced with positive atmospheric pressure chemical ionization (APCI+). Acrylamide was simply extracted with 0.01 mM acetic acid in a vortex mixer prior to LC-MS analysis. The applicability of validated method was shown for a wide range of processed foods including chips, fries, crisps, breads, biscuits and cookies. The mean recovery was found to be 99.7 with a repeatability of 1.8% in the range 100-1000 ng/g. During LC-MS analyses, the major interfering co-extractive was identified as valine which yields characteristic [M + H]+ and compound specific product ions having m/z of 118 and 72, respectively. Valine increased the baseline signal preventing accurate and precise quantitation, and resulted in poorer sensitivity in selected ion monitoring mode. The adverse effect of valine could be limited by instrumentally adjusted delay time or by solid-phase extraction with strong cation-exchanger sorbent.
Keywords: Acrylamide; Interference; Valine; LC-MS; Delay time; Validation

Naofumi Morita, Tomoko Maeda, Reimei Sai, Kazuyoshi Miyake, Hiroyuki Yoshioka, Atsuo Urisu, Taiji Adachi, Studies on distribution of protein and allergen in graded flours prepared from whole buckwheat grains, Food Research International, Volume 39, Issue 7, August 2006, Pages 782-790, ISSN 0963-9969, DOI: 10.1016/j.foodres.2006.02.005.
(http://www.sciencedirect.com/science/article/B6T6V-4JRVFTG-3/2/46f90cf029a34ea6733e816ab995498e)
Abstract:
Buckwheat (Fagopyrum esculentum Moench) is one of the traditional crops and has become a renewed target of interest or a popular crop as a healthy foodstuff, because it is a good source of cereal protein which is rich with essential amino acids. However, what is critical to our health is that buckwheat contains proteins which cause a hypersensitive reaction (allergy). In this study, to decrease the allergenic activity of buckwheat products, some graded flours were prepared from various portions of buckwheat grain, and its protein distribution and characteristics of each graded flour fractions were determined. The protein and ash contents of all buckwheat fractions increased in the order from the inner fraction to the outer fraction. From SDS-PAGE patterns, the concentrations of 15, 22, 35, 39 and 50 kDa proteins of the inner fractions were lower, and there were clear differences in the protein compositions between the inner and outer buckwheat flour fractions. Detection of allergenic proteins by IgE-immunoblotting showed that sera pooled from 9 patients reacted with proteins of 15 and 22 kDa bands, named Fag e 2 and Fag e 1, respectively. IgE binding activities of proteins, Fag e 1 or Fag e 2 of the inner fractions were weaker than those of the outer fractions. Therefore, the inner fractions without major allergic proteins could be separated from whole buckwheat grains, and also expected to be applied to manufacturing processed foods with low allergen. Furthermore, the graded-milling procedure could be used to provide less-allergenic buckwheat flours.
Keywords: Allergen; Buckwheat; Fagopyrum esculentum; SDS-PAGE; IgE

U. Tiemann, K.-P. Brussow, U. Kuchenmeister, L. Jonas, P. Kohlschein, R. Pohland, S. Danicke, Influence of diets with cereal grains contaminated by graded levels of two Fusarium toxins on selected enzymatic and histological parameters of liver in gilts, Food and Chemical Toxicology,

Volume 44, Issue 8, August 2006, Pages 1228-1235, ISSN 0278-6915, DOI: 10.1016/j.fct.2006.01.021.
(http://www.sciencedirect.com/science/article/B6T6P-4JBB315-1/2/2dba7ffcf8a5cffd10a4a7f2851a4ace)
Abstract:
Feeding experiments with diets containing Fusarium toxin-contaminated wheat were conducted to clarify the pathogenesis of enzymatic and histopathological effects of Fusarium toxins on porcine liver cells. A total of 36 prepuberal gilts were divided into four groups and fed diets with increasing proportions of Fusarium toxin-contaminated wheat at a total wheat proportion of 40% over a period of 35 days. The concentrations of the indicator toxins deoxynivalenol (DON) and zearalenone (ZON) which were analyzed by HPLC methods were 210/4, 3070/88, 6100/235, and 9570/358 [mu]g/kg in the diets fed to groups I-IV, respectively. The feeding of mycotoxin-contaminated diets did not cause gross pathological findings in the livers of the animals. Liver tissues were subjected to enzymatic, histological, and ultrastructural examinations. The percentages of the stained areas in periodic acid-Schiff (PAS), Berlin-Blue, and Masson Goldner's trichrome stainings were calculated using the AnalySIS 3.4-system. Significant histopathological findings of alterations with varying degrees in glycogen reduction and increase of hemosiderin particles were found in the liver cells of groups II, III and IV. The thickness of interlobular connective tissue septum in liver cells was significantly increased in groups III and IV. Qualitative ultrastructural alterations were observed in hepatocytes of gilts in groups III and IV. Dependent upon the mycotoxin concentration in the diet, the hepatocytes developed a dose-dependent, extensive, smooth endoplasmic reticulum, exhibited loss of ribosomes, and acquired an increased number of fatty and autophagic vacuoles. However, liver damage as measured by prominent elevated transaminase activities in serum was not detected. Together, the histopathological results provide evidence of liver dysfunction in the absence of clinical signs, especially in pigs fed higher concentrations of Fusarium toxin-contaminated wheat.
Keywords: Mycotoxins; Trichothecene; Nutrition; Gilts; Liver; Enzymes; Histopathology

Heimo Scherz, Eva Kirchhoff, Trace elements in foods: Zinc contents of raw foods--A comparison of data originating from different geographical regions of the world, Journal of Food Composition and Analysis, Volume 19, Issue 5, August 2006, Pages 420-433, ISSN 0889-1575, DOI: 10.1016/j.jfca.2005.10.004.
(http://www.sciencedirect.com/science/article/B6WJH-4JVSVFB-1/2/41c16d1e2b96acfc5ed8c169e075be0f)
Abstract:
Zinc is one of the most important essential trace elements in human nutrition. A zinc deficiency of the human body leads to several disorders, but an excessive zinc intake also causes various acute and chronic adverse effects. Therefore an adequate supply of zinc from food is a basic necessity, and the documentation of reliable quantitative data in several international food composition tables is of general interest. In this study, the zinc contents of selected raw foods, originating from different continents of the world, are compiled, and their variations are displayed. Representative foods for several food groups like milk, meat, fish, cereals, vegetables and fruits are discussed comparatively. Interestingly, we could posit a remarkable consistency in the amounts of zinc in raw foods, especially in edible animal offal and some vegetable raw materials, deriving from European, Asian, African or American regions. The contamination of soils, such as that caused by metal processing industries, is significantly influencing the zinc concentration in plants. The standard of knowledge concerning the forms and mechanisms of the molecular binding of zinc in animal and plant tissues is summarized.
Keywords: Raw foods; Zinc content; Zinc-binding compounds; Geographical influence; International food composition tables

Mary Franz, Laura Sampson, Challenges in developing a whole grain database: Definitions, methods and quantification, Journal of Food Composition and Analysis, Volume 19, Supplement 1, 28th US National Nutrient Databank Conference, August 2006, Pages S38-S44, ISSN 0889-1575, DOI: 10.1016/j.jfca.2005.12.010.
(http://www.sciencedirect.com/science/article/B6WJH-4JRVDVS-5/2/644fef85e769dde49ef173a9e3d31642)
Abstract:
A whole grain database was developed: to quantify the whole grain, bran and germ components of foods and breakfast cereals; to estimate the whole grain composition of foods and cereals with and without added bran and germ; and to establish classification categories ranking foods and cereals as low, medium or high whole grain, according to their percentages of whole grain, with and without added bran and germ. Ten database variables related to whole grain, bran and germ were created. Literature searches provided estimates of the bran, germ and endosperm constituents of cereal grains. Whole grain profiles were developed for foods using an automated recipe program. Whole grain, bran and germ values were assigned to approximately 140 breakfast cereals and other foods. Key whole grain foods included brown rice, oatmeal, popcorn and cold cereals. Wheat and oat bran were the primary sources of bran, and wheat germ was a minor contributor to whole grain content. This may be the first quantitative database providing whole grain, bran and germ values for breakfast cereals and other foods. Maintenance of this database will allow exploration of associations between whole grain consumption and disease risk in prospective cohorts.
Keywords: Nutrient database; Whole grain; Bran; Germ

W.J. Fulkerson, K.S. Nandra, C.F. Clark, I. Barchia, Effect of cereal-based concentrates on productivity of Holstein-Friesian cows grazing short-rotation ryegrass (Lolium multiflorum) or kikuyu (Pennesitum clandestinum) pastures, Livestock Science, Volume 103, Issues 1-2, August 2006, Pages 85-94, ISSN 1871-1413, DOI: 10.1016/j.livsci.2006.01.005.
(http://www.sciencedirect.com/science/article/B7XNX-4JKJTDX-1/2/ef41de9409ff8e4b54f860bf0f61a3f0)
Abstract:
In this study, the effect of increasing the proportion of concentrate in the diet, on efficiency of feed utilisation, was determined when Holstein-Friesian cows grazed short-rotation ryegrass (Lolium multiflorum) or kikuyu (Pennisetum clandestinum) pastures. The concentrates were energy-dense dairy pellets fed twice-a-day at milking and the roughage component was lucerne hay and the pasture.
When cows grazed ryegrass, there was no effect on animal performance as the proportion of concentrate in the diet increased from 0.23 to 0.35 (4.75 to 7.50 kg concentrate/cow/day). The substitution rate of concentrates for pasture for the first 1.57 kg concentrate/cow/day fed was 0.58 but rose to 1.18 for the next 1.28 kg concentrate/cow/day.
When cows grazed kikuyu, there was also no effect of increasing the proportion of concentrate in the diet on total dry matter intake (DMI) or milk production. However, there was a substantial increase in the in vivo digestibility of whole diet, pasture and acid detergent fibre (ADF) was observed when the proportion of concentrate in the diet increased from 0.08 to 0.25. However, there was a marked decline in pasture digestibility (72% to 64%), and more so in ADF digestibility (61.3% to 48.4%), as the proportion of concentrate in the diet increased further to 0.29 (5.52 kg/cow/day). The intake of kikuyu, when determined by difference between pre- and post-grazing pasture mass, was substantially underestimated compared to the use of the n-alkane technique, and this discrepancy increased as the pasture on offer increased.
On both pasture types, the neutral detergent fibre intake, as a % of bodyweight varying from 1.6% to 2.2% for kikuyu and 1.5% to 1.6% for ryegrass was far above the values claimed of 1.2% to restrict intake.

The results of this study highlight the limits to the amount of concentrate that can be fed on a typical Australian dairy farm where concentrates can only be fed twice-a-day at milking. The results also provide a more appropriate benchmark for fibre limitation in the ration when cows graze pasture, particularly poorer quality tropical grasses, and this value is well above that found in more intense feeding situations.
Keywords: Effect of energy supplements on dairy cows; Grazing pasture

S.K. Jalota, Anil Sood, G.B.S. Chahal, B.U. Choudhury, Crop water productivity of cotton (Gossypium hirsutum L.)-wheat (Triticum aestivum L.) system as influenced by deficit irrigation, soil texture and precipitation, Agricultural Water Management, Volume 84, Issues 1-2, 16 July 2006, Pages 137-146, ISSN 0378-3774, DOI: 10.1016/j.agwat.2006.02.003.
(http://www.sciencedirect.com/science/article/B6T3X-4JRM086-1/2/63c6fef02388c6e3c118e65fbe4d9b73)
Abstract:
In the agricultural sector there is an urgent need to use dwindling water resources efficiently and enhancing crop water productivity (CWP). At the farm level, reducing evapotranspiration (ET) through deficit irrigation (lesser number of irrigations) and identification of the most sensitive crop growth stage to water stress has been reported as one of the ways to enhance CWP. Although information on CWP in relation to irrigation water of some cereal crops based on the field experimental data is available in the literature. However, the influence of soil texture, precipitation and deficit irrigation regime and their interactions on CWP is not well-documented. We explored these components in cotton (Gossypium hirsutum L.)-wheat (Triticum aestivum L.) cropping system through simulation analysis, which otherwise are difficult to be explained through field experimentation. The simulated results showed that by reducing the amount of irrigation water input below economic optima, both the yield and ET of cotton and wheat crops were reduced and consequently CWP to varying magnitudes depending upon soil texture, precipitation and irrigation regimes. With reducing post-sowing irrigation water from 300 to 75 mm, the decrease in CWP in silt loam, sandy loam and loamy sand soils were 15, 4 and 1% for cotton and 8, 36 and 55% for wheat, respectively, indicating higher decrease in CWP for wheat than for cotton, and in coarse-textured than fine-textured soils. Precipitation increased the CWP. The increase was more in wheat crop on coarse-textured soil with less number of irrigations. Averaged over soil texture and irrigation regimes, real CWP (RCWP) (yield/ET) was 47 and 9 and 60% of apparent CWP (ACWP) (yield/irrigation water) in cotton, wheat and cotton-wheat system, respectively. The crop growth stages found to be most sensitive to water stress were from flowering to boll formation in cotton and grain development stage in wheat.
Keywords: Crop water productivity; Cotton-wheat system; Soil texture; Irrigation water; Precipitation

I. Lewandowski, U. Schmidt, M. Londo, A. Faaij, The economic value of the phytoremediation function - Assessed by the example of cadmium remediation by willow (Salix ssp), Agricultural Systems, Volume 89, Issue 1, July 2006, Pages 68-89, ISSN 0308-521X, DOI: 10.1016/j.agsy.2005.08.004.
(http://www.sciencedirect.com/science/article/B6T3W-4H5N264-2/2/3fc737d07341b0e403bdffc078f614c4)
Abstract:
The combination of biomass production with other land use functions in multiple land use systems can reduce biomass production costs if these land use functions generate an economic benefit. Aim of this study is to find and apply methods for the quantification of the economic value of the phytoremediation function (cleaning of the soil by plants). For the purpose the combination of biomass production from willow and the phytoremediation function in a cadmium-contaminated case study area in the Rhine valley (near Freiburg, Germany) was analyzed. Farmers in this area

will either have to set the land aside or switch from the high value vegetable production to the production of cereals that generate a lower gross margin. An alternative is the production of heavy metal accumulating willow varieties, which would clean the soil to the cadmium threshold value at which the area can be taken into vegetable production again within a period of six years. Three methods were chosen and applied to quantify the economic value of the phytoremediation function to the farmers: willingness-to-pay, substitution costs, and hedonic pricing. The economic value of the phytoremediation function to farmers as assessed by the substitution cost and hedonic price analysis delivers similar results and is about 14,600 and 14,850 [euro] ha-1, respectively, over a period of 20 years. Farmers, however, are only willing to pay 0-1500 [euro] ha-1, mainly because they consider remediation as the government's duty. The study shows that the phytoremediation function generates an economic benefit for the farmers, but the amount considered strongly depends on the potential income from the cleaned area, the period of crop production after cleaning the soil and the time needed for cleaning the soil. The application of different methods to assess the economic benefit generates different results; here the use of hedonic price analysis is recommended.
Keywords: Multiple land use systems; Biomass; Phytoremediation; Economic value; Decision support

K. Kyllmar, C. Carlsson, A. Gustafson, B. Ulen, H. Johnsson, Nutrient discharge from small agricultural catchments in Sweden: Characterisation and trends, Agriculture, Ecosystems & Environment, Volume 115, Issues 1-4, July 2006, Pages 15-26, ISSN 0167-8809, DOI: 10.1016/j.agee.2005.12.004.
(http://www.sciencedirect.com/science/article/B6T3Y-4J43YWG-1/2/459379e5de46a71620c6d2fd40bd5910)
Abstract:
Within the Swedish Monitoring Programme for Agriculture, 27 small agricultural catchments were investigated for between 9 and 14 years (6 years for one catchment), starting in the late 1980s, to determine the impact of agricultural activities on discharge water. The catchments represent major variations in climate, soil types and farming in Sweden and hence long-term average load of total nitrogen (N) and total phosphorus (P) at stream outlets varied widely among the catchments, from 2 to 41 and from 0.1 to 0.9 kg ha-1 yr-1, respectively. Catchments with large N loads were characterised by several factors favourable for leaching, such as mild winter climate, large precipitation, sandy or organic soils and high animal density in combination with intensive cropping systems with a low percentage of ley. Large P loads were mainly related to factors such as clay and clay loam soils, medium to high precipitation and large proportions of annual crops in the catchments. Flow-normalised time series of monthly loads of nitrate N, phosphate P and particulate P (for 24 catchments) were tested for trends. Significant downward trends were revealed for nitrate N, phosphate P and particulate P for seven, eight and three catchments, respectively, whereas, upward trends were revealed for nitrate N and particulate P for one and two catchments, respectively. Downward nitrate N trends for two catchments were correlated to smaller amounts of applied manure, especially during autumn, and to a decrease in the area of spring cereals and spring rape.
Keywords: Monitoring; Agriculture; Nitrogen; Phosphorus; Transport; Load

K. Sieling, H. Kage, N balance as an indicator of N leaching in an oilseed rape - winter wheat - winter barley rotation, Agriculture, Ecosystems & Environment, Volume 115, Issues 1-4, July 2006, Pages 261-269, ISSN 0167-8809, DOI: 10.1016/j.agee.2006.01.011.
(http://www.sciencedirect.com/science/article/B6T3Y-4JDVNS0-2/2/f7a79b59826b6c0952b77999cc591b4d)
Abstract:

The nitrogen (N) balance (N input - N export by the grain) is often used to estimate the risk of N leaching from arable land. In a nine year study during the leaching seasons 1991/1992 to 1999/2000, the relationships between N fertilization, N balance and N leaching in the subsequent percolation period were investigated in a multifactorial field experiment near Kiel in NW Germany at the Hohenschulen Experimental Station. The crop rotation was oilseed rape (OSR) - winter wheat - winter barley, while soil tillage (minimum tillage without ploughing, conventional tillage), application of pig slurry (none, application in autumn, application in spring, application in autumn plus in spring), mineral N fertilization (none, 120 or 240 kg N ha-1 to cereals), and application of fungicides (none, intensive) were all varied. In each year the rotation and the treatments were located on the same plots. N leaching was calculated by multiplying the drainage volume with the respective N concentration obtained using ceramic suction cups. In all crops, N fertilization significantly increased the N balance in the order mineral N < spring slurry < autumn slurry. N leaching significantly correlated with the amount of percolation ($P < 0.05$). Highest annual N losses occurred with wheat following OSR (73 kg N ha-1) compared to the situation with OSR following barley (44 kg N ha-1). Without slurry, mineral N fertilization increased N leaching only slightly, whereas slurry, especially if applied in autumn, boosted N losses. Soil tillage and fungicide application had no significant effect on N leaching, although the latter showed a large influence on N balance. Increasing N balance progressively raised N leaching in the subsequent period with all crops, however, only 13-25% of the N balance surpluses originating from the preceding crop seem to leave the system via this pathway. The results indicate only a poor correlation between N balances and N leaching. In the short-term, therefore, the N balance is not an appropriate indicator for the environmental impact of N fertilization. However, if set up over a longer period, N balances may still give good estimates of the leaching potential arising from different management systems.
Keywords: N balance; N leaching; Mineral N fertilization; Slurry application; Oilseed rape; Wheat; Barley

Bram Govaerts, Monica Mezzalama, Ken D. Sayre, Jose Crossa, Julie M. Nicol, Jozef Deckers, Long-term consequences of tillage, residue management, and crop rotation on maize/wheat root rot and nematode populations in subtropical highlands, Applied Soil Ecology, Volume 32, Issue 3, July 2006, Pages 305-315, ISSN 0929-1393, DOI: 10.1016/j.apsoil.2005.07.010.
(http://www.sciencedirect.com/science/article/B6T4B-4H99JD0-2/2/7add622cb34530f5d125b69f2c9895e7)
Abstract:
Densely populated and intensively cropped, the subtropical highlands of the world have severe agricultural sustainability problems resulting from soil erosion and fertility decline. In 1991, the International Maize and Wheat Improvement Center (CIMMYT) initiated a long-term field experiment with zero tillage under rainfed conditions at its semi-arid highland experiment station in Mexico (2240 m asl; 19.31[degree sign]N, 98.50[degree sign]W; Cumulic Phaeozem) to evaluate the effects of tillage, residue management, and rotation on maize and wheat production. Long-term effects on root rot and nematode populations - and their possible detrimental effects on yield - were monitored from 1998 to 2003 to evaluate the sustainability of the cropping system. In general, wheat showed less root rot incidence than maize. Crop residue retention reduced the numbers of the nematode Pratylenchus thornei in both crops, as did zero tillage compared with conventional tillage. Conventional tillage with continuous maize and residue removal, the common farmer practice in this region, reduced yield and dramatically increased P. thornei. Zero tillage with residue removal resulted in low values for yield, root rot, and nematode populations, especially under maize monoculture. Under zero tillage and residue retention, root rot incidence in maize was moderate, parasitic nematode numbers were low, and yield was highest compared to alternative practices. In wheat, the highest yields were observed under zero tillage and residue retention, with intermediate root rot incidence. Zero tillage with rotation and residue retention enhanced water availability, soil structure, and nutrient availability more than conventional tillage. Microbial life

diversity increased under zero tillage and residue retention, which may useful for biological control and integrated pest management.
Keywords: Conservation agriculture; Tillage; Crop rotation; Residue management; Root rot; Cereal nematodes

P.S. Minhas, N. Sharma, R.K. Yadav, P.K. Joshi, Prevalence and control of pathogenic contamination in some sewage irrigated vegetable, forage and cereal grain crops, Bioresource Technology, Volume 97, Issue 10, July 2006, Pages 1174-1178, ISSN 0960-8524, DOI: 10.1016/j.biortech.2005.05.006.
(http://www.sciencedirect.com/science/article/B6V24-4GMGW7R-3/2/3b1310e6f10cad40b46d0b9f1c730ef0)
Abstract:
A total of 344 samples comprising of different vegetables, fodder and grain crops were obtained from a long-term experiment under sewage irrigation. The aerobic bacterial plate counts for vegetables, fodder and grain crops ranged between 2 x 106 and 3.5 x 107, 6 x 106 and 3 x 108, 2 x 105 and 3.8 x 1010, respectively, while the corresponding Faecal coliform ranged between <2 and 9 x 105, 9 x 102 and 2 x 105 and <2, indicating that the pathogenic loads got reduced below permissible level in the produce that was harvested after sun drying in the field itself, whereas the parts coming in direct contact were the most severely contaminated. The health hazards could be markedly lowered with adoption of some of the low cost practices such as repeated washings, exposure of the produce to sunlight and raising the crops on beds. The coliform counts in vegetables were within permissible limits by two washings with water, exposing these to sunlight for about 4 h and removing the two outmost leaves of cabbage. Also, cutting above some height from ground level (0.10 m) in sorghum reduced the pollution load in fodder crops.
Keywords: Faecal coliform; Pathogenic contamination; Wastewater; Health hazards; Management practices

Lorenzo Barbanti, Silvia Grandi, Angela Vecchi, Gianpietro Venturi, Sweet and fibre sorghum (Sorghum bicolor (L.) Moench), energy crops in the frame of environmental protection from excessive nitrogen loads, European Journal of Agronomy, Volume 25, Issue 1, July 2006, Pages 30-39, ISSN 1161-0301, DOI: 10.1016/j.eja.2006.03.001.
(http://www.sciencedirect.com/science/article/B6T67-4JRVDCD-1/2/19a55079d175314884e74d448bd9ef2a)
Abstract:
Sweet and fibre sorghum (Sorghum bicolor (L.) Moench) are multipurpose cereals of potential interest for several non-food uses. In order to assess the effects of nitrogen (N) fertilization on crop growth, yield and N budget during crop cycle, field trials were carried out in Northern Italy (44[degree sign]33'N, 11[degree sign]21'E) in the years 1997-1999. Sweet and fibre sorghum were grown in combination with three N rates (0, 60, 120 kg ha-1). Both crops depicted a sigmoidal growth-pattern, but fibre sorghum showed an earlier and steeper growth. Sweet sorghum recovered due to a longer cycle, 118 versus 105 days in the 3 years' average, and attained a similar final yield. Nitrogen fertilization did not affect growth pattern, nor yield partitioning among plant organs: the sweet type allocated more photosynthates to stems (about 75% of total dry weight) compared to the fibre one (55-60%), due to a limited partitioning to panicles. Total dry weight at harvest showed an interaction with years: fibre sorghum yielded significantly more than sweet sorghum in 1997 (23.8 versus 17.7 Mg ha-1), but the opposite happened in 1998 and 1999 (20 versus 24.2 Mg ha-1 as average), when a different sweet hybrid was grown, involving a longer season. When only the stem was considered of potential interest, such as in the case of ethanol production or fibre extraction, fibre sorghum showed a slight advantage in the 1st year (14.4 versus 12 Mg ha-1), whereas the sweet type prevailed in the following 2 years (18.7 versus 11 Mg ha-1). Fertilization did not significantly influence total yield, although interacted with sorghum type

in plant N concentration and uptake: fibre sorghum rose in both parameters, due to bulkier panicles acting as a late-season sink for the nutrient, while the sweet type was not affected. Nitrogen budget at harvest was clearly influenced by applied fertilizer and plant uptake, whereas nutrient losses as ammonia volatilization and nitrate leaching and natural supplies along with precipitation played a less relevant role. The expected variations in soil reserves ranged between -216 and +77 kg ha-1 of N, depending also on the plant portion removed from the field (whole plant or stem). A slight decrease in soil reserves, more favourable in environmental terms, is achieved when the whole biomass is removed from the field and when fertilizer rates are tight-suited to crop needs in specific growth conditions.
Keywords: Sweet sorghum; Fibre sorghum; Plant partitioning; Nitrogen dilution; Nitrogen losses; Nitrogen budget

A. Huotilainen, A.-M. Pirttila-backman, H. Tuorila, How innovativeness relates to social representation of new foods and to the willingness to try and use such foods, Food Quality and Preference, Volume 17, Issue 5, July 2006, Pages 353-361, ISSN 0950-3293, DOI: 10.1016/j.foodqual.2005.04.005.
(http://www.sciencedirect.com/science/article/B6T6T-4GCX081-2/2/f5c2b26dd1ec8e5debb6ed838ace81da)
Abstract:
The relationship between domain specific innovativeness scale (DSI) and social representation (SR) components of new foods (suspicion of new foods; adherence to natural food; adherence to technology; eating as an enjoyment; eating as a necessity) was explored in a survey with Finnish consumers (N = 1156). Both DSI and SR were used to predict willingness to try/use new foods, categorized into six subgroups of which three were functional (cereal-based and otherwise functional foods; functional drinks), and the remaining three categories were modified dairy products, organic products, and energy drinks. Enjoyment and low suspicion predicted 27% of variation in DSI, which, in turn, predicted up to 6% of willingness to try categories of new foods, excluding organic products. When added to the predictive model, SR components increased the prediction of all food categories, particularly functional cereal-based and organic products (up to 20.4%). Thus, DSI predicted willingness to try new foods to some extent, but SR components, most of all low suspicion of new foods and adherence to natural food, significantly improved the prediction.
Keywords: New foods; Innovators; Social representations

Johnny Beaugrand, Kurt Gebruers, Cedric Ververken, Ellen Fierens, Evi Croes, Bruno Goddeeris, Christophe M. Courtin, Jan A. Delcour, Antibodies against wheat xylanase inhibitors as tools for the selective identification of their homologues in other cereals, Journal of Cereal Science, Volume 44, Issue 1, July 2006, Pages 59-67, ISSN 0733-5210, DOI: 10.1016/j.jcs.2006.02.003.
(http://www.sciencedirect.com/science/article/B6WHK-4JS1MVS-1/2/3e82a91230de7987aa97253723f01c9e)
Abstract:
Polyclonal antibodies (PAbs) were raised against wheat (Triticum aestivum L.) TAXI- and XIP-type xylanase inhibitors by rabbit immunization. A small contaminant in both antigens, not detected by SDS-PAGE and later identified through Western blot as a recently discovered third type of xylanase inhibitor from wheat, i.e. thaumatin-like xylanase inhibitor (TL-XI), led to the coproduction of PAbs against this protein in the rabbits. To obtain inhibitor-specific PAbs, the PAbs against TAXI, XIP and TL-XI were separated by affinity chromatography using immobilised recombinant and native xylanase inhibitors. The purified PAbs allowed the immunoquantification of each type of wheat xylanase inhibitor using Western blot and densitometric analysis against purified inhibitor standards. The method allowed the detection of the purified inhibitors at the 20 ng level. As the PAbs against the wheat xylanase inhibitors cross-reacted with their homologous targets from other

cereals, immunoprobing allowed identification of XIP homologues in oats (Avena sativa L.) and TL-XI homologues in durum wheat (Triticum durum Desf.) and rye (Secale cereale L.).
Keywords: Xylanase inhibitors; TAXI; XIP; TL-XI; Cereals; Antibodies

Mina C. Mojtahedi, Karen L. Plawecki, Karen M. Chapman-Novakofski, Edward McAuley, Ellen M. Evans, Older Black Women Differ in Calcium Intake Source Compared to Age- and Socioeconomic Status-Matched White Women, Journal of the American Dietetic Association, Volume 106, Issue 7, July 2006, Pages 1102-1107, ISSN 0002-8223, DOI: 10.1016/j.jada.2006.04.020.
(http://www.sciencedirect.com/science/article/B758G-4K96R4J-S/2/052e6c5bd391ab1ac2af10e69a8dc9d8)
Abstract:
Racial disparity in osteoporosis between older black and white women is well established; however, less is known regarding daily dietary and supplemental calcium intake in these populations. Moreover, racial differences in calcium intake are confounded by differences in socioeconomic status (SES). The objective of this study was to assess calcium intake and source in older black women (n=33) and white women (n=33), matched in age and SES. Calcium intake and source were evaluated by interview using a 46-item calcium food frequency questionnaire including all food groups and supplements. Black and white women were identical in SES and matched on age (black women 66.9+/-6.2 years vs white women 67.1+/-5.5 years [mean+/-standard deviation], P=0.85). No significant difference existed for dietary calcium intake between black and white women (974+/-524 vs 1,070+/-600 mg/day; P=0.65) or total calcium intake between black and white women (1,485+/-979 vs 1,791+/-887 mg/day; P=0.15). Dairy foods contributed most to dietary calcium intake in black and white women and differed by race (black women 402+/-269 mg/day, white women, 603+/-376 mg/day; P=0.02). Calcium intake from grains differed by race (black women 205+/-201 mg/day vs white women 130+/-234 mg/day; P=0.010) and fortified cereals were a major source of calcium for black women. Calcium supplementation contributed substantially to total calcium intake in both groups, with more white women (n=23, 70%) using supplements than black women did (n=19, 58%). However, no racial difference existed in supplemented calcium intake (black women, n=19; 889+/-605 vs white women, n=23; 1,034+/-460 mg/day; P=0.20). Our data suggest that total daily dietary and supplemental calcium intakes do not differ, but calcium intake from dairy foods and from grains differ in older black and white women matched in age and SES.

Catherine Benjamin, Yves Le Roux, Euan Phimister, Direct payments versus interest rate subsidies to new farmers: a simulation analysis of alternative farm set-up policies in France, Land Use Policy, Volume 23, Issue 3, July 2006, Pages 311-322, ISSN 0264-8377, DOI: 10.1016/j.landusepol.2004.08.001.
(http://www.sciencedirect.com/science/article/B6VB0-4DXSRFH-1/2/d1e6e743e3a48e28949090fa3b35b250)
Abstract:
This article considers the effectiveness of the current farm set-up policy in France relative to a direct payments policy. Specifically, using information on French specialist cereal farms from the French Farm Accountancy Data Network, the current policy of interest rate subsidies plus direct payments is simulated and compared with a direct payments scheme in the presence of asymmetric information.
The results indicate that the budgetary cost of a direct payment scheme when information is perfect, i.e. the government knows which farms would set up without subsidy, is substantially less than the subsidy cost of the simulation of the current policy. However, the results show that the presence of an imperfect information increases the costs of a direct payments policy significantly with total costs, in this case, substantially exceeding those for the current policy simulation.

Keywords: France; Farm set-up policy; Young farmers; Direct payments; Imperfect information

J.M. Krupinsky, D.L. Tanaka, S.D. Merrill, M.A. Liebig, J.D. Hanson, Crop sequence effects of 10 crops in the northern Great Plains, Agricultural Systems, Volume 88, Issues 2-3, June 2006, Pages 227-254, ISSN 0308-521X, DOI: 10.1016/j.agsy.2005.03.011.
(http://www.sciencedirect.com/science/article/B6T3W-4G65VHM-1/2/fd4d91ea27f4354966dfc21d4387ccc4)
Abstract:
Dynamic cropping systems, which involve a long-term strategy of annual crop sequencing, require detailed information on management components known to influence crop performance. Considering that proper sequencing of crops is an important component for successful dynamic cropping systems, a research project was undertaken to determine the advantages and/or disadvantages of previous crop and crop residues for numerous crop sequences. A multi-disciplinary team of scientists evaluated crop sequence effects of 10 crops (barley, canola, crambe, dry bean, dry pea, flax, safflower, soybean, spring wheat, and sunflower) on seed yield, soil coverage by residue, soil water use, surface soil properties, and plant diseases in central North Dakota. Two years were required to establish a crop by crop residue matrix (crop matrix). During the second year (site 1, 1999; site 2, 2000) 10 crops were evaluated with a crop matrix. During the third and fourth year spring wheat (site 1, 2000; site 2, 2001) and sunflower (site 1, 2001; site 2, 2002), respectively, were seeded over the crop matrix. The seed yield of four crops (crambe, flax, safflower, and soybean) of the 10 crops evaluated in the crop matrix was influenced by the preceding crop at site 1 in 1999 an above average moisture year. The seed yield of eight crops (canola, crambe, dry bean, flax, safflower, soybean, spring wheat, and barley) was influenced by the preceding crop at site 2 in 2000 a more average precipitation year. Some of the lowest seed yields were obtained when a crop was seeded on its own residue. A synthesis of seed yield data from a given year provided overall values for positive and negative effects of crops and crop residue on subsequent crops. In general, the three legume crops had positive effects in contrast to non-leguminous crops, which usually had negative effects. However, sunflower was an exception among the non-leguminous crops; at site 2 in 2000, sunflower was positive for subsequent crops compared with canola or crambe, which had negative effects. Crop sequences composed of small cereal grains had the highest soil coverage by residue while sequences of two dicotyledonous species had considerably lower coverage. Soil water use among crops varied, ranging from sunflower with the numerically highest soil water use to dry pea with the least. Significant changes in surface soil properties due to crops were generally not detected in this short-term project. Given the variation in Sclerotinia disease incidence for canola, crambe, safflower, and sunflower within the crop matrix, it was difficult to detect significant differences based on the previous crop. Differences were evident two years later when the highest incidence of Sclerotinia basal stalk rot for sunflower was detected in plots where crambe was grown two years earlier. During the third year, when spring wheat was seeded over a crop matrix, spring wheat yields increased following 23 and 19 crop sequence treatments out of a possible 100 at site 1 and site 2, respectively, compared to the continuous wheat treatment. All crop sequence treatments that yielded better than the continuous wheat treatment were comprised of mostly non-cereal crops, demonstrating the positive impact of crop diversity on cereal crop production. The severity of leaf spot diseases on spring wheat were affected by crop sequence and fungal spore production was greatest on the continuous wheat treatment. Even though decreases in leaf spot disease severity and modest yield increases were obtained with some crop sequence treatments, significant yield increases due to reduced leaf spot disease severity were not obtained under our conditions.
Keywords: Diverse cropping systems; Crop rotation; Rotation effect

L.C. Simms, A. Ester, M.J. Wilson, Control of slug damage to oilseed rape and wheat with imidacloprid seed dressings in laboratory and field experiments, Crop Protection, Volume 25, Issue 6, June 2006, Pages 549-555, ISSN 0261-2194, DOI: 10.1016/j.cropro.2005.08.011.
(http://www.sciencedirect.com/science/article/B6T5T-4HNSFXD-1/2/0be7d8089edfbf246bb93cb26aeca2e6)
Abstract:
Slugs are common pests of oilseed and cereal crops in Europe and are currently controlled using bait pellets that often fail to give adequate protection. Here we investigate the potential of the broad-spectrum insecticide imidacloprid, previously suggested to have activity against slugs, to control slug damage to oilseed rape and winter wheat. In a series of laboratory experiments, imidacloprid seed treatment (2 and 4 g a.i./kg seed) caused no reduction in slug damage to oilseed rape when exposed to three slug species and with one species, Milax gagates, significantly more oilseed rape was consumed in imidacloprid treatments. In two laboratory experiments using winter wheat, low doses of imidacloprid (0.7 and 1.4 g a.i./kg seed) had no deterrent activity and in some cases increased slug damage, but high doses (2.8, 5.6 and 8.1 g a.i./kg seed) significantly reduced levels of slug damage. In a field experiment with winter wheat, imidacloprid seed treatments (0.7 and 1.4 g a.i./kg seed) reduced slug damage to a lower level than that achieved by conventional bait pellets. However, the inconsistent and short-lived activity of imidacloprid suggests that it has little potential to be developed as a seed treatment for mollusc control in itself, but may offer some protection when applied to wheat or rape seeds to control insect pests.
Keywords: Slugs; Deroceras; Milax; Arion; Seed treatment; Imidacloprid

E. Pardo, V. Sanchis, A.J. Ramos, S. Marin, Non-specificity of nutritional substrate for ochratoxin A production by isolates of Aspergillus ochraceus, Food Microbiology, Volume 23, Issue 4, June 2006, Pages 351-358, ISSN 0740-0020, DOI: 10.1016/j.fm.2005.05.005.
(http://www.sciencedirect.com/science/article/B6WFP-4GK1GGG-1/2/d96f15e71f77335ed24204589c867862)
Abstract:
Aspergillus ochraceus is an important contaminant of diverse substrates, such as cereals, coffee, grapes and derivates. This fungus produce a nephrotoxic metabolite, ochratoxin A (OTA), whose presence on food and feeds may be an important risk for animal and human health.
The aim of this work was to evaluate the significance of the origin of A. ochraceus isolates on their OTA production patterns on different substrates (yeast extract sucrose (YES) broth, irradiated barley grains, irradiated green coffee beans and sterilized grapes) and under different environmental conditions.
Results did not show a significant influence of the isolation source on OTA-production profiles by A. ochraceus isolates on several substrates, since the isolates which produced the highest OTA amounts in vitro (YES medium) were also the isolates with the highest OTA yields on the other substrates.
Abiotic factors assayed (water activity, temperature and substrate) affected significantly OTA productions by A. ochraceus. Maximum OTA amounts were detected at 25 [degree sign]C and 0.98 aw on all substrates tested. The highest OTA accumulations found on the different substrates were: green coffee beans (> 2 mg g-1), barley grains (~1 mg g-1), YES medium (13.9 [mu]g ml-1) and grape (~3 ng g-1).
Keywords: A. ochraceus; Barley; Grape; Green coffee; Ochratoxin A; Temperature; Water activity

Thomas F.X. Collins, Robert L. Sprando, Thomas N. Black, Nicholas Olejnik, Robert M. Eppley, Fred A. Hines, James Rorie, Dennis I. Ruggles, Effects of deoxynivalenol (DON, vomitoxin) on in utero development in rats, Food and Chemical Toxicology, Volume 44, Issue 6, June 2006, Pages 747-757, ISSN 0278-6915, DOI: 10.1016/j.fct.2005.10.007.

(http://www.sciencedirect.com/science/article/B6T6P-4HPK8XY-1/2/a912544e5f5c5c26c67fb1354cf7aa19)
Abstract:
Deoxynivalenol (DON, vomitoxin), is one of the most common contaminants of cereal grains worldwide. The effects of DON on fetal development were assessed in Charles River Sprague-Dawley rats. Pregnant female rats were gavaged once daily with DON at doses of 0, 0.5, 1, 2.5, or 5 mg/kg body weight on gestation days (GD) 6-19. At cesarean section on GD 20, reproductive and developmental parameters were measured. All females survived to cesarean section. DON caused a dose-related increase in excessive salivation by the pregnant females, a reaction probably linked to the lack of emetic reflex in rats. At 5 mg/kg, feed consumption and mean body weight gain were significantly decreased throughout gestation, mean weight gain (carcass weight), and gravid uterine weight were significantly reduced, 52% of litters (12/23) were totally resorbed, the average number of early and late deaths per litter was significantly increased, average fetal body weight and crown-rump length were significantly decreased, the incidence of runts was significantly increased, and the ossification of fetal sternebrae, centra, dorsal arches, vertebrae, metatarsals, and metacarpals was significantly decreased. At 2.5 mg/kg, DON significantly decreased average fetal body weight, crown-rump length, and vertebral ossification. These effects may be secondary to maternal toxicity and the reduced size of the fetuses. The incidence of misaligned and fused sternebrae was significantly increased at 5.0 mg/kg. No adverse developmental effects were observed at 0.5 and 1.0 mg/kg. Dose-related increases in maternal liver weight-to-body weight ratios were observed in all treated groups (significant at 1, 2.5, and 5 mg/kg). The weight changes were correlated with dose-related cytoplasmic alterations of hepatocytes. The NOEL for maternal toxicity for this study is 0.5 mg/kg based on the dose-related increase in liver-body weight ratio at 1 mg/kg. The NOEL for fetal toxicity is 1 mg/kg based on the general reduction in fetal development at 2.5 and 5 mg/kg. DON is considered a teratogen at 5 mg/kg day in Sprague-Dawley rats based on the anomalous development of the sternebrae.
Keywords: Deoxynivalenol; Vomitoxin; Trichothecene mycotoxin; Developmental toxicity; Rat

Mustafa Erbas, M. Kemal Uslu, M. Ozgun Erbas, Muharrem Certel, Effects of fermentation and storage on the organic and fatty acid contents of tarhana, a Turkish fermented cereal food, Journal of Food Composition and Analysis, Volume 19, Issue 4, After Processing: The Fate of Food Components, June 2006, Pages 294-301, ISSN 0889-1575, DOI: 10.1016/j.jfca.2004.12.002.
(http://www.sciencedirect.com/science/article/B6WJH-4JD0H28-1/2/77e44fd320b54af5ce1fadce9387d096)
Abstract:
Tarhana, commonly consumed as soup, is a traditional Turkish fermented food made with cereal, milk products, various vegetables and spices using yoghurt bacteria and baker's yeast as culture. This study investigates the daily changes that take place in organic and fatty acid composition of tarhana dough during its 3-day fermentation phase, as well as the monthly changes that take place in organic and fatty acid composition of five different types of stored tarhana during their 6-month storage period. During the 3-day tarhana fermentation period, titratable acidity increased from 26.50 to 41.4 g/kg, lactic acid increased from 13.58 to 20.26 g/kg, acetic acid increased from 4.85 to 7.78 g/kg, propionic acid increased from 2.44 to 7.58 g/kg, pyruvic acid increased from 0.16 to 0.58 g/kg and citric acid decreased from 6.39 to 3.58 g/kg. In addition, it was observed that the drying process caused tarhana to lose a significant amount of its organic acid content. Tarhana was found to be composed of 14% unsaturated and 86% saturated fatty acids. The predominant fatty acid in tarhana was found to be palmitic acid (40.13%).
Keywords: Tarhana; Organic acid; Fatty acid; Fermentation; Storage

Kunchit Judprasong, Somsri Charoenkiatkul, Pongtorn Sungpuag, Kriengkrai Vasanachitt, Yupaporn Nakjamanong, Total and soluble oxalate contents in Thai vegetables, cereal grains and

legume seeds and their changes after cooking, Journal of Food Composition and Analysis, Volume 19, Issue 4, After Processing: The Fate of Food Components, June 2006, Pages 340-347, ISSN 0889-1575, DOI: 10.1016/j.jfca.2005.04.002.
(http://www.sciencedirect.com/science/article/B6WJH-4GTVYJY-1/2/e8b02d305afa13902f58dc1e4b2ffcb2)
Abstract:
This study was conducted to determine soluble and total oxalate contents in common vegetables, cereal grains and legume seeds and the effect of household cooking on these substances. Each food sample was randomly purchased from three main representative markets in metropolitan area of Bangkok, Thailand. Soluble and total oxalates were determined by high-performance liquid chromatography (HPLC). The limit of quantitation for the oxalates was 3 mg/100 g.
All studied vegetables contained relatively small amounts of total oxalate (<100 mg/100 g), except chinese convolvulus (Lpomoea reptans), acacia pennata (Acacia pennata), and cultivated bamboo shoot (Bambusa spp.), contained total oxalate more than 150 mg/100 g which can be significantly reduced after cooking by boiling. Among the legume seeds, soybeans (Glycine max (L.) Merrill) and peanuts (Arachis hypogaea L.) contained highest and moderate amounts of total oxalate, 204+/-14 mg and 142+/-35 mg/100 g, respectively. Rice contained negligible amount of total oxalate (<3 mg/100 g). There was significant reduction ($P<0.05$) in total oxalate due to cooking by boiling, percentage loss ranged form 18% in coconut heart top stems (Cocos nucifera Linn.) to 76% in A. pennata. Similar findings appeared in soluble oxalate, significant loss ($P<0.05$) ranged from 30% in cooked white stems swamp morning glory (Lpomoea aquatica, Forsk) to 83% in cooked cultivated bamboo shoot (Bambusa spp.). Loss of oxalates in various foods is likely due to their leaching loss in cooking water.
Keywords: Total oxalate; Soluble oxalate; Vegetables; Cereals; Legume seeds; Effect of cooking

Nelofar Athar, Allan Hardacre, Grant Taylor, Suzanne Clark, Rebecca Harding, Jason McLaughlin, Vitamin retention in extruded food products, Journal of Food Composition and Analysis, Volume 19, Issue 4, After Processing: The Fate of Food Components, June 2006, Pages 379-383, ISSN 0889-1575, DOI: 10.1016/j.jfca.2005.03.004.
(http://www.sciencedirect.com/science/article/B6WJH-4J9X2W2-3/2/5eeaa1a81c9421f3d85894b053eb8b25)
Abstract:
Crisp extruded snack food like products were produced from a range of cereal products using a short barrel, single screw snack food extruder. The retention of B group vitamins during extrusion processing was compared for the different cereal grains and under different extrusion conditions. This work showed that short barrel extruders used for snack food production retain between 44% and 62% of the B group vitamins. This is considerably higher than the 20% retention for maize reported previously for long barrel extruders. The stability of the vitamins was similar, with riboflavin and niacin having the highest stability. Pyridoxine was stable in maize, but less so in oats and the maize+pea ingredients. Thiamin was the least stable during extrusion. It is concluded that short term high-temperature cooking of extruded snacks allows the retention of higher levels of heat labile B vitamins than the longer time and lower temperature cooking methods used in modern snack food extruders.
Keywords: Extrusion; Nutrient retention

S. Gebert, B. Eichenberger, H.P. Pfirter, C. Wenk, Influence of different dietary vitamin C levels on vitamin E and C content and oxidative stability in various tissues and stored m. longissimus dorsi of growing pigs, Meat Science, Volume 73, Issue 2, June 2006, Pages 362-367, ISSN 0309-1740, DOI: 10.1016/j.meatsci.2005.12.012.
(http://www.sciencedirect.com/science/article/B6T9G-4JCCM6G-2/2/4ed7456938fe4b4a119fdc18bdfb941d)

Abstract:
Both vitamin E and C have antioxidative properties and may act synergistically. To examine a possible interaction between vitamin E, C and oxidative stability in various tissues, 40 barrows (25-105 kg body weight) were allocated to four cereal-based diets (13.4 MJ digestible energy/kg, 168 g crude protein/kg, 140 mg dietary dl-[alpha]-tocopheryl acetate) which were supplemented with 0 (B), 150 (C100), 300 (C200) or 600 (C400) mg/kg crystalline ascorbic acid. The influence of storage time on these factors in m. longissimus dorsi samples (LD) was investigated. Samples of liver (LI), heart (HT), spleen (SP), backfat outer layer (BF) and LD were obtained. Dry matter, vitamin E, vitamin C and thiobarbituric acid reactive substances (TBARS) were analyzed in all investigated tissues and in addition color (L*, a*, b* values) and drip loss measurements in LD at day 0, 1, 2, 3, 4 and 8 were collected. The treatments did not influence growth performance and slaughter data of the pigs. Neither the vitamin E nor the vitamin C content of investigated tissues showed differences due to feeding treatments. There was also a lack of response to the amount in TBARS. Parameters in LD samples were only affected by storage time and not by diets. The results show that dietary use of both vitamins simultaneously did not further improve qualitative characteristics of the investigated pork tissues.
Keywords: Growing pigs; Vitamin E; Vitamin C; Oxidative stability; Tissues; Storage time

Ella Allerdings, John Ralph, Hans Steinhart, Mirko Bunzel, Isolation and structural identification of complex feruloylated heteroxylan side-chains from maize bran, Phytochemistry, Volume 67, Issue 12, June 2006, Pages 1276-1286, ISSN 0031-9422, DOI: 10.1016/j.phytochem.2006.04.018.
(http://www.sciencedirect.com/science/article/B6TH7-4K5ST7D-1/2/ac0abf415d6a00393796dd8eb7ecb54c)
Abstract:
Three complex heteroxylan side-chains acylated with ferulate and one arabinosyl ester of p-coumaric acid have been isolated from maize bran insoluble fibre after acidic hydrolysis and fractionation by gel permeation chromatography and semi-preparative RP-HPLC. The complete structural elucidation of all isolated compounds was achieved by 1D/2D NMR spectroscopy and HPLC-MS in combination with methylation analysis. The absolute configuration of the carbohydrate constituents was determined by chiral GC after acidic hydrolysis and trifluoroacetylation. The identified feruloylated tetrasaccharides [alpha]-d-xylopyranosyl-(1 --> 3)-[alpha]-l-galactopyranosyl-(1 --> 2)-[beta]-d-xylopyranosyl-(1 --> 2)-5-O-trans-feruloyl-l-arabinofuranose (FAXGX) and [alpha]-d-galactopyranosyl-(1 --> 3)-[alpha]-l-galactopyranosyl-(1 --> 2)-[beta]-d-xylopyranosyl-(1 --> 2)-5-O-trans-feruloyl-l-arabinofuranose (FAXGG) are the most complex heteroxylan side-chains from maize bran that have been isolated to date. The isolated trisaccharide [alpha]-l-galactopyranosyl-(1 --> 2)-[beta]-d-xylopyranosyl-(1 --> 2)-5-O-trans-feruloyl-l-arabinofuranose (FAXG) contributes to the complexity of heteroxylan side-chains from maize bran and 5-O-trans-p-coumaroyl-l-arabinofuranose represents the first p-coumaroylated heteroxylan side-chain isolated from cereal grains. Complex feruloylated heteroxylan side-chains are possibly, like ferulate cross-linking of the heteroxylans and binding of heteroxylans to lignin, a factor contributing to limited enzymatic degradation of fibre.
Keywords: Zea mays L.; Graminaceae; Maize bran; Feruloylated oligosaccharides; Ferulic acid; p-Coumaroylated arabinose; Coumaric acid; Arabinoxylans; Cell wall cross-linking; NMR

Zuhair Masri, John Ryan, Soil organic matter and related physical properties in a Mediterranean wheat-based rotation trial, Soil and Tillage Research, Volume 87, Issue 2, June 2006, Pages 146-154, ISSN 0167-1987, DOI: 10.1016/j.still.2005.03.003.
(http://www.sciencedirect.com/science/article/B6TC6-4G4MMBJ-1/2/9c28cb7c00ba427ceae0f40e651a2708)
Abstract:

Under semi-arid Mediterranean conditions, limited moisture is the main constraint to rainfed cropping with wheat (Triticum aestivum), barley (Hordeum vulgare), and food and forage legumes. With increasing land-use pressure, moisture-conserving fallowing is being replaced by continuous cropping, which is considered an unsustainable practice. Thus, a long-term trial with durum wheat (T. turgidum var. durum) was established in 1983 at Tel Hadya, Aleppo, Syria (mean annual rainfall 330 mm) to assess alternative rotation options to fallow and continuous cropping. Nitrogen (N) and grazing/residue management were secondary factors. Soil aggregation, infiltration, hydraulic conductivity, and total soil organic matter and component fractions (fulvic and humic acids and polysaccharides) were determined at the end of 12 years. Some rotations, e.g., medic (Medicago sativa) and vetch (Vicia faba), significantly increased soil organic matter (12.5-13.8 g kg-1 versus 10.9-11 g kg-1 for continuous wheat and wheat/fallow). All measurements, or indices, indicated parallel trends with increasing organic matter, e.g., coefficients of macro-structure, micro-aggregation, and water-stable aggregates, and decreasing dispersion. Similarly, legume rotations had higher infiltration rates (16.2-21.8 cm h-1 versus 13.9-14.4 cm h-1 with continuous wheat and wheat/fallow) and hydraulic conductivity rates (8.7-12.4 cm h-1 versus 6.2-7.4 cm h-1 with continuous wheat and wheat/fallow). We conclude that cereal/legume rotations, in addition to being biologically and economically attractive, also enhance soil quality and thus promote soil use sustainability in fragile semi-arid areas as in the Mediterranean zone.
Keywords: Soil organic matter; Soil physical properties; Soil aggregation; Cereal/legume rotations; Mediterranean cropping systems

Nurhan Unusan, Nevin Sanlier, Hasan Danisik, Comparison of attitudes towards breakfast by Turkish fourth graders living in Turkey and Germany, Appetite, Volume 46, Issue 3, May 2006, Pages 248-253, ISSN 0195-6663, DOI: 10.1016/j.appet.2006.01.009.
(http://www.sciencedirect.com/science/article/B6WB2-4JHMF9S-2/2/e0cf95302766c469c00813c6792be2ce)
Abstract:
The purpose of this article is to identify and compare Turkish fourth graders attitudes towards breakfast living in Turkey and Germany. A sample group of 882 Turkish students enrolled in fourth grade in Hamburg (Germany, N=422) and Konya (Turkey, N=460) were surveyed. Independent t-tests, [chi]2 test and Pearson product-moment correlations were used. More students living in Turkey had breakfast and had enough time before going to school (P<0.01). Students living in Turkey reported that eating breakfast affected them positively (P<0.01). Students living in Germany reported that eating breakfast made them feel tired (P<0.01). The consumption of breakfast cereal (P<0.05) and fruit juice (P<0.01) that had not been consumed widely in Turkey increased in Germany. Students who eat breakfast also eat lunch (r=0.296 and -0.236, P<0.01, students living in Turkey and Turkish students living in Germany, respectively). Nutrition education programs in primary schools may change Student's attitudes about breakfast and offering a breakfast programme in schools may greatly improve breakfast consumption rates.
Keywords: Breakfast; Student; Lunch; Benefits; Barriers; Foods

K. Mengel, B. Hutsch, Y. Kane, Nitrogen fertilizer application rates on cereal crops according to available mineral and organic soil nitrogen, European Journal of Agronomy, Volume 24, Issue 4, May 2006, Pages 343-348, ISSN 1161-0301, DOI: 10.1016/j.eja.2005.12.001.
(http://www.sciencedirect.com/science/article/B6T67-4J6X3WK-1/2/0a07b17d548f0298e6a72bde8f06bbbb)
Abstract:
From all plant nutrients N fertilizer rates deserve highest attention as too high rates may result in nitrate leaching, volatilisation of N2O (greenhouse gas) and affect the farmers' profit. Too low rates will also depress the profit. The problem is accentuated by the fact that crops not only feed from soil inorganic but also from organic soil N. Most soil N tests do not consider the available organic

soil N. The Electro-Ultra-Filtration (EUF) method applied by us takes into account the EUF extractable inorganic and organic soil N for calculating the N fertilizer rate. This method developed at the Liebig University Giessen is called Giessen model (sampling in autumn out of the upper soil layer, 0-30 cm). We compared it with the standard soil N test the 'Nmin method' recommended by German officials which method does not consider the available organic soil N (sampling in spring out of three or two soil layers, depending on soil depth). The investigation was carried out on farmers' fields on five different sites with winter cereals (wheat, barley) in 1989/1990, 1990/1991 and 1991/1992. Recommended fertilizer application rates differed somewhat for both methods. Of the 23 cases, significantly higher grain yields were obtained five times by Nmin and four times by EUF; otherwise grain yields did not differ significantly between both methods. Grain yield and crude protein concentration were increased by fertilizer N compared with the plots without N fertilizer. On the site Giessen, however, there were some cases in which the N fertilizer did not increase grain yield. The soil of the Giessen site was rich in interlayer NH4+ which is not recovered by the EUF and Nmin method, but which obviously contributed to the N supply of the crop, and therefore the N rates were too high. Grain crude protein concentration were higher with Nmin for Wernborn and Bruchkobel sites because of higher N fertilizer rates. For the Giessen site in 1989/1990 the reverse was true. Nitrogen agronomic efficiency (AE) ranged from 0 to 35.6. Apparent N recovery (ANR) ranged from 0 to 111. The gross profit differed from -88 to 489 Euro/ha. Negative values (three cases out of 23) were found on the Giessen site where no yield increase was obtained by the N fertilizer because of interlayer NH4+. This interpretation is supported by the finding that interlayer NH4+ significantly decreased from autumn to spring. Apart from the results found in 1 year on the Giessen site, the gross profit calculation showed that a precise N fertilizer application based on soil analysis yields a high profitability of cereal production.
Keywords: Nitrogen; Availability; Yield; Fertilizer recommendation; N fertilizer rate; Cereal; Economical grain yield; Soil N

Shyamala Hegde, S. Kavitha, M.C. Varadaraj, G. Muralikrishna, Degradation of cereal bran polysaccharide-phenolic acid complexes by Aspergillus niger CFR 1105, Food Chemistry, Volume 96, Issue 1, May 2006, Pages 14-19, ISSN 0308-8146, DOI: 10.1016/j.foodchem.2005.01.050.
(http://www.sciencedirect.com/science/article/B6T6R-4FSCMGB-H/2/cbeb1e71d1a198393f8614277fbd1203)
Abstract:
Cereal brans such as wheat and rice are abundant sources for obtaining bioactive phenolic compounds such as ferulic and coumaric acids, in turn these can be bio-transformed into high value flavour compounds such as vanillin. Aspergillus niger CFR 1105, found to induce greater amounts of cell wall degrading enzymes, was inoculated into wheat and rice brans, and grown for 24, 48, 72 and 96 h to understand the degradation pattern of non-starch polysaccharides and phenolic acid complexes. Native wheat bran polysaccharides mainly consisted of arabinose, xylose, galactose, and glucose, in % of 27:39:2:30, with traces of mannose, whereas rice bran consisted of arabinose, xylose, galactose, and glucose in % of 9:27:31:32, respectively. Both the cereal bran arabinoxylans were degraded extensively by A. niger at 96 h, whereas the degradation of 1,3/1,4-[beta]-d-glucans and cellulose was negligible. Bound phenolic acids of rice and wheat brans identified by HPLC were found to be mainly ferulic, coumaric, syringic acids in % of 93.6:6.3:0 (wheat), 34.7:55.8:9.5 (rice) and were drastically degraded/utilized at 96 h. The above results have indicated preferential degradation of arabinoxylans of wheat bran by A. niger, which can be exploited to obtain bioactive compounds such as ferulic acid.
Keywords: Non-starch polysaccharides; Arabinoxylans; Ferulic acid; Vanillin; Fungal transformation

Xueliang Ren, Xiaoyang Zhu, Maarten Warndorff, Peter Bucheli, Qingyao Shu, DNA extraction and fingerprinting of commercial rice cereal products, Food Research International, Volume 39, Issue 4, May 2006, Pages 433-439, ISSN 0963-9969, DOI: 10.1016/j.foodres.2005.09.006.
(http://www.sciencedirect.com/science/article/B6T6V-4HDG9B7-2/2/bfcfe188f5a62e9d049952a833f5cf85)
Abstract:
DNA was extracted from commercial rice cereal products using modified conventional methods (CTAB, SDS and a commercial kit) in large fragments (>3 kb) and with relatively high yields (1.4-10.7 [mu]g DNA per g of sample) and was used as template for the amplification of a single copy rice gene (i.e. MIPS) fragment (ca. 850 bp) and microsatellite DNAs (ca. 120-400 bp). The cereal products were further discriminated by using six microsatellite markers. The usefulness of DNA analysis was discussed for quality control and authenticity testing of raw rice materials in rice-based food production, and to monitor genetically modified (GM) rice ingredients in commercial food products.
Keywords: DNA extraction; DNA marker; Fingerprinting; Rice cereal; Quality

Alberto Hernando, Jorge Raul Mujico, David Juanas, Enrique Mendez, Confirmation of the Cereal Type in Oat Products Highly Contaminated with Gluten, Journal of the American Dietetic Association, Volume 106, Issue 5, May 2006, Page 665, ISSN 0002-8223, DOI: 10.1016/j.jada.2006.03.024.
(http://www.sciencedirect.com/science/article/B758G-4JTJ7J1-8/2/eb30e255532ebfdaa5d23a39c9cedb7d)

S.B. Atwood, F.D. Provenza, J.J. Villalba, R.D. Wiedmeier, Intake of lambs offered ad libitum access to one of three iso-caloric and iso-nitrogenous mixed rations or a choice of all three foods, Livestock Science, Volume 101, Issues 1-3, May 2006, Pages 142-149, ISSN 1871-1413, DOI: 10.1016/j.livprodsci.2005.10.022.
(http://www.sciencedirect.com/science/article/B7XNX-4JXS70Y-J/2/57d8b55ca3e54e79ecfce1a601ce4c7d)
Abstract:
Modern practices for finishing livestock typically involve offering a single uniform food to large groups of presumably similar animals in an attempt to increase efficiency. Nevertheless, differences in physiology and behavior still cause variations in performance that may precipitate biological inefficiencies by not appreciating the importance of differences among individuals, the capacity of animals to select foods that meet ever-changing individual needs, and the dynamic nature of a nutrient's value to an animal. We examined intakes of groups of lambs offered a single food or three foods differing only in their proportions of cereal grains: High, 70%; Medium, 50%; Low, 40%. Foods consisted of the same ingredients (barley, corn, sugar beet pulp, alfalfa, soybean meal, grape pomace, feather meal, wheat straw), had similar levels of metabolizable energy (ME) and crude protein (CP), and met NRC requirements. We hypothesized that intake and performance would be greater when animals had a choice of foods because high grain concentrations would not limit intake of individuals unable to process high amounts of energy from grain. In general, lambs offered a Choice of the three foods ate more, converted food more efficiently, and cost less per unit gain than lambs fed the High food ($P < 0.05$). Animals fed the Low or Medium foods were intermediate in their responses between these two extremes. Within Choice, preference for High, Medium, and Low shifted from the beginning (21 d) to the finishing (21 d) periods of the trial. Though lambs in the Choice treatment preferred Low > Medium and High in the beginning stage of the trial, their preferences became pronounced as we increased the amount of grain in each food during the finishing period ($P < 0.05$). Collectively, our findings suggest improved intake, rate of gain, and feed efficiency can result when animals are allowed to select their diets from biochemically complementary foods, possibly enabling them to realize

greater benefits than typically thought from inexpensive forages. In addition, offering animals choices is an alternative to feeding uniform diets of rapidly fermented energy, a major cause of illness in feedlots.
Keywords: Diet; Food; Intake; Feed efficiency; Mixed ration; Selection; Variety; Animal performance

Nam-Soo Jwa, Ganesh Kumar Agrawal, Shigeru Tamogami, Masami Yonekura, Oksoo Han, Hitoshi Iwahashi, Randeep Rakwal, Role of defense/stress-related marker genes, proteins and secondary metabolites in defining rice self-defense mechanisms, Plant Physiology and Biochemistry, Volume 44, Issues 5-6, May-June 2006, Pages 261-273, ISSN 0981-9428, DOI: 10.1016/j.plaphy.2006.06.010.
(http://www.sciencedirect.com/science/article/B6VRD-4K6CN7S-3/2/f329c375bc793afd540774b11fa47658)
Abstract:
Rice, a first cereal crop whose draft genome sequence from two subspecies (japonica-type cv. Nipponbare and indica-type 93-11) was available in 2002, along with its almost complete genome sequence in 2005, has drawn the attention of researchers worldwide because of its immense impact on human existence. One of the most critical research areas in rice is to discern the self-defense mechanism(s), an innate property of all living organisms. The last few decades have seen scattered research into rice responses to diverse environmental stimuli and stress factors. Our understanding on rice self-defense mechanism has increased considerably with accelerated research during recent years mainly due to identification and characterization of several defense/stress-related components, genes, proteins and secondary metabolites. As these identified components have been used to study the defense/stress pathways, their compilation in this review will undoubtedly help rice (and others) researchers to effectively use them as a potential marker for better understanding, and ultimately, in defining rice (and plant) self-defense response pathways.
Keywords: Defense/stress response; Oryza sativa; Pathogenesis-related protein genes; Potential markers; Oxidative stress; Phytoalexins

Shao-Bo Li, Zhi-Hong Zhang, Ying Hu, Chen-Yu Li, Xuan Jiang, Ting Mao, Yang-Sheng Li, Ying-Guo Zhu, Genetic dissection of developmental behavior of crop growth rate and its relationships with yield and yield related traits in rice, Plant Science, Volume 170, Issue 5, May 2006, Pages 911-917, ISSN 0168-9452, DOI: 10.1016/j.plantsci.2005.12.005.
(http://www.sciencedirect.com/science/article/B6TBH-4HYM1SH-2/2/602e658297681ed0121f63a8e15af3f3)
Abstract:
Crop growth rate is a dynamic character that determines the final yield in cereal crops. The objective of the current study is to reveal its genetic basis and to genetically understand its relationships with grain yield and yield related traits like heading date, grain-filling duration, 1000-grain weight and plant height in rice (Oryza sativa L.). With 258 recombinant inbred lines (RILs) derived from a cross between cv. Lemont and cv. Teqing, time-related QTL mapping was conducted. Eight QTL for crop growth rate were identified at four consecutive growth periods. These QTL individually explained 5-29% of the trait variation. The Teqing alleles increased the trait values at all the four QTL detected before heading, while Lemont contributed alleles to increase the trait values at three of the other four QTL mapped after heading, which was in agreement with the observation that Teqing was the high-value parent before heading, while Lemont became the high-value parent after heading. No common QTL was observed at different growth periods. These results implied that crop growth rate of rice might be controlled by different genes (QTL) during different time intervals. A total of 22 QTL were identified for the other five traits, and the amount of variation explained by individual QTL ranged from 3% to 26%. The interval RM25-CSU754 on

chromosome 8 was identified to produce a major effect on multiple traits such as crop growth rate IV, grain yield, heading date, grain-filling duration, plant heights II and IV, which provided a genetic explanation for the close correlations among the traits. The implications of the results for further improvement in rice yield potential were discussed.
Keywords: Crop growth rate; Heading date; Grain-filling duration; Time-related QTL mapping

Sakine Ozpinar, Effects of tillage systems on weed population and economics for winter wheat production under the Mediterranean dryland conditions, Soil and Tillage Research, Volume 87, Issue 1, May 2006, Pages 1-8, ISSN 0167-1987, DOI: 10.1016/j.still.2005.02.024.
(http://www.sciencedirect.com/science/article/B6TC6-4FRB7X0-2/2/f183d51985babdc506a739a19e6a7bea)
Abstract:
Unsuitable tillage practices have often been identified as major constraints to cereal crop production in northwest of Turkey. In an effort to increase crop production, decrease the production costs and conserve the soil from degradation through mechanical manipulation of the soil, field experiments were conducted during the two cropping periods of 2001-2002 and 2002-2003 to evaluate the effects of tillage systems on grain yield of winter wheat (Triticum aestivum L.), weed density and tillage economy on a clay-loam soil. The tillage systems used were: conventional tillage (CT) with mouldboard plough, reduced tillage with rototiller (RT) and disc (DT). The economic analysis was made by comparing the gross margin in each tillage system based on the 2004 input costs and product prices. As result of this study, weed density was significantly higher for disc and this was followed by rototiller and mouldboard plough in terms of the sum of all the weed species both in 2002 and 2003: 56, 36, 29 and 65, 52, 49 weeds m-2, respectively. Although tillage systems had no significant influence on grain yield in 2003 but in 2002 the highest grain yield was significantly earned with rototiller, followed by mouldboard plough and disc: 4055, 3540 and 3188 kg ha-1, respectively. Further, rototiller resulted in the highest gross margin per hectare ($ 122) significantly because of the higher grain yield compared with mouldboard plough ($ 22), followed by disc ($ 7) that provided the lowest gross margin according to the average of two years.
Keywords: Gross margin; Production cost; Weed population; Tillage; Wheat; Mediterranean

S. Muurinen, P. Peltonen-Sainio, Radiation-use efficiency of modern and old spring cereal cultivars and its response to nitrogen in northern growing conditions, Field Crops Research, Volume 96, Issues 2-3, 30 April 2006, Pages 363-373, ISSN 0378-4290, DOI: 10.1016/j.fcr.2005.08.009.
(http://www.sciencedirect.com/science/article/B6T6M-4H6PKMX-1/2/f046d316d6187aceab0e247772b5cdce)
Abstract:
The typical features of high latitude growing seasons, particularly the short and intensive growth period and intense solar radiation during early growth, limit crop development and yield formation. A field study was conducted over two years to assess the differences between old and modern spring cereal cultivars in radiation-use efficiency (RUE), to characterise the traits contributing to the differences and to gauge the effect of nitrogen on the traits. Field experiments were conducted with wheat (Triticum aestivum L.), barley (Hordeum vulgare L.) and oat (Avena sativa L.) under two nitrogen regimes (90 kg N ha-1 and control with 0 kg N ha-1). RUE was reduced at 0 kg N ha-1. Pre-heading RUE was not influenced by year, but post-heading RUE was, with values being either higher or nearly the same in comparison with pre-heading values. RUE values for barley, wheat and oat were similar to those reported elsewhere. Old two- and six-row barley cultivars had higher pre-heading RUE than modern cultivars. After heading, under decreasing light levels biomass accumulation was high due to the high RUE values. Old oat and six-row barley cultivars

had higher post-heading RUE than modern cultivars. In intensive northern growing conditions, RUE varied seasonally and increased at increasing N application rate.
Keywords: Barley; Biomass; Nitrogen; Oats; Radiation-use efficiency; Wheat

Ann Hogbergand, Jan Erik Lindberg, The effect of level and type of cereal non-starch polysaccharides on the performance, nutrient utilization and gut environment of pigs around weaning, Animal Feed Science and Technology, Volume 127, Issues 3-4, 28 April 2006, Pages 200-219, ISSN 0377-8401, DOI: 10.1016/j.anifeedsci.2005.09.004.
(http://www.sciencedirect.com/science/article/B6T42-4HBSGY0-2/2/4ba74571eddc0d1416e43f48900a131a)
Abstract:
The influence of non-starch polysaccharides (NSP) level and solubility on performance, digestion site and gut environment was investigated in 20 Swedish Yorkshire litters between 3 and 9 weeks of age. The litters were distributed among five diets based on cereals and cereal by-products. The control diet (C) had a medium content of NSP (147 g/kg dry matter (DM)), whereas diets H and Hi had a high content of NSP (188-250 g/kg DM), and diets L and Li had a low content of NSP (95-109 g/kg DM) after dilution with starch. The proportion of insoluble (i) NSP was higher in diet Hi and Li (0.80-0.85) than in diets C, H and L (0.68-0.73). The pigs offered diet Li showed the highest ($P<0.05$) feed intake and grew faster ($P<0.05$) than pigs offered diets C, L and H. In the post-weaning period feed:gain was highest for pigs offered the C and H diets and lower for pigs offered the low NSP diets and diet Hi. During week 6, the coefficient of caecal (CCAD) and total tract (CTTAD) apparent digestibility of organic matter (OM) was lower ($P<0.05$) in diet Hi compared to the other diets, and the CCAD and CTTAD of crude protein (CP) was higher ($P<0.05$) in diet L compared to the high NSP diets. During week 7, the CCAD and CTTAD of OM was lower ($P<0.05$) in diet Hi compared to the low NSP diets and diet C. The CCAD of CP and starch was higher ($P<0.05$) in diet L compared to the control diet. Diet L showed higher ($P<0.05$) values of digestible energy compared to the high NSP diets, both in the 6 and 7 weeks old piglets. NSP solubility influenced ($P<0.05$) the caecal digestibility of arabonixylans and total NSP in the 6 and 7 weeks old piglets, as well as the caecal digestibility of total dietary fibre in the 7 weeks old piglets. The content of total organic acids (OA) was linearly related to the pH level at the ileum ($R2 = 0.70$), caecum ($R2 = 0.57$) and colon ($R2 = 0.83$). The experimental diets altered the molar proportions of lactic acid and short chain fatty acids (SCFA), of total OA, as well as the molar proportions of acetic, propionic and butyric acids, of total SCFA, in the stomach, ileum, caecum and colon of the piglets. In conclusion, NSP solubility influenced the digestibility of cell wall polysaccharides at the caecum but not at the total tract. Diet Hi promoted production of lactic acid in the stomach and small intestine and butyric acid in the large intestine.
Keywords: Piglets; NSP; Cereals; Digestibility; Digestion site; Gut environment

Tapio Salo, Eila Turtola, Nitrogen balance as an indicator of nitrogen leaching in Finland, Agriculture, Ecosystems & Environment, Volume 113, Issues 1-4, April 2006, Pages 98-107, ISSN 0167-8809, DOI: 10.1016/j.agee.2005.09.002.
(http://www.sciencedirect.com/science/article/B6T3Y-4HGM70W-1/2/e143ca885eff398274efb560d616fcfe)
Abstract:
When measured data of nitrogen (N) losses to the environment are not available, calculated N balances are often used to indicate losses. The aim of this study was to describe the relations between N surface balances and N leaching losses in two agricultural runoff fields. Data of runoff fields dominated by cereal and grass production were available for clay soil for 1980-2001 and for sandy soil for 1992-2000. The total sum of N leaching via drainage and surface runoff was 2-40 kg N ha-1 year-1 in the clay soil and 2-104 kg N ha-1 year-1 in the sandy soil. The annual N surface balances were from -44 to 145 kg N ha-1 in the clay soil and from -63 to 417 kg N ha-1 in the

sandy soil. The highest annual N leaching losses were usually not caused simply by high N balances, but, rather, were mainly due to poor management. The highest annual N leaching losses occurred in the clay soil from bare fallow and in sandy soil after application of slurry to the frozen soil.
Since the annual N balance did not predict the measured N leaching in the annual datasets, several smaller datasets were formed that consisted of similar management techniques and periods of 4-10 subsequent years. In the sandy soil, when the annual N balance (Nfertiliser + Nslurry + Nfixation - Nharvest - Nvolatilised from slurry) and the volume of subsurface drainage were used as predictors in a linear regression model, at most 56% of the variation in N leaching could be predicted. The clay soil received mineral N fertilisers only, and the annual N balance was calculated as Nfertiliser - Nharvest. When the N balance and the volume of total runoff or only subsurface drainage were used as predictors in a linear regression model, 55-60% of the variation in N leaching loss could be predicted. However, the average N balance calculated from 1980 to 1990 for the experimental clay soil plots, including bare fallows, predicted 71% of the variation in N leaching. Similarly, the average N balance calculated over 5 years for the slurry application experiment predicted 70% of the variation in N leaching in sandy soil. Average N balances were found to be useful indicators for N leaching when cultivation techniques included environmentally risky management, but when good agricultural practice was maintained, N leaching was not predicted by the balances.
Keywords: Runoff; Crop rotation; Management; Manure

Katja Poveda, Ingolf Steffan-Dewenter, Stefan Scheu, Teja Tscharntke, Belowground effects of organic and conventional farming on aboveground plant-herbivore and plant-pathogen interactions, Agriculture, Ecosystems & Environment, Volume 113, Issues 1-4, April 2006, Pages 162-167, ISSN 0167-8809, DOI: 10.1016/j.agee.2005.09.005.
(http://www.sciencedirect.com/science/article/B6T3Y-4HHP36V-2/2/61be95d20ad07a3f53c5accdbd3816f9)
Abstract:
Soil organisms may significantly affect the aboveground system. However, the influence of farming practices in modifying the effects of soil organisms on aboveground systems is poorly understood. The aim of our study was to investigate: (1) How important are soil organisms for plant growth and the development of herbivores and pathogens above the ground? (2) How do agricultural management practices affect interactions between soil organisms, plants and their aboveground herbivores and pathogens? To answer these questions we investigated the effect of experimental defaunation of soils from organic versus conventional farms on growth of wheat, abundance of aphids and infection of wheat by Septoria fungi. Plant biomass in soil from conventional farms exceeded that of soils from organic farms, presumably due to the higher nutrient input in the conventional farming system. Soil defaunation likely mobilized nutrients that increased plant growth. Aphid abundance and Septoria infection was reduced by defaunation but only in organic soils. This suggests that soil organisms in organic farming systems are more important for aphid performance and the infection rate by Septoria than in conventional systems. Hence, changes in the soil animal food web caused by farming practice feed back on aboveground organisms, and this appears to be more pronounced in organic farming systems. Further, the results indicate that soil organisms may modify higher trophic levels (aphid and pathogen infection) without significantly affecting lower trophic levels (plant growth).
Keywords: Aphids; Cereals; Defaunation; Farming systems; Soil organisms; Septoria spp

I.A. Rasmussen, M. Askegaard, J.E. Olesen, K. Kristensen, Effects on weeds of management in newly converted organic crop rotations in Denmark, Agriculture, Ecosystems & Environment, Volume 113, Issues 1-4, April 2006, Pages 184-195, ISSN 0167-8809, DOI: 10.1016/j.agee.2005.09.007.

(http://www.sciencedirect.com/science/article/B6T3Y-4HK5SFS-3/2/7abf9ebdb2bb7bd078e78c9cf4aa6ac5)
Abstract:
We investigated the effects on annual weeds of location, weed control, manure application and catch crops and their interactions in a crop rotation with cereals and pulses for grain during conversion to organic farming in order to better understand the combined effects of management. An experiment with a 4-year crop rotation (spring barley/undersown ley, grass-clover, winter wheat and pea/barley) was carried out from 1997 to 2000 under organic conditions at three locations in Denmark with four treatments: with and without catch crop and with and without manure. Mechanical weed control was reduced or absent in cereals or pulses with undersown catch crops or grass-clover. Manure application increased weed biomass, but not the proportion of total biomass that was weed biomass, indicating that crop as well as weeds benefited from manure. The effect of catch crop on weed biomass was linked to weed control, while direct effects of catch crops on weed biomass were of minor importance. At the location with most intensive weed control, weed biomass decreased in all crops over the years. At the two other locations, weed biomass was stable or increased slightly in winter wheat and pea/barley, in which some weed control was performed, but increased in spring barley where no weed control was performed. Catch crops reduced weed density. The entry point of the rotation, i.e. the crop at the start of the rotation in 1997, had a significant influence on mean weed biomass, but it differed between locations and could mostly be explained by differences in weed biomass between years and crops. This suggests that experiments that do not include all crops in the rotation every year may give biased results. Effect of management practices (manure, catch crop and weed control) was specific to sites, but with similar effects in the different crops at each location.
Keywords: Catch crop; Manure; Mechanical weed control; Organic farming; Weed management; Long-term experiment

O. Olfert, R.M. Weiss, Impact of climate change on potential distributions and relative abundances of Oulema melanopus, Meligethes viridescens and Ceutorhynchus obstrictus in Canada, Agriculture, Ecosystems & Environment, Volume 113, Issues 1-4, April 2006, Pages 295-301, ISSN 0167-8809, DOI: 10.1016/j.agee.2005.10.017.
(http://www.sciencedirect.com/science/article/B6T3Y-4J0XRYM-1/2/144a0e5ea3ba6f931132db3c6e2da340)
Abstract:
Climate change scenarios were applied to bio-climatic models to predict the potential distributions and relative abundances of three pest species that have recently been introduced to Canada: Ceutorhynchus obstrictus (Coleoptera: Curculionidae), Meligethes viridescens (Coleoptera: Nitidulidae), and Oulema melanopus (Coleoptera: Chrysomelidae). The models, developed using CLIMEX(TM), were extended by utilizing incremental scenarios, representing potential climate change scenarios, as inputs. Compared to predicted range and distribution under current climate conditions, model results indicated that all three species would have increased ranges and relative abundances for temperature increases between 1 and 7 [degree sign]C. Risks associated with these species will likely become more intense, both in terms of severity in regions where these species presently occur and in terms of their ability to become established in areas they do not occur.
Keywords: Cabbage seedpod weevil; Cereal leaf beetle; Pollen beetle; Bio-climate model; Climate change

E. Syvasalo, K. Regina, E. Turtola, R. Lemola, M. Esala, Fluxes of nitrous oxide and methane, and nitrogen leaching from organically and conventionally cultivated sandy soil in western Finland, Agriculture, Ecosystems & Environment, Volume 113, Issues 1-4, April 2006, Pages 342-348, ISSN 0167-8809, DOI: 10.1016/j.agee.2005.10.013.

(http://www.sciencedirect.com/science/article/B6T3Y-4HVDN10-2/2/395c99b91ca97c963733cbdbafaeca77)

Abstract:
Organic farming is considered to be environmentally beneficial partly due to the ban on synthetic fertilisers and pesticides, but there are few studies including direct measurements on the environmental impact of organic farming compared with the conventional system. In this study, greenhouse gas emissions and nitrogen leaching were compared in three different farming systems in western Finland. Two of them consisted of grass production and livestock raising, and were managed either organically (OF) or conventionally (CF). The third farming system was conventionally managed cereal production without livestock (CEF). Greenhouse gas (CH4 and N2O) fluxes, nitrogen leaching and soil mineral nitrogen concentrations were measured for 1 year from three replicate plots of each farming system. The annual flux of nitrous oxide (N2O) was 1.4 kg N ha-1 in OF, 1.2 kg N ha-1 in CF, and 3.5 kg N ha-1 in CEF. Annual methane (CH4) oxidation ranged between -0.72 and -0.44 kg CH4 ha-1 in the three treatments. In the case of OF and CF nitrogen losses to water were larger than gaseous losses as N2O but in CEF they were equal. Of the N added as mineral fertiliser and cattle slurry to the CF fields, 1.6% was lost by leaching, while 0.7% was lost to the atmosphere as N2O. In CEF, the respective percentages were 3.0% for N leaching and 3.2% for N lost to the air. The environmental advantages of organic compared with conventional farming systems were not confirmed in this study.
Keywords: Greenhouse gas emissions; Nitrous oxide; Methane; Nitrogen leaching; Organic farming

R.F. Pywell, E.A. Warman, L. Hulmes, S. Hulmes, P. Nuttall, T.H. Sparks, C.N.R. Critchley, A. Sherwood, Effectiveness of new agri-environment schemes in providing foraging resources for bumblebees in intensively farmed landscapes, Biological Conservation, Volume 129, Issue 2, April 2006, Pages 192-206, ISSN 0006-3207, DOI: 10.1016/j.biocon.2005.10.034.
(http://www.sciencedirect.com/science/article/B6V5X-4HR76NG-1/2/e12ff278e308fec8c74905f9b48ac0e4)

Abstract:
Intensive farming has contributed to the serious declines in abundance and geographic range suffered by several bumblebee species in Europe and North America. Recent UK agri-environmental policy aims to conserve and restore bumblebee populations by providing foraging habitats on arable field margins. We examined the effectiveness of strategies to achieve this, including sowing seed mixtures of (1) tussocky grass species, (2) wildflowers and (3) pollen- and nectar-rich plants. These were compared to conventionally managed cereal crops. Sampling was undertaken in 32 10 x 10 km squares throughout England, each containing a sample of the different field margin types. Bumblebee abundance in July and August was significantly higher on pollen and nectar margins (86 +/- 14 bees per 100 m) compared with wildflower margins (43 +/- 14), mature grass margins (6 +/- 14) and recently sown grass margins (8 +/- 4). Bees were virtually absent from the cereal crop (0.2 +/- 0.1). Bumblebee species richness was significantly higher on margins sown with either wildflowers or the pollen and nectar mix. There was evidence that richness of the bumblebee assemblage at the 10 x 10 km square scale was positively correlated with land use heterogeneity, the proportion of grassland, and the abundance and richness of dicotyledon flowers. The abundance of long-tongued bees per margin was explained by the number of pollen and nectar agreements per 10 x 10 km square, together with flower abundance. Future research is required to determine the quantity and location of foraging habitat required to sustain bumblebee populations at the landscape scale.
Keywords: Keystone species; Pollen and nectar resources; Habitat restoration; Field margins

D.P. Livingston, R. Premakumar, S.P. Tallury, Carbohydrate partitioning between upper and lower regions of the crown in oat and rye during cold acclimation and freezing, Cryobiology, Volume 52, Issue 2, April 2006, Pages 200-208, ISSN 0011-2240, DOI: 10.1016/j.cryobiol.2005.11.001.
(http://www.sciencedirect.com/science/article/B6WD5-4HTBM44-1/2/2c176808794c7a726797cbfbaf892141)
Abstract:
Carbohydrates have long been recognized as an important aspect of freezing tolerance in plants but the association between these two factors is often ambiguous. To help clarify the relationship, the allocation of carbohydrates between specific tissues within the over wintering organ (crown) of winter cereals was measured. A winter-hardy and non-winter-hardy oat (Avena sativa L.), and a rye (Secale cereale L.) cultivar were grown and frozen under controlled conditions. Crown tissue was fractionated into an upper portion, called the apical region, and a lower portion, called the lower crown. These tissues were ground in liquid N and extracted with water. Extracts were analyzed by HPLC for the simple sugars, sucrose, glucose, fructose, and for fructan of various size classes. After 3 weeks of cold acclimation at 3 [degree sign]C, carbohydrates accounted for approximately 40% of the dry weight of oats and 60% of the dry weight of rye. The apical region, which is the tissue within the crown that acclimates to the greatest extent, was generally 10% higher in total carbohydrates than the lower crown. During a mild freeze, various carbohydrates were allocated differently between specific tissues in the three genotypes. When frozen, fructan generally decreased to a greater extent in the lower crown than in the apical region but sugars increased more in the apical region than in the lower crown. Results suggest that to understand how carbohydrates relate to freezing tolerance, regions of the crown that endure freezing stress differently should be compared.
Keywords: Cold acclimation; Oat (Avena sativa); Rye (Secale cereale); Freezing; Apical meristem; Crown; Carbohydrates; Fructan; Histology

Esteban Bortiri, Dave Jackson, Sarah Hake, Advances in maize genomics: the emergence of positional cloning, Current Opinion in Plant Biology, Volume 9, Issue 2, Genome studies and molecular genetics: Part 1: Model legumes / edited by Nevin D Young and Randy C Shoemaker; Part 2: Maize genomics / edited by Susan R Wessler. Plant biotechnology / edited by John Salmeron and Luis R Herrera-Estrella, April 2006, Pages 164-171, ISSN 1369-5266, DOI: 10.1016/j.pbi.2006.01.006.
(http://www.sciencedirect.com/science/article/B6VS4-4J5T8D2-3/2/700bfb03dbdfbbcb66c62654a9d2a653)
Abstract:
Positional cloning has been and remains a powerful method for gene identification in Arabidopsis. With the completion of the rice genome sequence, positional cloning in rice also took off, including the cloning of several quantitative trait loci. Positional cloning in cereals such as maize whose genomes are much larger than that of rice was considered near impossible because of the vast amounts of repetitive DNA. However, conservation of synteny across the cereal genomes, in combination with new maize resources, has now made positional cloning in maize feasible. In fact, a chromosomal walk is usually much faster than the more traditional method of gene isolation in maize by transposon tagging.

M.J. Hinojo, A. Medina, F.M. Valle-Algarra, J.V. Gimeno-Adelantado, M. Jimenez, R. Mateo, Fumonisin production in rice cultures of Fusarium verticillioides under different incubation conditions using an optimized analytical method, Food Microbiology, Volume 23, Issue 2, April 2006, Pages 119-127, ISSN 0740-0020, DOI: 10.1016/j.fm.2005.03.006.
(http://www.sciencedirect.com/science/article/B6WFP-4G82Y0J-2/2/3982185e0572f63caf8c441817116b0a)
Abstract:

Fumonisin B1 (FB1) and fumonisin B2 (FB2) are the main members of a family of mycotoxins produced by various fungal species belonging to the Gibberella fujikuroi complex. The present work shows the results of a comparative study of various clean-up and derivatization procedures for analysis of fumonisins in rice cultures. Fumonisins were extracted from rice with acetonitrile/water (50/50, v/v). For clean-up, three solid-phase extraction procedures were assayed (C18 cartridge, SAX cartridge, and a combination of both). Two reagents (o-phthaldialdehyde and 4-fluoro-7-nitro-benzofurazan) were studied comparatively for formation of fluorescent derivatives. The separation was carried out by LC using a fluorescence detector. The best procedure for analysis of fumonisins in rice involved clean-up with C18 cartridge and derivatization with o-phthaldialdehyde. The limit of detection was 0.010 mg kg-1 for both toxins. In the 10-500 mg kg-1 spiking level range, the recovery rates for FB1 and FB2 in rice varied from 94.6% to 103.6% and from 96.3% to 101.9%, respectively. The optimized analytical method for determination of fumonisins in rice was applied to the study of FB1 and FB2 production by four isolates of the G. fujikuroi species complex in rice cultures carried out at different temperatures and water activities to establish the influence of strain and environmental conditions on fumonisin production in this cereal. In general, fumonisin production was the highest at 20 [degree sign]C and lowest at 37 [degree sign]C. Four of the five assayed water activity (aw) values (0.97, 0.98, 0.99, and 1.0) did not affect significantly fumonisin accumulation but fumonisins were not detected in cultures when aw was 0.96.

T. Uchino, T. Roychowdhury, M. Ando, H. Tokunaga, Intake of arsenic from water, food composites and excretion through urine, hair from a studied population in West Bengal, India, Food and Chemical Toxicology, Volume 44, Issue 4, April 2006, Pages 455-461, ISSN 0278-6915, DOI: 10.1016/j.fct.2005.08.018.
(http://www.sciencedirect.com/science/article/B6T6P-4H6PKWF-2/2/70b64ed20412de80be686120d30299a4)
Abstract:
To evaluate the main intake source of arsenic by the villagers from arsenic-affected families in Jalangi and Domkol blocks in Mushidabad district, West Bengal--India, we determined the concentrations of arsenic in tubewell water and in food composites, mainly including vegetables and cereals collected from the surveyed families which were cultivated in that region. The daily dietary intakes of arsenic by the villagers were estimated and the excretions of arsenic through urine and hair were determined. The arsenic concentrations in hair and urine of the studied population living in mild (2.78 [mu]g/L), moderate (30.7 [mu]g/L) and high (118 [mu]g/L) arsenic-affected families were 133, 1391 and 4713 [mu]g/kg and 43.1, 244 and 336 [mu]g/L, respectively. The linear regressions show good correlations between arsenic concentrations in water vs hair ($r2 = 0.928$, $p < 0.001$) and water vs urine ($r2 = 0.464$, $p < 0.01$). Approximately 29.4%, 58.1% and 62.1% of adult population from mild, moderate and high arsenic-affected families were suffering from arsenical skin manifestations. The mean arsenic concentrations of food composites (vegetables and cereals) in high arsenic-affected families are not significantly different from mild arsenic-affected families. The daily dietary intakes of arsenic from water and food composites of the studied population, living in high, moderate and mild arsenic-affected families were 568, 228 and 137 [mu]g, respectively. The linear regressions show good correlations between arsenic concentrations in hair vs daily dietary intake ($r2 = 0.452$, $p < 0.001$) and urine vs daily dietary intake ($r2 = 0.134$, $p < 0.001$). The water for drinking contributed 6.07%, 26.7% and 58.1% of total arsenic in our study from mild, moderate and high arsenic-affected families. The result suggested that the contaminated water from high arsenic-affected families should be the main source for intake of arsenic. On contrary, the contribution of arsenic-contaminated food composites from mild and moderate arsenic-affected families might be the main source for intake of arsenic. The Food and Agriculture Organization/World Health Organization (FAO/WHO) provisional tolerable weekly intake (PTWI) values of arsenic in our study were 3.32, 5.75 and 12.9 [mu]g/kg body weight/day

from mild, moderate and high arsenic-affected families, respectively, which is higher than the recommended PTWI value of arsenic (2.1 [mu]g/kg body weight/day).
Keywords: West Bengal--India; Arsenic in tubewell water; Food composites; Human hair and urine; ICP-MS; HPLC

M.E. Gouze, J. Laffitte, P. Rouimi, N. Loiseau, I.P. Oswald, P. Galtier, Effect of various doses of deoxynivalenol on liver xenobiotic metabolizing enzymes in mice, Food and Chemical Toxicology, Volume 44, Issue 4, April 2006, Pages 476-483, ISSN 0278-6915, DOI: 10.1016/j.fct.2005.08.020.
(http://www.sciencedirect.com/science/article/B6T6P-4H80T40-1/2/84fa014cc4b57bf216d44d4307119931)
Abstract:
DON is one of the major mycotoxic contaminant of cereal grains throughout the world. The purpose of this investigation was to characterize the effects of a range of environmentally relevant doses of DON in mice exposed through a subchronic toxicological assay. Animals received 3 days per week for 4 weeks, 0.014, 0.071, 0.355 or 1.774 mg of toxin/kg b.w. All doses, except 0.014 mg/kg, provoked increases in plasma immunoglobulin A whereas there was no change in plasma biochemical parameters such as alkaline phosphatase, electrolytes or other immunoglobulins. Administration of 0.071 or 0.355 mg/kg doses led to increased liver microsomal pentoxyresorufin depentylase and cytosolic glutathione transferase activities. Examining protein modulation, western blot analyses liver fractions from mice receiving these doses revealed increased levels in both P450 2b, GST [alpha] and [pi] isoenzymes without any change in P450 1a expression. A significant competitive inhibition of deoxynivalenol on CDNB conjugation in vitro suggests that the mycotoxin is a putative substrate for glutathione S-transferases. These changes in liver xenobiotic metabolizing enzymes are discussed by considering the structural nature of deoxynivalenol and previous reports on similar effects exerted by other trichothecenes. These results suggest that a subchronic exposure to low doses of deoxynivalenol causes changes in the normal liver metabolism of xenobiotics.
Keywords: Deoxynivalenol; Cytochrome P450; Glutathione S-transferase; Liver; Mice

Ranad Shaheen, Maria A. Andersson, Camelia Apetroaie, Anja Schulz, Monika Ehling-Schulz, Veli-Matti Ollilainen, Mirja S. Salkinoja-Salonen, Potential of selected infant food formulas for production of Bacillus cereus emetic toxin, cereulide, International Journal of Food Microbiology, Volume 107, Issue 3, 1 April 2006, Pages 287-294, ISSN 0168-1605, DOI: 10.1016/j.ijfoodmicro.2005.10.007.
(http://www.sciencedirect.com/science/article/B6T7K-4J2TS9F-1/2/6fb7267c9fafad07fc194beea6a6d2b3)
Abstract:
Cereulide producing Bacillus cereus was isolated from randomly chosen commercial infant foods. The cereulide production in infant food formulas was investigated. When the reconstituted foods were inoculated with > 105 cfu ml- 1 of cereulide producing B. cereus, 2 to 200 [mu]g of cereulide per 100 ml of food accumulated during 24 h of non-refrigerated storage. The amount of cereulide measured in the foods by the accurate chemical assay (LC-MS) matched with that found by sperm micro assay, proving the cereulide was the sole heat stable toxin in the foods and present in its toxic form. The infant formulas containing both cereal and dairy ingredients were the most supportive for cereulide production. Cereulide accumulation was affected by the infant food composition as well as by the handling of the food. Diluting the reconstituted food with water resulted in increased toxin production expressed as [mu]g per volume. More cereulide was accumulated when the food was incubated stationary compared with moderate shaking. The amount of cereulide accumulated within 24 h at room temperature per 100 ml of cereal and dairy or in rice-nondairy reconstituted infant formulas, inoculated with >= 105 cfu ml- 1 of B. cereus strain F4810/72, was higher or similar to the amounts reported for foods implicated in emetic type

of food poisonings. Thus mishandling and temperature abuse of infant foods may cause food poisoning when emetic B. cereus is present.
Keywords: B. cereus; Infant food; Emetic toxin; Cereulide; Ribopattern; Sperm micro assay

Henry Jorgensen, Jan Erik Lindberg, Prediction of energy and protein digestibility in pig feeds using growing rats as a model, Animal Feed Science and Technology, Volume 127, Issues 1-2, 30 March 2006, Pages 55-71, ISSN 0377-8401, DOI: 10.1016/j.anifeedsci.2005.08.011.
(http://www.sciencedirect.com/science/article/B6T42-4H877HG-2/2/8c64e82315ff2788b268c89f7ddc7027)
Abstract:
The present investigation was undertaken firstly to establish the relationship between coefficient of total tract digestibility of energy (CTTAD-E), and dry matter (CTTAD-DM) and organic matter (CTTAD-OM) in a wide range of feedstuffs using growing rats. Secondly to establish prediction equations on CTTAD-E and crude protein digestibility (CTTAD-CP) in growing pigs from digestibility estimated with growing rats. Further the established equations were evaluated with independent set of data. In the first part of the study 18 experimental diets varying widely in chemical composition was used together with 164 diets each prepared with a different feedstuff and adjusted to 15 g N per kg DM with a N-free mixture. In the second part of the study a total of 138 diets was used of which 56 were classified as cereal and cereal by-products as main ingredients. Further for evaluation of the equations 13 diets composed of hulled or naked barley and oats was prepared. All diets were assayed in digestibility experiments. Each diet was assayed with either three to five growing pigs in balance periods of 12 days with a 7 days collection period or five growing Wistar rats in balance periods of 9 days with 5 days collection. A close relationship was found between CTTAD-DM/CTTAD-OM and CTTAD-E. When diets contain a high content of ash it is preferred to use CTTAD-OM to predict CTTAD-E. The relation between the growing pig and the growing rat for CTTAD-E for all 138 diets showed a coefficient of variation (CV) of 4.7. When a sub-sample (n = 56) of cereal and cereal by-products was used the CV was more than halved to 2.2. Pigs digested most fibrous diet to a higher degree than rats causing the higher CV. The correlation of CTTAD-CP between the two species was lower than for CTTAD-E. The derived prediction equations were tested with an independent set of data. In conclusion, the results showed the potential of using the rat model as a tool in feed evaluation for pigs. However, for practical purposes the equations could be used to predict the energy value with an acceptable precision.
Keywords: Energy digestibility; Crude protein digestibility; Prediction; Interrelationship

J.M. O'Connell, J.J. Callan, J.V. O'Doherty, The effect of dietary crude protein level, cereal type and exogenous enzyme supplementation on nutrient digestibility, nitrogen excretion, faecal volatile fatty acid concentration and ammonia emissions from pigs, Animal Feed Science and Technology, Volume 127, Issues 1-2, 30 March 2006, Pages 73-88, ISSN 0377-8401, DOI: 10.1016/j.anifeedsci.2005.09.002.
(http://www.sciencedirect.com/science/article/B6T42-4HC771G-3/2/942ee3bdda273452492dd17de8484a15)
Abstract:
A 2 x 2 x 2 factorial was used to investigate the interaction between dietary crude protein level (CP) (220 g/kg versus 160 g/kg), cereal type (wheat versus barley) and exogenous enzyme supplementation (with or without enzyme) on nutrient digestibility, nitrogen balance and manure ammonia (NH3) emission and faecal volatile fatty acid (VFA) content. The enzyme supplement used contained endo-1,3-(4)-[beta]-glucanase (EC 3.2.1.6) and endo-1,4-[beta]-xylanase (EC 3.2.1.8). Diets were formulated to contain similar concentrations of net energy (9.8 MJ/kg) and lysine (10.0 g/kg). Following a 14-day dietary adaptation period, 32 boars, 4 boars per treatment (80.0 kg, S.D. = 3.6 kg), were transferred to metabolism crates where urine and faeces were

collected separately over 7 days. NH3 emissions were measured over 240 h using a laboratory scale procedure. There was a significant interaction between cereal type and enzyme supplementation in the apparent digestibility of gross energy (P<0.05) and total faecal volatile fatty acid concentration (P<0.05). Pigs offered the barley-based diets containing an enzyme supplement had a significantly higher gross energy digestibility and a significantly lower concentration of total volatile fatty acids in the faeces than unsupplemented barley diets. However, there was no effect of enzyme supplementation in wheat-based diets. Pigs offered diets containing 220 g CP/kg excreted significantly more N (P<0.01), urinary N (P<0.05) and faecal N (P<0.01) and had a lower than those offered diets containing 160 g CP/kg. Pigs offered barley-based diets excreted significantly less urinary nitrogen (P<0.05) and more faecal nitrogen (P<0.001) and had a lower apparent N digestibility (P<0.001) than pigs offered wheat-based diets. There was a significant three-way interaction in manure NH3 emissions from 0 to 240 h (P<0.05). Enzyme supplementation significantly increased NH3 emissions in the barley-based diet at the 220 g CP/kg concentration while it had no effect on the wheat-based diet. However, at the 160 g CP/kg concentration, enzyme supplementation had no effect on NH3 emissions. In conclusion, the excretion of pollutants, viz. nitrogen, ammonia and volatile fatty acids could be reduced by lowering dietary CP level and by increasing the level of barley in the diet. Enzyme supplementation increased NH3 emissions with barley-based diets.
Keywords: Pigs; Cereals; Enzymes; Crude protein; Pollutants

F. Fabre, J.S. Pierre, C.A. Dedryver, M. Plantegenest, Barley yellow dwarf disease risk assessment based on Bayesian modelling of aphid population dynamics, Ecological Modelling, Volume 193, Issues 3-4, 15 March 2006, Pages 457-466, ISSN 0304-3800, DOI: 10.1016/j.ecolmodel.2005.08.021.
(http://www.sciencedirect.com/science/article/B6VBS-4HDGBRP-1/2/5cdf59cc5a35b0e07489c6d5fcbed44f)
Abstract:
A stochastic population dynamics model is proposed to improve integrated pest management strategies against the aphid Rhopalosiphum padi, the main Barley yellow dwarf virus (BYDV) vector in winter cereals during autumn in Europe. The model is based on a temperature-dependent simulation of R. padi population dynamics. The model requires a single early assessment of the proportion of plants infested by aphids. To account for sampling errors and for uncertainty caused by the numerous factors acting on aphid population dynamics under field conditions, Bayesian statistical inference was used. The model allows assessment of the probability distribution of the area under the curve of the percentage of plants infested by R. padi during autumn, a predictor of the need for insecticide sprays against BYDV vectors. The accuracy of model predictions was tested on an independent data set collected from 1995 to 1998 in the main French small grain production areas. The use of this model as a basis for a user-friendly decision support system improving BYDV management is discussed.
Keywords: Barley yellow dwarf virus; Decision support system; Integrated pest management; Rhopalosiphum padi; Stochastic modelling; Temperature

Gill Tuck, Margaret J. Glendining, Pete Smith, Jo I. House, Martin Wattenbach, The potential distribution of bioenergy crops in Europe under present and future climate, Biomass and Bioenergy, Volume 30, Issue 3, March 2006, Pages 183-197, ISSN 0961-9534, DOI: 10.1016/j.biombioe.2005.11.019.
(http://www.sciencedirect.com/science/article/B6V22-4J4HK84-1/2/fd34835bed115db6b8b9bdb8ce11ce6b)
Abstract:
We have derived maps of the potential distribution of 26 promising bioenergy crops in Europe, based on simple rules for suitable climatic conditions and elevation. Crops suitable for temperate

and Mediterranean climates were selected from four groups: oilseeds (e.g. oilseed rape, sunflower), starch crops (e.g. potatoes), cereals (e.g. barley) and solid biofuel crops (e.g. sorghum, Miscanthus). The impact of climate change under different scenarios and GCMs on the potential future distribution of these crops was determined, based on predicted future climatic conditions. Climate scenarios based on four IPCC SRES emission scenarios, A1FI, A2, B1 and B2, implemented by four global climate models, HadCM3, CSIRO2, PCM and CGCM2, were used. The potential distribution of temperate oilseeds, cereals, starch crops and solid biofuels is predicted to increase in northern Europe by the 2080s, due to increasing temperatures, and decrease in southern Europe (e.g. Spain, Portugal, southern France, Italy, and Greece) due to increased drought. Mediterranean oil and solid biofuel crops, currently restricted to southern Europe, are predicted to extend further north due to higher summer temperatures. Effects become more pronounced with time and are greatest under the A1FI scenario and for models predicting the greatest climate forcing. Different climate models produce different regional patterns. All models predict that bioenergy crop production in Spain is especially vulnerable to climate change, with many temperate crops predicted to decline dramatically by the 2080s. The choice of bioenergy crops in southern Europe will be severely reduced in future unless measures are taken to adapt to climate change.
Keywords: Bioenergy crops; Biofuel crops; Modelling; Climate change; GIS mapping; Europe

Sanaa Ragaee, El-Sayed M. Abdel-Aal, Pasting properties of starch and protein in selected cereals and quality of their food products, Food Chemistry, Volume 95, Issue 1, March 2006, Pages 9-18, ISSN 0308-8146, DOI: 10.1016/j.foodchem.2004.12.012.
(http://www.sciencedirect.com/science/article/B6T6R-4FP1J26-1/2/63997d6ef89d00eeb4b5be8188eb10c4)
Abstract:
In an attempt to improve intake of dietary fibre and antioxidants and quality of whole grain products, whole grain meals from barley, millet, rye and sorghum were evaluated individually and in blends with wheat flour in terms of starch pasting properties and protein heat damage, during cycles of heating and cooling in RVA tests. The whole grain meals were blended with either hard or soft wheat flour and processed into bread, cake, cookie or snack products. The products were then evaluated with regard to physical properties and acceptability. Significant differences were observed between cereals in starch peak, breakdown and setback viscosities as well as in protein peak viscosity. The results showed that RVA could be used to help formulate cereal blends with certain pasting properties. Substitution of wheat flour, with 15% of barley, rye, millet or sorghum whole grain, did not have significant detrimental effects on physical properties or acceptability of pita bread. Additionally, replacement of wheat flour with up to 30% of barley, rye, millet or sorghum whole grain meal had no significant effects on quality of cakes or cookies. A multigrain snack-like food was also developed as a healthy product and was highly acceptable in a sensory test. The developed product would help enhance consumption of whole grain foods, resulting in improved intake of fibre and health-enhancing components.
Keywords: Wheat; Barley; Millet; Rye; Sorghum; Flour; Wholemeal; Blends; RVA; Pasting properties; Pita bread; Cookie; Cake; Multigrain snack; Sensory properties

Zia-Ur-Rehman, Storage effects on nutritional quality of commonly consumed cereals, Food Chemistry, Volume 95, Issue 1, March 2006, Pages 53-57, ISSN 0308-8146, DOI: 10.1016/j.foodchem.2004.12.017.
(http://www.sciencedirect.com/science/article/B6T6R-4GDSF6D-1/2/792c314a3477d91991c81f8fa505b250)
Abstract:
Storage effects on nutritional quality of commonly consumed cereal grains are studied. Freshly harvested wheat, maize and rice grains were stored at 10, 25 and 45 [degree sign]C for six

months. A significant decrease in pH and an increase in titratable acidity was observed during storage of these three cereal grains at 25 and 45 [degree sign]C. A gradual decline in moisture, total available lysine and thiamine contents was observed during storage. Total available lysine contents decreased by 6.50% and 18.5% in wheat, 14.3% and 20.7% in maize and 23.7% and 34.2% in rice during six months of storage at 25 and 45 [degree sign]C, respectively. Six month's storage of rice, maize and wheat grains at 25 and 45 [degree sign]C resulted in reduction of thiamine contents by 16.7% and 29.2%, 17.2% and 24.1% and 21.4% and 29.5%, respectively. About 36.4-44.4% decrease in total soluble sugars at 45 [degree sign]C and 9.30-31.8% increase in total soluble sugars were observed at 10 and 25 [degree sign]C during six months storage of these cereal grains. Protein and starch digestibilities of cereal grains also deceased during six months of storage at 25 and 45 [degree sign]C. No significant change in nutritional quality was observed during storage of cereal grains at 10 [degree sign]C.
Keywords: Cereal grains; Nutritional quality; Storage effect

A. Lebiedzinska, P. Szefer, Vitamins B in grain and cereal-grain food, soy-products and seeds, Food Chemistry, Volume 95, Issue 1, March 2006, Pages 116-122, ISSN 0308-8146, DOI: 10.1016/j.foodchem.2004.12.024.
(http://www.sciencedirect.com/science/article/B6T6R-4FH4V4G-6/2/d373d60057ab6e8075c27770cbd64138)
Abstract:
The present study provides information about the concentrations of vitamins B (thiamine, riboflavin, pyridoxine and niacin) in cereal and soy-products, grain and seeds. The concentrations of vitamins were determined by microbiological analytical methods. The results demonstrated that there are great differences in vitamin B composition within varieties of the analysed products. Whole grain products and seeds, are better sources of the vitamin B group than technologically processed products, and therefore more nutritionally efficacious.
Keywords: Vitamins B (thiamine, riboflavin, pyridoxine and niacin); Grain; Cereal foods; Soy-products; Seeds

L. Olexova, L. Dovicovicova, M. Svec, P. Siekel, T. Kuchta, Detection of gluten-containing cereals in flours and 'gluten-free' bakery products by polymerase chain reaction, Food Control, Volume 17, Issue 3, March 2006, Pages 234-237, ISSN 0956-7135, DOI: 10.1016/j.foodcont.2004.10.009.
(http://www.sciencedirect.com/science/article/B6T6S-4F14YTN-3/2/af0cd702f47b3e14e9cc9f854f67b42f)
Abstract:
A polymerase chain reaction-based method for the detection of gluten-containing cereals in flours and 'gluten-free' bakery products was optimized and its intralaboratory validation was carried out. The optimized method involved DNA isolation by chaotropic solid-phase extraction and PCR with primers of Dahinden et al. [Dahinden I., von Buren M., Luthy J., 2001. A quantitative competitive PCR system to detect contamination of wheat, barley and rye in gluten-free food for coeliac patients. European Food Research and Technology 212, 228-233]. Using purified DNA, intrinsic detection limit of 42 +/- 12 pg was determined, which corresponds to 10[degree sign] genome copies. By the analysis of a panel of 26 European wheat cultivars and flours from six non-gluten-containing plants, which are commonly used for the production of gluten-free bakery products, inclusivity of 100% and exclusivity of 100% were determined. By the analysis of model samples of soya flour and cakes, detection limit of 0.1% (w/w) of fine wheat flour was determined, which is suitable for the analysis of 'gluten-free' food products, as it is approximately equivalent to the limit of 10 mg per 100 g for gluten stated by Codex Alimentarius. The method was successfully applied to four samples of flours and 13 brands of biscuits designated 'gluten-free', out of which two flours and one brand of biscuits were found positive for gluten-containing cereals. The method proved to

be suitable for routine use, it was relatively straightforward and could be completed in one working day.

W. Li, Q. Wang, S.W. Cui, X. Huang, Y. Kakuda, Elimination of aggregates of (1-->3) (1-->4)-[beta]-D-glucan in dilute solutions for light scattering and size exclusion chromatography study, Food Hydrocolloids, Volume 20, Issues 2-3, 7th International Hydrocolloids Conference, March-May 2006, Pages 361-368, ISSN 0268-005X, DOI: 10.1016/j.foodhyd.2005.03.018.
(http://www.sciencedirect.com/science/article/B6VP9-4GYH809-3/2/232411d8cef5ca20b7633ffbb44692f6)
Abstract:
Methods for eliminating aggregates of cereal (1-->3) (1-->4)-[beta]-D-glucan in dilute solutions were investigated using dynamic light scattering and size exclusion chromatography. Wheat [beta]-D-glucan samples were selected and dissolved in various solvents under different preparation conditions. The molecular size distribution was monitored by dynamic light scattering measurement. In most of the solutions, there were two well separated species of different average sizes. It appeared that the specie with smaller average size represented the un-aggregated molecules (unimers) and the specie with larger particle size corresponded to the aggregates. The results showed that heat treatment, filtration, ultrasonication, and the use of urea solution (up to 6 M) could not eliminate aggregates completely. However, the percentage of aggregates in aqueous NaOH solution decreased significantly with the increase of NaOH concentration. In 0.5 M NaOH solution, no aggregation was detectable by dynamic light scattering measurement. Both dynamic light scattering and HPSEC data showed that wheat [beta]-D-glucan was stable in 0.5 M NaOH solution without any noticeable degradation when stored at 25 [degree sign]C for 12 h. The results of present study suggested that 0.5 M NaOH solution is a suitable solvent for cereal [beta]-D-glucans. Using this solvent, the molecular characteristics of wheat [beta]-D-glucan was studied by both dynamic and static light scattering. The weight average molecular weight (Mw), radius of gyration (Rg), hydrodynamic radius (Rh), and the second virial coefficient (A2) were obtained with the values of 3.29x105 g/mol, 45.6 nm, 26.2 nm, and 1.04x10-3 cm3 mol/g2 respectively. This study also confirmed that wheat [beta]-glucan in solution exhibited a random coil conformation.
Keywords: [beta]-D-glucan; Conformation; Aggregates; Size distribution; Light scattering and solution properties

S. Cavret, S. Lecoeur, Fusariotoxin transfer in animal, Food and Chemical Toxicology, Volume 44, Issue 3, March 2006, Pages 444-453, ISSN 0278-6915, DOI: 10.1016/j.fct.2005.08.021.
(http://www.sciencedirect.com/science/article/B6T6P-4H8FR1W-2/2/13769c33ad563127be586070f937ca94)
Abstract:
Mycotoxin fusariotoxins, essentially represented by trichothecenes, zearalenone and fumonisins, are widely scattered in cereals and their products. Human and animals are particularly concerned by toxicity consecutive to oral chronic exposure. Human exposure can be direct via cereals or indirect via products of animals having eaten contaminated feed. As this alimentary risk is considered as a major problem in public health, it is thus of great importance to determine bioavailability, metabolic pathways and distribution of these mycotoxins in animal and human organism. Most studies indicate that fusariotoxins can be rapidly absorbed in the small intestine but the mechanisms involved remain unclear. Except NIV, fusariotoxins can be partly metabolised into more hydrophilic molecules in digestive tract or liver. Fumonisins present different behaviour as they seem very few and slowly absorbed and metabolised. The main part of absorbed fusariotoxins shows a rapid elimination within 24 h after ingestion, followed by a slower excretion of small amounts. However, traces of fusariotoxins or their derivates can be found in animal products. This manuscript, reviewing literature published on fusariotoxin transfer, highlights that too little data are available to correctly appreciate fusariotoxin transfer in organism. Further studies

focusing on mechanisms involved in the transfer are needed before clarifying risk assessment for human health.
Keywords: Mycotoxins; Trichothecenes; Absorption; Metabolism; Transfer

Nicoline Vermeulen, Jan Kretzer, Hetty Machalitza, Rudi F. Vogel, Michael G. Ganzle, Influence of redox-reactions catalysed by homo- and hetero-fermentative lactobacilli on gluten in wheat sourdoughs, Journal of Cereal Science, Volume 43, Issue 2, March 2006, Pages 137-143, ISSN 0733-5210, DOI: 10.1016/j.jcs.2005.08.006.
(http://www.sciencedirect.com/science/article/B6WHK-4HYD9KN-2/2/5455b83e36669de289d035cf48e20cb2)
Abstract:
The effect of redox reactions catalysed by lactobacilli on properties of wheat gluten was followed during sourdough fermentations. Thiol levels in doughs remained high in doughs fermented with Lactobacillus sanfranciscensis or in chemically acidified doughs to which 10 [mu]mol g-1 glutathione were added. In chemically acidified doughs or sourdoughs fermented with L. sakei or L. perolens, the thiol levels decreased during fermentation. Thiol-groups in gluten proteins were estimated by RP-HPLC separation of DAC-maleimide-labeled, propanol-soluble proteins extracted from wheat doughs. An increase of the SH groups in gluten proteins was observed in protein fractions from sourdoughs fermented with L. sanfranciscensis but not from chemically acidified doughs. A glutathione-reductase was expressed in L. sanfranciscensis and during its growth in sourdough resulted in the reduction of extracellular GSSG to GSH. It was concluded that in addition to the pH-dependent activity of cereal proteases, redox reactions catalysed by lactobacilli determine gluten quality during sourdough fermentations. The formation of thiols by L. sanfranciscensis interferes with gluten polymerisation. Due to differences in their central carbon metabolism, homo- or facultative hetero-fermentative lactobacilli have opposite effects on redox-reactions in wheat doughs.
Keywords: Wheat sourdough; Lactobacillus sanfranciscensis; Glutathione-dehydrogenase; Gluten

Elisabeth Roca, Valerie Guillard, Stephane Guilbert, Nathalie Gontard, Moisture migration in a cereal composite food at high water activity: Effects of initial porosity and fat content, Journal of Cereal Science, Volume 43, Issue 2, March 2006, Pages 144-151, ISSN 0733-5210, DOI: 10.1016/j.jcs.2005.08.008.
(http://www.sciencedirect.com/science/article/B6WHK-4HYD9KN-3/2/3508b7e8437159803532386c65dee89b)
Abstract:
Water sorption isotherms and effective moisture diffusivities were determined at 20 [degree sign]C for sponge cakes at high water activity as a function of their initial porosity, in the range 86 and 52% (0 g/g dry basis fat content), and of their fat content, ranging between 0 and 0.30 g/g dry basis (67% initial porosity). The equilibrium moisture values were not affected by food structure and decreased with increasing fat content. The effective moisture diffusivity decreased from 7.5 to 0.3x10-10 m2/s with increasing moisture content from 0.30 to 2.20 g/g dry basis. Decreasing initial porosity from 86 to 52% decreased effective moisture diffusivity by more than four orders of magnitude. This behaviour was related to differences of water transfer mechanisms, with the contribution from liquid water diffusion in the solid matrix and from vapour water diffusion in pores. Increasing fat content of 0.30 g/g dry basis in sponge cake, independently of porosity, decreased effective moisture diffusivity by more than five orders of magnitude. A predictive mathematical model was used to simulate moisture intake in two-composite food systems: sponge cakes with varying initial porosities and fat contents and an agar gel as a model of a non-rate limiting water source. Increasing the density of the structure or addition of fat in the cereal-based phase could increase shelf life of composite foods.
Keywords: Moisture migration; Sorption isotherm; Moisture diffusivity; Composite food

Jiyeon Chun, James A. Martin, Liwen Chen, Junsoo Lee, Lin Ye, Ronald R. Eitenmiller, A differential assay of folic acid and total folate in foods containing enriched cereal-grain products to calculate [mu]g dietary folate equivalents ([mu]g DFE), Journal of Food Composition and Analysis, Volume 19, Issues 2-3, March-May 2006, Pages 182-187, ISSN 0889-1575, DOI: 10.1016/j.jfca.2005.07.001.
(http://www.sciencedirect.com/science/article/B6WJH-4HCDJPP-4/2/452198d4c6e801329cebbb1f3e4a87c6)
Abstract:
A method was developed to differentiate folic acid from total folate in enriched cereal products. By elimination of the protease and conjugase digestion steps from the trienzyme digestion used to measure total folate, folic acid can be directly quantified by the microbiological assay using Lactobacillus casei (ssp. rhamnosus) ATCC 7469. Determination of total folate by the trienzyme digestion together with assay of folic acid by the procedure reported here allows calculation of food folate and [mu]g dietary folate equivalents ([mu]g DFE). Recovery studies conducted at five concentration levels in a non-fortified wheat flour gave a mean recovery of 95.5 (RSD% 9.7) for folic acid and 98.5 (RSD% 5.0) for total folate. Recoveries from a variety of enriched cereal foods ranged from 88% to 99% for the folic acid extraction and 90% to 96% for the trienzyme digestion. Analysis of SRM 1846 Infant Formula (n=11) gave means+/-s.d. of 123.5+/-6.9 [mu]g/100 g of folic acid and 136.6+/-6.7 [mu]g/100 g of total folate (reference concentration value=129+/-28 [mu]g/100 g). Intermediate precision determined as intra-laboratory reproducibility(r) gave RSDr % values of 4.32 for the folic acid assay and 3.15 for the total folate assay. Microgram DFE values were determined for several enriched cereals by calculating food folate as the difference between total folate and folic acid and the formula [mu]g DFE=[mu]g food folate+(1.7x[mu]g folic acid). The differential assay of folic acid and total folate is a simple and accurate procedure to determine [mu]g DFE in enriched cereal-grains or foods containing enriched flour.
Keywords: Analysis; Folic acid; Total folate; [mu]g DFE; Food folate

Minna Simila, Marja-Leena Ovaskainen, Mikko J. Virtanen, Liisa M. Valsta, Nutrient content patterns of Finnish foods in a food composition database, Journal of Food Composition and Analysis, Volume 19, Issues 2-3, March-May 2006, Pages 217-224, ISSN 0889-1575, DOI: 10.1016/j.jfca.2005.08.002.
(http://www.sciencedirect.com/science/article/B6WJH-4HS1D2C-C/2/c4224c9a76d50181844a9fac5b19a7b0)
Abstract:
Dietary pattern analysis has recently been used in nutritional epidemiology. However, there has been little research on nutrient co-occurrence patterns in foods although they are useful for understanding associations of nutrients in foods. In this study, nutrient content data of Finnish foods were submitted to factor analysis. From the food composition database Fineli(R), 530 basic food items and 106 common nutrients were selected. Nutrient patterns were analysed in two data sets, nutrient values (/100 g) and nutrient densities (/1 MJ), with principal component solutions of factor analysis. Four patterns, explaining 36-39% of total variance in nutrient content, were identified for both solutions. The patterns in the nutrient value solution were characterised by: (1) fish, meat, dairy products, legumes, seeds, nuts; (2) vegetable fats; (3) staple foods; and (4) offal foods (liver, kidney). In the nutrient density solution, the patterns were characterised by: (1) vegetables and berries; (2) low fat fish, meat and dairy products; (3) mushrooms and offal foods (liver, kidney); and (4) vegetable fats. These patterns were consistent with prior knowledge of nutrient composition. The basic structures of nutrient content among foods seem to have held constant over recent decades. The study also attests to the benefit of increased consumption of vegetables, fruit and cereals.

Keywords: Pattern; Factor analysis; Food-based dietary guidelines; FBDG; Food composition database; FCDB

Agata Marzec, Piotr P. Lewicki, Antiplasticization of cereal-based products by water. Part I. Extruded flat bread, Journal of Food Engineering, Volume 73, Issue 1, March 2006, Pages 1-8, ISSN 0260-8774, DOI: 10.1016/j.jfoodeng.2004.12.002.
(http://www.sciencedirect.com/science/article/B6T8J-4H3JJ3J-1/2/6da7c3398f8e21225ea1aaa5d4ee12cd)
Abstract:
Flat extruded wheat and rye bread was equilibrated to variable water activities using saturated salt solutions. At those water activities the bread was subjected to compression and three-point breaking tests. Compression test showed that water antiplasticizes both investigated breads. In the range of water activities from 0 to 0.53 for wheat bread, and from 0 to 0.59 for rye bread, the compression force reached 600 N at true strain 0.8. Compression proceeded in two steps; hence the mechanical resistance of the surface layers is larger than that of the center of the slice. Above the critical water activities water plasticizes the breads, and decrease of compression force with increasing water activity is recorded.
Three-point breaking test shows that water affects mechanical properties of extruded breads in a complicated fashion. At water activities lower than 0.15, water plasticizes the material. At higher water activities antiplasticizing effect of water is evident. The critical water activities at which the plasticizing effect of water is evident are lower than those in compression test. The respective values are 0.49 and 0.44 for wheat and rye bread, respectively. Three-point breaking test is more sensitive to the kind of investigated material and shows larger differences between wheat and rye bread than the compression test.
Critical water activities correspond to hydration levels at which internal dynamics of macromolecules begins. Hence, it is suggested that rotational and translational movements of macromolecules caused by adsorption of water are pronounced by the plastic deformation of the material.
Keywords: Compression force; Breaking force; Compression work; Breaking work; Plastic flow; Sorption isotherms; Critical water activity

Antonio Ficarella, Marco Milanese, Domenico Laforgia, Numerical study of the extrusion process in cereals production: Part I. Fluid-dynamic analysis of the extrusion system, Journal of Food Engineering, Volume 73, Issue 2, March 2006, Pages 103-111, ISSN 0260-8774, DOI: 10.1016/j.jfoodeng.2004.11.034.
(http://www.sciencedirect.com/science/article/B6T8J-4H9YBX5-1/2/e27bb42f397933c0b2450abf28f8deed)
Abstract:
A numerical investigation on the extrusion cooking process for cereals in a co-rotating twin-screw extruder was carried out, using a fluid-dynamic, numerical simulation model. Simulation tests were carried out, varying temperature, screw rotation velocity, mass flow rate and extruder geometry. Fluid-dynamic parameters inside the extruder, as shear rate, residence time and mixing index were evaluated.
Extruder geometry is an important parameter in the extrusion process, since it affects the values of shear rate and residence time and consequently the quality of the final product. Screw with regular geometry shows a more regular profile of the mean shear rate along the extruder, but characterized by lower values of this parameter, determining a reduced gelatinization of the compound. Instead, extruders characterized by a more complex geometry allow to obtain higher values of shear rate, but with some difficulties in the control of the final quality of the products due to a more complex behavior of the shear rate profile along the screw axis.
Keywords: Extrusion; Cereals; Simulation; Fluid-dynamic analysis

L. Bailoni, R. Mantovani, G. Pagnin, S. Schiavon, Effects of physical treatments on the resistant starch content and in vitro organic matter digestibility of different cereals in horses, Livestock Science, Volume 100, Issue 1, Nutritive Value of Concentrates in Horses, March 2006, Pages 14-17, ISSN 1871-1413, DOI: 10.1016/j.livprodsci.2005.11.004.
(http://www.sciencedirect.com/science/article/B7XNX-4JGXNYB-6/2/ba62656c1caa6233273028fc6c555c3a)
Abstract:
Samples of some cereals (corn, barley, and oats), whole (W) or subjected to flaking (F), rolling (R) and extrusion (E) were collected from different horses feed industries. Feed samples were analyzed for their proximate composition and fibrous fractions by Van Soest procedure. The total starch content (TS) was determined directly by liquid chromatography (TS1) and as sum of resistant and non-resistant starch using a specific enzymatic kit before the spectrophotometric reading (TS2). In vitro organic matter digestibility (OMD) by pepsin-cellulase technique was also estimated. The content of resistant starch was low in the cereals (on average 2.0% of the total starch), except for the whole corn samples. TS1 values were lower than TS2, particularly at lower starch levels. The in vitro OMD values ranged from 66.8% (whole white oats) to 95.7% (flaked corn). The effects of the physical treatments on the in vitro OMD were variable among cereals. The in vitro OMD of flaked white oats was lower with respect to whole and rolled grain. In corn and barley samples the physical treatments did not change the in vitro OMD values. Using the step-wise multiple regression method for all the chemical parameters, in vitro OMD of the cereals could be predicted by ADF content (R2 = 0.986; RSD = +/- 1.2%). Other parameters (CP, lipids, lignin and total starch) gave little improvement in predicting in vitro OMD when included in the model.
Keywords: Cereals; Physical treatments; In vitro organic matter digestibility; Resistant starch

V. Julliand, A. De Fombelle, M. Varloud, Starch digestion in horses: The impact of feed processing, Livestock Science, Volume 100, Issue 1, Nutritive Value of Concentrates in Horses, March 2006, Pages 44-52, ISSN 1871-1413, DOI: 10.1016/j.livprodsci.2005.11.001.
(http://www.sciencedirect.com/science/article/B7XNX-4JGXNYB-9/2/4b184ecfae842f18a588ff6350062bf3)
Abstract:
Neither the partition of digestion between the foregut and the hindgut nor the factors of variation for diverse starches in feeds or rations is well documented in spite of their importance in respect of nutrition and health of the athletic horse. At similar intakes, feed processing and the botanical origin of the starch are two major factors that control the extent of prececal starch digestion. Physical and biochemical changes occurring during the process influence both the mean retention time of the feeds and the enzymatic activity in the foregut. Apparent digestibility of cereal starch varies from 20% to 90% in the foregut depending on the process used. Physical processes have a lesser effect than thermal and hydrothermal ones. Physical processes increase significantly the prececal digestibility of cornstarch but have a moderate impact on other cereals. Starch digestibility is increased by thermal and hydrothermal processes whatever the botanical origin. Feed processing was shown to affect the fermentability of starch in ruminants. In horses, a similar impact is expected not only in the hindgut but also in the stomach where numerous starch-utilizing bacteria have been observed. Further investigations are needed to identify the process which allows the highest prececal digestibility and decreases the hindgut fermentability of starch.
Keywords: Starch digestion; Horses; Food processing

P.C.H. Morel, T.S. Lee, P.J. Moughan, Effect of feeding level, live weight and genotype on the apparent faecal digestibility of energy and organic matter in the growing pig, Animal Feed Science and Technology, Volume 126, Issues 1-2, 28 February 2006, Pages 63-74, ISSN 0377-8401, DOI: 10.1016/j.anifeedsci.2005.06.006.

(http://www.sciencedirect.com/science/article/B6T42-4GMJ941-1/2/bc0b468c5ec84b9965ec5578c30e90d1)
Abstract:
The effects of live weight and feeding level on apparent digestible energy (ADE) and apparent digestible organic matter (ADOM) in two cereal based diets, differing in their fibre content (wheat and wheat by-products) were studied using 48 Large White x Landrace entire male pigs. Pigs fed the low fibre diet (wheat) had higher ADOM and ADE ($P<0.001$) than those fed the high fibre diet (wheat by-product). The effect of ingesting the diets at 6 or 11% of metabolic live weight (W0.75) had no effect on ADOM and ADE. Heavier pigs (90 kg live weight) achieved slightly improved ADOM and ADE ($P<0.05$) relative to lighter pigs (25 kg live weight). No interactions between diet type, live weight and feeding level were observed.
In a second experiment, the effect of genotype was studied using six 4-month-old Large White x Landrace entire male pigs (54 kg live weight) and six 3-month-old Kune-Kune entire male pigs (19 kg live weight). The ADE and ADOM were significantly higher ($P<0.001$) for the Kune-Kune pigs than for the Large White x Landrace with the high fibre diet (wheat by-product). However, no differences ($P>0.05$) in ADE and ADOM were observed between genotype for the low fibre diet (wheat).
Keywords: Live weight; Energy digestibility; Feed intake; Fibre; Pig; Genotype; Kune-Kune

John Passioura, Increasing crop productivity when water is scarce--from breeding to field management, Agricultural Water Management, Volume 80, Issues 1-3, Special Issue on Water Scarcity: Challenges and Opportunities for Crop Science, 24 February 2006, Pages 176-196, ISSN 0378-3774, DOI: 10.1016/j.agwat.2005.07.012.
(http://www.sciencedirect.com/science/article/B6T3X-4GV8T86-1/2/d1821aff0e8bc5bee4dbcd754b1ad4d1)
Abstract:
To increase crop yield per unit of scarce water requires both better cultivars and better agronomy. The challenge is to manage the crop or improve its genetic makeup to: capture more of the water supply for use in transpiration; exchange transpired water for CO2 more effectively in producing biomass; and convert more of the biomass into grain or other harvestable product. In the field, the upper limit of water productivity of well-managed disease-free water-limited cereal crops is typically 20 kg ha-1 mm-1 (grain yield per water used). If the productivity is markedly less than this, it is likely that major stresses other than water are at work, such as weeds, diseases, poor nutrition, or inhospitable soil. If so, the greatest advances will come from dealing with these first. When water is the predominant limitation, there is scope for improving overall water productivity by better matching the development of the crop to the pattern of water supply, thereby reducing evaporative and other losses and fostering a good balance of water-use before and after flowering, which is needed to give a large harvest index. There is also scope for developing genotypes that are able to maintain adequate floret fertility despite any transient severe water deficits during floral development. Marker-assisted selection has helped in controlling some root diseases that limit water uptake, and in maintaining fertility in water-stressed maize. Apart from herbicide-resistance in crops, which helps reduce competition for water by weeds, there are no genetic transformations in the immediate offing that are likely to improve water productivity greatly.
Keywords: Water balance; Harvest index; Floret fertility; Water-use efficiency; Water deficits

M.D. Thorsted, J.E. Olesen, J. Weiner, Width of clover strips and wheat rows influence grain yield in winter wheat/white clover intercropping, Field Crops Research, Volume 95, Issues 2-3, 15 February 2006, Pages 280-290, ISSN 0378-4290, DOI: 10.1016/j.fcr.2005.04.001.
(http://www.sciencedirect.com/science/article/B6T6M-4G24XFB-1/2/88d5357e672bd03484b51dbbb31061e5)
Abstract:

Cereal-legume intercropping offers potential benefits in low-input cropping systems, where nutrient inputs, in particular nitrogen (N), are limited. In the present study, winter wheat (Triticum aestivum L.) and white clover (Trifolium repens L.) were intercropped by sowing the wheat into rototilled strips in an established stand of white clover.
A field experiment was performed in two fields starting in two different years to explore the effects of width of the wheat rows and clover strips on the competition between the species and on wheat yields. The factors were intercropping (clover sole crop, wheat sole crop and wheat/clover intercropping), rototilled band width, sowing width and wheat density in a factorial experimental design that enabled some of the interactions between the factors to be estimated. The measurements included grain yield, ear density, grain weight, grain N concentration, dry matter and N in above-ground biomass of wheat, clover and weeds and profiles of photosynthetic active radiation (PAR) within the crop canopy.
Intercropping of winter wheat and clover resulted in wheat grain yield decreases of 10-25% compared with a wheat sole crop. The yield reductions were likely caused by interspecific competition for light and N during vegetative growth, and for soil water during grain filling. N uptake in the wheat intercrop increased during late season growth, resulting in only small differences in total N uptake between wheat intercrops and sole crops, but increased grain N concentrations in the intercrop. Interspecific competition during vegetative wheat growth was reduced by increasing width of the rototilled strips from 7 to 14 cm, resulting in higher grain yields and increased grain N uptake. Increasing the sowing width of the wheat crop from 3 to 6 cm increased interspecific interactions and reduced wheat intraspecific competition during the entire growing season, leading to improved grain yields and higher grain N uptake.
Keywords: Intercropping; Winter wheat; White clover; Competition; Crop management; Yield components; Nitrogen uptake

Sakiko Takahashi, Yuki Ogiyama, Hiroaki Kusano, Hiroaki Shimada, Makoto Kawamukai, Koh-ichi Kadowaki, Metabolic engineering of coenzyme Q by modification of isoprenoid side chain in plant, FEBS Letters, Volume 580, Issue 3, 6 February 2006, Pages 955-959, ISSN 0014-5793, DOI: 10.1016/j.febslet.2006.01.023.
(http://www.sciencedirect.com/science/article/B6T36-4J2TRT4-3/2/9a14be9015fdf5e1850d553d6dbd6010)
Abstract:
Coenzyme Q (CoQ), an electron transfer molecule in the respiratory chain and a lipid-soluble antioxidant, is present in almost all organisms. Most cereal crops produce CoQ9, which has nine isoprene units. CoQ10, with 10 isoprene units, is a very popular food supplement. Here, we report the genetic engineering of rice to produce CoQ10 using the gene for decaprenyl diphosphate synthase (DdsA). The production of CoQ9 was almost completely replaced with that of CoQ10, despite the presence of endogenous CoQ9 synthesis. DdsA designed to express at the mitochondria increased accumulation of total CoQ amount in seeds.
Keywords: Metabolic engineering; CoQ10, ubiquinone; Subcellular localization; Decaprenyl diphosphate synthase; Rice

Yuri B. Kirsta, System-analytical modelling--Part II: Wheat biotime run and yield formation. Agroclimatic potential, the Le Chatelier principle, and changes in agroclimatic potential and climate in Russia and the U.S., Ecological Modelling, Volume 191, Issues 3-4, 5 February 2006, Pages 331-345, ISSN 0304-3800, DOI: 10.1016/j.ecolmodel.2005.05.027.
(http://www.sciencedirect.com/science/article/B6VBS-4GR8N96-2/2/58136aeb131d28c2b0d3cd33c1e3890d)
Abstract:
System-analytical modelling (SAM) shows that plants possess two types of biological time that alternate during the annual cycle of plant development. The alternation of these biotimes and the

process of yield formation are described by the previously derived information principle. The elaborated model of the agroecosystems of wheat is characterized by theoretically best accuracy. The model serves as a basis for the universal model of land agroclimatic potential (AP). This study simultaneously estimated the vegetation biotime run and phenological development, 12-month dynamics of soil humidity, yield formation and its bulk, multiple year trends of mean monthly air temperature, monthly precipitation, and agricultural technologies efficiency dependent on soil fertility as well as AP dynamics. The calculations were made through the mathematical solutions of inverse problems, with the help of the model. Only the long-term series of actual wheat/cereal yields, along with the long-term average monthly values of air temperature and precipitation, were used as input data. With SAM and the grain-producing area of Siberia as a case study, the information basis for the well-known Le Chatelier principle characterizing self-stabilization of ecosystems and agroecosystems has been revealed. Self-stabilization provides the restriction on random variations of their specific basic processes (informational regulated biomass formation) up to 24%. Under such a restriction, the transfer of stochastic information that destroys the system information stability does not exist. SAM of current changes in both AP and climate in grain-producing areas of Russia, as well as in the U.S., has shown that the AP of the U.S. is twice as much as the Russian one. The manifestation of global warming in the U.S. is more significant than in Russia, and a decrease in precipitation in the U.S. and an increase in precipitation in Russia were found.
Keywords: System-analytical modelling; Wheat; Biological time; Le Chatelier principle; Agroclimatic potential; Climate

S. Fountas, D. Wulfsohn, B.S. Blackmore, H.L. Jacobsen, S.M. Pedersen, A model of decision-making and information flows for information-intensive agriculture, Agricultural Systems, Volume 87, Issue 2, February 2006, Pages 192-210, ISSN 0308-521X, DOI: 10.1016/j.agsy.2004.12.003.
(http://www.sciencedirect.com/science/article/B6T3W-4FSK7P0-1/2/7a96c7a265c6881616f8a6ed1513da53)
Abstract:
This paper describes the development of a systems based model to characterise farmers' decision-making process in information-intensive practices, and its evaluation in the context of Precision Agriculture (PA). A participative methodology was developed in which farm managers decomposed their process of decision-making into brief decision statements along with associated information requirements. The methodology was first developed on a university research farm in Denmark and further revised during testing on a number of research and commercial farms in Indiana, USA. Twenty-one decision-analysis factors were identified to characterise a farm manager's decision-making process. Then, a general data flow diagram (DFD) was constructed that describes the information flows 'from data to decision'. Illustrative examples of the model in the form of DFDs are presented for a strategic, a tactical and an operational decision. The model was validated for a range of decisions related to operations by three university farm managers and by five commercial farmers practicing PA for cereal, corn and soybean production in Denmark and in Indiana, USA.
Keywords: Data flow diagram; Decision-making process; Management Information Systems; Management strategy; Precision Agriculture; Systems analysis

Elifatio Towo, Erika Matuschek, Ulf Svanberg, Fermentation and enzyme treatment of tannin sorghum gruels: effects on phenolic compounds, phytate and in vitro accessible iron, Food Chemistry, Volume 94, Issue 3, February 2006, Pages 369-376, ISSN 0308-8146, DOI: 10.1016/j.foodchem.2004.11.027.
(http://www.sciencedirect.com/science/article/B6T6R-4GKWJ7B-1/2/bafd4b4dd522164e6fbfda0b32a50529)
Abstract:

The presence of polyphenols and phytate in cereal products has been shown to interfere with the bioavailability of minerals such as iron. In the present study, we added enzymes (wheat phytase and mushroom polyphenol oxidase) during fermentation of tannin sorghum gruels prepared from flour with or without addition of 5% flour of germinated tannin-free sorghum grains (power flour), and investigated the effects on phenolic compounds, phytate and in vitro accessible iron. Assayable phenolic compounds were significantly reduced by fermentation, with high reductions observed in gruels with added enzymes. Fermentation of the gruels with addition of enzymes reduced (on average) total phenols by 57%, catechols by 59%, galloyls by 70% and resorcinols by 73%. The phytate content was significantly reduced by fermentation (39%), with an even greater effect after addition of power flour (72%). The largest reduction of phytate (88%) was, however, obtained after addition of phytase. The in vitro accessible iron was 1.0% in the sorghum flour and it increased after fermentation with power flour and/or with enzymes. The highest in vitro accessibility of iron (3.1%) was obtained when sorghum was fermented with addition of power flour and incubated with phytase and polyphenol oxidase after the fermentation process.
Keywords: Fermentation; Sorghum; Polyphenols; Condensed tannins; Phytate; In vitro iron accessibility; Polyphenol oxidase; Phytase

Fulgencio Saura-Calixto, Isabel Goni, Antioxidant capacity of the Spanish Mediterranean diet, Food Chemistry, Volume 94, Issue 3, February 2006, Pages 442-447, ISSN 0308-8146, DOI: 10.1016/j.foodchem.2004.11.033.
(http://www.sciencedirect.com/science/article/B6T6R-4FFGJGM-5/2/b7ba55c4965a01988c37b4cdf5bf8a0b)
Abstract:
The objective of this work was to determine the total dietary antioxidant capacity (TDAC) of the Spanish Mediterranean diet. The antioxidant capacity of plant foods and beverages included in National food consumption data was determined. TDAC of the Spanish diet was estimated at 6014 and 3549 [mu]mol trolox equivalents by FRAP (ferric reducing antioxidant power) and ABTS (free radical-scavenging capacity) procedures, respectively. About 68% of TDAC came from beverages and 20% from fruits and vegetables, with a very low contribution from cereals. The capacity to inhibit in vitro LDL oxidation of plant foods and beverages was consistent with their antioxidant capacity. The recommended daily intakes of antioxidant vitamins, C and E, represent about 10% of TDAC. Total phenolics intake was estimated as 1171 mg gallic acid/person/day by the Folin-Ciocalteau method. TDAC may be a parameter to be considered in nutritional and epidemiological studies.
Keywords: Food antioxidant capacity; Total dietary antioxidant capacity; Total phenolics intake; Dietary antioxidants; Spanish Mediterranean diet

C.S. Srinivasan, Xavier Irz, Bhavani Shankar, An assessment of the potential consumption impacts of WHO dietary norms in OECD countries, Food Policy, Volume 31, Issue 1, February 2006, Pages 53-77, ISSN 0306-9192, DOI: 10.1016/j.foodpol.2005.08.002.
(http://www.sciencedirect.com/science/article/B6VCB-4H4T138-1/2/630f83d954d42d8013b487f8b0ee4991)
Abstract:
The member countries of the World Health Organization (WHO) have recently endorsed its global strategy on diet, physical activity and health. The strategy emphasises the need to limit the consumption of saturated fats and trans-fatty acids, salt and sugars, and to increase consumption of fruits and vegetables in order to combat the growing burden of non-communicable diseases. This paper attempts a broad quantitative assessment of the consumption impacts of these norms in OECD countries using a mathematical programming approach. We find that adherence to the WHO norms would involve a significant decrease in the consumption of vegetable oils (30%), dairy products (28%), sugar (24%), animal fats (30%) and meat (pig meat, 13.5%, mutton and goat

14.5%) and a significant increase in the human consumption of cereals (31%), fruits (25%) and vegetables (21%).
Keywords: Diet and nutrition; WHO global strategy; Diet optimisation; Consumption impacts

Stephen P.J. Brooks, Roger Mongeau, Josephine R. Deeks, Brian J. Lampi, Rene Brassard, Dietary fibre in baby foods of major brands sold in Canada, Journal of Food Composition and Analysis, Volume 19, Issue 1, February 2006, Pages 59-66, ISSN 0889-1575, DOI: 10.1016/j.jfca.2005.02.002.
(http://www.sciencedirect.com/science/article/B6WJH-4HC0VTH-5/2/0d7fe4554b1c6aa5826dd0e06462f94a)
Abstract:
Total dietary fibre (TDF) was measured using the rapid gravimetric method (AOAC 992.16) in 88 infant foods available in the Canadian marketplace. The sampling included 1-8 different lots (depending on availability) and indicated approximately equal TDF values in vegetable products (1.48+/-0.78 g/100 g, n=13), fruit products (1.23+/-0.83 g/100 g, n=26) and cereal products (0.78+/-0.35 g/100 g, n=39) when compared on a 'ready-to-eat' basis. Ready-to-eat dinners and meat products had significantly lower TDF content (0.41+/-0.17 g/100 g, n=13). Individual TDF values ranged from 3 g/100 g 'as is' (junior peas) and 2.9 g/100 g as is (toddler Bartlett pears) to 0.16 g/100 g as is (custard plain w/arrowroot, banana and butterscotch) and 0.15 g/100 g as is (toddler chicken with rice). In some cases, infant foods had higher soluble dietary fibre/insoluble dietary fibre ratios than the published values for similar adult foods suggesting that processing of infant foods has occurred. Calculations using the TDF content of these foods revealed that they may be adequate in preparing infants for dietary patterns that approach recent Institute of Medicine recommendations of 19 g/d for infants between 1 and 3 years of age.
Keywords: Infant foods; Total dietary fibre; Soluble dietary fibre; Insoluble dietary fibre; Nutrition; Recommendations

Adriana Laca, Zoe Mousia, Mario Di'az, Colin Webb, Severino S. Pandiella, Distribution of microbial contamination within cereal grains, Journal of Food Engineering, Volume 72, Issue 4, February 2006, Pages 332-338, ISSN 0260-8774, DOI: 10.1016/j.jfoodeng.2004.12.012.
(http://www.sciencedirect.com/science/article/B6T8J-4FNP2BP-1/2/c6640fada7407dd8d195c536df26138a)
Abstract:
Some of the microorganisms present in cereals constitute a potential problem since their development may alter the properties of the grains, and the mycotoxins produced by some moulds could potentially pose a health risk. It has been reported that these microorganisms are located close to the surface of the grain, but the real thickness affected by microbial contamination has not been determined. In this paper, the distribution of microorganisms present in wheat has been studied by controlled debranning. An abrasive mill has been used to remove the outer layers of the wheat kernels and the process has been monitored by scanning electronic microscopy. The total mesophilic microorganisms and moulds contained in the pearlings have been measured. The contamination profiles obtained showed that in fact most of contamination was located close to the surface of the grain and the thickness affected has been estimated. Results show that by removing only some of the outer layers of the grains (pericarp) it is possible to substantially reduce the microbial contamination.
Keywords: Microbial contamination; Debranning; Wheat

S. Banon, R. Vila, A. Price, E. Ferrandini, M.D. Garrido, Effects of goat milk or milk replacer diet on meat quality and fat composition of suckling goat kids, Meat Science, Volume 72, Issue 2, February 2006, Pages 216-221, ISSN 0309-1740, DOI: 10.1016/j.meatsci.2005.07.004.

(http://www.sciencedirect.com/science/article/B6T9G-4H4V75D-2/2/be5f17a452193fe86fbb0c799bb5faa7)
Abstract:
The effects of a diet with goat milk 'GM' or milk replacer 'MR' on the meat quality and fat composition of suckling Murciano-Granadina kids were studied. MR consisted of powdered skimmed milk, coconut oil and fat, and cereal products and by-products. Raw meat quality (moisture, protein, lipids, ash, collagen, cholesterol, haem pigments, CIELab colour, pH and water retention capacity), fatty acid 'FA' composition and eating quality of cooked meat (odour, flavour and texture) were determined. Diet had only a slight effect on raw meat quality but had a pronounced effect on fatty acid composition and eating quality of cooked meat. MR diet increased the water/protein proportion in the muscle. The saturated/unsaturated FA ratio in GM and MR fat was 0.94 and 2.27, respectively. The major FA in GM and MR fat were C16:0 and C18:1, respectively. Short-chain C4-C12 hardly accumulated in the adipose tissue of suckling kid, increasing the relative percentages of C14-C20. This effect was more pronounced in MR fat, due to the fact that MR contained more short-chain fatty acids than GM. MR diet gave cooked meat a more intense characteristic goat meat odour and flavour, more tenderness and more juiciness than the natural suckling diet. This fact could be related to differences in meat and fat composition.

M.M. Campo, G.R. Nute, S.I. Hughes, M. Enser, J.D. Wood, R.I. Richardson, Flavour perception of oxidation in beef, Meat Science, Volume 72, Issue 2, February 2006, Pages 303-311, ISSN 0309-1740, DOI: 10.1016/j.meatsci.2005.07.015.
(http://www.sciencedirect.com/science/article/B6T9G-4H8MP65-1/2/cec56528c4290cf9e5b07661d335abad)
Abstract:
Lipid oxidation is a major factor in meat quality. In order to relate human perceptions of lipid oxidation, as determined by a trained taste panel, to a chemical measurement of oxidation, we studied meat from animals with a wide range of potential oxidation through differences in their PUFA composition and by displaying the meat in high oxygen modified atmosphere packs for varying lengths of time. Meat was obtained from 73 Angus- and Charolais-cross steers from different trials that had been raised on 10 different diets: grass silage (high in C18:3, n-3), cereal concentrate (high in C18:2, n-6), three diets with 3% added fat consisting of three levels of protected lipid supplement (high in C18:2, n-6 and C18:3, n-3, ratio 1:1), a control with Megalac(R) (relatively saturated), three diets with three levels of inclusion of protected fish oil (high in C20:5 n-3 and C22:6 n-3) plus a constant amount of unprotected fish oil and a final diet with an unprotected fish oil control. The longissimus dorsi muscle was excised from the left carcass side, aged vacuum packaged for 10-13 days depending on the projects and frozen for less than eight months. TBARS and sensory analyses were performed on steaks displayed for 0, 4 or 9 days under simulated retail conditions, exposed to light in modified atmosphere packaging (CO2:O2; 25:75). Meat oxidation increased throughout display for each of the diets, as shown by a rise in TBARS values. This increase was not linear, differences between 0 and 4 days of display were smaller than between 4 and 9 days of display. The lowest TBARS and lowest increment occurred in the two control diets and the grass-fed animals, probably due to the more saturated fat of meat from animals fed the control diets and the higher content of vitamin E. Sensory attributes were also influenced by time of display. Positive attributes, such as beef flavour or overall liking, decreased throughout display, whereas negative attributes, such as abnormal and rancid flavours, increased.
The correlations between sensory and analytical attributes were high. TBARS were a good predictor of the perception of rancidity (Spearman's rho = 0.84). Panellist preferences were related to the presence of beef flavour (rho = 0.93) and to the absence of abnormal (rho = -0.88) and rancid flavours (rho = -0.83). Under the experimental conditions used, a TBARS value of around 2 could be considered the limiting threshold for the acceptability of oxidised beef.
Keywords: Beef; Oxidation; Flavour; MAP

Kaoru Kohyama, Tomoko Sasaki, Differential scanning calorimetry and a model calculation of starches annealed at 20 and 50 [degree sign]C, Carbohydrate Polymers, Volume 63, Issue 1, 18 January 2006, Pages 82-88, ISSN 0144-8617, DOI: 10.1016/j.carbpol.2005.08.004.
(http://www.sciencedirect.com/science/article/B6TFD-4HR76K7-2/2/6afba3623f18f482312601c7fdad2676)
Abstract:
Corn, wheat, and potato starches were annealed at 20 and 50 [degree sign]C, and the gelatinization phenomena were observed with differential scanning calorimetry (DSC). Amylose content and amylopectin chain length distribution were not changed by the annealing treatment. The DSC endotherm associated with gelatinization of amylopectin shifted to a higher temperature, and became narrower and deeper after annealing at 50 [degree sign]C; however the conclusion temperature and enthalpy of gelatinization were similar. The ordered structures of amylopectin, formed by a varying number of links by hydrogen bonds, were cleft at the gelatinization temperature. Model calculation suggested that more links (N) would be generated in each ordered amylopectin region, and the number of ordered regions (M) would be reduced by annealing at a higher temperature. However, the total number of links in amylopectin, represented by the product (NxM), was similar for cereal starches and only slightly increased for potato starch.
Keywords: Starch; Annealing; Amylopectin; Differential scanning calorimetry (DSC); Gelatinization

E.H. Tou, J.P. Guyot, C. Mouquet-Rivier, I. Rochette, E. Counil, A.S. Traore, S. Treche, Study through surveys and fermentation kinetics of the traditional processing of pearl millet (Pennisetum glaucum) into ben-saalga, a fermented gruel from Burkina Faso, International Journal of Food Microbiology, Volume 106, Issue 1, 15 January 2006, Pages 52-60, ISSN 0168-1605, DOI: 10.1016/j.ijfoodmicro.2005.05.010.
(http://www.sciencedirect.com/science/article/B6T7K-4H9PMWP-2/2/6afdf95641466e0bf084c0cc1b159421)
Abstract:
Traditional cereal-based fermented foods are frequently used as complementary foods for infants and young children in Africa. This is the case for ben-saalga, a popular fermented gruel produced from pearl millet (Pennisetum glaucum) in Burkina Faso. Detailed knowledge of traditional processing is a prerequisite for investigating ways to improve both the nutritional and sanitary qualities of the corresponding foodstuff. In this work, the traditional processing of pearl millet into ben-saalga was investigated in 24 production units, and fermentation kinetics were studied in pilot scale experiments. Processing steps include: washing (optional), soaking of the grains (first fermentation step), grinding and sieving of the wet flour, settling (second fermentation step), and cooking. The soaking step was mainly characterized by alcoholic fermentation whereas lactic acid fermentation occurred during the settling step. Fermentation kinetics during settling indicates a temporal variation of metabolic activity. Initially, both homofermentative and heterofermentative pathways were simultaneously active, and later only a homofermentative pathway was active. The paste produced at the end of settling had a low pH (4.0 +/- 0.4) and its microflora was dominated by lactic acid bacteria (LAB) with an amylolytic LAB/LAB ratio of 12%. Sucrose disappeared in the grains during soaking but was not detected in the soaking water, whereas glucose, fructose and maltose appeared transiently. Glucose and fructose were the main substrates observed for lactic acid fermentation during the settling step; however unbalanced fermentation led to the hypothesis that starch hydrolysis products may also serve as substrates for lactic acid formation. At the end of the processing, a 75% and 83% decrease was observed in phytate (IP6) and raffinose, respectively. The sour gruel ben-saalga resulting from cooking the sour paste had inadequate nutritional characteristics with respect to infants' and young children's requirements; it was characterized by fluid consistency (Bostwick flow: 137 mm/30 s) and low energy density (about 30 kcal/100 g of gruel).

Keywords: Lactic acid fermentation; Pearl millet; Complementary food; Phytate; [alpha]-Galactoside; Amylolytic lactic acid bacteria

Paolo Mantovi, Letizia Fumagalli, Giovanni Pietro Beretta, Marina Guermandi, Nitrate leaching through the unsaturated zone following pig slurry applications, Journal of Hydrology, Volume 316, Issues 1-4, 10 January 2006, Pages 195-212, ISSN 0022-1694, DOI: 10.1016/j.jhydrol.2005.04.026.
(http://www.sciencedirect.com/science/article/B6V6C-4GG2M02-3/2/f7b3fe4c12fd9ab27d1aa4feab93e7cb)
Abstract:
As the increase of nitrate concentration in groundwater has often been ascribed to an inappropriate use of liquid manure, the main purpose of this study was to better understand the factors controlling nitrate dynamics in the unsaturated zone of soils subjected to characteristic agronomic practices, and to contribute to improving Action Programmes, with reference to EU Directive 91/676, for nitrate vulnerable zones (NVZ).
Water infiltration and nitrate leaching have been studied in experimental fields located inside nitrate vulnerable zones of the Emilia-Romagna region (Northern Italy), characterized by different pedological and hydrogeological properties and equipped with meteorological station, tensiometers, ceramic-cup samplers and piezometers. This article describes the results obtained from one of these sites, monitored over a 6-year period, which was cereal cropped and treated with pig slurry. MACRO and SOILN field-scale models have been used in order to verify the reliability of simulated water flow and nitrogen transport.
The results demonstrate how nitrogen inputs from slurry, substantially higher than crop uptake, cause nitrate accumulation in the surface layer of the soil especially in warm periods (concentrations of up to 300 mg NO3-N l-1 were found in soil water). Even if the soil texture was fine, the shrinking-swelling properties of clay minerals determined fast drainage conditions (related to macroporosity), so that during the early rainy periods nitrates leached through the first meters of the unsaturated zone, at least down to 4 m. This shows that nitrate accumulation should be limited before these periods, i.e. by reducing manure application rates, especially if the soil is to be left uncultivated.
The model results confirm the observed role of macroporosity in accelerating the breakthrough of surface applied soluble compounds and provide evidence that MACRO and SOILN may be suitable tools for predicting such phenomena, even though their calibration requires some further refinements.
Keywords: Ceramic cup samplers; Manure; Mathematical models; Nitrate vulnerable zone (NVZ); Soil water; Tensiometers

Victor O. Sadras, The N:P stoichiometry of cereal, grain legume and oilseed crops, Field Crops Research, Volume 95, Issue 1, 8 January 2006, Pages 13-29, ISSN 0378-4290, DOI: 10.1016/j.fcr.2005.01.020.
(http://www.sciencedirect.com/science/article/B6T6M-4FHKCXG-1/2/8e483ac3b5327533e06cf762e976891d)
Abstract:
A data base including grain yield, nitrogen uptake (Nu) and phosphorus uptake (Pu) was compiled to investigate the N:P stoichiometry of cereal (n = 759), grain legume (n = 413) and oilseed species (n = 421). Actual ratios and slopes of functions relating nitrogen uptake and phosphorus uptake were used to characterise N:P stoichiometry. The focus is on variability in N:P ratios of field crops, and N:P stoichiometry of crops achieving maximum yield.
N:P ratios varied between ~20, the maximum for legumes and oilseed crops, and ~1.5, the minimum for cereals. By definition, N:P ratios are a direct function of N uptake and an inverse function of P uptake. The expected association between N:P ratio and N uptake was not evident

except for grain legumes whereas the expected relationship between N:P and P uptake was verified for all three crop types. This highlights the role of P uptake as the main source of variability in N:P stoichiometry.
The relationship between N uptake (Nu) and P uptake (Pu) for crops achieving maximum yield in each experiment was markedly non-linear. Functions of the form Nu = NmaxPu/(+ Pu) described the way in which N:P stoichiometry scaled with grain yield. Maximum uptake of nitrogen (Nmax) was similar for all three crop types ([approximate]240 kg N ha-1), but it was achieved via different avenues, i.e. high yield and low grain protein concentration for cereals compared to lower yield and higher grain protein concentration in oilseed and legume crops. Phosphorus uptake at half Nmax () ranged from 27 kg P ha-1 for oilseeds to 14 kg P ha-1 for legumes. The N:P ratio at was 4.5 for oilseed crops, 5.6 for cereals and 8.7 for legumes. For cereals and oilseeds, over 40% of crops attaining maximum yield had N:P ratios in a relatively narrow range between 4 and 6. Variation in grain protein concentration was a major source of instability in N:P ratios of legumes.
Being at the base of agro-ecological food webs, the N:P stoichiometry of crops has implications for both decomposers and consumers, and stoichiometric concepts might be of interest in fertiliser management and modelling. Variability in N:P stoichiometry related to plant storage products, however, restricts its application.
Keywords: Multiple stresses; Co-limitation; Nitrogen; Phytin; Fertiliser; Protein; Yield

Karin Ericsson, Hakan Rosenqvist, Ewa Ganko, Marcin Pisarek, Lars Nilsson, An agro-economic analysis of willow cultivation in Poland, Biomass and Bioenergy, Volume 30, Issue 1, January 2006, Pages 16-27, ISSN 0961-9534, DOI: 10.1016/j.biombioe.2005.09.002.
(http://www.sciencedirect.com/science/article/B6V22-4HR76FN-1/2/367f9a126dac14347be8d761096671bf)
Abstract:
Bioenergy is recognized as the most important renewable energy source in Poland in several national policy documents. This has spurred an in increasing interest in energy crops, particularly willow, due to the large areas of arable land in Poland. However, in order for willow to be adopted by farmers, this crop must be perceived to be at least as profitable as cereal crops, such as wheat and barley, which compete for the same land. The objective of this study was to calculate the economics of growing willow on relatively large farms from a farmer's perspective in Poland. An additional objective was to relate the viability of growing willow to that of growing wheat and barley. Our calculations show that growing willow can indeed be an economically viable alternative to wheat and barley. At the current Polish price of wood chips (about 33 PLN/MWh or 7.5 [euro]/MWh), the viability of willow is similar to that of barley given our assumptions on yields, etc. Wheat is the most viable crop of the three crops studied. Willow, however, is more profitable than both wheat and barley assuming a wood chip price of 50 PLN/MWh (11 [euro]/MWh), which better represents the price in Europe as a whole. Despite good viability, willow is unlikely to be adopted by a great number of farmers without active support mechanisms and long-term stability of the status of energy crops in the Polish and the EU common agricultural policy.
Keywords: Willow; Economics; Poland

C. Gallardo, L. Jimenez, M.-T. Garcia-Conesa, Hydroxycinnamic acid composition and in vitro antioxidant activity of selected grain fractions, Food Chemistry, Volume 99, Issue 3, 2006, Pages 455-463, ISSN 0308-8146, DOI: 10.1016/j.foodchem.2005.07.053.
(http://www.sciencedirect.com/science/article/B6T6R-4H6PKXK-B/2/26e99b91463f6dc005d57a3ccf765ad0)
Abstract:
This study was designed to determine the composition in hydroxycinnamic acids and the antioxidant properties of soluble extracts from wheat, rye and buckwheat. Free, soluble and insoluble hydroxycinnamic acids were determined by HPLC-diode array (DAD). Some C-glycosyl

flavonoid derivatives were also identified by LC/MS/MS. Total antioxidant capacity, inhibition of lipid peroxidation and scavenging of oxygen radicals were used to evaluate the in vitro antioxidant capacity of the cereal soluble extracts. The highest levels of total hydroxycinnamic acids and derivatives were found in the wheat bran and rye bran fractions whereas the buckwheat flours had only trace quantities of these compounds. The most abundant compound present in the wheat and rye fractions was ferulic acid but small quantities of diferulic acids, sinapic acid, p-coumaric acid and benzoic acid derivatives were also present. The largest proportions of these phenolic compounds were found covalently bound (esters) in the insoluble pellet but between 10% and 30% of the total compounds were solubilized, mostly in water. Most of the antioxidant capacity was found in the water extracts from all the cereal fractions. Overall, buckwheat and wheat germ products exhibited the highest antioxidant capacity whereas the rye products had the lowest antioxidant values. The antioxidant capacity of these complex cereal extracts cannot be explained by simple correlation with the content of total soluble hydroxycinnamic acids. All other soluble compounds present in the extracts, their possible antioxidant activity and interactions need to be elucidated in order to fully explain the final antioxidant capacity of the extracts.
Keywords: Antioxidants; Hydroxycinnamic acids; Ferulic acid; Diferulic acids; Flavonoids; Cereals; Water extracts; Wheat; Rye; Buckwheat

Sanaa Ragaee, El-Sayed M. Abdel-Aal, Maher Noaman, Antioxidant activity and nutrient composition of selected cereals for food use, Food Chemistry, Volume 98, Issue 1, 2006, Pages 32-38, ISSN 0308-8146, DOI: 10.1016/j.foodchem.2005.04.039.
(http://www.sciencedirect.com/science/article/B6T6R-4GT7V4H-1/2/63c8eab41130d1cd0637f5f74ff32f93)
Abstract:
Whole grain products are recommended for healthy diets as being recognized sources of dietary fiber and antioxidant substances. In the present study, four cereals including barley, pearl millet, rye and sorghum which are adapted to the growing conditions in the United Arab Emirates were evaluated in terms of their composition of dietary fiber, resistant starch, minerals and total phenols and antioxidant properties. Antioxidant activity was evaluated on the basis of scavenging capacity of 2,2-diphenyl-1-picrylhydrazyl (DPPH) radicals and 2,2'-azino-di-[3-ethylbenzthiazoline sulphonate] (ABTS+ radical cations). The adapted grains exhibited better nutritional quality compared to commercial hard and soft wheat flours, the main ingredients in grain-based food products. They were significantly rich in resistant starch, soluble and insoluble dietary fibers, minerals and antioxidants. Barley had the highest levels of phosphorus, calcium, potassium, magnesium, sodium, copper, and zinc, and the second highest content of iron following millet. Sorghum was exceptionally high in antioxidant activities followed by millet and barley. The antioxidant properties of the three grains were comparable to butylated hydroxytoluene. The nutritional data suggest that the selected grains, particularly barley and sorghum, hold promise as healthy food ingredients.
Keywords: Wheat; Barley; Millet; Rye; Sorghum; Flour; Whole grain; Protein; Resistant starch; Dietary fiber; Minerals; Total phenols; Antioxidant activity; DPPH test; ABTS test

Silvia D. Dutcosky, M Victoria E. Grossmann, Rui Sergio S.F. Silva, Anette K. Welsch, Combined sensory optimization of a prebiotic cereal product using multicomponent mixture experiments, Food Chemistry, Volume 98, Issue 4, 2006, Pages 630-638, ISSN 0308-8146, DOI: 10.1016/j.foodchem.2005.06.029.
(http://www.sciencedirect.com/science/article/B6T6R-4H0BT67-5/2/684e75e0b3629e748b1cdc4acb86d590)
Abstract:
An experimental design for mixtures was used to develop tasty cereal bars with prebiotic properties. Inulin (I), oligofructose (OF) and gum acacia (GA) were the prebiotic ingredients added

(13.5% w/w) to cereal and fruits. The bars were analyzed by QDA (quantitative descriptive analysis) and the best formulations were determined in accordance with a preference test. GA was responsible for effects on dryness appearance of cereals flakes, hardness and chewiness while OF enhanced the brightness and crunchiness. The optimized formulations (50% I + 50% OF + 0% GA and 8.46% I + 66.16% OF + 25.38% GA) showed that blends of fibres imparted, to the bars, better textural characteristics than did each fibre alone. Syrup viscosity (greatly influenced by GA concentration) had a negative correlation (r = -0.904) with the preference score. The selected formulations aimed at reduction of 18-20% caloric value while providing an average increase of 200% in total fibre.
Keywords: Fibre; Cereal bars; Inulin; Oligofructose; Gum acacia; Functional foods; Bioactive ingredients

Q. Liu, E. Donner, Y. Yin, R.L. Huang, M.Z. Fan, The physicochemical properties and in vitro digestibility of selected cereals, tubers and legumes grown in China, Food Chemistry, Volume 99, Issue 3, 2006, Pages 470-477, ISSN 0308-8146, DOI: 10.1016/j.foodchem.2005.08.008.
(http://www.sciencedirect.com/science/article/B6T6R-4H877SK-4/2/fa620cddf77361024997acd063d03810)
Abstract:
Digestibility, gelatinization, retrogradation and pasting properties of starch in various cereal, tuber and legume flours were determined. Rapidly and slowly digestible starch and resistant starch were present in 11 selected flours. In general, cereal starches were more digestible than legume starches and tuber starches contained a high amount of resistant starch. Thermal and rheological properties of flours were different depending on the crop source.
Keywords: Flour; Cereal; Tuber; Legume starch digestibility; Gelatinization; Retrogradation; Pasting properties; DSC; RVA

Yanhong Bai, Ling Zhou, Jiang Wang, Organophosphorus pesticide residues in market foods in Shaanxi area, China, Food Chemistry, Volume 98, Issue 2, 2006, Pages 240-242, ISSN 0308-8146, DOI: 10.1016/j.foodchem.2005.05.070.
(http://www.sciencedirect.com/science/article/B6T6R-4GV9SPC-5/2/475da543618ca03e492dac1dd9d1a796)
Abstract:
The aim of this study was to investigate the organophosphorus (OP) pesticide residues in market foods (cereals, vegetables, and fruits) in the Shaanxi area of China. The concentrations of eight OP pesticides were determined by gas chromatography with flame photometric detection (GC-FPD). In 18 of 200 samples, five OP pesticides, including dichlorvos, dimethoate, parathion-methyl, pirimiphos-methyl and parathion, were found in concentrations ranging from 0.004 to 0.257 mg/kg. The mean levels of dimethoate in fruits and parathion in vegetables exceeded the maximum residue limits (MRLs) allowed by the Ministry of Health, of China. Other detectable OP pesticide residues levels were below their MRLs. Demeton, diazinon and sumithion were not found in any sample. The results provide important information on the current contamination status of a key agricultural area in China, and point to the need for urgent action to control the use of some excessively applied and potentially persistent OP pesticides, such as dimethoate and parathion.
Keywords: Organophosphorus pesticide residues; Market foods

Vivek Singh, A.N. Garg, Availability of essential trace elements in Indian cereals, vegetables and spices using INAA and the contribution of spices to daily dietary intake, Food Chemistry, Volume 94, Issue 1, January 2006, Pages 81-89, ISSN 0308-8146, DOI: 10.1016/j.foodchem.2004.10.053.
(http://www.sciencedirect.com/science/article/B6T6R-4FFGJGM-2/2/41ab2866f9e2136fd27bf0b61012d617)
Abstract:

Indian diet is primarily vegetarian and consists of various cereals and vegetables along with spices, often used in the preparation of curries. The nutritive potential of each ingredient, in terms of trace element contents, has been evaluated using instrumental neutron activation analysis (INAA). Four minor (Na, K, P and Cl) and 16 trace elements (Br, Co, Cr, Cs, Cu, Fe, Hg, Mn, Mo, Rb, Sb, Sc, Se, Sr, Th and Zn) have been determined in six cereals, nine vegetables and 20 spices and condiments, including two betel leaves. None of the carbohydrate-rich cereals or potato was rich in any of the essential elements but leafy vegetables showed higher contents of Fe and other nutrients. Fe/Zn is well correlated with Fe contents in cereals and spices. Out of various spices, cinnamon was most enriched in Fe, Co, Cr, Na, K, P and Zn, whereas turmeric and curry leaves were found to be particularly rich in Se. Cumin and mustard seeds were rich in Cu. Some environmental contaminants, such as Hg, Cr, Br and Th, were also present in significant amounts. An attempt has been made to evaluate the contribution of essential elements (Cr, Cu, Fe, Mn, P, Se and Zn) in spices to the daily dietary intake (DDI) through an Indian vegetarian diet. For a typical mixture of six commonly used spices, contributions of Cr, Fe, Mn and Zn, were found to be 7.5% of DDI in each case.
Keywords: Cereals; Vegetables; Spices; Essential nutrients; Instrumental neutron activation analysis; Daily dietary intake; Toxic contaminants

Saleemullah, Amjad Iqbal, Iqtidar A. Khalil, Hamidullah Shah, Aflatoxin contents of stored and artificially inoculated cereals and nuts, Food Chemistry, Volume 98, Issue 4, 2006, Pages 699-703, ISSN 0308-8146, DOI: 10.1016/j.foodchem.2005.06.034.
(http://www.sciencedirect.com/science/article/B6T6R-4H0BT67-8/2/2d07f0151b3f9b2f3f8730c6911801f8)
Abstract:
Aflatoxin contents of cereals and nuts, collected from local markets of NWFP, were determined by thin layer chromatography (TLC). The seeds of these crops were also inoculated with Aspergillus flavus and the aflatoxin content and its relation with the proximate composition of seeds was studied. The effect of storage for different durations of time (2-3 and 12-18 months) on the aflatoxin content of seeds was also assessed. Aflatoxin content of cereals (wheat, maize and rice) ranged from 14 to 45 [mu]g/kg, and that of nuts (almond, walnut and peanut) varied from 5 to 17 [mu]g/kg. The aflatoxin content was within the safe limit (50 [mu]g/kg) recommended by FAO. The aflatoxin content of inoculated seeds was significantly ($p < 0.05$) increased over control (un-inoculated seeds). This was positively related ($r = 0.65$) to moisture content of the seeds. However, negative correlation ($r = -0.50$) existed between aflatoxin and ash contents of the seeds. Protein, fat and total carbohydrate (NFE) contents were not much affected by inoculation. Prolonged storage for 18 months (1.5 years) significantly ($p < 0.05$) increased aflatoxin contents of seeds compared to short storage periods (2-3 months). It was concluded that aflatoxin content of food should be monitored to ensure food safety. Prolonged storage of cereal and nuts in warm humid condition should be avoided to minimize the risk of aflatoxin contamination.
Keywords: Aflatoxin; Cereals; Nuts; Storage; Nutritional quality

Richard Koplik, Marketa Borkova, Barbara Bicanova, Jan Polak, Oto Mestek, Jana Kominkova, Speciation analysis of elements in cereal flours by liquid chromatography-inductively coupled plasma mass spectrometry, Food Chemistry, Volume 99, Issue 1, 2006, Pages 158-167, ISSN 0308-8146, DOI: 10.1016/j.foodchem.2005.07.030.
(http://www.sciencedirect.com/science/article/B6T6R-4H3JHG2-5/2/21d2a6c485861218c363877768e6ecb0)
Abstract:
Phosphorus, manganese, iron, cobalt, nickel, copper, zinc, and molybdenum species fractions were studied in maize and rye flour. Total and extractable contents of elements were determined by ICP-MS. Extracts of flours were prepared using 0.02 mol/l Tris-HCl buffer solution (pH 7.5) and

70% (v/v) ethanol as extractants, respectively. Both types of extracts were analysed by size exclusion chromatography (SEC) using a Superdex 75 HR 10/30 column on-line coupled to an ICP-MS. The 0.02 mol/l Tris-HCl buffer solution, pH 7.5 served as the mobile phase. Cobalt, nickel, zinc and molybdenum compounds were found in the low molecular mass region (<1 kDa). The main fraction of phosphorus compounds was found in the 3.5 kDa region. Remaining phosphorus compounds were detected in the high-molecular (>150 kDa) and the low-molecular mass (<1 kDa) regions. Minor amounts of copper and phosphorus (in both samples), zinc (in maize flour) and molybdenum (in rye flour) were found in the high molecular mass region (45 to >150 kDa). When the flours' extracts are spiked with cupric ions, practically all copper is bound to low molecular mass compounds. The low molecular mass fractions of unspiked flours' extracts obtained by SEC were further separated by reversed phase chromatography using a Kromasil C4 column and 10% methanol as the mobile phase.
Keywords: Maize flour; Rye flour; Liquid chromatography; Inductively coupled plasma mass spectrometry; Phosphorus; Trace elements; Speciation

C.I. Vardavas, D. Majchrzak, K.-H. Wagner, I. Elmadfa, A. Kafatos, The antioxidant and phylloquinone content of wildly grown greens in Crete, Food Chemistry, Volume 99, Issue 4, 2006, Pages 813-821, ISSN 0308-8146, DOI: 10.1016/j.foodchem.2005.08.057.
(http://www.sciencedirect.com/science/article/B6T6R-4HG6HGR-3/2/01ce81d9d604e564142392c9bde6d695)
Abstract:
The traditional Mediterranean diet of Crete is renowned for its very high consumption of olive oil, vegetables, legumes, fruit, fish, whole-wheat cereals and a moderate consumption of dairy products and meat. Wild greens play an important role in the traditional diet and are eaten either fresh in salads, boiled or cooked in pies, thus increasing the daily vitamin and antioxidant intake of the population that adheres to the traditional diet. Six cultivated and 48 wildly grown greens were collected and analyzed for their carotenoid, l-ascorbic acid, phylloquinone, [gamma]-tocopherol, [alpha]-tocopherol and total polyphenol content. In most cases, the wild greens had higher micronutrient contents than those cultivated. Certain wild greens, such as Rumex obtusifolius, Prasium majus and Lathyrus ochrus had higher concentrations of vitamin K1, vitamin C, lutein, [beta]-carotene, [gamma]-tocopherol and total polyphenol content than those cultivated; proving the significance of these wildly grown greens for the well being of the Cretan population.
Keywords: Carotenoids; Tocopherols; Polyphenols; Ascorbic acid; Phylloquinone; Wild greens; Cretan diet

Lamia Ait Ameur, Gilles Trystram, Ines Birlouez-Aragon, Accumulation of 5-hydroxymethyl-2-furfural in cookies during the backing process: Validation of an extraction method, Food Chemistry, Volume 98, Issue 4, 2006, Pages 790-796, ISSN 0308-8146, DOI: 10.1016/j.foodchem.2005.07.038.
(http://www.sciencedirect.com/science/article/B6T6R-4H57TG6-4/2/e17c39cfd19fd7d51b3f121dbc9e5d99)
Abstract:
During baking, complex chemical reactions take place in the cookies, such as the Maillard reaction (MR) and caramelisation (CR). Both reactions involve glucose and fructose, generated from starch and sucrose hydrolysis during baking. Among the many products formed, HMF a possible mutagen, seems particularly interesting because of a rapid accumulation during the process.
No validation of HMF quantification method has been proposed for cereal products. Our objectives were to validate a simple HPLC method with UV detection and study the kinetic of HMF accumulation in a cookie model during baking at three temperatures. Solubilization in water followed by protein precipitation in trichloroacetic acid was selected as the best extraction procedure avoiding interferences with the matrix. During the baking process, HMF accumulated

exponentially with an activation energy of 10.6 kJ mol-1, once the water activity decreased from 0.40 downwards. HMF in commercial cookies ranged from 0.5 to 74.6 mg kg-1.
Keywords: Hydroxymethylfurfural; HPLC-UV; Cookies; Baking

Elizabeth Aparecida Ferraz da Silva Torres, Maria Lima Garbelotti, Jose Machado Moita Neto, The application of hierarchical clusters analysis to the study of the composition of foods, Food Chemistry, Volume 99, Issue 3, 2006, Pages 622-629, ISSN 0308-8146, DOI: 10.1016/j.foodchem.2005.08.032.
(http://www.sciencedirect.com/science/article/B6T6R-4H877SK-J/2/c06b21410e7437fc1ad4bb8dfa1a7052)
Abstract:
The nutritional value of prepared foods is frequently questioned or requested at restaurants by its costumers. Therefore, this paper aimed to apply HCA to categorize foods according to their nutritive values. Fifty three samples of prepared foods from four different restaurants were analyzed for proximate composition using the AOAC methods [AOAC (1995). Association of Official Analytical Chemists. Official method of analysis. Arlington, Cereal foods, Supplement (pp. 7-11).]. The multivariate statistical analysis of data using the hierarchical cluster analysis (HCA) technique was obtained through the SPSS (10.0) program. French fries were the most caloric preparation; they also have considerable total fiber content. Milled white rice is rich in carbohydrates; and calories and fiber-poor. Arugula offers the highest protein and total fiber content, whereas lettuce presented the smallest amount of these two nutrients. Beans are the main source of dietary fiber and have a low caloric value. The most caloric preparations are French fries and fried zucchini Milanese Type of processing employed in preparing the foods might account for the variation in results between the establishments studied HCA was a useful guide for looking at and analyzing the different types of foods comparatively. Given how easy it is to calculate this with software, it is recommendable to be used even as an exploratory tool, capable of aiding intuition in the analysis of the set of data. HCA can be useful guide/tools to educate consumers on the nutritive values of foods selling in a restaurant and to help the consumers to select the foods which are suitable to their help, if required.
Keywords: Proximate composition; Dietary fiber; 'By weight' restaurants; Hierarchical clusters analysis; HCA

Atul Bhargava, Sudhir Shukla, Deepak Ohri, Chenopodium quinoa--An Indian perspective, Industrial Crops and Products, Volume 23, Issue 1, January 2006, Pages 73-87, ISSN 0926-6690, DOI: 10.1016/j.indcrop.2005.04.002.
(http://www.sciencedirect.com/science/article/B6T77-4GNCXT0-1/2/4d4ed5cddfe4d70869a5f340500acb74)
Abstract:
Chenopodium quinoa Willd. is a pseudocereal that has been cultivated in the Andean region for thousands of years. It is an annual broad-leaved plant, 1-2 m tall with deep penetrating roots and can be cultivated from sea level upto an altitude of 3800 m. The plant shows tolerance to frost, salinity and drought, and has the ability to grow on marginal soils. Quinoa grain is highly nutritious due to its outstanding protein quality and wide range of minerals and vitamins. The grain protein is rich in amino acids like lysine and methionine that are deficient in cereals. The grain is used to make flour, soup, breakfast, cereal and alcohol, while the flour is utilized in making biscuits, bread and processed food. Quinoa starch having small grains and high viscosity, can be exploited for various industrial applications. The crop is self-pollinated with low outcrossing rates. Emasculation and hybridization are cumbersome due to small size of the flowers, but male sterility in some cultivars and gynomonoecious breeding system may help breeding research in this crop. Quinoa's ability to produce high-protein grains under ecologically extreme conditions makes it important for

the diversification of future agricultural systems, especially in high-altitude area of the Himalayas and North Indian Plains.
Keywords: Chenopodium quinoa; Saponins; Protein; Breeding; Male sterility; Stress conditions

M. Mariotti, C. Alamprese, M.A. Pagani, M. Lucisano, Effect of puffing on ultrastructure and physical characteristics of cereal grains and flours, Journal of Cereal Science, Volume 43, Issue 1, January 2006, Pages 47-56, ISSN 0733-5210, DOI: 10.1016/j.jcs.2005.06.007.
(http://www.sciencedirect.com/science/article/B6WHK-4H27C24-1/2/edecf353087fa44c96eb02aacd335369)
Abstract:
Puffed cereals are commonly used as ready-to-eat breakfast foods or as ingredients in snack formulations. Few investigations have been made on the ultrastructure and physical characteristics of puffed cereals; the properties of the flours milled from them have been even less investigated. The changes associated with the gun puffing process were evaluated for six different grains: common wheat, emmer wheat, rye, barley, rice and buckwheat. The results demonstrate that the effect of the puffing treatment is strongly influenced by the morphology and composition of the kernel. Puffed rye and rice have a very porous matrix, made up of numerous cavities of different sizes separated by a very thin `wall' puffed wheat, emmer wheat and barley on the other hand show a much more compact, homogeneous and less porous structure; puffed buckwheat is characterised by a large number of small and regular cavities. Moreover, puffing induces significant changes in the structure and physical properties of the starch and an increased water holding capacity of both the grains and the flours.
Keywords: Physical properties; Puffed cereals; SEM; Ultrastructure

J.A. Rufian-Henares, C. Delgado-Andrade, F.J. Morales, Analysis of heat-damage indices in breakfast cereals: Influence of composition, Journal of Cereal Science, Volume 43, Issue 1, January 2006, Pages 63-69, ISSN 0733-5210, DOI: 10.1016/j.jcs.2005.05.001.
(http://www.sciencedirect.com/science/article/B6WHK-4HJRRST-1/2/e81ceaa83429e279ae060a4aa6d03f8d)
Abstract:
To evaluate heat damage caused by processing, the content of hydroxylmethylfurfural (HMF), furfural and glucosylisomaltol (GIM) in sixty commercial breakfast cereals was analysed by HPLC. The influence of different cereal compositions on HMF, furfural and GIM content and the correlation between the three indices was explored. Samples were grouped to perform the statistical comparisons between breakfast cereals made from different cereals, according to the presence of cocoa powder or honey, the percentage of dietary fibre and the consumer focus. A statistically significant effect of added-dietary fibre on the level of furfural present in the breakfast cereals and the existence of a significant relationship between HMF and GIM was found. Due to the exclusive origin of GIM from the Maillard reaction this compound is a suitable indicator for the extent of the treatments used by the breakfast cereal industry.
Keywords: Breakfast cereals; Hydroxymethylfurfural; Glucosylisomaltol; Furfural

Antonio Ficarella, Marco Milanese, Domenico Laforgia, Numerical study of the extrusion process in cereals production: Part II. Analysis of variance, Journal of Food Engineering, Volume 72, Issue 2, January 2006, Pages 179-188, ISSN 0260-8774, DOI: 10.1016/j.jfoodeng.2004.11.035.
(http://www.sciencedirect.com/science/article/B6T8J-4F2V56V-3/2/213378c88ec8ac5e0b5c2a131a5f5d87)
Abstract:
Extrusion cooking of cereals is a complex process, regarding a wide range of food products (snack-foods, baby-foods, cereals for breakfast and pasta). In this work, an analysis of variance (ANOVA) on the extrusion cooking process for cereals in a co-rotating twin-screw extruder was

carried out, using a finite-element fluid dynamic simulation model, to study shear rate, residence time and mixing index inside the extruder, varying temperature, screw rotation velocity, flow rate and extruder geometry.
Besides, the significance analysis, carried out in this study, have shown several aspects of the process under investigation: (i) the interdependence between shear rate, screw rotation velocity and screw axis ratio seems very strong; (ii) the significance of the effects on shear rate of the variations of temperature and flow rate appears less meaningful; (iii) the influence on the residence time of the flow rate and screw axis ratio is more meaningful respect to the screw speed and temperature.
The numerical simulations have revealed numerous aspects that can be used to improve the extrusion process: the flow temperature can be varied without modifying the gelatinization of material that is mainly influenced by screw rotation velocity and screw axis ratio.
Keywords: Extrusion; Cereals; Simulation; ANOVA analysis

D. Silhacek, C. Murphy, A simple wheat germ diet for studying the nutrient requirements of the Indian meal moth, Plodia interpunctella (Hubner), Journal of Stored Products Research, Volume 42, Issue 4, 2006, Pages 427-437, ISSN 0022-474X, DOI: 10.1016/j.jspr.2004.07.004.
(http://www.sciencedirect.com/science/article/B6T8Y-4JW126T-1/2/d6ac043232ac77b20bacc35f187819e1)
Abstract:
Indian meal moth infestation of processed cereal products during storage could be managed with little or no use of conventional pesticides if there was a greater recognition and use of the moth's innate vulnerabilities. Slowing the growth rate of the infesting larvae is a simple strategy that can decrease the amount of damage and decrease the frequency of pesticide intervention. The growth rates of Indian meal moths on different cereal products varies widely indicating product-related differences in nutrient availability for the insects. Nutrient availability depends upon both the amounts of nutrients available in the cereal product and upon physical characteristics of the product that restrict the assimilation of nutrients.
The development of control strategies for protecting processed cereal products based upon nutrient availability requires a simple, palatable test diet of known composition. Wheat germ mixed with 30% glycerol (w/w) provides a suitable growth medium for the Indian meal moth whose nutrients have been largely identified and quantified. Our studies indicate that dietary glycerol augments Indian meal moth growth and development on wheat germ by moisturizing the diet and probably provides a source of carbon and energy for larval growth.
Keywords: Stored-product moth; Indian meal moth; Moth nutrition; Cereal nutrients; Oligidic diet; Larval growth; Wheat germ; Glycerol

Mary Kay Fox, Kathleen Reidy, Vatsala Karwe, Paula Ziegler, Average Portions of Foods Commonly Eaten by Infants and Toddlers in the United States, Journal of the American Dietetic Association, Volume 106, Issue 1, Supplement 1, Feeding Infants and Toddlers Study II, January 2006, Pages 66-76, ISSN 0002-8223, DOI: 10.1016/j.jada.2005.09.042.
(http://www.sciencedirect.com/science/article/B758G-4HVW37C-8/2/85bfb797e154c7d720349b7cbb202628)
Abstract: Objectives
To examine average portion sizes consumed per eating occasion by infants and toddlers. Average portions reported for toddlers were compared to average portions for comparably aged children reported in the 1994 to 1996 and 1998 Continuing Survey of Food Intakes by Individuals. In addition, reported average portions were compared with minimum required portion sizes for meals served to infants and toddlers in the Child and Adult Care Food Program (CACFP).Design
Data from 24-hour recalls collected in the 2002 Feeding Infants and Toddlers Study (FITS) were analyzed. Average portion sizes were determined for major food groups and individual foods that

were reported by at least 5% of the population. Most foods were reported separately; however, sandwiches were disaggregated into their components. Gram weights of portions consumed were converted, on a food-by-food basis, to household units so that foods with different volume-to-weight ratios could be analyzed together.Subjects/Setting
A national random sample of 3,022 US infants and toddlers 4 to 24 months of age.Statistical Analyses Performed
For each food and food group, average portion sizes per eating occasion were computed for up to six age groups. An average per-eating occasion portion was determined for each child who consumed a given food by summing the total amount of food consumed over the day and dividing by the number of eating occasions. These estimates were then summed across all children who consumed the food and divided by the total number of consumers. The number of eating occasions was defined as the total number of times a child had anything to eat or drink during the day, excluding eating occasions that included only water and/or supplements.Results
For most foods, there was a gradual increase in the average portion as age increased. Average portions reported for FITS toddlers were consistent with those reported for comparably aged children in the most recent Continuing Survey of Food Intakes by Individuals. The average portions reported for FITS infants and toddlers were consistent with CACFP-recommended portion sizes for formula, juice, meats, and cheese. For milk (toddlers only), cereal, breads, fruits, and vegetables, average portions reported in FITS were consistently larger than CACFP portion sizes. Distributions showed that, in many cases, the per-eating occasion portion sizes of 50% to 90% of FITS infants and toddlers exceeded the CACFP portion sizes.Conclusions
Dietitians, pediatricians, and health educators can use the data presented in this article to provide guidance to parents and caregivers about reasonable portion sizes for infants and toddlers. The data should also be useful to those who plan meals for infants and toddlers in child care settings and to researchers studying dietary intakes of infants and toddlers. Advice about reasonable portion sizes should always be tempered with appropriate cautions about avoiding coercive 'clean your plate' feeding practices. Parents and caregivers should be encouraged to offer infants and toddlers appropriate portions of healthful foods from the basic food groups, with a special emphasis on fruits, vegetables, and whole grains, and allow them to eat until they are satiated.

Julie A. Mennella, Paula Ziegler, Ronette Briefel, Timothy Novak, Feeding Infants and Toddlers Study: The Types of Foods Fed to Hispanic Infants and Toddlers, Journal of the American Dietetic Association, Volume 106, Issue 1, Supplement 1, Feeding Infants and Toddlers Study II, January 2006, Pages 96-106, ISSN 0002-8223, DOI: 10.1016/j.jada.2005.09.038.
(http://www.sciencedirect.com/science/article/B758G-4HVW37C-C/2/cfec50af21339d3903b63fe127574ac6)
Abstract: Objective
To assess the prevalence of breastfeeding and formula feeding, the age of introduction to specific foods, and the types of foods and beverages consumed by Hispanic infants and toddlers compared with similarly aged non-Hispanic infants and toddlers living in the United States.Design
Descriptive and comparative analysis of dietary recall data and responses to specific interview questions, which were collected in the 2002 Feeding Infants and Toddlers Study. Breastfeeding status, timing of introduction of complementary foods, percentage consuming foods from specific food groups, and the most frequently consumed fruits and vegetables by Hispanic and non-Hispanic childrens by age group (4-5 months, 6-11 months, 12-24 months).Subjects
A national random sample of 371 Hispanic and 2,637 non-Hispanic infants and toddlers between the ages of 4 and 24 months.Statistical Analysis
To test for differences between Hispanic and non-Hispanic children in the percentage who consumed a particular food item, we calculated percentages and standard errors in SUDAAN and 95% and 99% confidence intervals. The most frequently consumed fruits and vegetables were

determined by tallying the percentage of infants and toddlers who consumed each specific fruit or vegetable on a given day.Results
Although there were some similarities, the early flavor and food experiences of Hispanic infants were different from similarly aged non-Hispanic infants in several ways. Hispanic infants younger than 1 year of age were more likely to have ever been breastfed and those who were 4 to 5 months were more likely than non-Hispanics to be eating pureed baby foods on a daily basis. Although less likely to be eating noninfant cereals and baby food vegetables, 6- to 11-month-old Hispanics were more likely to be eating fresh fruits, fruit-flavored drinks, baby cookies, and foods such as soups, rice, and beans that are common in many Hispanic cultures. When fruits were introduced into the Hispanic child's diet, they were most commonly consumed fresh. This higher prevalence of being fed soups, rice, beans, and sweetened fruit-flavored drinks as well as tortillas was also observed among the 12- to 24-month-old toddlers.Conclusions
Dietetics professionals should be aware of the cultural differences in the foods fed to infants and toddlers that may contribute to the development of long-term food preferences and impact on nutrition. Understanding the factors that underlie food preferences is important if we are to develop evidence-based strategies to improve children's eating habits and lower their risks factors associated with obesity and other chronic diseases.

Qun Li, Fang Chen, Liangxian Sun, Zhongqin Zhang, Yinong Yang, Zuhua He, Expression profiling of rice genes in early defense responses to blast and bacterial blight pathogens using cDNA microarray, Physiological and Molecular Plant Pathology, Volume 68, Issues 1-3, January-March 2006, Pages 51-60, ISSN 0885-5765, DOI: 10.1016/j.pmpp.2006.06.002.
(http://www.sciencedirect.com/science/article/B6WPC-4KNKBT8-1/2/2de9c2ed9b4ce1b53425556d0265d2a0)
Abstract:
In order to understand the defense machinery in the model cereal crop rice, we performed a large-scale analysis of rice gene expression in response to rice blast Magnaporthe grisea (M. grisea) or Magnaporthe oryzae and bacterial blight Xanthomonas oryzae pv. oryzae (Xoo) during the early incompatible and compatible interactions. Using a gene chip containing 10 254 rice cDNAs representing 9240 unique genes, we identified 794 and 612 genes differentially expressed in the incompatible and compatible rice-M. grisea interactions, respectively, with 274 genes co-regulated during both interactions. In the rice-Xoo pathosystem, 454 and 498 differentially expressed genes were identified in the incompatible and compatible interactions, respectively, including 237 co-regulated genes in the both interactions. By clustering differentially regulated genes from all these interactions, we identified 29 co-regulated genes in the all four interactions, and 86 and 74 co-regulated genes in the two incompatible and two compatible interactions, respectively. These differentially expressed genes could be classified into three categories, including M. grisea- and Xoo-regulated, M. grisea-specific, and Xoo-specific. The expression patterns of representative defense-related genes were further confirmed by RT-PCR. The large-scale expression data from our microarray analysis indicated the existence of distinctive as well as shared defense pathways between the rice-M. grisea and rice-Xoo interactions.
Keywords: Expression profile; Defense response; cDNA microarray; Oryza sativa; Magnaporthe grisea/Magnaporthe oryzae; Xanthomonas oryzae pv. oryzae

R. Shyama Prasad Rao, G. Muralikrishna, Water soluble feruloyl arabinoxylans from rice and ragi: Changes upon malting and their consequence on antioxidant activity, Phytochemistry, Volume 67, Issue 1, January 2006, Pages 91-99, ISSN 0031-9422, DOI: 10.1016/j.phytochem.2005.09.036.
(http://www.sciencedirect.com/science/article/B6TH7-4HJRRXH-1/2/297d1184a0279005702a040d056124e4)
Abstract:

The objective of this study is to determine the changes brought about by germination on water soluble feruloyl arabinoxylans (feraxans), one of the major components of soluble fibre from rice and ragi and their consequence on antioxidant activity. Soluble feraxans, isolated from native and malted rice and ragi were fractionated on DEAE-cellulose. Ferulic acid content of the major [0.1 molar ammonium carbonate (AC) eluted] fraction was higher in malts (rice: 1045 [mu]g/g; ragi: 1404 [mu]g/g) than in native (rice: 119 [mu]g/g; ragi: 147 [mu]g/g) and this fraction was separated by Sephacryl S-300 chromatography into two peaks each in rice (native: 232 and 24.4 kDa; malt: 75.4 and 39.6 kDa) and ragi (native: 140 and 15.4 kDa; malt: 38.9 and 15.4 kDa). 0.1 molar AC eluted fractions showed very strong antioxidant activity in vitro as determined by [beta]-carotene-linoleate emulsion (IC50: 0.16-0.24 mg), DPPH* (IC50: 4.1-11.4 mg) and Ferric reducing/antioxidant power, FRAP (EC1: 0.76-3.1 mg) assays. Antioxidant activity of feraxans was several (4.9-1400) folds higher than the expected activity due to their bound ferulic acid content. Apart from ferulic acid, presence of sugars with >CO (uronyl/acetyl) groups and degree/nature of glycan-polymerization were observed to influence antioxidant activity of the polysaccharides. Malting resulted in many dynamic changes in the ferulic acid content in different feraxan types and affected their antioxidant activity.
Keywords: Antioxidant; Arabinoxylan; Cereals; Dietary fibre; Ferulic acid; Non-starch polysaccharide; Ragi

Robert Evans, Monitoring water erosion in lowland England and Wales--A personal view of its history and outcomes, CATENA, Volume 64, Issues 2-3, 25 Years of Assessment of Erosion, 30 December 2005, Pages 142-161, ISSN 0341-8162, DOI: 10.1016/j.catena.2005.08.003.
(http://www.sciencedirect.com/science/article/B6VCG-4HG6B29-1/2/4bc4d8325d0ec8257ad4e6255d2415f9)
Abstract:
A personal account is given of the history of monitoring soil erosion by water in England and Wales from the late 1960s to the present. Prior to the mid-1970s it was not easy to carry out research on water erosion and information was obtained on an ad hoc basis. Since 1982 there have been four major monitoring schemes, three of them national schemes funded by the Ministry of Agriculture, and one scheme on the South Downs of Sussex, southern England, carried out by John Boardman. The three national schemes were carried out by staff of the (then) Soil Survey of England and Wales (1982-1986), of the (then) Agricultural Development and Advisory Service (1989-1994) and by the (then) Soil Survey and Land Research Centre (1996-1998). Some results of these four schemes are compared. It is likely severity of erosion has not changed over time. The evidence that erosion may have increased in extent over the last 20 years is arguable. Although most erosion occurs in winter cereals--all four schemes show this--three of the schemes, because of the ways in which they were set up, overemphasise the fact. The results from the more extensive 1982-1986 scheme show that fields drilled to other crops can be more vulnerable. A new monitoring scheme is urgently needed and should cover large blocks of land representative of the soil landscapes of England and Wales. In this way a sufficient number of eroded fields will be located to allow statistical analysis of the data and to enable future trends in severity and extent of water erosion to be identified.
Keywords: Water erosion; Monitoring schemes; Extent erosion; Rates erosion; Risk erosion

H.B. Goosey, P.G. Hatfield, A.W. Lenssen, S.L. Blodgett, R.W. Kott, The potential role of sheep in dryland grain production systems, Agriculture, Ecosystems & Environment, Volume 111, Issues 1-4, 1 December 2005, Pages 349-353, ISSN 0167-8809, DOI: 10.1016/j.agee.2005.06.003.
(http://www.sciencedirect.com/science/article/B6T3Y-4GSJPX2-2/2/e107ec0bb2d452a335189f06d6c56361)
Abstract:

In dryland farming areas of Montana, annual precipitation is not sufficient for annual planting of cereal grains. Instead, a crop-summer fallow farming system is used to conserve soil moisture and increase available nitrogen for subsequent crop growth. Managing this summer fallow, either by mechanical means or with herbicides, is the highest variable cost associated with dryland grain production in Montana. Wheat stem sawfly, Cephus cinctus (Hymenoptera: Cephidae) is the most damaging insect pest to Montana's US$ 1 billion per year grain industry. Weed management is the largest variable cost associated with dryland grain production and summer fallow management. Six fields, located on four commercial Montana grain operations, were grazed by sheep and goats from October 2002 to May 2003 to determine the impact grazing has on C. cinctus populations, weed and volunteer cereal growth, soil compaction, and gravimetric water concentrations. Percent C. cinctus larval mortality and percent reduction of weed biomass was greater in grazed compared to non-grazed areas ($P <= 0.01$). No differences in soil bulk density or gravimetric water concentrations were found between treatments ($P > 0.11$). Grazing fallow with sheep and goats appears to successfully improve C. cinctus and weed management in grain production systems without impacting soil compaction.
Keywords: Sheep; Soil bulk density; Fallow; Weeds; Wheat stem sawfly

D. Goodwin, H.P.B. Davidson, P. Harris, Selection and acceptance of flavours in concentrate diets for stabled horses, Applied Animal Behaviour Science, Volume 95, Issues 3-4, December 2005, Pages 223-232, ISSN 0168-1591, DOI: 10.1016/j.applanim.2005.04.007.
(http://www.sciencedirect.com/science/article/B6T48-4G63J0M-2/2/aedf94aadab6f7f56cb10875ed94fdf0)
Abstract:
Like most large grazing herbivores, horses select their food based on visual cues, odour, taste, texture, availability and variety. There is relatively little published information about the role of flavour in diet selection by domestic horses in comparison with other domestic and companion animals. However, previous trials investigating effects of diet flavour in stabled horses indicated significant effects on foraging behaviour and selection.
In this series of three trials we aimed to determine relative acceptance by presenting flavour preference tests to eight horses. Horses were stabled and fed hay ad lib on trial data collection days plus a standard unflavoured concentrate ration at 7:30 a.m.
In Trial 1, 15 flavours were separately presented in standard 100 g cereal by-product meals and the trial was replicated. Quantity consumed, time of completion, partial rejection or refusal were recorded. Order of presentation was determined by a Latin Square design. Trial data were collected on five sampling days, separated by a minimum of 1 day. Horses were presented with six flavoured meals daily; minimum 1 h between the meals. Twelve flavours were universally accepted and of these the eight flavours with fastest mean consumption times (banana, carrot, cherry, cumin, fenugreek, oregano, peppermint and rosemary) were presented in paired preference tests in Trial 2.
In Trial 2, all paired combinations of the eight flavours were presented, in two tests per day at noon and 4 p.m. Presentations of the same flavour were separated by at least 1 day. Paired presentations were in 300 g cereal by-product. Presentations were terminated when approximately half of the total amount presented had been consumed. Flavour preferences were expressed as a ratio from 0 (rejection) to 1 (exclusive consumption). Paired flavour preferences produced the following rank order: fenugreek, banana, cherry, rosemary, cumin, carrot, peppermint, oregano.
In Trial 3, relative consumption times of mineral pellets flavoured with fenugreek and banana were significantly reduced in comparison with unflavoured pellets.
In these short-term trials, flavour had significant effects on diet acceptance, selection and consumption times.
Keywords: Horse; Flavour; Diet; Selection; Acceptance

Fabrizio Esposito, Guido Arlotti, Angela Maria Bonifati, Aurora Napolitano, Davide Vitale, Vincenzo Fogliano, Antioxidant activity and dietary fibre in durum wheat bran by-products, Food Research International, Volume 38, Issue 10, December 2005, Pages 1167-1173, ISSN 0963-9969, DOI: 10.1016/j.foodres.2005.05.002.
(http://www.sciencedirect.com/science/article/B6T6V-4GJM3JP-1/2/3b0c55f5ad6a3c327de7e35bafcfdedc)
Abstract:
Milling of wheat generates by-products, which can be used to improve the technological performance and/or to integrate foods with healthy compounds. The aim of this paper was to select fractions of durum wheat bran having different functional and nutritional characteristics. Wheat bran by-products were obtained by an industrial milling process. Beside the single fractions, two commercial products Bran & Brain 50 and 70, obtained by blending some of the durum wheat fractions were also studied. All samples were investigated for water holding capacity, soluble and insoluble dietary fibre content and for their antioxidant activity. The soluble fibre content of the durum wheat by-product ranged between 0.9% and 4.1%; while that of insoluble fibre between 21% and 64%. B&B 70 has a TDF content of 61%, while B&B 50 has 42%. The water holding capacity of each fraction is strictly related to the amount of insoluble fibre and to the granulometry of the by-products. Cooking-extrusion process does not affect the amount of soluble fibre; by contrast, a significant increase of the insoluble fibre was detected. The antioxidant activity is higher for the internal bran fraction and it increases in fractions having reduced granulometry. The antioxidant activity of some durum wheat by-product fractions is comparable to that of widespread fruits and fresh vegetables, likely due to the presence of fibre-bound phenol compounds. The high fibre content and antioxidant activity of durum wheat bran by-products can be of particular interest for their use in cereal-based products.
Keywords: Durum wheat; Pre-processed fraction; Fibre; Extrusion-cooking; Antioxidant activity phenol compounds

G. Falco, A. Bocio, J.M. Llobet, J.L. Domingo, Health risks of dietary intake of environmental pollutants by elite sportsmen and sportswomen, Food and Chemical Toxicology, Volume 43, Issue 12, December 2005, Pages 1713-1721, ISSN 0278-6915, DOI: 10.1016/j.fct.2005.05.014.
(http://www.sciencedirect.com/science/article/B6T6P-4GJM3X8-4/2/72e3e1c59893bd53544f95bdd576528d)
Abstract:
The dietary intake of arsenic (As), cadmium (Cd), mercury (Hg), lead (Pb), hexachlorobenzene (HCB), polychlorinated naphthalenes (PCNs), polycyclic aromatic hydrocarbons (PAHs), polychlorinated diphenyl ethers (PCDEs), polybrominated diphenyl ethers (PBDEs), polychlorinated biphenyls (PCBs), and polychlorinated dibenzo-p-dioxins and dibenzofurans (PCDD/Fs) by elite sportsmen and sportswomen of Catalonia, Spain, was assessed. In 2000, food samples were randomly acquired in various cities of Catalonia. Analysis of the above pollutants were determined according to the appropriate analytical techniques (ICP-MS, HRGC/HRMS, HPLC). In general terms, elite sportsmen and sportswomen showed a higher intake of Cd, Hg, Pb, HCB, PCNs, PCDD/Fs and PAHs than the general population, while it was lower for PCDEs (both sexes), and PCBs and PBDEs (women). According to the FAO/WHO provisional tolerable weekly intake (PTWI) for metals, the WHO tolerable daily intake (TDI) for HCB, and the US EPA's reference dose (RfD) for PAHs, the dietary intakes of environmental pollutants should not mean a potential toxic hazard. However, the WHO-TDI for PCDD/Fs and 'dioxin-like' PCBs is exceeded in sportsmen. The current results indicate that the consumption of those food groups showing the highest contribution to the intake of these pollutants should be diminished. In relation to this, the reduction of the consumption of dairy products and cereals would be important.
Keywords: Metals; Organic pollutants; Dietary intake; Sportsmen/women; Catalonia (Spain)

Melaku Umeta, Clive E. West, Habtamu Fufa, Content of zinc, iron, calcium and their absorption inhibitors in foods commonly consumed in Ethiopia, , Journal of Food Composition and Analysis, Volume 18, Issue 8, December 2005, Pages 803-817, ISSN 0889-1575, DOI: 10.1016/j.jfca.2004.09.008.
(http://www.sciencedirect.com/science/article/B6WJH-4G65NH2-3/2/2dafb583dd2f2a3a5913d999c0265112)
Abstract:
The zinc, iron, calcium, phosphorus, phytate, tannin and moisture content of 36 foods consumed in rural Ethiopia were analysed. The foods analysed included those based on cereals, starchy tubers and roots, and legumes and vegetables as well as some fruits. Although many foods were relatively rich in zinc and iron, many also contained high levels of phytic acid and tannins, which impair bioavailability of zinc and iron. The phytate:zinc molar ratios were >20 for non-fermented cereal foods, >15 for legumes, and <12 for fermented cereals, starchy tubers and roots. Ratios >15 are associated with low bioavailability of zinc. Given the high iron content and the relatively favourable phytate:iron molar ratio, tef enjera was the best source of bioavailable iron of all foods analysed. Foods prepared from tef, enset and kale are rich sources of calcium. The consumption of diets based on cereals and legumes but poor in animal products can lead to deficiencies of zinc and iron. However, since fermentation can decrease the phytate content by a factor of 3-4, traditional household practices such as fermentation need to be encouraged to address the problem of zinc deficiency, which is particularly prevalent in Ethiopia.
Keywords: Zinc; Iron; Calcium; Phosphorus; Phytate; Tannins; Foods; Bioavailability; Ethiopia

Berrit C. Stroehla, Lorraine Halinka Malcoe, Ellen M. Velie, Dietary Sources of Nutrients among Rural Native American and White Children, Journal of the American Dietetic Association, Volume 105, Issue 12, December 2005, Pages 1908-1916, ISSN 0002-8223, DOI: 10.1016/j.jada.2005.09.002.
(http://www.sciencedirect.com/science/article/B758G-4HP5YFV-K/2/01fb1883ee314e0fb8fa41844fadf505)
Abstract: Objective
To identify important food sources of energy, fiber, and major macro- and micronutrients among rural Native American and white children.Design
In a 1997 cross-sectional study, food frequency questionnaire data were collected during in-person interviews with caregivers of young children.Subjects/Setting
Participants included a representative sample of 329 rural Native American and non-Hispanic white children aged 1 through 6 years living in northeastern Oklahoma.Statistical Analyses
The percentage that each of 85 food items contributed to the population intake of 10 dietary constituents was calculated for the total sample and by age and race/ethnicity. Percentages are presented in descending rank order for foods providing at least 2% of the total sample intake. Z scores were used to assess age and racial/ethnic differences in food sources.Results
Primary energy sources among study children were milk, cheese, white breads, salty snacks, nondiet soft drinks, hot dogs, candy, and sweetened fruit drinks. Diets showed poor food variety. With few exceptions (eg, milk, cheese, 100% orange juice, ready-to-eat cereals, peanuts/peanut butter, and dried beans), top sources of most dietary constituents were low-nutrient-dense high-fat foods and refined carbohydrates. Solid fruits and vegetables contributed minimally to nutrient and fiber intake. There were few differences in food sources by age or race/ethnicity.Conclusions
Among rural Native American and white children in northeastern Oklahoma, food sources of nutrients appear less healthful than found in national samples. Sugar-sweetened beverages, high-fat foods, and refined carbohydrates are displacing more nutrient-dense alternatives, increasing children's risk for childhood obesity, type 2 diabetes, and adult chronic disease.

Craig S. Patch, Linda C. Tapsell, Trevor A. Mori, Barbara J. Meyer, Karen J. Murphy, Jackie Mansour, Manny Noakes, Peter M. Clifton, Ian B. Puddey, Lawrence J. Beilin, Geoffrey Annison, Peter R.C. Howe, The Use of Novel Foods Enriched with Long-Chain n-3 Fatty Acids to Increase Dietary Intake: A Comparison of Methodologies Assessing Nutrient Intake, Journal of the American Dietetic Association, Volume 105, Issue 12, December 2005, Pages 1918-1926, ISSN 0002-8223, DOI: 10.1016/j.jada.2005.09.001.
(http://www.sciencedirect.com/science/article/B758G-4HP5YFV-N/2/0343503af4f30af1ad9cb813f213d2e4)
Abstract: Objective
To evaluate the effect of consuming a variety of foods enriched in long-chain n-3 fatty acids in low fish eaters.Design
Evaluation of reported dietary intakes in a 6-month, double-blind, randomized, controlled parallel design trial.Subjects/setting
Eighty-five men and women with overweight and mildly elevated triglyceride levels who have a low habitual intake of fish.Intervention
Subjects were randomized to consume foods either enriched in long-chain n-3 fats or control foods (not enriched). Subjects were asked to consume eight portions per day (equivalent to approximately 1 g/day long-chain n-3 fatty acid if randomized to the intervention).Main Outcome Measure
Reported energy, macronutrient, and fatty acid intakes were measured by diet history, 3-day food records, and body weight.Statistical Analyses
Repeated measures analysis of variance, Kruskall-Wallis test, Pearson's correlation coefficient, and Bland-Altman plots were conducted.Results
The two groups did not differ in mean dietary intake of long-chain n-3 fatty acid intake at baseline (258 mg and 313 mg for the intervention and control groups, respectively). At 6 months the intervention group members increased their intake of long-chain n-3 fats 4.5-fold compared with baseline and with the control group (P<.001). The data from the diet histories correlated well with the food records for all reported macronutrient and fatty acid values. Food pattern analysis showed that milk (13.8%), cereal (12.1%), and bread (11.3%) contributed the most to the overall long-chain n-3 fatty acid intake in the intervention group.Conclusions
This long-term study in free-living subjects indicates that population intakes of long-chain n-3 fatty acids could be substantially increased through the availability of a variety of n-3 fatty acid-enriched processed foods.

Jan Nechwatal, Anna Wielgoss, Kurt Mendgen, Pythium phragmitis sp. nov., a new species close to P. arrhenomanes as a pathogen of common reed (Phragmites australis), Mycological Research, Volume 109, Issue 12, December 2005, Pages 1337-1346, ISSN 0953-7562, DOI: 10.1017/S0953756205003990.
(http://www.sciencedirect.com/science/article/B7XMR-4RS503M-6/2/d6a19d5556ca4d12cb07e1a0dbd38742)
Abstract:
During a study on the occurrence and pathogenicity of oomycetes in the reed-belt (Phragmites australis) of Lake Constance (Germany), a new Pythium resembling the important cereal pathogen species complex P. arrhenomanes/P. graminicola was consistently isolated from necrotic mature reed leaves and reed rhizosphere samples. The new species proved to be significantly more aggressive towards reed leaves and seedlings in vitro than related species. It is characterised by filamentous, inflated sporangia and plerotic oospores with usually more than one antheridium. ITS and cox II sequence data indicate this new species shares a common ancestor with P. arrhenomanes, but the sequence differences are clearly consistent with a divergence of the two taxa and with P. phragmitis being a distinct species. ITS 1 and 2 of 15 isolates of the taxon consistently differed from P. arrhenomanes by 13 positions. Sequence analyses of the cox II gene

confirmed the new species' phylogenetic position. This paper gives a formal description of the taxon as P. phragmitis sp. nov., providing information on morphology, ecology and pathogenicity in comparison to related species. As indicated by the close association to Phragmites australis, the high aggressiveness towards reed leaves and seedlings, and the abundance in the investigated stands, Pythium phragmitis might act as a reed pathogen of considerable importance, in particular under flooding situations.

Philip J. White, Martin R. Broadley, Biofortifying crops with essential mineral elements, Trends in Plant Science, Volume 10, Issue 12, Trends in Plant Science 10th Anniversary Issue - Feeding the World: Plant Biotechnology Milestones, December 2005, Pages 586-593, ISSN 1360-1385, DOI: 10.1016/j.tplants.2005.10.001.
(http://www.sciencedirect.com/science/article/B6TD1-4HGD7GC-1/2/76a061a37046f68b35518398d7eb70b2)
Abstract:
Humans require more than 22 mineral elements, which can all be supplied by an appropriate diet. However, the diets of populations subsisting on cereals, or inhabiting regions where soil mineral imbalances occur, often lack Fe, Zn, Ca, Mg, Cu, I or Se. Traditional strategies to deliver these minerals to susceptible populations have relied on supplementation or food fortification programs. Unfortunately, these interventions have not always been successful. An alternative solution is to increase mineral concentrations in edible crops. This is termed `biofortification'. It can be achieved by mineral fertilization or plant breeding. There is considerable genetic variation in crop species that can be harnessed for sustainable biofortification strategies. Varieties with increased mineral concentrations in their edible portions are already available, and new genotypes with higher mineral densities are being developed.

Marcio dos Santos Azevedo, Katia Regina dos Santos Teixeira, Gudrun Kirchhof, Anton Hartmann, Jose Ivo Baldani, Influence of soil and host plant crop on the genetic diversity of Azospirillum amazonense isolates, Pedobiologia, Volume 49, Issue 6, 30 November 2005, Pages 565-576, ISSN 0031-4056, DOI: 10.1016/j.pedobi.2005.06.008.
(http://www.sciencedirect.com/science/article/B7CW5-4GTWRWD-2/2/0496ce43cc51aa94fadbc41c9e3443f3)
Abstract: Summary
The genetic structure of Azospirillum amazonense populations isolated from the rhizosphere soil and washed and surface-sterilised roots of rice, maize and sorghum plants, cropped simultaneously in two different soils (clay loam and sandy loam) was characterised. Genetic diversity was measured by restriction fragment length polymorphism of the amplified 16S-23S rDNA intergenic spacer region (RISA-RFLP) and cluster analysis. Four genetically distinct clusters of isolates were observed with 78% similarity, suggesting that the A. amazonense population was heterogeneous at the strain level regardless of the soil type or host plant. Analysis of molecular variance (AMOVA) demonstrated that the host plant had a highly significant selective effect on the genetic structure of this species, especially on those isolates intimately associated with them, but also to a lesser extent on isolates from the rhizosphere and washed roots. The soil type also had a highly significant selective effect on A. amazonense genetic diversity, especially for those isolates from the rhizosphere soil. The selective effect of the soil type combined with that of the host plant suggests that environmental factors, such as soil texture and composition of exudates provided by C3 or C4 plants, play major roles in the overall genetic structure of A. amazonense populations associated with these cereals.
Keywords: A. amazonense genetic diversity; Nitrogen-fixing bacteria; RISA-RFLP; Soil type; Host plant; AMOVA

Hege Hovd, Arnfinn Skogen, Plant species in arable field margins and road verges of central Norway, Agriculture, Ecosystems & Environment, Volume 110, Issues 3-4, 1 November 2005, Pages 257-265, ISSN 0167-8809, DOI: 10.1016/j.agee.2005.04.013.
(http://www.sciencedirect.com/science/article/B6T3Y-4GBD7VP-2/2/e4901ff20db071c4f3bc32bbfc039bcd)
Abstract:
Plant species composition and species number were studied in two types of field margins: 31 arable field margins and 33 road verges. Both field margin types were adjacent to intensively managed grass or cereal fields. Effects of eight variables on field margin vegetation were studied. Despite having many plant species in common, composition and species number differed between the two field margin types, due to different ecological conditions and margin management. Arable field margins were composed of tall and/or nutrient demanding ubiquitous species and were characterised by species of later successional stages than those of road verges. The vegetation of road verges was lower and species numbers were higher than in arable field margins. The road verges contained several semi-natural meadow species that are declining in abundance. A CCA ordination of the field margins and the recorded variables showed that plant species composition was significantly affected by thickness of litter, slope, width, moisture level and type of crop in the adjacent field. Number of plant species was significantly higher in mown than unmown margins and generally higher in margins adjacent to fields with mainly grass production than in margins adjacent to fields with mainly cereal crops. In order to preserve botanical diversity in this agricultural landscape, the maintenance of regularly mown road verges should be prioritized.
Keywords: Field margins; Plant species composition; Species numbers; Land-use; Management

M.A. Keyzer, M.D. Merbis, I.F.P.W. Pavel, C.F.A. van Wesenbeeck, Diet shifts towards meat and the effects on cereal use: can we feed the animals in 2030?, Ecological Economics, Volume 55, Issue 2, 1 November 2005, Pages 187-202, ISSN 0921-8009, DOI: 10.1016/j.ecolecon.2004.12.002.
(http://www.sciencedirect.com/science/article/B6VDY-4FN76SB-2/2/094b2125c50107143bca20f185213fb0)
Abstract:
The paper argues that current international projections of meat and feed demand may underestimate future consumption patterns, for mainly two reasons: demand projections are based on income extrapolation with an assumed demand elasticity and feed requirements per unit of meat are taken to be fixed. Instead, we propose a structural specification that includes a dietary shift towards meat as per capita income increases, and we account for a shift from traditional to cereal intensive feeding technologies. Our finding is that under the commonly assumed growth rates of per capita income, world cereal feed demand will be significantly higher in the coming 30 years than is currently projected by international organizations, even if we allow for price effects. Compared to other factors that are generally expected to affect the future world food situation, the quantitative impact of the increased cereal feed demand greatly exceeds that of GMOs and climate change in the coming three decades.
Keywords: Food consumption pattern; Meat demand; Dietary change; Cereal feed demand; Land use

G. Dongowski, B. Drzikova, B. Senge, R. Blochwitz, E. Gebhardt, A. Habel, Rheological behaviour of [beta]-glucan preparations from oat products, Food Chemistry, Volume 93, Issue 2, November 2005, Pages 279-291, ISSN 0308-8146, DOI: 10.1016/j.foodchem.2004.08.051.
(http://www.sciencedirect.com/science/article/B6T6R-4F02M1T-C/2/ec09d8dfd98a089bd10d7ba414da5912)
Abstract:

The cereal dietary fibre [beta]-glucan has outstanding functional and nutritional properties, because of its viscosity in aqueous systems and in the intestinal tract. The rheological behaviour of [beta]-glucan (concentrations: 2% and 4%) isolated from extruded and autoclaved oat meal and from oat bran was evaluated using oscillatory and rheological measurements. In frequency sweep, the storage and loss moduli G' and G'' of [beta]-glucan preparations from extruded meal and from bran increased continuously with increasing frequency, showing a dominantly viscous behaviour. With increasing frequency, the elastic properties improved. [beta]-Glucan from autoclaved meal also showed elastic behaviour. With the exception of [beta]-glucan from autoclaved meal, G' and G'' were not influenced by deformation in the amplitude sweep. Complex viscosities decreased with frequency (in all samples) and were independent of deformation (in extruded meal and bran). In shear experiments, [beta]-glucan solutions were structurally viscous non-Newtonian solutions with rheostable behaviour. [beta]-Glucan (2%) from bran had the highest and that from autoclaved meal had the lowest apparent and process viscosities. Fluid dynamic parameters may influence the flow, diffusion or transport behaviour of [beta]-glucan during digestion processes in the small intestine, but the influence of the viscous behaviour is limited.
Keywords: [beta]-Glucan; Rheology; Flow behaviour; Oscillation test; Oat meal; Oat bran

K.O. Adebowale, T.A. Afolabi, B.I. Olu-Owolabi, Hydrothermal treatments of Finger millet (Eleusine coracana) starch, Food Hydrocolloids, Volume 19, Issue 6, November 2005, Pages 974-983, ISSN 0268-005X, DOI: 10.1016/j.foodhyd.2004.12.007.
(http://www.sciencedirect.com/science/article/B6VP9-4FGXS6X-2/2/4d70379161b29aa3c99fac2c5009cd2d)
Abstract:
The effect of hydrothermal treatments on the properties of Finger millet starch was investigated. Finger millet was modified by heat-moisture treatment, HMT at 100 [degree sign]C, 16 h; 20% moisture level (MHT-20), 25% moisture level (MHT-25) and 30% moisture level (MHT-30) and annealed, ANN at 50 [degree sign]C for 48 h (MAN). Results of the pasting characteristics shows that MNS and MAN were indicative of type `B' starch which is characteristic of normal cereal starches, while HMT starches were Type `C' which is characteristics of cross-linked or legume starches. MNS belonged to the type `A' pattern of cereal starches. X-ray diffractometry studies (XRD) show that MNS gave strong peaks centered at 23.5, 20.3, 18.2, 17.15, and 15.15 A, while HMT and ANN starches retained the typical `A' pattern. Scanning electron microscopy (SEM) studies show that the shape and surface characteristics of the starches were irregular, polygonal-shaped granules, with less than 1% cavity or ruptured granules. Modification did not affect the appearance. All the starches swell as the temperature increased in the order MNS>MAN>MHT-20>MHT-25>MHT-30, and solubilized at different rate in the following order: MHT-30>MHT-20>MHT-25>MAN>MNS. The gelation profile of the starches ranged from 4 to 8% (w/v), while its oil and water absorption capacity ranged from 1.90 to 2.50 and 2.75 to 3.25 g/g, respectively.
Keywords: Hydrothermal treatments; Heat-moisture treatment; Annealing; Finger millet (Eleusine coracana); Functional properties

J.A. Gerrard, K.H. Sutton, Addition of transglutaminase to cereal products may generate the epitope responsible for coeliac disease, Trends in Food Science & Technology, Volume 16, Issue 11, November 2005, Pages 510-512, ISSN 0924-2244, DOI: 10.1016/j.tifs.2005.07.002.
(http://www.sciencedirect.com/science/article/B6VHY-4GWBDVC-3/2/9a3632b0dfcc9612da7f15d4801756a2)
Abstract:
Transglutaminase is a crosslinking enzyme that is being used more extensively in foods and has been widely accepted as a processing aid. We, and others, have reported the use of transglutaminase in the baking industry to improve the functional properties of bread, pastry and croissant dough. Early work suggested that transglutaminase may reduce the allergenicity of

wheat flour. However, recent research into the molecular mechanism of coeliac disease suggests the disturbing possibility that transglutaminase in baked products may act upon gliadin proteins in dough to generate the epitope associated with the coeliac response. Further work is urgently required to assess this possibility. In the meantime, we do not recommend the use of transglutaminase in baked products.

Xin Mei Feng, Anders R.B. Eriksson, Johan Schnurer, Growth of lactic acid bacteria and Rhizopus oligosporus during barley tempeh fermentation, International Journal of Food Microbiology, Volume 104, Issue 3, 25 October 2005, Pages 249-256, ISSN 0168-1605, DOI: 10.1016/j.ijfoodmicro.2005.03.005.
(http://www.sciencedirect.com/science/article/B6T7K-4GG8VDM-2/2/4e9a0d0b82e26468bd12d5bfc9437f10)
Abstract:
The zygomycete Rhizopus oligosporus is traditionally used to ferment soybean tempeh, but it is also possible to ferment other legumes and cereals to tempeh. The traditional soybean tempeh harbours a multitude of microorganisms with potentially beneficial or detrimental effects on quality. Lactic acid bacteria (LAB) have positive effects on the safety of soybean tempeh, but the effects of LAB on R. oligosporus growth have not been investigated. We have developed a cereal grain tempeh by fermenting pearled barley with R. oligosporus ATCC 64063. Four LAB species, Lactobacillus plantarum, Lactobacillus fermentum, Lactobacillus reuteri and Lactococcus lactis were assessed for their growth abilities and their effects on R. oligosporus growth during barley tempeh fermentation. Growth of LAB was assayed as colony forming units (cfu), while growth of R. oligosporus was measured as ergosterol content and hyphal length. The two fungal measurements highly correlated ($r = 0.83$, $P < 0.001$, $n = 90$). The ergosterol content of fungal mycelia ranged from 11.7 to 30.1 mg/g fungal dry matter. L. plantarum multiplied from 4.8 to 7.4 log cfu/g dry tempeh and L. fermentum increased from 4.4 to 6.8 log cfu/g during 24 h incubation at 35 [degree sign]C. L. reuteri and L. lactis had significantly slower growth, with increases from 4.8 to 5.6 log cfu/g and 5.0 to 5.4 log cfu/g, respectively. The growth of R. oligosporus and the final pH (4.9) in barley tempeh were not significantly influenced by any of the LAB investigated.
Keywords: Ergosterol; Hyphal length; Lactobacillus plantarum; Tempe; Fungal biomass

David Serrano, Carlos Astrain, Microhabitat use and segregation of two sibling species of Calandrella larks during the breeding season: Conservation and management strategies, Biological Conservation, Volume 125, Issue 3, October 2005, Pages 391-397, ISSN 0006-3207, DOI: 10.1016/j.biocon.2005.04.010.
(http://www.sciencedirect.com/science/article/B6V5X-4G7GFRF-2/2/0029237a08cd8066c458c395df54c12e)
Abstract:
Although agricultural policies have led to a substantial transformation of pseudo-steppes in Spain, little is known about the habitat use of avian species occupying patches with natural vegetation cover. We studied the microhabitat preferences and segregation of two sibling species of declining larks, the lesser short-toed (Calandrella rufescens) and the short-toed lark (Calandrella brachydactyla). We developed occurrence models by comparing nest-site, feeding and singing points with random points in an area where the two species coexist, as well as carrying out discriminant function analyses to investigate patterns of habitat segregation. Lesser short-toed larks systematically occurred in areas with greater percentages of short Suaeda plants and bare ground than expected by chance, suggesting strict habitat requirements. Short-toed larks used areas with greater percentages of short Salsola plants for nesting, less cereal for feeding, and more short Artemisa plants for singing, but the models for this species had a poor explanatory power. These results, besides the fact that the discriminant function analyses mainly included variables already identified in the occurrence models for lesser short-toed larks, suggest that

short-toed larks are more generalist in their habitat requirements, explaining their broader distribution and larger population size at a regional scale. Our results emphasize that vegetation community types are not redundant, but are complementary to habitat structure, so they should be taken into account in management strategies for steppe birds. Conservation guidelines for steppe birds should therefore consider microhabitat preferences, rather than natural vegetation cover as a unique category, to improve the effectiveness of management actions.
Keywords: Calandrella brachydactyla; Calandrella rufescens; Habitat use; Segregation; Pseudo-steppe; Steppe birds

E.F. Kristensen, S. Elmholt, U. Thrane, High-temperature Treatment for Efficient Drying of Bread Rye and Reduction of Fungal Contaminants, Biosystems Engineering, Volume 92, Issue 2, October 2005, Pages 183-195, ISSN 1537-5110, DOI: 10.1016/j.biosystemseng.2005.06.004.
(http://www.sciencedirect.com/science/article/B6WXV-4GWBF0X-2/2/bfa1252cb06c359bdb5d72792f03ad7b)
Abstract:
Mycotoxin-producing fungi are natural contaminants of cereals and their toxins are harmful to humans and animals. Ochratoxin A (OTA) is among the most important. Heat treatment by drum drying does not eliminate already formed mycotoxins but the technique can reduce the number of viable fungi on the grain. The aim of this study was to establish a drying regime that kills fungal propagules on rye without reducing its quality for baking. Special attention was paid to some important mycotoxin-producing species. As drying temperatures and retention time in the drum are essential, the drum drier must be equipped with an effective control unit. Two different control systems were tested. The results showed that fungi colonising the grain can be much more efficiently and precisely reduced by controlling the maximum grain temperature (MGT) than the fixed constant drying air temperature (FAT). Drum drying very efficiently reduced the fungal propagules colonising the grain, including the mycotoxin-producing Penicillium verrucosum, Fusarium avenaceum, F. culmorum, F. poae, F. sporotrichioides and F. tricinctum. Both temperature and retention time in the drum affected survival rate of the fungi. Using MGT, a retention time of 10[middle dot]5 min and a temperature of 64 [degree sign]C killed 99% of the yeast propagules and 98% of the filamentous fungi. Moisture contents were reduced to about 12%. A similar drying regime in a supplementary trial reduced the number of P. verrucosum contaminated kernels from more than 70% to 12% but confirmed that drum drying did not destroy already formed OTA. The combination of a high drying capacity and a short but efficient heat treatment was obtained by drum drying as opposed to on-floor, batch and ordinary continuous flow drying, and it reduced the risk of mould deterioration to almost zero when the grain was properly stored afterwards. At the same time a high quality for baking was maintained. The highest baking quality in rye was obtained at grain temperatures of about 62 [degree sign]C and only at grain temperatures above 70 [degree sign]C visual quality changes were detected.

R. Ioos, A. Belhadj, M. Menez, A. Faure, The effects of fungicides on Fusarium spp. and Microdochium nivale and their associated trichothecene mycotoxins in French naturally-infected cereal grains, Crop Protection, Volume 24, Issue 10, October 2005, Pages 894-902, ISSN 0261-2194, DOI: 10.1016/j.cropro.2005.01.014.
(http://www.sciencedirect.com/science/article/B6T5T-4FNW4CY-1/2/19ef74ab7b2f96ed53a6953f642fa7c8)
Abstract:
Chemicals applied to wheat at the flowering stage are used to reduce yield losses associated with Head Blight (HB) and trichothecene contamination of infected grains. Efficacy of fungicide treatments at anthesis were assessed against Fusarium spp. (Fusarium graminearum, F. avenaceum, F. poae, F. culmorum and F. tricinctum were the most frequent Fusarium species) and Microdochium nivale and on Fusarium mycotoxin concentration over three years on naturally

infected fields of soft wheat, durum wheat and barley. Deoxynivalenol (DON) and nivalenol (NIV) were the most frequently detected mycotoxins. Treatments including azoxystrobin significantly decreased M. nivale infection levels, while infection levels of F. graminearum and F. culmorum were unaffected. Treatments that included metconazole or tebuconazole significantly decreased F. graminearum or F. culmorum infection levels, but the effect was variable across the years and type of fungicide applied. In 2002, DON concentration in wheat treated with tebuconazole and metconazole was reduced by 46% and 48%, respectively, while NIV concentration was unaffected. Yet, in 2000 and 2001, significant reduction in F. graminearum or F. culmorum infection levels were not always associated with significant reductions in DON and NIV mycotoxins. The fungicides we applied in naturally infected fields did not always reduce mycotoxin producers or alternatively the trichothecenes produced. Different explanations for this phenomenon are discussed.
Keywords: Fusarium graminearum; Fusarium culmorum; HB; Deoxynivalenol; Nivalenol

J. Berntsen, B.M. Petersen, J.E. Olesen, J. Eriksen, K. Soegaard, Simulation of residual effects and nitrate leaching after incorporation of different ley types, European Journal of Agronomy, Volume 23, Issue 3, October 2005, Pages 290-304, ISSN 1161-0301, DOI: 10.1016/j.eja.2005.01.004.
(http://www.sciencedirect.com/science/article/B6T67-4FW7MFS-1/2/f1c59eaa855653c7fdbdd7b8a1779baa)
Abstract:
The FASSET farm model was used to simulate production in an experiment, where a grass-clover or a grass ley was either cut or grazed with dairy cows receiving low or high N supplements. The six different ley types were ploughed in and followed by 3 years with spring cereals with undersown catch crops.
The original model was extended with a new grass and clover model, which included the capability to simulate rhizodeposition and root growth. The new model predicted the observed annual carbon (C) and nitrogen (N) production satisfactorily. The simulated first year residual effects of cut grass or grass-clover ley varied between 0 and 34, while the residual effect of a grazed grass or grass-clover ley varied between 71 and 150 fertilizer equivalents (kg N ha-1). Second and third year residual effects of the grazed leys were ca. 40 and 9 fertilizer equivalents, respectively, while the residual effects of the cut leys were ca. 5 and 3 fertilizer equivalents.
The effects of the different treatments on nitrate leaching were simulated quite satisfactorily. However, there was a deviation between the simulated and observed absolute level and timing of nitrate concentrations in suction cups. Scenario analysis showed that this partly could be explained by problems with refractory soil organic matter and gross nitrogen mineralization in soils with high C:N ratios.
Keywords: Dynamic simulation; FASSET; Grass-clover; Ley; Model; Nitrate leaching; Pasture; Residual effect

E. Erhart, W. Hartl, B. Putz, Biowaste compost affects yield, nitrogen supply during the vegetation period and crop quality of agricultural crops, European Journal of Agronomy, Volume 23, Issue 3, October 2005, Pages 305-314, ISSN 1161-0301, DOI: 10.1016/j.eja.2005.01.002.
(http://www.sciencedirect.com/science/article/B6T67-4FVJC1G-1/2/2aacdb5199a46e8efc0cc2ad9dbb4170)
Abstract:
Organic wastes should be recycled from an ecological as well as from an economical point of view. To integrate compost into the crop rotation, however, the availability of nutrients should be known. Therefore, when municipal composting operations attained a large scale in Vienna in 1992, the present field trial was set up to investigate the performance of the biowaste compost in agriculture on a fertile soil under relatively dry climatic conditions, as is typical for eastern Austria.

This paper presents the yields and crop quality results of the first 10 years. The experiment included three treatments with compost fertilization (9, 16 and 23 t ha-1 year-1 fresh matter (f.m.) on average of 10 years), three treatments with mineral nitrogen fertilization (25, 40.5 and 55.9 kg N ha-1 year-1 on average), five treatments with combined fertilization and an untreated control in a latin rectangle design with a practical local crop sequence.
The yield in the compost treatments increased for 8%, 7% and 10% compared to the unfertilized control (average of 10 years). Yield response to the compost applications was very low in the beginning and increased slightly with the duration of the experiment. This is likely due to the dry climatic conditions (552 mm precipitation), to the average C/N ratio of 23 in the composts used, and the high level of fertility of the Fluvisol on the site. The analysis of the yield components of the cereals showed that the plants in the compost treatments were sufficiently supplied with nitrogen in the early growth stages and after pollination, but at booting, when N-uptake is highest, the N-supply in the compost treatments was comparable to that with mineral fertilization at up to 30 kg N ha-1. Crop quality was not affected by compost fertilization, but in some cases even improved. The results suggest that on fertile soils in the pannonic climate the fertilizer effect of biowaste compost is small, but increasing with time. The yields as well as the results concerning nitrogen availability during the vegetation period and crop quality show that the compost acted as a slow-release source of nitrogen on a medium level.
Keywords: Biowaste compost; Yield; Nitrogen supply; Crop quality

Erland Brathen, Svein Halvor Knutsen, Effect of temperature and time on the formation of acrylamide in starch-based and cereal model systems, flat breads and bread, Food Chemistry, Volume 92, Issue 4, October 2005, Pages 693-700, ISSN 0308-8146, DOI: 10.1016/j.foodchem.2004.08.030.
(http://www.sciencedirect.com/science/article/B6T6R-4DXT7X6-3/2/d673503bd32c3ad9344b265abe7268ca)
Abstract:
Dry starch systems, containing varying amounts of asparagine and glucose, freeze-dried rye-based flat bread doughs, flat bread and bread, were baked at varying temperatures and times according to central composite designs. In the starch-based model system the amount of acrylamide went through a maximum when the level of asparagine increased. No such maximum was found for glucose. In the starch system, freeze-dried flat bread doughs and flat breads, the amount of acrylamide formation went through a maximum at approximately 200 [degree sign]C, depending on the system and the baking time. The amount of acrylamide was reduced at long baking times. However, in bread crust, the amount of acrylamide increased with both baking time and temperature in the interval tested.
Keywords: Acrylamide; Cereal products; Asparagine; Glucose; Heating time; Temperature

Alexander Prange, Barbara Birzele, Johannes Kramer, Anja Meier, Hartwig Modrow, Peter Kohler, Fusarium-inoculated wheat: deoxynivalenol contents and baking quality in relation to infection time, Food Control, Volume 16, Issue 8, 7th Karlsruhe Nutrition Congress on Food Safety, October 2005, Pages 739-745, ISSN 0956-7135, DOI: 10.1016/j.foodcont.2004.06.013.
(http://www.sciencedirect.com/science/article/B6T6S-4D1R2HT-8/2/11c1f6f1263bd196bb1e91e73bfceada)
Abstract:
Cereals contaminated by Fusarium spp. and their mycotoxins, e.g. deoxynivalenol (DON), are not only a risk to human and animal health but also show reduced technological properties. This study examines the influence of high Fusarium infection levels of wheat on its baking quality in relation to infection time. Nearly uninfected wheat, wheat inoculated with a spore-mixture of different Fusarium spp. at the time of flowering, and wheat inoculated with spores of Fusarium graminearum at different growth stages were investigated. Extension and baking tests, HPLC

analyses of gluten proteins, and DON determination were performed as well as X-ray absorption spectroscopy to analyse the sulfur speciation of gluten proteins on a molecular level. Our results indicate that high Fusarium infection levels accompanied with high DON contents did not necessarily deteriorate baking quality. This finding was independent of infection time.
Keywords: Fusarium; Baking quality; Micro-scale rheology; Deoxynivalenol (DON); XANES spectroscopy

A.J. Borderias, I. Sanchez-Alonso, M. Perez-Mateos, New applications of fibres in foods: Addition to fishery products, Trends in Food Science & Technology, Volume 16, Issue 10, October 2005, Pages 458-465, ISSN 0924-2244, DOI: 10.1016/j.tifs.2005.03.011.
(http://www.sciencedirect.com/science/article/B6VHY-4G65V4W-1/2/8613b0906712ec3cd88afeefa0c75256)
Abstract:
Seafoods possess high nutritional value and moreover offer functional properties. However, fish products do not contain fibre. Fibre is an essential compound in the diet, which has health benefit effects in certain disorders. At the same time, dietary fibres can be an effective tool in seafood processing for improving functional properties such as water binding, gelling, etc. This paper offers a general view of the role of dietary fibres in a food system and discusses the technological and functional roles of different types of fibres of vegetable origin (cereal, fruits) and animal origin (chitosan), with different characteristics, when they are used as ingredients in the development of restructured fish products.

M. Tafaj, Q. Zebeli, B. Junck, H. Steingass, W. Drochner, Effects of particle size of a total mixed ration on in vivo ruminal fermentation patterns and inocula characteristics used for in vitro gas production, Animal Feed Science and Technology, Volumes 123-124, Part 1, The in vitro Gas Production Technique: Limitations and Opportunities, 30 September 2005, Pages 139-154, ISSN 0377-8401, DOI: 10.1016/j.anifeedsci.2005.04.032.
(http://www.sciencedirect.com/science/article/B6T42-4GBD6PG-3/2/f7fe086b5b7de211b943c36061473ddc)
Abstract:
The objective was to investigate effects of particle size (PL) of a total mixed ration (TMR) on in vivo ruminal fermentation patterns and characteristics of the inocula used for in vitro gas production. A 3 x 3 randomized block design was used with three ruminally cannulated Holstein cows (640 kg BW, 63 DIM, 36 kg milk/d) fed ad libitum with TMR diets consisting of 450 g/kg grass silage (GS) with three PL levels (25, 11 and 5.5 mm), 500 g/kg cereal-based concentrate mixture and 50 g/kg of long hay. Replicates of samples of solid digesta from the dorsal (SRF-T) and ventral (SRF-B) rumen and free fluid (FRL) samples were collected 1 h before and 2, 8 and 12 h after the morning feeding. Samples were analyzed for pH and short chain fatty acids (SCFA), thiamine and protozoa concentrations. The same digesta collected 1 h before the morning feeding was used as inoculum for in vitro incubation in a gas test, and the gas production (GP) profile of all TMR were determined. The SCFA concentration of SRF-T increased with reduction of PL of TMR ($P < 0.05$), but that of FLR decreased ($P < 0.05$). There was no effect of PL of TMR on SCFA concentration in SRF-B. Reducing the PL of TMR to 5.5 mm decreased ruminal pH and the acetate: propionate ratio 1 h prior to the morning feeding ($P < 0.05$), while 11 mm did not affect ruminal pH. Ruminal protozoa numbers increased by reducing the PL to 11 mm. These effects of PL on the ruminal milieu are also reflected in the digestive characteristics of inocula used for in vitro incubation. The inocula of SRF-T collected from cows fed TMR of 11 and 5.5 mm PL increased in vitro GP of blank and substrate (TMR) in comparison to the 25 mm PL treatment. GP positively correlated with concentrations of SCFA and thiamine, and negatively to pH of the ruminal digesta in vivo, 2 h after incubation and feeding ($P < 0.05$) only (i.e. at the start of

fermentation of feed). Studies are needed to explain effects of PL reduction on microbial activity in vivo and in vitro.
Keywords: Particle size; TMR; Gas production; Rumen fermentation; Dairy cows

A. Hamdy, V. Sardo, K.A. Farrag Ghanem, Saline water in supplemental irrigation of wheat and barley under rainfed agriculture, Agricultural Water Management, Volume 78, Issues 1-2, Special Issue on Advances in Integrated Management of Fresh and Saline Water for Sustainable Crop Production: Modeling and Practical Solutions, 15 September 2005, Pages 122-127, ISSN 0378-3774, DOI: 10.1016/j.agwat.2005.04.017.
(http://www.sciencedirect.com/science/article/B6T3X-4GBWJD7-1/2/4898dec96ee61ebd6bf0b0fc71c4c02d)
Abstract:
In the Mediterranean climate, rainfed cereal crops are planted in autumn and harvested in late spring, relying on the rains during this period for the conclusion of their cycle; the vagaries of rains, however, often put at risk the final harvest. The present research was aimed at investigating the possibility of applying supplemental irrigation to wheat and barley during their sensitive phenophases of flowering and seed formation using brackish water with salinity levels generally considered too high for its use (EC of 3-9 dS/m). Results showed the possibility of securing high yields, with mean reductions of only 21% in barley and 25% in wheat compared to the fully, fresh-water irrigated control, through the application of limited amounts of brackish water. The sustainability of the practice is presumably high, due to the limited amounts of added salts, which can be easily leached out even by a modest precipitation.
Keywords: Supplemental irrigation; Wheat; Barley; Brackish water

Tigst Demeke, Randy M. Clear, Susan K. Patrick, Don Gaba, Species-specific PCR-based assays for the detection of Fusarium species and a comparison with the whole seed agar plate method and trichothecene analysis, International Journal of Food Microbiology, Volume 103, Issue 3, 15 September 2005, Pages 271-284, ISSN 0168-1605, DOI: 10.1016/j.ijfoodmicro.2004.12.026.
(http://www.sciencedirect.com/science/article/B6T7K-4FHJGD8-D/2/0a2f2ce51eaeb8f6074ba86aacc6073b)
Abstract:
Species-specific PCR was used for the identification of nine Fusarium species in pure mycelial culture. A PCR-based method was compared with the whole seed agar plate method and trichothecene analysis for three toxin-producing Fusarium species using 85 grain samples of wheat, barley, oat, corn and rye. A simple SDS-based DNA extraction system followed by potassium acetate precipitation resulted in consistent PCR amplification of DNA fragments from cultures and grain samples. The species-specific PCR assays correctly identified pure cultures of Fusarium avenaceum ssp. avenaceum (9 isolates), Fusarium acuminatum ssp. acuminatum (12 isolates), Fusarium crookwellense (7 isolates), Fusarium culmorum (12 isolates), Fusarium equiseti (11 isolates), Fusarium graminearum (77 isolates), Fusarium poae (10 isolates), Fusarium pseudograminearum (23 isolates), and Fusarium sporotrichioides (10 isolates). Multiplex PCR was developed for the simultaneous detection of F. culmorum, F. graminearum and F. sporotrichioides, the three most important trichothecene producing species in Canada. In grain samples, results of PCR assays for these same three species related well with whole seed agar plate method results and determination of Fusarium trichothecenes. The PCR assay described in this study can be used for routine detection and identification of Fusarium spp. in Canada.
Keywords: F. graminearum; deoxynivalenol; Identification; Cereal grains; Multiplex PCR; Mycotoxins

R.K. Rattan, S.P. Datta, P.K. Chhonkar, K. Suribabu, A.K. Singh, Long-term impact of irrigation with sewage effluents on heavy metal content in soils, crops and groundwater--a case study,

Agriculture, Ecosystems & Environment, Volume 109, Issues 3-4, 1 September 2005, Pages 310-322, ISSN 0167-8809, DOI: 10.1016/j.agee.2005.02.025.
(http://www.sciencedirect.com/science/article/B6T3Y-4G002FC-1/2/3a246ff485013711d6aedaab4fdee22d)
Abstract:
There is a gradual decline in availability of fresh water to be used for irrigation in India. As a consequence, the use of sewage and other industrial effluents for irrigating agricultural lands is on the rise particularly in peri-urban areas of developing countries. On the other hand, there is increasing concern regarding the exceedance of statutory and advisory food standards for trace metals throughout the world. Hence, a case study was undertaken to assess the long-term effect of sewage irrigation on heavy metal content in soils, plants and groundwater. For this purpose, peri-urban agricultural lands under Keshopur Effluent Irrigation Scheme (KEIS) of Delhi, India were selected where various cereals, millets, vegetable and fodder crops have successfully been grown. Sewage effluents, ground water, soil and plant samples were collected and analysed mainly for metal contents. Results indicated that sewage effluents contained much higher amount of P, K, S, Zn, Cu, Fe, Mn and Ni compared to groundwater. While, there was no significant variation in Pb and Cd concentrations in these two sources of irrigation water and metal content were within the permissible limits for its use as irrigation water. There was an increase in organic carbon content ranging from 38 to 79% in sewage-irrigated soils as compared to tubewell water-irrigated ones. On an average, the soil pH dropped by 0.4 unit as a result of sewage irrigation. Sewage irrigation for 20 years resulted into significant build-up of DTPA-extractable Zn (208%), Cu (170%), Fe (170%), Ni (63%) and Pb (29%) in sewage-irrigated soils over adjacent tubewell water-irrigated soils, whereas Mn was depleted by 31%. Soils receiving sewage irrigation for 10 years exhibited significant increase in Zn, Fe, Ni and Pb, while only Fe in soils was positively affected by sewage irrigation for 5 years. Among these metals, only Zn in some samples exceeded the phytotoxicity limit. Fractionation study indicated relatively higher build-up of Zn, Cu, Fe and Mn in bioavailable pools of sewage-irrigated soils. By and large, tissue metal concentrations in all the crops were below the generalized critical levels of phytotoxicity. Based on the soil to plant transfer ratio (transfer factor) of metals, relative efficiency of some cereals, millet and vegetable crops to absorb metals from sewage and tubewell water-irrigated soils was worked out. Risk assessment in respect of metal contents in some vegetable crops grown on these sewage-irrigated soils indicated that these vegetables can be consumed safely by human.
Keywords: Long-term sewage irrigation; Heavy metals; Soils; Groundwater; Crops; Hazard quotient

B. Svihus, A.K. Uhlen, O.M. Harstad, Effect of starch granule structure, associated components and processing on nutritive value of cereal starch: A review, Animal Feed Science and Technology, Volume 122, Issues 3-4, 1 September 2005, Pages 303-320, ISSN 0377-8401, DOI: 10.1016/j.anifeedsci.2005.02.025.
(http://www.sciencedirect.com/science/article/B6T42-4G7NF76-1/2/178baffdcd9acb777c40bb2f3cc551e4)
Abstract:
Starch is organized in concentric alternating semi-crystalline and amorphous layers in granules of various sizes within the endosperm. The amount of amylose in starch normally varies between 200 and 300 g/kg, but waxy cereals may contain negligible amounts and starch from high-amylose varieties may contain up to 700 g amylose/kg. High amylose content is associated with reduced digestibility. Fat and protein are found on the surface of starch granules, and these components may act as physical barriers to digestion. Heat treatment with sufficient water present will cause gelatinisation that will increase susceptibility for starch degradation in the digestive tract, although a linear relationship between extent of gelatinisation due to processing and digestibility has not been found. The low water content during feed processing limits the extent of gelatinisation, but

gelatinisation temperature and extent of gelatinisation will be affected by properties of the starch, which in turn may affect digestibility. The effect of starch properties and feed processing on digestion in non-ruminant animals and ruminants are discussed.
Keywords: Starch digestibility; Wheat; Barley; Oats; Maize; Sorghum; Pelleting; Extrusion

A. de Toro, Influences on Timeliness Costs and their Variability on Arable Farms, Biosystems Engineering, Volume 92, Issue 1, September 2005, Pages 1-13, ISSN 1537-5110, DOI: 10.1016/j.biosystemseng.2005.06.007.
(http://www.sciencedirect.com/science/article/B6WXV-4GWC11H-3/2/2f8c2f884585ec0920b9e7cff5e26201)
Abstract:
The objective of this study was to analyse the influence of daily weather on timeliness costs of field machinery on cereal farms in Sweden while varying its size, number of drivers, farm size and location. A discrete event simulation model with the capability to simulate daily field operations on a farm for a series of years was linked to a soil model to infer daily soil workability. Completion dates of operations for individual fields and years were utilised to quantify annual timeliness costs in detail for 15 or 20 yr.
Timeliness costs were an important part of total costs and `least-cost' sets, i.e. those sets with the lowest sum of specific machinery+labour+timeliness costs, were situation-specific, they varied from a low value to more than [euro]150 ha-1. Within certain limits of machinery capacity and for a given farm, there was not only one set identified as the `least-cost' set but several. Sets with high daily effective field capacity showed low annual variation in timeliness costs; the effects of decreasing capacity on timeliness costs were not linear because an increasing number of fields were left uncultivated or partially cultivated, making timeliness costs difficult to predict. The machinery set to be selected should be the largest one among those with similar `least-cost' on account of its lower annual variation, which in turn should lead to lower risks.

Anne Molinie, Virginie Faucet, Marcel Castegnaro, Annie Pfohl-Leszkowicz, Analysis of some breakfast cereals on the French market for their contents of ochratoxin A, citrinin and fumonisin B1: development of a method for simultaneous extraction of ochratoxin A and citrinin, Food Chemistry, Volume 92, Issue 3, September 2005, Pages 391-400, ISSN 0308-8146, DOI: 10.1016/j.foodchem.2004.06.035.
(http://www.sciencedirect.com/science/article/B6T6R-4D7K2R3-3/2/588d15e12ca00d6679d6753d9f349a45)
Abstract:
Crops may be contaminated by mycotoxins which can persist in the final products. Forty-five breakfast cereals were collected in French supermarkets. Ochratoxin A (OTA) and citrinin (CIT) were simultaneously extracted by a new method based on solvent partition validated in-house. The recoveries were over 80% for CIT and OTA. Fumonisin B1 (FB1) was analysed by an IUPAC method. The recoveries for FB1 ranged from 50% to 70%, depending on the matrix. The losses were located at the step of immunoaffinity clean-up.
OTA was detected in 69% of the samples; 20% of them were above the EU limit of 3 [mu]g/kg. Twenty percent contained CIT (1.5-42 [mu]g/kg). FBs were detected, not only in cornflakes, but also in products containing oats or rice, in the range 1-1110 [mu]g/kg. Some samples were contaminated by all three mycotoxins.
Keywords: Mycotoxins; Ochratoxin A; Citrinin; Fumonisins; Analytical method; Breakfast cereal

C. Araguas, E. Gonzalez-Penas, A. Lopez de Cerain, Study on ochratoxin A in cereal-derived products from Spain, Food Chemistry, Volume 92, Issue 3, September 2005, Pages 459-464, ISSN 0308-8146, DOI: 10.1016/j.foodchem.2004.08.012.

(http://www.sciencedirect.com/science/article/B6T6R-4DS6VB1-8/2/e7bc99fba3993e436c33d41be6ecbb97)
Abstract:
A study on ochratoxin A (OTA) in cereal-derived products was carried out. Cereal-based baby foods, breakfast cereals and beers were analyzed for mycotoxin OTA using an in-house developed high-performance liquid-chromatographic method.
OTA was detected in 19 of the 21 samples of breakfast cereals (limit of detection 0.066 [mu]g/kg), in 14 of the 20 samples of cereal-based baby foods (limit of detection 0.035 [mu]g/kg) and in 24 of the 31 samples of beer (limit of detection 0.012 [mu]g/l). The mean concentrations of OTA found were the following: 0.265 [mu]g/kg in breakfast cereals, 0.187 [mu]g/kg in cereal-based baby food and 0.044 [mu]g/l in beer. The influence of different factors, such as the fibre content in breakfast cereals, type of cereals used in cereal-based baby food and alcohol content in beer, on the OTA levels was studied.
Keywords: Mycotoxins; Ochratoxin A; OTA; HPLC; Cereals; Cereal-based baby food; Breakfast cereals; Beer

D. Every, K.H. Sutton, P.R. Shewry, A.S. Tatham, T. Coolbear, Specificity of action of an insect proteinase purified from wheat grain infested by the New Zealand wheat bug, Nysius huttoni, Journal of Cereal Science, Volume 42, Issue 2, September 2005, Pages 185-191, ISSN 0733-5210, DOI: 10.1016/j.jcs.2005.04.003.
(http://www.sciencedirect.com/science/article/B6WHK-4GK1BNR-1/2/e8f53f07f7c62343aeebc5e6ddc43341)
Abstract:
A salivary proteinase from the New Zealand wheat bug (Nysius huttoni) was partially purified and analysed for substrate specificity by a variety of techniques on the following proteins: wheat, rye, barley and corn proteins, haemoglobin, bovine serum albumin, cytochrome c, cytochrome c oxidase, elastin, collagen, gelatine, keratin (hide powder), fibrin, azo-casein, [alpha]-casein, [beta]-casein and [kappa]-casein. The only proteins substantially hydrolysed (> 50%) by Nysius-proteinase were the high Mr glutenin subunits of wheat, the high Mr secalin and Mr 60,000 [gamma]-secalin of rye, the d-hordeins of barley, the Mr 70,000, Mr 66,000 and Mr 58,000 C hordeins, and [beta]-casein subunit of bovine milk. Sequence analysis of the peptide products of enzyme reaction on high Mr glutenin subunits, [beta]-casein and [kappa]-casein revealed that glutamine occupied the P1 position relative to the scissile bond at all cleavage sites. Proline in the P3 or P4 position, and particular residues in the P'1 position relative to the scissile bond may also be preferred structural features. A variety of fluorogenic substrates made from synthetic peptides with glutamine in the P1 position relative to the fluorogenic group were tested with the enzyme, but none reacted.
Keywords: Proteinase; Enzyme specificity; Wheat bug; Nysius huttoni; Cleavage site; Scissile bond; Cereal proteins; Casein

Giuseppina Mandalari, Craig B. Faulds, Ana I. Sancho, Antonella Saija, Giuseppe Bisignano, Rosario LoCurto, Keith W. Waldron, Fractionation and characterisation of arabinoxylans from brewers' spent grain and wheat bran, Journal of Cereal Science, Volume 42, Issue 2, September 2005, Pages 205-212, ISSN 0733-5210, DOI: 10.1016/j.jcs.2005.03.001.
(http://www.sciencedirect.com/science/article/B6WHK-4G7X9MN-1/2/0e90cfdbf0f078e9943d0f854a6814d9)
Abstract:
Two agro-industrial co-products, brewers' spent grain and wheat bran, were fractionated by sequentially extracting with alkali of increasing strength. Over 60% of the brewers' grain biomass was solubilised by these treatments, compared with only 25% for wheat bran. The carbohydrate and phenolic composition of the solubilised fractions were determined, highlighting two

compositionally different sets of fractions. In both co-products arabinoxylan was the main polysaccharide released. The degree of arabinose substitution of the extracted arabinoxylan diminished as the alkali strength increased. Insoluble residues contained both cellulose and non-cellulosic polysaccharides. In spent grain, the composition of the arabinoxylan in the residue was similar to that of the starting material. In wheat bran, the residual xylan was very highly substituted with arabinose. Both ferulic acid and three forms of diferulic acid (5,5', 8-O-4' and 8,5') were present in the solubilised material, even after treatment with 4 M KOH. Esterified acetate was also present on polymers solubilised with KOH at concentrations up to 1 M. The more soluble fractions of spent grain represented a heterogeneous aggregation of feruloylated arabinoxylans with a broad molecular mass range, but the fractions extracted with stronger base were separated into low molecular weight moieties, presumably due to cleavage of covalent cross-links. Potential food and non-food uses for the isolated fractions from the cereal co-products are discussed.
Keywords: Arabinoxylan; Wheat; Barley; Brewers' spent grain; Cereal processing co-products; Ferulic acid; Diferulic acid; Cell walls; Phenolic acids; Carbohydrate

M. Papageorgiou, N. Lakhdara, A. Lazaridou, C.G. Biliaderis, M.S. Izydorczyk, Water extractable (1-->3,1-->4)-[beta]-d-glucans from barley and oats: An intervarietal study on their structural features and rheological behaviour, Journal of Cereal Science, Volume 42, Issue 2, September 2005, Pages 213-224, ISSN 0733-5210, DOI: 10.1016/j.jcs.2005.03.002.
(http://www.sciencedirect.com/science/article/B6WHK-4G4XBTY-1/2/78b61caa2eab20151db98ab60a6ab576)
Abstract:
The fine structures and rheological behaviours of aqueous flour dispersions and of [beta]-glucan, (1-->3,1-->4)-[beta]-d-glucan isolates obtained from 18 registered varieties of normal covered barley seeds and four registered oat varieties, grown in the same location in Greece, were investigated. The [beta]-glucan content of the barleys and oats varied between 2.5-5.4 and 2.1-3.9%, respectively (dry matter basis). Heat treatment of the barley and oat flour dispersions with 80% (v/v) ethanol, to inactivate endogenous [beta]-glucanases, had a stabilizing effect on the viscosity profile of the flour slurries. The relationship between total [beta]-glucan content and aqueous slurry viscosity (at 247 s-1) of the heat-treated barley flours was weak ($r^2=0.45$, $p<0.05$, $n=18$). [beta]-Glucans were isolated by water extraction at temperatures slightly below the gelatinization temperature of starch, enzymatic removal of starch and partial removal of contaminating proteins by adjustment to pH 4.0-4.5, and subsequent precipitation of the water-soluble [beta]-glucans with 80% (v/v) ethanol. The cellulosic oligomers released by the action of a (1-->3,1-->4)-[beta]-d-glucan hydrolase showed cellotriosyl and cellotetraosyl units, accounted for 91.1-92.1% for barley and between 92.4 and 94.1% for the oat preparations; the respective molar ratios of tri- to tetra-saccharides (DP3/DP4) ranged between 2.73-3.05 (barley) and 2.16-2.42 (oat). Steady shear measurements confirmed the random coil type behaviour of freshly prepared [beta]-glucan solutions (5 and 7%, w/v). The rate at which shear thinning began was dependent on both concentration and molecular size of the polysaccharide. Most of the [beta]-glucan dispersions followed the Cox-Merz rule, except Mucio, a variety with high Mw [beta]-glucan (2.39x105). Viscoelastic characterization, at 8% (w/v), of three barley [beta]-glucan aqueous dispersions differing in molecular size, indicated that the low molecular weight sample exhibited shorter gelation time and higher gelation rate (IE=[dlog G'/dt]max) than its higher molecular weight counterparts. Small deformation oscillatory measurements on gels of all barley [beta]-glucan isolates (10% (w/v), 7 d storage, 25 [degree sign]C) revealed a strong negative relationship ($r^2=0.88$, $p<0.01$) between G' (1 Hz, strain 0.1%) and apparent Mw of the polysaccharide.
Keywords: (1-->3,1-->4)-[beta]-d-glucans; Cereals; Molecular size; Structure; Rheological behaviour; Gelation; Melting; Barley; Oats

Sewa Ram, Vinamrata Dawar, R.P. Singh, Jag Shoran, Application of solvent retention capacity tests for the prediction of mixing properties of wheat flour, Journal of Cereal Science, Volume 42, Issue 2, September 2005, Pages 261-266, ISSN 0733-5210, DOI: 10.1016/j.jcs.2005.04.005.
(http://www.sciencedirect.com/science/article/B6WHK-4GD4SGV-1/2/222c1ef23fb0347e0f7c83ff7081dfee)
Abstract:
One hundred and ninety-two wheat genotypes including 150 released varieties and 42 germplasm lines were evaluated for solvent retention capacity (SRC) tests using 1 g of flour and 1 g of wholemeal to determine relationships with mixing properties of their doughs. Strong positive correlations ($p<0.001$) were observed between different SRCs (using both wholemeal as well as flour) and Farinograph water absorption (FWA). In multiple regression analysis, flour water SRC explained 41.2%, sodium carbonate SRC 24.6%, sucrose SRC 20.7% and protein content 13.5% of the total variability (multiple $r=0.91$) in FWA. The data demonstrated that water absorption is governed mainly to starch damage and pentosan content of the flour. Based on multiple regression analysis an equation was developed to predict FWA and a very high positive correlation ($r=0.91$) was observed between predicted FWA and actual FWA. LASRC exhibited significant positive correlations ($p<0.001$) with Farinograph and Mixograph parameters related to gluten strength such as the Farinograph peak time and mixing tolerance index and the mixograph peak time and peak dough resistance. Wholemeal flour SRCs accounted for 48% of the variation in FWA and was highly significant ($p<0.001$). The average values of FWA of corresponding clusters made using wholemeal and flour SRCs were not significantly different. This demonstrates that wholemeal SRCs together with grain protein content can be used to screen early generation lines for FWA. Since large numbers of diverse genotypes were used in the estimation of various parameters, high correlations observed between SRCs and functional properties including water absorption have obvious implications in breeding programs for the improvement of wheat cultivars.
Keywords: Solvent retention capacity; Farinograph; Mixograph; Gluten strength

Won O. Song, Ock Kyoung Chun, Saori Obayashi, Susan Cho, Chin Eun Chung, Is Consumption of Breakfast Associated with Body Mass Index in US Adults?, Journal of the American Dietetic Association, Volume 105, Issue 9, September 2005, Pages 1373-1382, ISSN 0002-8223, DOI: 10.1016/j.jada.2005.06.002.
(http://www.sciencedirect.com/science/article/B758G-4GYY39P-9/2/0d53dd9e9c1e99fda5cf7a3ca21b2689)
Abstract: Objective
To test the hypothesis that breakfast consumption is associated with weight status measured by body mass index in US adults.Design
Analyses of data from the National Health and Nutrition Examination Survey, 1999-2000.Participants/Setting
Men and women aged >=19 years (N=4,218), excluding pregnant and/or lactating women.Statistical Analyses Performed
SAS (release 8.1, 2000, SAS Institute Inc, Cary, NC) and SUDAAN (release 8.0.2, 2003, Research Triangle Institute, Research Triangle Park, NC) software were used to calculate sample-weighted means, standard errors, and population percentages of breakfast consumers. Multiple logistic and linear regression models, with controls for covariates, were used to determine the predictability of body mass index from breakfast consumption and from inclusion of ready-to-eat cereal (RTEC) in the breakfast meal.Results
Breakfast consumers were more likely than breakfast nonconsumers to be older, female, white, nonsmokers, regular exercisers, and trying to control their weight. For women, daily energy intake was higher among breakfast consumers than among breakfast nonconsumers; for both men and women, energy intake from fat among RTEC breakfast consumers was significantly lower than among non-RTEC breakfast consumers, whereas energy from carbohydrate among RTEC

breakfast consumers was significantly higher than among non-RTEC breakfast consumers. For women, the odds ratios for BMI >=25 were lower for breakfast consumers (odds ratio=0.76) and RTEC breakfast consumers (odds ratio=0.70) compared with breakfast nonconsumers and non-RTEC breakfast consumers, respectively, after adjusting the models for covariates. When RTEC consumption was added as a covariate, breakfast consumers no longer exhibited significantly lower odds ratios compared with breakfast nonconsumers. Furthermore, regression analyses supported an inverse association between RTEC breakfast consumption and body mass index in women (regression coefficient=-0.37, P<.01) after adjusting for covariates.Conclusions
When we document the association of breakfast consumption with lower prevalence of overweight and obesity, types of meal should be considered as an important determinant. RTEC breakfast consumption, associated with a desirable macronutrient profile for preventing obesity, predicted weight status in women, but not in men. In addition to sex difference in the association of breakfast consumption and RTEC breakfast consumption with lower prevalence of overweight, the effects of physiological variables and health-related behaviors on the relationship between total and RTEC intake at breakfast and weight status, remain to be established.

Bruce A. Barton, Alison L. Eldridge, Douglas Thompson, Sandra G. Affenito, Ruth H. Striegel-Moore, Debra L. Franko, Ann M. Albertson, Susan J. Crockett, The Relationship of Breakfast and Cereal Consumption to Nutrient Intake and Body Mass Index: The National Heart, Lung, and Blood Institute Growth and Health Study, Journal of the American Dietetic Association, Volume 105, Issue 9, September 2005, Pages 1383-1389, ISSN 0002-8223, DOI: 10.1016/j.jada.2005.06.003.
(http://www.sciencedirect.com/science/article/B758G-4GYY39P-B/2/01583fe40861cdc85867c32b1fde305e)
Abstract: Objective
To describe changes in breakfast and cereal consumption of girls between ages 9 and 19 years, and to examine the association of breakfast and cereal intake with body mass index (BMI) and consumption of nutrients.Design
Data from the National Heart, Lung, and Blood Institute Growth and Health Study, a longitudinal biracial observational cohort study with annual 3-day food records.Subjects/Setting
The National Heart, Lung, and Blood Institute Growth and Health Study recruited 2,379 girls (1,166 white and 1,213 black), ages 9 and 10 years at baseline, from locations in the Berkeley, CA; Cincinnati, OH; and Washington, DC, areas.Main Outcome Measures
Frequency of consumption of breakfast (including cereal vs other foods) and cereal; BMI; and dietary fat, fiber, calcium, cholesterol, iron, folic acid, vitamin C, and zinc.Statistical Analyses
Generalized estimating equations methodology was used to examine differences in the frequency of breakfast and cereal eating by age. Generalized estimating equations and mixed models were used to examine whether breakfast and cereal consumption were predictive of BMI and nutrient intakes, adjusting for potentially confounding variables.Results
Frequency of breakfast and cereal consumption decreased with age. Days eating breakfast were associated with higher calcium and fiber intake in all models, regardless of adjustment variables. After adjusting for energy intake, cereal consumption was related to increased intake of fiber, calcium, iron, folic acid, vitamin C, and zinc, and decreased intake of fat and cholesterol. Days eating cereal was predictive of lower BMI.Conclusions
Cereal consumption as part of an overall healthful lifestyle may play a role in maintaining a healthful BMI and adequate nutrient intake among adolescent girls.

Olivia J. Desmond, Cameron I. Edgar, John M. Manners, Donald J. Maclean, Peer M. Schenk, Kemal Kazan, Methyl jasmonate induced gene expression in wheat delays symptom development by the crown rot pathogen Fusarium pseudograminearum, Physiological and Molecular Plant

Pathology, Volume 67, Issues 3-5, September 2005-October 2006, Pages 171-179, ISSN 0885-5765, DOI: 10.1016/j.pmpp.2005.12.007.
(http://www.sciencedirect.com/science/article/B6WPC-4JFHF27-1/2/97297f298cfaafc0c656a1d7311bf9d6)
Abstract:
The necrotrophic fungal pathogen Fusarium pseudograminearum (F. pseudograminearum) causes crown rot disease (CR) in wheat. This host-pathogen interaction has not been studied previously at the molecular level. In this study, using real-time quantitative PCR, the expression of 26 selected wheat genes was examined 1, 2 and 4 days after inoculation of wheat seedlings of the CR susceptible cultivar Kennedy and the partially field-resistant cultivar Sunco. Reproducible induction of eight defence genes consisting of PR1.1, PR2 ([beta],1[hyphen (true graphic)]3 glucanase), PR3 (chitinase), PR4 (wheatwin), PR5 (thaumatin-like protein), TaPERO (peroxidase), PR10 and TaGLP2a (germin-like) was observed. These genes were induced in both cultivars, however, some genes were induced more rapidly in Sunco than in Kennedy. MJ treatment also induced the above pathogen responsive defence genes in both cultivars while benzo(1,2,3)thiadiazole-7-carbothionic acid S-methyl ester (BTH) treatment weakly induced them in Kennedy only. Similarly, treatment with MJ before inoculation significantly delayed the development of necrotic symptoms for 2 weeks in both wheat cultivars, while BTH pre-treatments delayed symptom development in Kennedy only. The chemically induced protection, therefore, correlated with induction of the F. pseudograminearum-responsive genes. These results support the emerging role of jasmonate signalling in defence against necrotrophic fungal pathogens in monocots and future manipulation of this pathway may improve CR resistance in wheat.
Keywords: Fusarium crown rot; Wheat defence genes; Wheat; Pathogen induced defence responses; Induced resistance; Fungal infection; Systemic acquired resistance; BTH; Monocot; Cereal; Oxylipins; Real-time quantitative PCR; Fusarium pseudograminearum; Triticum aestivum

Marija Licen, Ivan Kreft, Buckwheat (Fagopyrum esculentum Moench) low molecular weight seed proteins are restricted to the embryo and are not detectable in the endosperm, Plant Physiology and Biochemistry, Volume 43, Issue 9, September 2005, Pages 862-865, ISSN 0981-9428, DOI: 10.1016/j.plaphy.2005.08.002.
(http://www.sciencedirect.com/science/article/B6VRD-4H6PP13-2/2/872e6baa86e4c9711e5cbb0468edef2d)
Abstract:
Buckwheat (Fagopyrum esculentum Moench) proteins are nutritionally important because of their high and balanced content of essential amino acids making their biological value much higher than that of cereal proteins. We analyzed extracts of buckwheat endosperm and embryo proteins by sodium dodecyl sulfate-polyacrylamide gel electrophoresis (SDS-PAGE). On electropherograms of endosperm proteins, six intense bands were detected. Two most intense bands were in the range of molecular weights (M.W.s) from 50 to 60 kDa. Protein of 57 kDa has been shown not to cross-react against antibodies raised against proteins of M.W. ranging between 23 and 25 kDa. There are no reports about the allergenicity of other endosperm proteins. On the electropherogram of buckwheat endosperm no low M.W. proteins could be detected. In this study we have demonstrated the tissue specific presence of proteins of different size classes of the endosperm and embryo tissues.
Keywords: Allergenic proteins; Common buckwheat; Endosperm; Fagopyrum esculentum; Low molecular seed proteins; SDS-PAGE electrophoresis

Eric Arsenault, Ferdinand Bonn, Evaluation of soil erosion protective cover by crop residues using vegetation indices and spectral mixture analysis of multispectral and hyperspectral data, CATENA, Volume 62, Issues 2-3, Surface characterisation for soil erosion forecasting, 31 August 2005, Pages 157-172, ISSN 0341-8162, DOI: 10.1016/j.catena.2005.05.003.

(http://www.sciencedirect.com/science/article/B6VCG-4GG2JPF-1/2/0231528e104a3b72ec0d9daed556e044)
Abstract:
Crop residues are efficient in reducing erosion and surface water runoff on agricultural soils. Evaluating the crop residue cover fraction and its spatial distribution is important to scientists involved in the modelling of soil erosion and surface runoff, and also to authorities wishing to assess soil conservation adoption by farmers. This study focuses on the evaluation of four remote sensing techniques to estimate the cover fraction of cereal crop residues (i.e., wheat and corn) from multispectral and hyperspectral measurements. These are the Soil Adjusted Corn Residue Index (SACRI), the Crop Residue Index Multiband (CRIM), the Normalized Difference Index (NDI) and the spectral mixture analysis technique (SMA). Field campaigns that were carried out by the FLOODGEN project in Sainte-Angele-de-Monnoir, Quebec, Canada and in the Pays-de-Caux located in the Normandy region of France, allowed us to gather digital photographs, spectra and other measurements to determine the actual ground cover fraction. A linear regression analysis between results derived from Landsat-5 TM simulated field spectra and the actual ground cover fractions showed best results for the CRIM on the Ste-Angele-de-Monnoir study site (R2 = 0.96), and equally good results for the Pays-de-Caux study site (R2 = 0.94). Results were not as good when SMA was applied to the same Landsat-5 TM simulated field spectra with R2 values of 0.70 and 0.68 for both sites, respectively. However, results improved significantly when SMA was applied to the hyperspectral data in which case the R2 values increased to 0.92 for the Sainte-Angele-de-Monnoir site and 0.89 for the Pays-de-Caux study site. Results obtained with the NDI and SACRI from both simulated TM and hyperspectral field spectra were not conclusive.
Keywords: Crop residue; Remote sensing; Vegetation index; Erosion; Runoff

John F. Kennedy, J.S. Panesar, E. Abdel-Aal and P. Wood, Editors, Specialty Grains for Food and Feed, American Association of Cereal Chemists, Inc., Minnesota, USA (2005) (413 pp., $109.00, ISBN 1-891127-41-1)., Carbohydrate Polymers, Volume 61, Issue 3, 29 August 2005, Page 384, ISSN 0144-8617, DOI: 10.1016/j.carbpol.2005.05.005.
(http://www.sciencedirect.com/science/article/B6TFD-4GJK8BB-1/2/ccc1c9130f0a9681646bb70addfb26fd)

Guy R. Sander, Adrian G. Cummins, Barry C. Powell, Rapid disruption of intestinal barrier function by gliadin involves altered expression of apical junctional proteins, FEBS Letters, Volume 579, Issue 21, 29 August 2005, Pages 4851-4855, ISSN 0014-5793, DOI: 10.1016/j.febslet.2005.07.066.
(http://www.sciencedirect.com/science/article/B6T36-4GTVW4S-2/2/5a26da91de19f6f9cf78036bbbedd9e2)
Abstract:
Coeliac disease is a chronic enteropathy caused by the ingestion of wheat gliadin and other cereal prolamines derived from rye and barley. In the present work, we investigated the mechanisms underlying altered barrier function properties exerted by gliadin-derived peptides in human Caco-2 intestinal epithelial cells. We demonstrate that gliadin alters barrier function almost immediately by decreasing transepithelial resistance and increasing permeability to small molecules (4 kDa). Gliadin caused a reorganisation of actin filaments and altered expression of the tight junction proteins occludin, claudin-3 and claudin-4, the TJ-associated protein ZO-1 and the adherens junction protein E-cadherin.
Keywords: Coeliac; Barrier function; Tight junction; Adherens junction; Permeability

Petr Pysek, Vojtech Jarosik, Zdenek Kropac, Milan Chytry, Jan Wild, Lubomir Tichy, Effects of abiotic factors on species richness and cover in Central European weed communities, Agriculture,

Ecosystems & Environment, Volume 109, Issues 1-2, 1 August 2005, Pages 1-8, ISSN 0167-8809, DOI: 10.1016/j.agee.2005.02.018.
(http://www.sciencedirect.com/science/article/B6T3Y-4FVCBY0-1/2/ad9ce49324274f2cae14a5e4ce0156c2)
Abstract:
Plant species richness and cover of 698 samples of weed flora, recorded in standard plots in the Czech Republic from 1955 to 2000, were related to altitudinal floristic regions, soil types, cultivated crops, climate, altitude and year of the record. Stepwise backward elimination of explanatory variables was used to analyse the data, taking into account their interactive nature, until the general linear model contained only significant terms. Net effects of particular variables on weed species number and cover, independent of covariance with other variables, were determined. Weed species number and cover were significantly affected by altitudinal floristic region and its interaction with the year of sampling. Both weed species number and cover decreased over time, more so in the moderate-to-cold than in the warm altitudinal floristic region, due to the increase in agricultural intensification being more profound at higher than lower altitudes. There was no direct effect of soil type on weed species number, whereas the decrease of weed cover with increasing crop cover was more pronounced on nutrient-poor than nutrient-rich soils. Maize fields contained the lowest number of weed species, while root crops and fodder plants were most species rich. Within the group of other cereals than maize, spring barley and oats harboured more weed species than winter wheat and, in particular, than rye. The differences in weed flora were largely attributable to management and partly related to crop-specific agricultural practices as well as general changes in the management of arable fields over the last decades.
Keywords: Agricultural management; Arable land; Crop characteristics; Czech Republic; Temporal changes

Michael Schwertl, Karl Auerswald, Rudi Schaufele, Hans Schnyder, Carbon and nitrogen stable isotope composition of cattle hair: ecological fingerprints of production systems?, Agriculture, Ecosystems & Environment, Volume 109, Issues 1-2, 1 August 2005, Pages 153-165, ISSN 0167-8809, DOI: 10.1016/j.agee.2005.01.015.
(http://www.sciencedirect.com/science/article/B6T3Y-4FHJGCK-2/2/e58dd6db5cc83f8cf640ceb7cce020b1)
Abstract:
Societal interest in food safety, animal welfare, and environmental quality attributes of food production is increasing, creating a need for reliable indicators of such factors. Here we test the hypothesis that cattle farming systems create unique and meaningful isotopic fingerprints, which can be characterized by analysing cattle tail switch hair. To this end we analysed feeding practices and nutrient fluxes, and sampled hair, feed components and fertilizers from 13 different farms in Upper Bavaria, Germany. The farms represented the range of cattle farming types present in the region and included: conventional confinement dairy, pasture based organic and conventional dairy, suckler cow, and bull and steer and heifer fattening enterprises. Samples were analysed for their carbon (C) and nitrogen (N) stable isotope composition ([delta]13C and [delta]15N). Feed samples could be assigned to one of three groups with characteristic [delta]13C, which varied very little between and within farms: C3 forages (including fresh forage, hay or silage from grassland and clover-grass mixtures) with -28.4[per mille sign] (+/-0.5[per mille sign] S.D.), maize (Zea mays L.) with -12.5[per mille sign] (+/-0.4[per mille sign]), and C3-derived concentrates (including mainly cereal grain and legume seeds) with -26.8 (+/-1.1[per mille sign]). The dry matter fraction of maize in the diet explained 96% of the farm average [delta]13C of hair. Hair was approx. 2.7[per mille sign] enriched in 13C relative to the diet (trophic level shift), and this effect was very similar for growing animals and cows, and seemingly independent of the fraction of maize in the diet. In contrast to [delta]13C, the [delta]15N of individual feed types differed very strongly between - and also within - farms. Only legume seeds had relatively constant [delta]15N (1.2 +/- 0.5[per mille

sign]). [delta]15N of cow hair was correlated with stocking rate (r2 = 0.55) and N input surplus (farm gate) (r2 = 0.78), respectively. This correlation was probably caused by increasing losses of 15N-depleted N via ammonia volatilisation, nitrate leaching and denitrification with increasing farm-level N surplus. Heterogeneity of feed 15N signatures indicated within-farm heterogeneity of N fluxes and cycling that was at (least partially) integrated in cattle hair. Thus, cattle hair 15N signature appears to indicate the `leakiness' of cattle production systems for N. Conversely, the 13C signatures reliably indicates maize feeding and, thus, the type of land use (arable forage cropping versus grassland farming) on which cattle production in the region is based.
Keywords: 13C; 15N; Food traceability; Environmental indicators; Livestock farming; Nitrogen balance

Iain D. Green, Mark Tibbett, Anita Diaz, Effects of aphid infestation on Cd and Zn concentration in wheat, Agriculture, Ecosystems & Environment, Volume 109, Issues 1-2, 1 August 2005, Pages 175-178, ISSN 0167-8809, DOI: 10.1016/j.agee.2005.02.014.
(http://www.sciencedirect.com/science/article/B6T3Y-4FR4BV7-1/2/b378afdcd3f92e81e6dc546b4dbb1d40)
Abstract:
The effect of infestation by the aphid Metopolophium dirhodum on the concentration and mass partitioning of Cd and Zn was studied in wheat plants. Results show that infestation did not affect the concentration of either metal in the roots or shoots of wheat, but elevated concentrations in the ears. This appeared to result from the concentration of metal in the smaller ear mass of infested plants. Infestation did not significantly affect the mass partitioning of either metal in any part of the plant, some 10% of both metals being allocated to the roots. However, the two metals contrasted in their partitioning in the aerial parts of the plant, with ca. 60% of Cd mass partitioned in the shoots and ca. 67% of Zn mass partitioned in the ears. The possible effects of infestation on the transfer of Cd and Zn from the soil to cereal aphids are discussed.
Keywords: Metopolophium dirhodum; Cadmium; Zinc; Aphids; Wheat; Trace metals

Sudarat Saeseaw, Juwadee Shiowatana, Atitaya Siripinyanond, Sedimentation field-flow fractionation: Size characterization of food materials, Food Research International, Volume 38, Issue 7, August 2005, Pages 777-786, ISSN 0963-9969, DOI: 10.1016/j.foodres.2005.04.001.
(http://www.sciencedirect.com/science/article/B6T6V-4G9GN5N-1/2/587dfdf88d89e068f36d2847f0000481)
Abstract:
Sedimentation field-flow fractionation (SdFFF) was applied to characterize particle size distributions of food materials. Two types of food particles were examined, including milk suspensions and flour samples. Milk eluted in the normal mode SdFFF, whereas the steric mode of retention was used for flour samples. Various types of milk being investigated were from cereal and cow's origins. The cereal milk samples included corn, job's tear, rice, and soy milk, whereas the bovine milk included chocolate and fresh full-fat milk. Most samples exhibited monomodal size distributions, whereas corn milk displayed a slight deviation from monomodal characteristic. The mean particle sizes were detected to be approximately 0.4 [mu]m for all cereal milk, except that they were approximately 0.5 [mu]m for corn and all bovine milk. The application of SdFFF for micrometer size food particles was demonstrated for four types of flour samples, including corn, mung bean, rice, and tapioca flours. Significantly differences in the particle size characteristics of all flour samples were observed, by which corn, mung bean, rice, and tapioca yielded mean particle sizes of 16.7, 31.5, 13.5, and 19.9 [mu]m, respectively. The ability of SdFFF for size separation of flours was confirmed by comparing the results obtained with those from scanning electron microscopy (SEM). Further, a new way to examine flour swelling was proposed. This study has demonstrated the potential value of SdFFF technique for food scientists.
Keywords: Sedimentation field-flow fractionation; Size distribution; Milk; Flour

Prapasri Puwastien, Naruemol Pinprapai, Kunchit Judprasong, Tsunenobu Tamura, International inter-laboratory analyses of food folate, Journal of Food Composition and Analysis, Volume 18, Issue 5, August 2005, Pages 387-397, ISSN 0889-1575, DOI: 10.1016/j.jfca.2004.02.011.
(http://www.sciencedirect.com/science/article/B6WJH-4D3B17J-1/2/58273b17c958f7d74d85472862316846)
Abstract:
An international inter-laboratory performance of food folate assay was evaluated using soybean flour, fish powder and breakfast cereal which were prepared as test materials. These materials were sent to 34 laboratories, which were asked to use their routine methods of food folate analysis, and 26 laboratories (76%) worldwide returned their assay data. Although trienzyme extraction has been recommended for folate extraction before the assay, this method of folate extraction was used in only nine laboratories, and eight laboratories still performed a single enzyme treatment using folate conjugase. Of these 26 laboratories, 20 used microbiological assay (17 used Lactobacillus casei), four used an HPLC-UV detection method, one LC-MS and one radiobinding assay for folate analysis, indicating a wide variety of folate detection methods. Among 17 laboratories where L. casei microbiological assay was performed, the inter-laboratory coefficient of variations of these test materials was 24%, 35% and 24% for soybean flour, fish powder and breakfast cereal, respectively, indicating that a valid comparison of the values between the laboratories may be difficult. Our observations suggest that for food folate analysis, it is important to standardize the methods of folate extraction and detection, and the use of reliable reference materials should be encouraged among laboratories worldwide.
Keywords: Food folate; Inter-laboratory evaluation; Reference material; Trienzyme extraction; Microbiological assay; Quality control

Amandeep Kaur, Jatinder Singh, Sukhdev Singh Kamboj, A.K. Sexana, Renu Moti Pandita, M. Shamnugavel, Isolation of an N-acetyl-d-glucosamine specific lectin from the rhizomes of Arundo donax with antiproliferative activity, Phytochemistry, Volume 66, Issue 16, August 2005, Pages 1933-1940, ISSN 0031-9422, DOI: 10.1016/j.phytochem.2005.06.026.
(http://www.sciencedirect.com/science/article/B6TH7-4GWBF1S-2/2/8dc33f8abaafa0766b1f68150f8622e3)
Abstract:
A lectin with antiproliferative activity towards human cancer cell lines and mitogenic towards human peripheral blood mononuclear cells was purified from the rhizomes of Arundo donax (Linn.) by affinity chromatography on N-acetyl-d-glucosamine linked to epoxy-activated sepharose-6B. The pure preparation apparently yielded a single band of approximately 15 kDa on SDS-PAGE, pH 8.3, under both reducing and non-reducing conditions. The molecular mass of native lectin was 32 kDa as determined by gel filtration chromatography. This showed the lectin to be a dimer, with subunits not held together by disulphide linkages. The A. donax lectin (ADL) agglutinated rabbit erythrocytes and the agglutination was inhibited by N-acetyl-d-glucosamine and its di- and trimer. The lectin was thermostable upto 55 [degree sign]C and showed optimum activity in the range of pH 7.0-9.0 and comprised of 2.1% carbohydrate content.
Keywords: N-acetyl-d-glucosamine; Antiproliferative; Arundo donax; Lectin; Mitogen

Miguel Jurado, Covadonga Vazquez, Belen Patino, M. Teresa Gonzalez-Jaen, PCR detection assays for the trichothecene-producing species Fusarium graminearum, Fusarium culmorum, Fusarium poae, Fusarium equiseti and Fusarium sporotrichioides, Systematic and Applied Microbiology, Volume 28, Issue 6, 1 August 2005, Pages 562-568, ISSN 0723-2020, DOI: 10.1016/j.syapm.2005.02.003.
(http://www.sciencedirect.com/science/article/B7GVX-4G992NT-1/2/248d6e4823b6716e327cd688a066613b)

Abstract:
Contamination of small-grain cereals with the fungal species Fusarium graminearum, F. culmorum, F. poae, F. sporotrichioides and F. equiseti is an important source of trichothecenes, Zearalenone and other mycotoxins which cause serious diseases in human and animals. Additionally, these species contribute to Fusarium Head Blight, a disease which produces important losses in cereal yield. Early detection and control of these Fusarium species is crucial to prevent toxins entering the food chain and a useful tool in disease management practices. We describe the development of specific PCR assays to F. graminearum, F. culmorum, F. poae, F. sporotrichioides and F. equiseti using DNA from pure fungal cultures as well as from naturally infected wheat seeds, using in this case a rapid and easy protocol for DNA isolation. The specific primers were designed on the basis of IGS sequences (Intergenic Spacer of rDNA), a multicopy region in the genome that permits to enhance the sensitivity of the assay in comparison with PCR assays based on single-copy sequences.
Keywords: Toxins; Fusarium graminearum; F. culmorum; F. equiseti; F. sporotrichioides; F. poae; Wheat; PCR

Tinglu Fan, Shuying Wang, Tang Xiaoming, Junjie Luo, Bob A. Stewart, Yufeng Gao, Grain yield and water use in a long-term fertilization trial in Northwest China, Agricultural Water Management, Volume 76, Issue 1, 30 July 2005, Pages 36-52, ISSN 0378-3774, DOI: 10.1016/j.agwat.2005.01.003.
(http://www.sciencedirect.com/science/article/B6T3X-4FFGJJ3-2/2/fcb53dfdc17a249dc268404b734b000c)
Abstract:
The wheat- (Triticum aestivum L.) and corn- (Zea mays L.) rotation system is important for food security in Northwest China. Grain yield and water-use efficiency [WUE: grain yield/estimated evapotranspiration (ET)] were recorded during a 24-year fertilization trial in Pingliang (Gansu, China). Mean yields of wheat for the 16 years, starting in 1981, ranged from 1.29 Mg ha-1 for unfertilized plots (CK) to 4.71 Mg ha-1 for plots that received manure (M) annually with nitrogen (N) and phosphorus (P) fertilizers (MNP). Corn yields for the 6 years, starting in 1979, averaged 2.29 and 5.61 Mg ha-1 for the same respective treatments. Whether the years were dry, normal or wet, average grain yields and WUEs for both crops were consistently highest in the MNP and lowest in the CK treatment, and were always lower in the N than in the M treatment and in all others treatments that received N along with P fertilizers. More importantly, WUEs for MNP and for straw along with N annually and P every second year (SNP) were always higher than the other fertilized treatments in dry years. Compared to yield data, coefficients of variance (CV) for WUEs were consistently low for all treatments, suggesting that WUEs were relatively stable from year to year. Yields and WUEs declined over time, except in the CK and MNP treatments for wheat. Declined yields of wheat for the N and M treatments were comparable, and the decline for the NP treatment was similar to that for the SNP treatment. Likewise, corn yields and WUEs declined for all treatments. Grain yields were significantly correlated with ET, with slopes ranging from 0.5 to 1.27 kg m-3 for wheat and from 1.15 to 2.03 kg m-3 for corn. Balanced fertilization and long-term addition of organic material to soil should be encouraged in this region to maximize the use of stored soil water, arrest grain yields decline, and ensure sustainable productivity using this intensive cereal cropping system.
Keywords: Analysis of variance; Corn; Crop water stress index; Grain yield; Long-term fertilization; Estimated evapotranspiration; Water-use efficiency; Wheat

Le H. Duc, Tran C. Dong, Niall A. Logan, Alastair D. Sutherland, Janice Taylor, Simon M. Cutting, Cases of emesis associated with bacterial contamination of an infant breakfast cereal product, International Journal of Food Microbiology, Volume 102, Issue 2, 15 July 2005, Pages 245-251, ISSN 0168-1605, DOI: 10.1016/j.ijfoodmicro.2004.11.022.

(http://www.sciencedirect.com/science/article/B6T7K-4FG4BC3-9/2/da8b6c19b1521e9743ad9c9b7283f199)
Abstract:
A commercial product for infants containing cereal mixed with dried infant formula was diagnosed as producing rapid projectile vomiting in two infants. Analysis of multiple samples of the cereal product revealed significant contamination with two spore-forming species, Bacillus subtilis and a strain of Bacillus cereus. The latter is the most likely cause of the emetic food poisoning, but we were unable to detect B. cereus emetic toxin. This raises the possibility of the cause being either a new cereulide-type toxin, or the bacterial load, in which case the presence of B. subtilis could have been a contributing factor.
Keywords: Bacillus cereus; Spores; Emesis; Food poisoning

M. Tsubo, S. Walker, H.O. Ogindo, A simulation model of cereal-legume intercropping systems for semi-arid regions: I. Model development, Field Crops Research, Volume 93, Issue 1, 14 July 2005, Pages 10-22, ISSN 0378-4290, DOI: 10.1016/j.fcr.2004.09.002.
(http://www.sciencedirect.com/science/article/B6T6M-4DK681N-2/2/321bacf331130a290b7c8eda4136704e)
Abstract:
Cereal-legume intercropping plays an important role in subsistence food production in developing countries, especially in situations of limited water resources. Crop simulation can be used to assess risk for intercrop productivity over time and space. In this study, a simple model for intercropping was developed for cereal and legume growth and yield, under semi-arid conditions. The model is based on radiation interception and use, and incorporates a water stress factor. Total dry matter and yield are functions of photosynthetically active radiation (PAR), the fraction of radiation intercepted and radiation use efficiency (RUE). One of two PAR sub-models was used to estimate PAR from solar radiation; either PAR is 50% of solar radiation or the ratio of PAR to solar radiation (PAR/SR) is a function of the clearness index (KT). The fraction of radiation intercepted was calculated either based on Beer's Law with crop extinction coefficients (K) from field experiments or from previous reports. RUE was calculated as a function of available soil water to a depth of 900 mm (ASW). Either the soil water balance method or the decay curve approach was used to determine ASW. Thus, two alternatives for each of three factors, i.e., PAR/SR, K and ASW, were considered, giving eight possible models (2 methods x 3 factors). The model calibration and validation were carried out with maize-bean intercropping systems using data collected in a semi-arid region (Bloemfontein, Free State, South Africa) during seven growing seasons (1996/1997-2002/2003). The combination of PAR estimated from the clearness index, a crop extinction coefficient from the field experiment and the decay curve model gave the most reasonable and acceptable result. The intercrop model developed in this study is simple, so this modelling approach can be employed to develop other cereal-legume intercrop models for semi-arid regions.
Keywords: Available soil water; Crop model; Intercropping; Radiation interception; Radiation use efficiency

M. Tsubo, S. Walker, H.O. Ogindo, A simulation model of cereal-legume intercropping systems for semi-arid regions: II. Model application, Field Crops Research, Volume 93, Issue 1, 14 July 2005, Pages 23-33, ISSN 0378-4290, DOI: 10.1016/j.fcr.2004.09.003.
(http://www.sciencedirect.com/science/article/B6T6M-4DTKDSW-1/2/695441d6a1ac5739dd25b82c8c073737)
Abstract:
Smallholder farmers in Africa practice traditional cropping techniques such as intercropping. Intercropping is thought to offer higher productivity and resource utilisation than sole cropping. In this study, risk associated with maize-bean intercropping was evaluated by quantifying long-term

yield in both intercropping and sole cropping in a semi-arid region of South Africa (Bloemfontein, Free State) with reference to rainfall variability. The crop simulation model was run with different cultural practices (planting date and plant density) for 52 summer crop growing seasons (1950/1951-2001/2002). Eighty-one scenarios, consisted of three levels of initial soil water, planting date, maize population, and bean population, were simulated. From the simulation outputs, the total land equivalent ratio (LER) was greater than one. The intercrop (equivalent to sole maize) had greater energy value (EV) than sole beans, and the intercrop (equivalent to sole beans) had greater monetary value (MV) than sole maize. From these results, it can be concluded that maize-bean intercropping is advantageous for this semi-arid region. Soil water at planting was the most important factor of all scenario factors, followed by planting date. Irrigation application at planting, November/December planting and high plant density of maize for EV and beans for MV can be one of the most effective cultural practices in the study region. With regard to rainfall variability, seasonal (October-April) rainfall positively affected EV and MV, but not LER. There was more intercrop production in La Nina years than in El Nino years. Thus, better cultural practices may be selected to maximize maize-bean intercrop yields for specific seasons in the semi-arid region based on the global seasonal outlook.
Keywords: Crop simulation; Intercropping; Phaseolus vulgaris; Risk analysis; Zea mays

J. Vos, P.E.L. van der Putten, C.J. Birch, Effect of nitrogen supply on leaf appearance, leaf growth, leaf nitrogen economy and photosynthetic capacity in maize (Zea mays L.), Field Crops Research, Volume 93, Issue 1, 14 July 2005, Pages 64-73, ISSN 0378-4290, DOI: 10.1016/j.fcr.2004.09.013.
(http://www.sciencedirect.com/science/article/B6T6M-4DKKFB4-1/2/9b5d13281a6489fbb6522cc8a56f97a9)
Abstract:
Leaf area growth and nitrogen concentration per unit leaf area, Na (g m-2 N) are two options plants can use to adapt to nitrogen limitation. Previous work indicated that potato (Solanum tuberosum L.) adapts the size of leaves to maintain Na and photosynthetic capacity per unit leaf area. This paper reports on the effect of N limitation on leaf area production and photosynthetic capacity in maize, a C4 cereal. Maize was grown in two experiments in pots in glasshouses with three (0.84-6.0 g N pot-1) and five rates (0.5-6.0 g pot-1) of N. Leaf tip and ligule appearance were monitored and final individual leaf area was determined. Changes with leaf age in leaf area, leaf N content and light-saturated photosynthetic capacity, Pmax, were measured on two leaves per plant in each experiment. The final area of the largest leaf and total plant leaf area differed by 16 and 29% from the lowest to highest N supply, but leaf appearance rate and the duration of leaf expansion were unaffected. The N concentration of expanding leaves (Na or %N in dry matter) differed by at least a factor 2 from the lowest to highest N supply. A hyperbolic function described the relation between Pmax and Na. The results confirm the `maize strategy': leaf N content, photosynthetic capacity, and ultimately radiation use efficiency is more sensitive to nitrogen limitation than are leaf area expansion and light interception. The generality of the findings is discussed and it is suggested that at canopy level species showing the `potato strategy' can be recognized from little effect of nitrogen supply on radiation use efficiency, while the reverse is true for species showing the `maize strategy' for adaptation to N limitation.
Keywords: Nitrogen supply; Nitrogen concentration; Leaf growth; Leaf appearance rate; Photosynthesis; Gramineae; Broad leaf species

H. Themeier, J. Hollmann, U. Neese, M.G. Lindhauer, Structural and morphological factors influencing the quantification of resistant starch II in starches of different botanical origin, Carbohydrate Polymers, Volume 61, Issue 1, 4 July 2005, Pages 72-79, ISSN 0144-8617, DOI: 10.1016/j.carbpol.2005.02.017.
(http://www.sciencedirect.com/science/article/B6TFD-4G0YTFK-1/2/d2dad8f9740a7fd881886ef4a41c9fe5)

Abstract:
Seven cereal starches and 11 pea starches were analysed for total starch, amylose content, resistant starch type II (RS), total dietary fibre (TDF) and starch damage. The data from the cereal starches could be interpreted on basis of the already published polymorph type. In the pea starch series RS and TDF correlated with the amylose content for most starches. But one starch with 20.7% of amylose had an extraordinary high RS content of 16.8%. DSC thermograms, starch granule size distribution, scanning electron and light micrographs revealed a large fraction of small granules of high cristallinity and high [alpha]-amylase resistance. Another starch of 32% amylose had a very low RS content. The reason for this was a high fraction of large starch granules, some being damaged. This study shows that besides amylose content, granule morphology and size, its extent of crystallinity or damage have a strong impact on the amylase resistance.
Keywords: Resistant starch; Pea starch; Amylose; Damaged starch; Polymorph type

H.G. Sung, H.T. Shin, J.K. Ha, H.-L. Lai, K.-J. Cheng, J.H. Lee, Effect of germination temperature on characteristics of phytase production from barley, Bioresource Technology, Volume 96, Issue 11, July 2005, Pages 1297-1303, ISSN 0960-8524, DOI: 10.1016/j.biortech.2004.10.010.
(http://www.sciencedirect.com/science/article/B6V24-4FB9GTG-1/2/227610c14694cc92ac275a53be201545)
Abstract:
The effects of germination temperature on the growth of barley seedlings for phytase production were studied at 15, 20 and 25 [degree sign]C for 6-10 days. The growth rate of the barley seedlings was increased as the germination temperature was increased. The initial rate of total protein production was closely coupled to that of the barley growth, and the rate of total protein production tended to increase as the germination temperature was increased. SDS-PAGE analysis of total protein from the barley seedlings showed time-dependent appearance and disappearance of protein bands. Although no significant phytase activity was detected at zero time of germination, a significant increase in phytase activity up to 7.9-fold occurred during the first several days of germination then decreased. Phosphate production (viz. phytate degradation) in the barley seedlings occurred rapidly at the beginning of germination. However, the rate of production continued to decrease with further germination. A time lag of about 1-2 days between the rate of total protein production and that of phytase production was observed. Unlike the extent of total protein production, that of phytase production was similar irrespective of germination temperature. Partial purification of a crude enzyme extract by hydrophobic interaction chromatography resulted in two phytase fractions (PI and PII). Zymogram analysis demonstrated that PI had two bands with molecular masses of about 66 and 123 kDa while PII had one band corresponding to a molecular mass of about 96 kDa. The optimal temperature for PI was found to be 55 [degree sign]C, while it was 50 [degree sign]C for PII. The enzyme fraction PI had a pH optimum at 6.0, whereas the optimum pH for PII was found to be 5.0. Addition of 0.1% (v/v) Tween 80 was found to increase enzyme activity significantly (i.e., 167% for PI and 137% for PII). Phytate in cereals including barley, rice, corn and soybean degraded effectively by the treatment of the barley phytases.
Keywords: Barley; Germination; Phytase; Phytate degradation; Zymogram

M.V. Lopez, J.L. Arrue, J. Alvaro-Fuentes, D. Moret, Dynamics of surface barley residues during fallow as affected by tillage and decomposition in semiarid Aragon (NE Spain), European Journal of Agronomy, Volume 23, Issue 1, July 2005, Pages 26-36, ISSN 1161-0301, DOI: 10.1016/j.eja.2004.09.003.
(http://www.sciencedirect.com/science/article/B6T67-4DXJYY1-3/2/70e89e06ade7d8ced53ad53cf65c8ac3)
Abstract:
Most of the benefits from conservation tillage are attained by maintaining crop residues on the soil surface. However, the effectiveness of crop residues depends on their persistence in time and

maintenance of sufficient residue cover can become difficult, especially when a long-fallow period is involved. In this study, we evaluate the effects of conventional tillage (CT) and two conservation tillage systems (reduced tillage, RT, and no-tillage, NT), under both continuous cropping (CC) and cereal-fallow rotation (CF), on the dynamics of surface barley residues during four fallow periods in a dryland field of semiarid Aragon. The CC system involves a summer fallow period of 5-6 months and the CF rotation a long-fallow of 17-18 months. Results indicate that the lack of residue-disturbing operations in NT makes this practice the best strategy for fallow management. With this tillage system, the soil surface still conserved a residue cover of 10-15% after long-fallowing and percentages of standing residues ranging from 20 to 40% of the total mass after the first 11-12 months. In both CT and RT, primary tillage operations had the major influence on residue incorporation, with percentages of cover reduction of 90-100% after mouldboard ploughing (CT) and 50-70% after chiselling (RT). Two decomposition models were tested, the Douglas-Rickman and the Steiner models. Our data indicate that the Steiner model described more accurately the decline of surface residue mass over the long-fallow period in the NT plots. Measured and predicted data indicate that, under NT, 80-90% of the initial residue mass is lost at the end of fallow and that 60-75% of this loss occurs during the first 9-10 months. Finally, the mass-to-cover relationship established in this study for barley residues could be used to predict soil cover from flat residue mass through the fallow period by using a single Am coefficient (0.00208 ha kg-1).
Keywords: Barley residues; Conservation tillage; Fallowing; Residue cover; Standing residues; Decomposition models

Charles S. Brennan, Louise J. Cleary, The potential use of cereal (1-->3,1-->4)-[beta]-d-glucans as functional food ingredients, Journal of Cereal Science, Volume 42, Issue 1, July 2005, Pages 1-13, ISSN 0733-5210, DOI: 10.1016/j.jcs.2005.01.002.
(http://www.sciencedirect.com/science/article/B6WHK-4FK42JD-1/2/51b0d0b4465be7645e5a981bad5110d5)
Abstract:
The health-related importance of dietary fibre, as part of a balanced diet, has been recognised for decades. More recently, soluble fibre such as (1-->3,1-->4)-[beta]-d-glucan (referred to as [beta]-glucan), has been shown to have effects on the glycaemic, insulin, and cholesterol responses to foods. Cereals (such as barley and oats) are good sources for these functional ingredients, with studies clearly demonstrating their potential nutritional benefits. At the same time research has indicated that the efficacy of [beta]-glucans may be related to extraction procedures, and factors such as dose, molecular weight and fine structure, and rheological characteristics of extracted and native [beta]-glucans. Concurrently, research has focussed on the inclusion of [beta]-glucans into both cereal and dairy-based food systems, illustrating their potential as ingredients to manipulate food structure and texture. Thus, [beta]-glucans (from barley, oat, and other cereals) should be regarded as important functional ingredients for the cereal foods industry.
Keywords: Barley; Oats; Bread; Pasta; Dietary fibre; Glycaemic response

M. Gulli, P. Rampino, E. Lupotto, N. Marmiroli, C. Perrotta, The effect of heat stress and cadmium ions on the expression of a small hsp gene in barley and maize, Journal of Cereal Science, Volume 42, Issue 1, July 2005, Pages 25-31, ISSN 0733-5210, DOI: 10.1016/j.jcs.2005.01.006.
(http://www.sciencedirect.com/science/article/B6WHK-4G65NH4-2/2/d329b26fb8c1208856062573455fcc9d)
Abstract:
Small heat shock proteins in plants are produced under stress conditions and play an important role in stress tolerance. The gene Hvhsp17 isolated from barley encodes a class I, low molecular weight heat shock protein (or sHSP) which is induced in barley seedlings in response to heat stress. Previous molecular analysis of the 5' promoter region of Hvhsp17 uncovered several cis regulatory elements upstream from the ATG of the gene, two heat shock elements (HSE1 and

HSE2), and a sequence highly homologous to a metal responsive element of mammalian cells. The importance of the protective role of these elements against abiotic stresses was investigated both in barley and in maize. The expression profile of Hvhsp17 in response to various environmental conditions was analysed in these two cereals, to understand the regulation of Hvhsp17 gene expression and also in relation to conditions other than heat shock. The expression of Hvhsp17 in both barley and maize is strictly associated with heat stress, except for treatment with cadmium ions.
Keywords: Heat stress; Stress genes; Heavy metals; Barley; Maize

Peter J. Frazier, In: Elsayed Abdel-Aal and Peter Wood, Editors, Speciality grains for food and feed, American Association of Cereal Chemists, Inc., St Paul, Minnesota, USA (2005) ISBN 1-891127-41-1, p. 412 pages hardcover, 6 in.x9 in., price $159.00., Journal of Cereal Science, Volume 42, Issue 1, July 2005, Pages 135-137, ISSN 0733-5210, DOI: 10.1016/j.jcs.2005.02.003.
(http://www.sciencedirect.com/science/article/B6WHK-4FV9MH1-1/2/c2c515af229274a9e388a1e4758ffd33)

Jan Frank, Beyond vitamin E supplementation: An alternative strategy to improve vitamin E status, Journal of Plant Physiology, Volume 162, Issue 7, 1 July 2005, Pages 834-843, ISSN 0176-1617, DOI: 10.1016/j.jplph.2005.04.017.
(http://www.sciencedirect.com/science/article/B7GJ7-4G7DXTB-G/2/f64ac8bfa7833fd7668f8847fdd28be0)
Abstract: Summary
Vitamin E has many reported health effects and is recognized as the most important lipid-soluble, chain-breaking antioxidant in the body. Vitamin E has also been reported to play a regulatory role in cell signalling and gene expression. Epidemiological studies show that high blood concentrations of vitamin E are associated with a decreased risk of cardiovascular diseases and certain cancers. Yet, high doses of supplemental vitamin E have been associated with an elevated risk of heart failure and all-cause mortality. Therefore, establishing alternative strategies to improve vitamin E status without potentially increasing mortality risk may prove important for optimal nutrition.
To identify dietary phenolic compounds capable of increasing blood and tissue concentrations of vitamin E, selected polyphenols were incorporated into standardized, semi-synthetic diets and fed to male Sprague-Dawley rats for 4 weeks. Blood plasma and liver tissue concentrations of [alpha]-T and [gamma]-T were determined. The flavanols (+)-catechin and (-)-epicatechin, the flavonol quercetin, and the synthetic preservative butylated hydroxytoluene (BHT) markedly elevated the amount of [alpha]-T in plasma and liver. The sesame lignan sesamin and cereal alkylresorcinols substantially increased the concentrations of [gamma]-T, but not [alpha]-T, in the liver. Sesamin also increased [gamma]-T concentrations in plasma.
In order to study the impact of selected polyphenols on the enzymatic degradation of vitamin E, HepG2 cells were incubated together with phenolic compounds in the presence of tocopherols and the formation of metabolites was determined. Sesamin, at concentrations as low as 2 [mu]M, almost completely inhibited tocopherol side-chain degradation and cereal alkylresorcinols inhibited it, dose-dependently (5-20 [mu]M), by 20-80%. BHT, quercetin, (-)-epicatechin, and (+)-catechin had no effect on tocopherol-[omega]-hydroxylase activity in HepG2 cells.
In order to confirm the inhibition of [gamma]-T metabolism by sesame lignans in humans, sesame oil or corn oil muffins together with deuterium-labelled d6-[alpha]-T and d2-[gamma]-T were given to volunteers. Urine samples were collected for 72 h and analysed for deuterated and non-deuterated tocopherol metabolites. Consumption of sesame oil muffins significantly reduced the urinary excretion of d2-[gamma]-CEHC and total (sum of labelled and unlabelled) [gamma]-CEHC.

Overall, the findings from these studies show that the tested dietary phenolic compounds increase vitamin E concentrations through different mechanisms and, thus, have the potential to improve vitamin E status without the use of vitamin E supplements.
Keywords: Blood plasma; Carboxyethyl hydroxychromanols; Humans; Liver; Metabolites; Rats; Tocopherols; Vitamin E status

Cecilia M. Antao, F. Xavier Malcata, Plant serine proteases: biochemical, physiological and molecular features, Plant Physiology and Biochemistry, Volume 43, Issue 7, July 2005, Pages 637-650, ISSN 0981-9428, DOI: 10.1016/j.plaphy.2005.05.001.
(http://www.sciencedirect.com/science/article/B6VRD-4GBD5C8-1/2/eee059d45a5d58cb5534dc4b4dca96da)
Abstract:
In the latest two decades, the interest received by plant proteases has been on the rise. Serine proteases (EC 3.4.21)--in particular those from cucurbits, cereals and trees--share indeed a number of biochemical and physiological features, that may prove useful toward understanding of several mechanisms at the subcellular level. This critical review focuses on the characterization of most plant serine proteases, and comprehensively lists information produced by more and more sophisticated research tools that have led to the current state of the art in knowledge of these unique enzymes.
Keywords: Enzyme; Mechanism; Substrate specificity; Function

Indra Roschewitz, Melanie Hucker, Teja Tscharntke, Carsten Thies, The influence of landscape context and farming practices on parasitism of cereal aphids, Agriculture, Ecosystems & Environment, Volume 108, Issue 3, Agri-Environmental Schemes as Landscape Experiments, 30 June 2005, Pages 218-227, ISSN 0167-8809, DOI: 10.1016/j.agee.2005.02.005.
(http://www.sciencedirect.com/science/article/B6T3Y-4FM0NYF-3/2/56b5951c690a0ae6160ac06e6e923d90)
Abstract:
Agri-environmental schemes in Europe aim to support biodiversity and ecological functions in agroecosystems, which are related to both farming practices and landscape context. Here, we analysed the relative importance of farming practices and landscape context on an important ecosystem service, the naturally occurring biological pest control. In a 3-years study, we investigated cereal aphids and their mortality due to parasitism in 24 paired winter wheat fields (i.e., one organic and one conventional field close to each other). The field pairs were located in 12 landscapes differing in landscape complexity, simple landscapes with high percentage of arable land (~80%), and complex landscapes with lower percentage of arable land (~50%) and high proportions of semi-natural habitats. Arable land (%) was used as simple predictor of landscape complexity, as it was closely related with other landscape metrics like habitat-type diversity. Aphid population densities varied considerably between the 3 years and the 12 different landscapes. Organic farming was related to lower abundance of cereal aphids at the time of wheat flowering, but not to higher parasitism. At wheat ripening, complex landscapes were related to higher parasitism than simple landscapes, presumably due to more overwintering sites, alternative hosts and nectar sources for parasitoids. However, aphid population densities were also higher in complex landscapes, presumably due to the high availability of winter hosts for these host-alternating species. In a geographical scale analysis, we tested the relative importance of landscape complexity at 5 spatial scales (1-3 km radius around the study sites). Parasitoids responded to landscape complexity at spatial scales of 1-2 km, whereas aphid densities responded to landscape complexity at all spatial scales, indicating a trophic level-specific perception of the surrounding landscape. We conclude that complex landscapes with low percentage of arable land appeared to enhance parasitism, but also the host-alternating aphids, so overall effects of landscape complexity on cereal aphid control appear to be ambivalent.

Keywords: Farming practices; Conventional farming; Organic farming; Landscape complexity; Cereal aphids; Aphid parasitoids; Biological control; Spatial scale

M. Manninen, P. Virkajarvi, L. Jauhiainen, Effect of whole-crop barley and oat silages on the performance of mature suckler cows and their progeny in outdoor winter feeding, Animal Feed Science and Technology, Volume 121, Issues 3-4, 24 June 2005, Pages 227-242, ISSN 0377-8401, DOI: 10.1016/j.anifeedsci.2005.03.006.
(http://www.sciencedirect.com/science/article/B6T42-4G1GFBJ-1/2/afbb40cdcaad02b3e9d962f470c2b25a)
Abstract:
This study was undertaken to assess during the winter feeding period the effects of replacing grass silage (G) with whole-crop barley silage (B) or whole-crop oat silage (O) on suckler cow and calf performance. Forty-eight Hereford cows with an initial live weight of 741 kg (S.D. 78.5) were selected for the experiment. The diet was either G, B or O as a sole feed. The aim was to offer the cows the same amount of energy in all diets. Therefore, the energy content of the silages was evaluated prior to the experiment by measuring the in vitro organic matter digestibility which resulted in 11.7 MJ metabolizable energy (ME)/kg dry matter (DM) for G and 9.9 MJ ME/kg DM for B and O. During the experiment, the digestibility of the silages was measured by both in vitro and in vivo methods.
The ME values of G, B and O evaluated by the in vivo method were 11.2, 10.5 and 9.5 MJ/kg DM, respectively. The DM intake on diets G, B and O averaged 9.2, 10.5 and 10.3 kg which resulted in ME intakes of 102, 109 and 97 MJ ME/d, respectively. The type of roughage affected the in vivo apparent protein digestibility co-efficients which for G, B and O were 0.841, 0.698 and 0.498, respectively (G versus B, $P < 0.05$; G versus O and B versus O, $P < 0.01$). The initial cow body condition score (BCS) averaged 3.2 (S.D. 0.23). Pre-grazing the change of BCS and the live weight gain (LWG) for G, B and O cows was on average 0.23, 0.09 and -0.39 (G versus O and B versus O, $P < 0.001$) and -20, -9 and -56 kg (G versus O, $P < 0.05$; B versus O, $P < 0.01$), respectively. All calves were born before the grazing season and milk and grass were the sole feeds at pasture. The pre-weaning calf LWG was not affected by the diets averaging 1357 g/d. The daily milk yield on diets G, B and O averaged 11.4, 10.3 and 9.5 kg (G versus O, $P < 0.05$), respectively. Forty-two out of 48 cows entered the mating period of which all were observed to be pregnant. The interval from calving to conception averaged 89 days. B and O proved to be suitable winter feeds for mature suckler cows in cold winter circumstances. Especially O had a lower energy and protein content than G but fulfilled the energy and protein demands of mature, pregnant beef cows in good body condition.
Keywords: Feeding; Beef; Body condition; Grazing; Milk; Reproduction; Whole-crop cereal silage

Liisa Pietola, Laura Alakukku, Root growth dynamics and biomass input by Nordic annual field crops, Agriculture, Ecosystems & Environment, Volume 108, Issue 2, 15 June 2005, Pages 135-144, ISSN 0167-8809, DOI: 10.1016/j.agee.2005.01.009.
(http://www.sciencedirect.com/science/article/B6T3Y-4FFN4V8-2/2/75c8df828e48c28a8e26920fbfaec38d)
Abstract:
Roots are an important sink for photoassimilates and carbon input to soil. Here the root growth and biomass of different spring sown annuals was determined to estimate the shoot:root (S:R) ratios and carbon inputs in the typical Nordic agroecosystem. The data, collected in southern Finland, present evidence for large difference in root growth dynamics and biomass input between spring oilseed rape (Brassica rapa L.) and annual ryegrass (Lolium multiflorum Lam. var. italicum) whereas the rooting of spring sown barley (Hordeum vulgare) and oats (Avena sativa) was related. The four crops were sown at the same time in a field with a fine sand soil (Eutric Cambisol) with good nutrient and water supply. During one growing season, root growth was determined 12 times

to a soil depth of 50 cm by using a minirhizotron-micro-video camera technology. At anthesis, root biomass and morphological parameters were measured to 60 cm soil depth at 5 cm intervals, with destructive soil sampling and image analysis of washed roots. The root growth rate of oilseed rape was clearly faster and that of rye grass slower compared with the other crops. At anthesis, the average total root dry biomass (0-60 cm) was160 g for barley, 260 g for oats, 340 g for ryegrass, and 110 g m-3 for oilseed rape. Also, the root length density and surface area of oilseed rape was less than that of other crops. Most of the biomass (59-80%) was accumulated the upper 20 cm of the soil. Shoot to root ratios (at anthesis for the seed crops) of 7.1, 4.4, 4.2 and 2.5 for barley, oats, oilseed rape, and ryegrass respectively, could be used for an approximation to estimate the amount of root biomass left in the 0-60 cm soil layer under Nordic long day conditions. In contrast to the seed crops, the root growth rate and density of ryegrass was high in the late season. Thus, ryegrass would be an efficient catch crop after harvest of cereals.
Keywords: Avena sativa; Brassica rapa; Hordeum vulgare; Lolium multiflorum; Minirhizotron; Root biomass; Root length density; Root surface area; Root width; Shoot:root

Amare Haileslassie, Joerg Priess, Edzo Veldkamp, Demil Teketay, Jan Peter Lesschen, Assessment of soil nutrient depletion and its spatial variability on smallholders' mixed farming systems in Ethiopia using partial versus full nutrient balances, Agriculture, Ecosystems & Environment, Volume 108, Issue 1, 5 June 2005, Pages 1-16, ISSN 0167-8809, DOI: 10.1016/j.agee.2004.12.010.
(http://www.sciencedirect.com/science/article/B6T3Y-4FC3S0B-1/2/87ed2cde3db9336af0b5bac94c4d9cb8)
Abstract:
Soil fertility depletion in smallholder farms is one of the fundamental biophysical causes for declining per capita food production in Ethiopia. In the present study, we assess soil nutrient depletion and its spatial variability for Ethiopia and its regional states, using nutrient balances as a tool. Data on crop production, fertilizer use and land management practices were collected from the Agricultural sample survey, which was carried out by the Central Statistics Authority (CSA) for the production year 1999/2000. We used a Geographic Information System (GIS) to process, and analyze spatially referenced information like soil properties, precipitation and land use types. We calculated nutrient balances for N, P and K from five nutrient fluxes entering and five nutrient fluxes leaving cultivated lands of smallholders. Some of the fluxes (e.g. leaching, denitrification and wet deposition) were estimated using transfer functions. Erosion was estimated by universal soil loss equation (USLE) and landscape process modelling at multi-dimensions and scales (LAPSUS). At the national level, full nutrient balance results indicate a depletion rate of 122 kg N ha-1 yr-1, 13 kg P ha-1 yr-1 and 82 kg K ha-1 yr-1. Soil nutrient stocks in all regional states were decreasing with the exception of areas under permanent and vegetable crops. In the analysis, soil erosion was the major cause for nutrients depletion, but this flux shows significant variability between different estimates and was highly uncertain. We calculated that the contribution of erosion to N losses was 70%, while its contribution to P and K losses were 80% and 63%, respectively. Nutrient losses under permanent and vegetable cropping were caused mainly by residues removal, harvested products and leaching, while losses under cereals and other annuals were dominated by erosion.
Keywords: Erosion; Leaching; Nutrient balances; Regional state; Soil degradation; Cropping systems

Sangita Pai, P.S. Ghugre, S.A. Udipi, Satiety from rice-based, wheat-based and rice-pulse combination preparations, Appetite, Volume 44, Issue 3, June 2005, Pages 263-271, ISSN 0195-6663, DOI: 10.1016/j.appet.2005.01.004.
(http://www.sciencedirect.com/science/article/B6WB2-4G05M3R-2/2/9a1e9888fe0344f70da1463b9839b6c9)

Abstract:
The satiety values of six breakfast items commonly consumed in India were determined on the basis of area under the curve. A repeated measures design was used wherein energy intake, hunger, and satiety scores were assessed for one rice-based, three wheat-based and a rice-pulse fermented preparation, using white bread as the reference. Subjects were provided equi-caloric portions of the six breakfast items on separate occasions, and satiety ratings were recorded every 15 min over a 120 min period, after which time they were free to consume whatever they desired. Satiety scores were in the order of fermented cereal-pulse preparation>savoury broken wheat preparation>whole wheat flour flat bread>savoury semolina preparation>savoury rice flakes preparation>white bread standard. Among the various factors examined for their influence on satiety scores, fibre content, energy density and cooked weight of the food items positively influenced satiety scores. Neither fat nor carbohydrate content showed any correlation with satiety scores. These data indicate that isoenergetic portions of various foods influence satiety to different extents. Thus results suggest that consumption of high protein, high fibre and foods with greater water/volume leading to low energy density may be effective in delaying the return of hunger.
Keywords: Energy intake; Breakfast; Satiety; Iso-caloric foods; Protein content

R.J. Gutteridge, J.-P. Zhang, J.F. Jenkyn, G.L. Bateman, Survival and multiplication of Gaeumannomyces graminis var. tritici (the wheat take-all fungus) and related fungi on different wild and cultivated grasses, Applied Soil Ecology, Volume 29, Issue 2, June 2005, Pages 143-154, ISSN 0929-1393, DOI: 10.1016/j.apsoil.2004.11.003.
(http://www.sciencedirect.com/science/article/B6T4B-4F7S177-1/2/3d0643fc3c99e134f967aa56cad769dc)
Abstract:
The susceptibilities of different grass species, including currently important annual weeds of cereal crops, to root infection by Gaeumannomyces cylindrosporus and related weakly or non-pathogenic fungi, and to G. graminis var. tritici (the take-all fungus), were tested in pot experiments. Amounts of infection on wheat grown subsequently were also compared. Infection by the non-take-all Gaeumannomyces spp., arising from artificial inoculation, was variable but characteristic swollen cells were often more numerous in root systems of wheat than of grasses. Take-all, arising from natural soil infestation, in the following wheat was decreased only after inoculation of the grasses with G. graminis var. graminis in one experiment; this effect was not influenced by previous host species. Wheat became more affected than grasses by take-all but bromes (Anisantha sterilis and Bromus secalinus) were more diseased than the other grasses. Overall, annual grasses, including the bromes and black-grass (Alopecurus myosuroides), developed more take-all than perennial grasses. The most affected species allowed most take-all to develop on wheat plants grown subsequently. Where a second sowing of wheat was tested (i.e. a total of three sowings), take-all after the perennial grasses was similar to or more than that after annual grasses or wheat. Implications for the effects of weed grasses on take-all in modern cereal cropping systems, particularly those involving set-aside, are discussed.
Keywords: Wheat; Take-all; Phialophora; Grasses; Weeds; Fallow

M. Ngouajio, H. Mennan, Weed populations and pickling cucumber (Cucumis sativus) yield under summer and winter cover crop systems, Crop Protection, Volume 24, Issue 6, June 2005, Pages 521-526, ISSN 0261-2194, DOI: 10.1016/j.cropro.2004.10.004.
(http://www.sciencedirect.com/science/article/B6T5T-4DVW22S-1/2/2c4e57060792a8ae4131a7c8bc90e18f)
Abstract:
Cucumber growers are increasingly interested in integrating cover crops into their cropping systems. This study was conducted to measure the effect of summer and winter cover crops on weed populations and cucumber yield. The experimental design was a factorial of cover crop and

killing method. The cover crops were sorghum sudangrass [Sorghum bicolor (L) x S. sudanense (P) Stapf.], cereal rye (Secale cereale L.), hairy vetch (Vicia villosa Roth), and bare ground was used as a control. The cover crops were killed either by discing or with glyphosate application. Cover crop killing method had no effect on weed density, weed species composition, cucumber yield, and soil nutrient composition. Weed density was lower in all cover crop systems compared to bare ground. At 43 days after cover crop kill (DAK) in 2002, weed density was 40, 56, 65, and 372 plants m-2 in the sorghum sudangrass, cereal rye, hairy vetch, and bare ground treatments, respectively. Similar results were found at 40 DAK in 2003. Cucumber yield was the highest in sorghum sudangrass and rye systems, and lowest in the hairy vetch system. Sorghum sudangrass and rye showed potential for improvement of cucumber yield. However, fresh residue of rye in early summer may interfere with crop planting. In spite of the high weed suppression, the hairy vetch system was unacceptable because of the low cucumber yield.
Keywords: Cereal rye; Hairy vetch; Integrated crop management; Secale cereale; Sorghum bicolor; Species richness; Sustainable; Vicia villosa

M. Eizaguirre, L. Xanxo, X. Pons, Importance and control of soil pests in silage maize in the highlands of the Pyrenees, north-east Spain, Crop Protection, Volume 24, Issue 6, June 2005, Pages 549-555, ISSN 0261-2194, DOI: 10.1016/j.cropro.2004.11.002.
(http://www.sciencedirect.com/science/article/B6T5T-4F320J2-1/2/ca2790ef61f0355fbe6bcb127e3357e0)
Abstract:
In the highlands of the Pyrenees (north-east Spain), during the last ten years natural pastures have been replaced by arable fodder crops with a non-tillage system in the rotation: silage maize-winter cereals-artificial pastures. This change of crops has led to several problems caused by previously undetected maize pests. A three-year study determined the species involved and their actual incidence . Two soil pest species were identified as the most important : Agriotes lineatus and Agrotis segetum, the latter causing the most important damage mainly in maize sown in bare soil. However, the level of attack did not justify preventive treatments against the soil pest, and curative treatments with liquid chlorpyrifos are considered to be an alternative.
Keywords: Silage maize; Soil pests; Soil insecticides

Catia Regina Storck, Leila Picolli da Silva, Carlos Alberto Alves Fagundes, Categorizing rice cultivars based on differences in chemical composition, Journal of Food Composition and Analysis, Volume 18, Issue 4, The International Year of Rice 2004, June 2005, Pages 333-341, ISSN 0889-1575, DOI: 10.1016/j.jfca.2004.09.005.
(http://www.sciencedirect.com/science/article/B6WJH-4F53HJX-B/2/21b66dcbbd0e3d95fe0d32e1e277e99e)
Abstract:
This research aimed to verify variations in chemical composition of rice cultivars after polishing and to evaluate the constancy between two cultivated years in order to categorize them into groups with distinct nutritional characteristics. The cultivation year only significantly affected the Ash values. Categorizing cultivars showed that some of them presented a standard pattern for some measures. The groups formed by cluster analysis from 2001/2002 samples were: 1A [PROCNT (crude protein)=7.80%; CHOAVL (digestible starch)=85.8%; FIBINS (insoluble fiber)=1.14%; FIBSOL (soluble fiber)=1.23%], 2A (PROCNT=9.90%; CHOAVL=84.8%; FIBINS=0.85%; FIBSOL=1.64%) and 3A (PROCNT=8.54%; CHOAVL=83.5%; FIBINS=1.64%; FIBSOL=1.48%); and by 2002/2003 samples were: 1B (PROCNT=7.63%; CHOAVL=86.1%; FIBINS=0.89%; FIBSOL=1.69%), 2B (PROCNT=10.3%; CHOAVL=82.9%; FIBINS=1.31%; FIBSOL=1.65%) and 3B (PROCNT=8.56%; CHOAVL=84.2%; FIBINS=0.66%; FIBSOL=3.09%). The groups formed in the two years were different, but some cultivars showed a standard pattern for some measures (i.e. BR-IRGA-409, IRGA-416 and FORMOSA for CHOAVL-high, PROCNT-

low, and FIBINS-intermediate), which can serve as indicators of the persistence of these characteristics. These results are of great importance for use in genetic improvement, since if we have a common cereal with differentiated nutritional values, we can improve diet quality in poor populations that need special attention.
Keywords: White rice; Nutritional value; Genetic improvement

Graeme D. Batten, In: Elaine T. Champagne, Editors, Rice chemistry and technology, third ed., American Association of Cereal Chemists Inc., St Paul, MN, USA (2004) ISBN 1-891127-34-9 (656pp., US$ 299 or Euro 229)., Journal of Food Composition and Analysis, Volume 18, Issue 4, The International Year of Rice 2004, June 2005, Pages 343-344, ISSN 0889-1575, DOI: 10.1016/j.jfca.2004.08.002.
(http://www.sciencedirect.com/science/article/B6WJH-4DXC28V-1/2/d095cdb57f9fe031d012ed65901e0e14)

Wahida Karmally, Maria G. Montez, Walter Palmas, Wendy Martinez, Anita Branstetter, Rajasekhar Ramakrishnan, Steve F. Holleran, Steven M. Haffner, Henry N. Ginsberg, Cholesterol-Lowering Benefits of Oat-Containing Cereal in Hispanic Americans, Journal of the American Dietetic Association, Volume 105, Issue 6, June 2005, Pages 967-970, ISSN 0002-8223, DOI: 10.1016/j.jada.2005.03.006.
(http://www.sciencedirect.com/science/article/B758G-4GB4GXM-W/2/7109da0be04160c1d8afc784cef0bb5a)
Abstract:
This randomized, controlled trial of cholesterol lowering by an oat bran cereal containing beta glucan vs a corn cereal without soluble fiber in Hispanic Americans was conducted for 11 weeks. One-hundred fifty-two men and women, ages 30 to 70 years, with baseline low-density lipoprotein cholesterol (LDL-C) levels between 120 and 190 mg/dL and triglycerides <400 mg/dL were included. After eating a National Cholesterol Education Program Step 1 diet for 5 weeks, subjects were randomly assigned to the corn or the oat cereal for the next 6 weeks. The daily dose of beta glucan was 3 g. Consumption of oat cereal was associated with a reduction in plasma levels of both total cholesterol (-10.9+/-21.6 mg/dL; -4.5%) and LDL-C (-9.4+/-20.3 mg/dL; -5.3%). Consumption of corn cereal did not affect either total cholesterol (+1.2+/-18.3 mg/dL; 1.1%) or LDL-C (+1.2+/-17.5 mg/dL; 2.2%). Differences between the effects of the two cereals on total cholesterol and LDL-C were significant, P=.0003 and P=.0007, respectively.

B.K. Nielsen, S.M. Thamsborg, Welfare, health and product quality in organic beef production: a Danish perspective, Livestock Production Science, Volume 94, Issues 1-2, Product quality and livestock systems, June 2005, Pages 41-50, ISSN 0301-6226, DOI: 10.1016/j.livprodsci.2004.11.023.
(http://www.sciencedirect.com/science/article/B6T9B-4FR3NRF-1/2/12dacb76cf4c8acbba7c0186de7f5008)
Abstract:
In Europe, organic beef production is based on grazing in summer and feeding a minimum of 60% roughage during the whole year. Although these recommendations were intended to improve animal health and welfare, several factors may cause problems in organic beef production systems. This paper gives an overview of welfare, health and product quality in organic beef production, with emphasis on organic steer production based on dairy-breed bull calves. A short overview of different production systems, highlighting the effect on health and welfare, is also given. Feeding aspects are discussed. Farm studies have shown that organic steer production involves large amounts of roughage; only small quantities of cereals are used compared to conventional production of bulls and calves. Fattening of organic steers may result in metabolic disorders due to sudden changes in the feed ration when changing from high roughage to high

cereal content. Various problems relating to the production system are discussed. Subjective monthly observations indicate a good level of general health and welfare in organic steer production systems. On pasture, parasitic infection is the primary factor affecting animal health and productivity of organic beef. Rearing of young calves and the utilization of marginal grazing areas requires further attention. The effect of castration on health and welfare, and the effect of castration age and method, are also discussed. Product quality of organic beef is affected by the production system, especially sex, grazing and exercise. Grazing and exercise, which are inevitable components of an organic beef production system, may affect the eating quality due to darker meat color, risk of off-flavor, yellow fat, and a higher content of unsaturated fatty acids, including conjugated linoleic acid (CLA). Nevertheless, the overall effect on sensory attributes may be of minor importance. For the future, feeding large amounts of roughage, combined with a high bioactive forage content, could be one way of improving the product quality of organic beef.
Keywords: Bioactive forage; Castration; Conjugated linoleic acid (CLA); Organic farming

Jianrong Lin, Chunhai Shi, Mingguo Wu, Jianguo Wu, Analysis of genetic effects for cooking quality traits of japonica rice across environments, Plant Science, Volume 168, Issue 6, June 2005, Pages 1501-1506, ISSN 0168-9452, DOI: 10.1016/j.plantsci.2005.02.018.
(http://www.sciencedirect.com/science/article/B6TBH-4FNW1HF-1/2/9b1be8ef21d9c8318f22be60863145c6)
Abstract:
The genetic effects of the cooking quality traits amylose content (AC) and gel consistency (GC) of japonica rice were analyzed by using a genetic model including genotype x environment (GE) interaction effects for quality traits of the endosperm in cereal crops. The results indicated that AC and GC of japonica rice were greatly controlled by the genetic main effects from endosperm, cytoplasm and maternal plant genes, but were also affected by GE interaction effects. The endosperm effects were most important among genetic main effects for the performance of AC and GC, while the cytoplasmic interaction effect or maternal interaction effects for AC or GC were more essential among GE interaction effects, respectively. Additive effects and cytoplasmic interaction effect were the main factors controlling the performance of AC, but GC was mainly affected by additive effects, additive interaction effects and cytoplasmic interaction effect. The endosperm general heritabilities were the largest ones among heritability components for AC and GC. A significant negative genotypic correlation was found between AC and GC. The genetic effects predicted for 13 parents showed that Liaojing 326 A and Hu 161 were the better parents for improving the rice cooking quality traits.
Keywords: Cooking quality traits; Genetic correlations; Genetic main effects; Genotype x environment interaction effects; Heritabilities; Japonica rice

E.N. Ponnampalam, A.R. Egan, A.J. Sinclair, B.J. Leury, Feed intake, growth, plasma glucose and urea nitrogen concentration, and carcass traits of lambs fed isoenergetic amounts of canola meal, soybean meal, and fish meal with forage based diet, Small Ruminant Research, Volume 58, Issue 3, June 2005, Pages 245-252, ISSN 0921-4488, DOI: 10.1016/j.smallrumres.2004.10.007.
(http://www.sciencedirect.com/science/article/B6TC5-4F8TK9P-1/2/bd53ba26f5a8704ec9661c0fd604ea0e)
Abstract:
This experiment was conducted to examine the effect of feeding small, isoenergetic amounts of supplements containing high protein and functional lipid components, rather than the greater amounts of cereal and/or legume grains usually fed during the dry season in Australia, on dry matter intake (DMI), growth performance, plasma metabolites, and fat deposition in lambs consuming low quality roughage. Thirty two crossbred wether lambs ([Merino x Border Leicester] x Poll Dorset) were divided into four groups by stratified randomization according to liveweight (26-33 kg). After a 7-day adaptation to a hay diet (lucerne hay:oaten hay; 30:70), lambs were allocated

to four treatments consisting of (1) basal diet of lucerne hay:oat hay (20:80; metabolizable energy (ME) = 7.0 MJ/kg DM), Basal; (2) basal + canola meal (84 g per day), CM; (3) basal + soymeal (75 g per day), SM; or (4) basal + fishmeal (80 g per day), FM. Daily hay and supplement DMI, and weekly liveweight were recorded during a 53-day experimental study. Blood samples were taken on day 1 and pre- and post-feeding on days 30 and 53 to measure changes in plasma glucose and plasma urea nitrogen (PUN) concentration. At the end of the experiment, lambs were slaughtered and hot carcass weight (HCW) recorded; cold carcass fatness (total muscle and adipose tissue depth at 12th rib, 110 mm from midline; GR) was determined at 24 h postmortem. Total DMI was increased ($P < 0.001$) in CM, SM and FM treatments, but basal hay DMI intake was only increased ($P < 0.01$) in CM and FM treatments compared with Basal treatment. This resulted in significant ($P < 0.01$) increases in metabolizable energy (ME) and crude protein (CP) intakes in all supplemented treatments, with the highest intakes recorded in the FM treatment. Liveweight gain (LWG) was significantly increased in CM and SM ($P < 0.05$) and FM ($P < 0.01$) treatments but HCW was significantly ($P < 0.01$) heavier slaughter only in the FM treatment. Feed conversion efficiency ($P < 0.001$) and GR fat at depth ($P < 0.05$) was reduced in all supplement treatments compared with Basal. Plasma glucose concentration was significantly ($P < 0.05$) increased after feeding in all treatments but there was no treatment effect. PUN was significantly increased over time in the supplemented treatments compared with the Basal treatment; there was no significant difference between supplement treatments by day 53. Results show that feeding small amounts of high protein and lipid-containing supplements improves production responses and are beneficial in producing carcasses with more lean compared with carcasses from lambs fed a low quality hay diet.

Keywords: Oilseed meals; Growth; Dry matter intake; Carcass weight; Fatness

D.I. Scott, A.R. Tams, P.M. Berry, S.J. Mooney, The effects of wheel-induced soil compaction on anchorage strength and resistance to root lodging of winter barley (Hordeum vulgare L.), Soil and Tillage Research, Volume 82, Issue 2, June 2005, Pages 147-160, ISSN 0167-1987, DOI: 10.1016/j.still.2004.06.008.
(http://www.sciencedirect.com/science/article/B6TC6-4DS804W-4/2/5702afe34524ea87377e52b189327cd9)

Abstract:
Lodging is the permanent displacement of cereal stems from the vertical. Cereal plants growing in the edge rows next to both wheel tracks (`tramlines') and the gaps between experimental plots (`inter-plot spaces'), which are traversed by farm vehicles during planting operations and agrochemical application, are less prone to lodge than plants growing elsewhere in fields and plots. Previous research has attributed this phenomenon to an increase in the stem strength of edge row plants, and hence their resistance to stem lodging, resulting from reduced competition between edge row plants for resources. However, this explanation gives no consideration to the anchorage strength of edge row plants, and hence their resistance to root lodging. Differences in soil and plant characteristics between the edge and centre rows of plots of winter barley (Hordeum vulgare L.) were examined on sand, silt and clay dominated soil types. Edge rows next to tramlines were investigated on the silt and clay soil types, whereas edge rows next to inter-plot spaces were investigated on the sand soil type. Edge row plants next to both tramlines and inter-plot spaces had 58.8% greater anchorage strength and hence resistance to root lodging than centre row plants. This was attributed to (1) greater soil compaction in the edge rows resulting from wheel traffic in the tramlines and inter-plot spaces, which increased the strength of the soil matrix surrounding the roots, and (2) greater plant root growth in the edge rows resulting from reduced competition. Bulk density, root plate spread and structural rooting depth were 19, 22, and 12% greater, respectively, in the edge rows of all soil types. The results suggest that in order to reduce lodging risk, energies should be directed towards identifying agricultural practices that optimise soil compaction in the seedbed without causing significant limitations to root growth.

Keywords: Soil compaction; Root lodging; Winter barley; Bulk density; Soil strength

David O. Kleemann, Simon K. Walker, Fertility in South Australian commercial Merino flocks: relationships between reproductive traits and environmental cues, Theriogenology, Volume 63, Issue 9, June 2005, Pages 2416-2433, ISSN 0093-691X, DOI: 10.1016/j.theriogenology.2004.09.052.
(http://www.sciencedirect.com/science/article/B6TCM-4DXTHTC-5/2/00dd0c82b5193214717a6ccf5b3e1654)
Abstract:
High levels of reproductive loss have been reported in commercial Merino flocks (n = 68) from the cereal/livestock and high rainfall zones in South Australia (Kleemann DO, Walker SK. Fertility in South Australian commercial Merino flocks: sources of reproductive wastage. Theriogenology 2005;63:2075-88). Relationships between reproductive traits (estrus, ovulation, fertility, fecundity, lamb survival) and environmental end points (liveweight, condition score, temperature at mating, chill index at lambing) are reported in this paper. They were analysed within season of mating (October to December; January to March) and age of ewe (maiden as 1.5-year-old, mature as older). Incidence of estrus was positively related (P < 0.05) to condition score in the October to November interval. Return rate to service was positively (P < 0.05) influenced and fertility was negatively (P < 0.05) influenced by the number of days ambient temperatures were >=32.0 [degree sign]C during mating, indicating that high ambient temperatures may reduce embryo survival. Liveweight and, to a lesser extent, condition score, accounted for significant proportions of variation associated with ovulation rate (39.3 and 12.7%, respectively). Ovulations per 100 ewes increased by 1.8 per kg increase in liveweight over all flocks. Ovulatory response to liveweight increased (P < 0.01) from the October to December to the January to March period of mating (1.5 versus 3.4 ovulations per kg, respectively). Overall, a flock's fertility and fecundity increased by 0.27 and 1.42% per kg increase in liveweight, respectively. Reproductive wastage from partial failure of multiple ovulations (PFMO) was positively related to liveweight (P < 0.01) and ovulation rate (P < 0.001). Survival of single lambs was positively and curvilinearly related to maternal liveweight and condition score measured in late pregnancy (P < 0.05). Linear relationship of these variables for twin lamb survival was significant for condition score only. Single and twin lamb survival were also positively related to liveweight and condition score at mating (P < 0.05). We concluded that nutritional cues have a major impact on reproductive traits in commercial Merino flocks in South Australia; it sets the potential number of lambs (ovulation rate) and influences survival of lambs as early as at mating. Indications are that high ambient temperatures may influence embryo survival. It is recommended that future research efforts focus on: (a) prenatal nutritional influences on the physiology of mother-offspring behaviours at birth; and (b) possible peri-conceptional dietary factors controlling embryo loss resulting from partial failure of twin ovulations, to improve reproductive efficiency in the Merino.
Keywords: Sheep; Reproductive wastage; Nutrition; Temperature; Chill index

Darcy Boellstorff, Gerardo Benito, Impacts of set-aside policy on the risk of soil erosion in central Spain, Agriculture, Ecosystems & Environment, Volume 107, Issues 2-3, 20 May 2005, Pages 231-243, ISSN 0167-8809, DOI: 10.1016/j.agee.2004.11.002.
(http://www.sciencedirect.com/science/article/B6T3Y-4F83PJ7-2/2/b5fff384b83cacd995f8fc0e7b93f195)
Abstract:
The 1992 European Union's Common Agricultural Policy (CAP) set-aside program led to an increase in area of set-aside land after 1992, but had a varying effect on soil erosion rates because of the different climatic, environmental and economic conditions of European agricultural regions. This study presents new data on the CAP implications for land use and management on subsidized-dependent agricultural zones of central Spain. The focus is on how this land change

has impacted the soil erosion risk since 1992. In many parts of cereal-growing central Spain, with Mediterranean continental climate, set-aside land management is managed as unseeded fallow, a management type used to increase soil moisture and fertility for subsequent rotations. Unseeded fallow land management has also been related to increased susceptibility to soil erosion. In order to quantify the effects CAP reform policies have had on erosion rates, land changes from 1991 to 1998 were used to calculate annual rates of erosion susceptibility using the revised universal soil loss equation (RUSLE) in a geographic information systems (GIS) environment within a study watershed. Additional land use scenarios were simulated to estimate the effects fallow land modification would have on erosion risk. The results show the increase in unseeded fallow land management, due to the 1992 EU policy, led to an increase in the amount of land in high erosion risk categories. Although the increase in set-aside land due to the CAP has resulted in less area vulnerable to soil erosion in some regions of Europe, the agricultural regions of central Spain have experienced the opposite.
Keywords: CAP; Set-aside; Spain; Mediterranean; Land use changes; Soil erosion; RUSLE

Jiun-Jiun Ferng, Local sustainable yield and embodied resources in ecological footprint analysis--a case study on the required paddy field in Taiwan, Ecological Economics, Volume 53, Issue 3, 15 May 2005, Pages 415-430, ISSN 0921-8009, DOI: 10.1016/j.ecolecon.2004.11.010.
(http://www.sciencedirect.com/science/article/B6VDY-4FCRFJ7-7/2/0f6c4c3d6c77f0a50df62141df33c178)
Abstract:
Since the 1990s, ecological footprint (EF) analysis has been employed to discuss two important dimensions of sustainable development, intra- and inter-generational equity, from the perspective of ecosystem appropriation. When examining the equality of resource use among generations in the EF analysis, sustainable yield plays a crucial role; however, its value is assumed to be the same as that of average industrial yield, which does not reflect differential productivity and its value can be much higher than the sustainable one through over-exploitation practices. The estimated EF, as well as ecological deficits, would be underestimated, from which false policy implications could be drawn. Through a review of the literature on the relationships between yield, soil quality, and farming practices, this paper suggests adopting a yield potential ranking system that was established by the government in Taiwan in 1991 through an 8-year field study. This ranking system served as a proxy for local sustainable yield in estimating the required paddy fields in Taiwan in 1996 under two scenarios. Scenario (I) concerned the required paddy fields for supporting the direct and indirect consumption of rice by Taiwan residents; Scenario (II) explored the additional area of paddy fields that would be needed when the food energy from cereals is provided exclusively by rice and the importing of rice is not possible. The results were then compared with the estimates when the average industrial yield of 1996 was used. A hybrid-units input-output modeling method was used to estimate the rice contained in manufactured products. The results of the scenario analysis shed light on the importance of preserving Taiwan's existing paddy fields for the sake of maintaining stable long-term food supply.
Keywords: Ecological footprint; Embodied resources; Hybrid-units input-output model; Local sustainable yields; Paddy field

B.C. Granzin, G. McL. Dryden, Monensin supplementation of lactating cows fed tropical grasses and cane molasses or grain, Animal Feed Science and Technology, Volume 120, Issues 1-2, 9 May 2005, Pages 1-16, ISSN 0377-8401, DOI: 10.1016/j.anifeedsci.2005.01.009.
(http://www.sciencedirect.com/science/article/B6T42-4FK3P9X-1/2/26b9d3cddfb7b96236e5a767d68c4835)
Abstract:
Effects of monensin (Mon) on performance of Holstein-Friesian cows fed tropical grasses and cane molasses (M) or cereal grain were examined in three experiments. In experiment 1

(incomplete 4 x 4 Latin square), three rumen-fistulated cows [188 +/- 11 days in milk (DIM)] were fed mixed diets based on rhodes grass (Chloris gayana cv. Callide) hay where M was substituted for wheat grain (W) at rates of 0 (M0), 125 (M125) or 250 (M250) g/kg dry matter (DM). A fourth diet contained M250 plus 0.02 g Mon/kg DM (M250 + Mon). Substituting M for W tended ($P < 0.10$) to decrease the ratio of rumen molar proportions of acetate + butyrate (Bu):propionate (Pr) (4.3 versus 3.8 and 4.0 for M0, M125 and M250, respectively). There were no treatment effects ($P > 0.10$) on intake, organic matter digestibility, milk production or liveweight (LW) change. In experiment 2, 48 cows (173 +/- 28.3 DIM) grazing kikuyu (Pennisetum clandestinum cv. common) pastures and supplemented with maize silage and a grain-based concentrate were offered either M (2.6 kg DM/(cow day)) or barley grain (B) (2.7 kg DM/(cow day)). Within each supplement type, half were fed 0 or 320 mg of Mon/(cow day). There were Mon x supplement interactions (Mon x S; $P < 0.05$) on the rumen molar proportion of Pr and Bu at 15:00 h, with B + Mon having the highest value for Pr (0.259 mmol/mmol) and lowest value for Bu (0.121 mmol/mmol). A Mon x S effect ($P < 0.05$) on milk fat content was noted with Mon causing a lower value regardless of energy source (31 and 36 g/l versus 40 and 38 g/l for B + Mon, M + Mon, B - Mon and M - Mon, respectively). As a main effect, M as opposed to B, reduced yields of milk ($P < 0.05$; 16.2 l/(cow day) versus 18.0 l/(cow day)) and protein ($P < 0.05$; 479 g/(cow day) versus 538 g/(cow day)). Monensin reduced milk fat yield ($P < 0.05$; 669 g/(cow day) versus 562 g/(cow day)), raised milk protein concentration ($P < 0.05$; 31 g/l versus 29 g/l) and caused LW gain rather than loss ($P < 0.05$; +0.06 kg/(cow day) versus -0.30 kg/(cow day)). No treatment effects on pasture intake were noted. In experiment 3, 48 cows (91 +/- 16.1 DIM) grazing kikuyu pasture and supplemented with grain-based concentrate, sugar cane silage and 2.7 kg DM/(cow day) of M were supplemented with either 0 or 320 mg Mon/(cow day). Monensin reduced ($P < 0.05$) milk fat content (33 g/l versus 30 g/l) and tended ($P < 0.10$) to reduce milk protein content (29 g/l versus 28 g/l). No effects of Mon on other milk production parameters, LW change or pasture intake were noted. Feeding monensin to mid-lactation Holstein-Friesian cows offered diets based on tropical grasses, and cane molasses or grain, improves rumen fermentation efficiency, thereby improving energy efficiency resulting in higher LW gain. Monensin had no effect on milk yield, but reduced milk fat concentration.
Keywords: Monensin; Molasses; Grain; Tropical grasses; Dairy cows

H. Boudra, D.P. Morgavi, Mycotoxin risk evaluation in feeds contaminated by Aspergillus fumigatus, Animal Feed Science and Technology, Volume 120, Issues 1-2, 9 May 2005, Pages 113-123, ISSN 0377-8401, DOI: 10.1016/j.anifeedsci.2005.01.006.
(http://www.sciencedirect.com/science/article/B6T42-4FH0DCT-1/2/aa41abc932e45d6bac1f0be91e955a43)
Abstract:
Aspergillus fumigatus, a common feed contaminant particularly ubiquitous in conserved forages, produces several mycotoxins that can affect the health of animals. The aim of this work was to assess the ability of A. fumigatus to produce toxins, particularly gliotoxin, on laboratory media and natural feed substrates. The ability of fourteen A. fumigatus strains to produce gliotoxin, verruculogen, fumagillin, and helvolic acid was evaluated on defined medium. Mycotoxin production was widespread; gliotoxin and verruculogen were produced by 70 and 85% of isolates at concentrations up to 62.2 and 3.5 [mu]g mL-1, respectively. In addition, all strains were positive for fumagillin (up to 25.9 [mu]g mL-1) and helvolic acid (up to 3.5 [mu]g mL-1). Growth and gliotoxin production of a gliotoxin-positive isolate was evaluated on several common animal feeds. Growth was extensive on cereals--wheat, corn, barley, and triticale, less pronounced on forage grasses--rye grass, orchard grass, and tall fescue, and negative or scarce growth was observed on leguminous forages--alfalfa and red clover. Gliotoxin production was in general correlated to growth, except for corn and tall fescue. In these two substrates, as well as in leguminous forages the toxin was not detected. Low pH culture conditions, similar to those present in silages, reduced gliotoxin production as compared to controls although growth was unaffected. Concentrations

found in cereals and grasses were up to 17.5 and 1.5 [mu]g g-1, respectively. The stability of A. fumigatus mycotoxins during storage was evaluated in orchard grass and ryegrass. Toxins were stable in both forages, except for fumagillin whose concentration decreased rapidly. After eight weeks of storage, the amount of gliotoxin, verruculogen, helvolic acid, and fumagillin was 63, 76, 89, and 10% of the initial concentration, respectively. The high concentrations found in experimentally contaminated feed and the relative stability of A. fumigatus toxins could pose a potential health risk for animals consuming contaminated feeds.
Keywords: Aspergillus fumigatus; Mycotoxin production; Mycotoxin stability; Forage; Cereal

G. Mariscal-Landin, J.E.L. Rodriguez, T.C. Reis de Souza, Evaluation of hulless barley as feed ingredient in growing-finishing pigs diets: amino acid ileal digestibility, Animal Feed Science and Technology, Volume 120, Issues 1-2, 9 May 2005, Pages 169-176, ISSN 0377-8401, DOI: 10.1016/j.anifeedsci.2005.01.003.
(http://www.sciencedirect.com/science/article/B6T42-4FHRPRM-1/2/db0bbbf09a62e5fe4c8ba918c9a2d5fe)
Abstract:
To evaluate hulless barley in growing pigs, an experiment was conducted to measure the coefficients of apparent ileal digestibility (CAID) of amino acids and protein in sorghum (S), hulless barley (HB) and barley (B) by the difference method, using soya bean meal (SBM) as a protein source. The experiment was carried under a 4 x 4 Latin square design using four castrates of an average initial weight of 40 kg, all fitted with a simple T cannula at the terminal ileum. The experimental diets contained 160 g CP kg-1. CAID of crude protein was similar (P > 0.05) among raw materials (0.690); arginine, lysine, isoleucine, methionine, threonine, aspartic acid and glycine, were more digestible (P < 0.05) in SBM. CAID of protein and amino acids in cereals was similar (P > 0.05). These results suggest that HB and S had a similar nutritional value.
Keywords: Hulless barley; Sorghum; Amino acids; Ileal digestibility; Pigs

G. Muralikrishna, M. Nirmala, Cereal [alpha]-amylases--an overview, Carbohydrate Polymers, Volume 60, Issue 2, 6 May 2005, Pages 163-173, ISSN 0144-8617, DOI: 10.1016/j.carbpol.2004.12.002.
(http://www.sciencedirect.com/science/article/B6TFD-4FBWHC1-2/2/93fe103ff48c137b9aef767f54ca1904)
Abstract:
This review article covers various facets of cereal [alpha]-amylase research, i.e. definition, history, types, sources, classification based on their mode of action, assay methods, molecular basis of [alpha]-amylase induction during malting; isolation, fractionation, purification procedures, purity criteria, kinetic properties of cereal amylases and their activators, stabilizers and inhibitors, [alpha]-amylase and its active site, mechanism of action, primary, secondary and tertiary structures. In this article emphasis is also given to recently characterized finger millet [alpha]-amylases. The future perspectives of the cereal [alpha]-amylases are also mentioned.
Keywords: Cereal [alpha]-amylases; Structure; Properties

Regino Cavia, Isabel E. Gomez Villafane, E. Alejandro Cittadino, David N. Bilenca, Mariela H. Mino, Maria Busch, Effects of cereal harvest on abundance and spatial distribution of the rodent Akodon azarae in central Argentina, Agriculture, Ecosystems & Environment, Volume 107, Issue 1, 2 May 2005, Pages 95-99, ISSN 0167-8809, DOI: 10.1016/j.agee.2004.09.011.
(http://www.sciencedirect.com/science/article/B6T3Y-4DYW4XD-2/2/917594a31e9b3e126ed2ce3fb72a4cb0)
Abstract:
The effects of corn and wheat harvest on abundance, movement, disappearance, sex ratio and age structure of Akodon azarae were studied in cropfield-border systems. Sampling occurred both

before and after harvest, in crops, in their weedy margins (borders) and in surrounding areas. The abundance of A. azarae decreased in fields between before and after harvest and increased along borders. Rodents moved among habitat patches, movement being higher as a consequence of harvest. There was no difference among habitats in terms of disappearance and sex ratio but changes occurred in age structure because of harvest. In response to harvest A. azarae was able to move from crops to borders, decreasing the mortality effects. The ability to respond to habitat changes allows A. azarae to maximize fitness in periodically disturbed habitats.
Keywords: Disturbance; Akodon azarae; Rodents; Agroecosystems; Cereals; Harvest; Habitat distribution; Movement

R.F. Pywell, K.L. James, I. Herbert, W.R. Meek, C. Carvell, D. Bell, T.H. Sparks, Determinants of overwintering habitat quality for beetles and spiders on arable farmland, Biological Conservation, Volume 123, Issue 1, May 2005, Pages 79-90, ISSN 0006-3207, DOI: 10.1016/j.biocon.2004.10.010.
(http://www.sciencedirect.com/science/article/B6V5X-4F14YV7-1/2/2f1a1780040812235c68126881a4e18e)
Abstract:
The provision of overwintering refuges has important implications for both conservation of invertebrate biodiversity on farmland and biological control of crop pests. In this study we carried out a systematic investigation of the effects of habitat type and age on the quality of overwintering refuges for Coleoptera and Araneae on an arable farm in the UK. Hedgerow habitats contained taller and more diverse vegetation with a greater proportion of bare ground compared with field margins. Vegetation height and diversity, and the richness and cover of forbs all increased significantly with habitat age. Soil organic matter content also increased with habitat age, suggesting a more favourable structure for burrowing Coleoptera. Total abundance and richness of Coleoptera and Araneae were significantly higher in hedgerow habitats compared with the field margins. This largely reflected the response of staphylinid beetles, the most abundant group recorded. There was no effect of habitat age on overall abundance or diversity, suggesting the good dispersal ability of many farmland invertebrates, but also reflecting the close relationship between habitat age and type. The response of individual invertebrate species was more mixed: 10 species were recorded in significantly higher densities in the hedge base compared with one in the field margin. Similarly, eight species were recorded in significantly higher densities in mature habitats compared with four in recently established vegetation. There were significant interactions between habitat type and age for six species, of which four showed a marked preference for the base of mature hedgerows. These included both important predators of cereal aphids and crop pests. It was concluded that hedgerows provided the highest quality overwintering habitat for invertebrates emphasising the importance of strategies directed at conserving and enhancing this habitat. However, newly created field margins fulfilled a useful role in rapidly providing overwintering refuges for a more limited group of invertebrate species.
Keywords: Hedgerows; Field margins; Restoration; Conservation; Integrated crop management

Hans Larsson, A crop loss model and economic thresholds for the grain aphid, Sitobion avenae (F.), in winter wheat in southern Sweden, Crop Protection, Volume 24, Issue 5, May 2005, Pages 397-405, ISSN 0261-2194, DOI: 10.1016/j.cropro.2004.08.011.
(http://www.sciencedirect.com/science/article/B6T5T-4FD9SWH-1/2/5d6308103e869d2e80a3461176d933b5)
Abstract:
Sitobion avenae is one of the most harmful cereal aphids in western Europe and it damages winter wheat in southern Sweden. Field experiments with insecticides were carried out (1977-2002) in farmers' fields to evaluate the relationship between aphid density and crop yield and quality. A

crop loss model is presented based on average annual yield loss in field experiments in high yielding varieties, 1995-2002, with low coefficients of variation.
Aphid populations varied greatly between years and population peaks occurred at different crop stages. Less than 40% of the years since 1977 have been aphid years with more than 15 aphids/tiller on average. Peak values of aphids gave better regressions than aphid days. The economic injury level was found to be 7 aphids/tiller with a control cost of 300 SEK/ha and a wheat price of 1 SEK/kg. Volume weight and grain weight were only slightly affected by high aphid populations and the protein percentage was unaffected.
The proposed crop loss model is a logistic curve: y=0.3826 ln(x)-0.4108 (p<0.001; r2=0.9799; DF=7) similar to a classic inverted S-shape with no damage under 4 aphids/ tiller. The model shows rapidly increasing damage from 4 to10 aphids/straw but much less damage/aphid at aphid levels from 15 to 40 aphids/tiller. Dynamic economic thresholds are proposed for different expected yield levels and different growth stages. Thus the economic threshold for high yielding wheat is 1 aphid/tiller at crop stage 59, 4 at crop stage 69 and 7 at crop stage 75. Economic injury levels and economic thresholds are important components of a cost-effective integrated pest management programme and are useful for decision-making in the application of pesticides. Understanding and appropriate use of economic decision levels in dealing with pests can increase profits and maintain environmental quality.
Keywords: Sitobion avenae; Economic injury level; Dynamic economic threshold; Crop loss model

D. Perez-Conesa, M. J. Periago, G. Ros, G. Lopez, Non-protein nitrogen in infant cereals affected by industrial processing, Food Chemistry, Volume 90, Issue 4, May 2005, Pages 513-521, ISSN 0308-8146, DOI: 10.1016/j.foodchem.2004.05.012.
(http://www.sciencedirect.com/science/article/B6T6R-4CSYN16-8/2/246a49b9999708af239813b378144c90)
Abstract:
The effects of industrial processing on non-protein content in four varieties of infant cereals, so-called `Multicereal' and `Wheat' as gluten infant cereals, and `Growth' and `Rice and carrot' as gluten-free infant cereals were determined. Samples were classified according to their industrial stage of treatment: (1) mixture of raw flours; (2) mixture of roasted flours; (3) mixture of enzymatically hydrolysed and drum-dried flours (film); (4) commercial infant cereals. Total nitrogen (TN), protein nitrogen (PN) and non-protein nitrogen (NPN) contents were higher in gluten infant cereals than in gluten-free infant cereals. NPN content was always higher than PN content in all cereals. Industrial processing led to a significant increase in NPN ($P<0.01$) and free amino acid contents ($P<0.001$), whereas TN and PN contents decreased significantly ($P<0.05$). Although non-amino acid nitrogen components remained stable with the industrial processing, a high content of ammonium was found in gluten-free infant cereals as a consequence of taurine and asparagine degradation.
Keywords: Infant cereals; Total nitrogen; Protein nitrogen; Non-protein nitrogen; Free amino acids; Non-amino acids nitrogen components

Erika Matuschek, Ulf Svanberg, The effect of fruit extracts with polyphenol oxidase (PPO) activity on the in vitro accessibility of iron in high-tannin sorghum, Food Chemistry, Volume 90, Issue 4, May 2005, Pages 765-771, ISSN 0308-8146, DOI: 10.1016/j.foodchem.2004.06.002.
(http://www.sciencedirect.com/science/article/B6T6R-4CYNNJG-2/2/f2b6b6496e848667057ce3881a761052)
Abstract:
Dephytinized high-tannin sorghum flour was incubated with crude extracts from pear, banana or avocado, respectively, followed by investigation of the effects on the phenolic content and on in vitro accessible iron. All fruits contained polyphenol oxidase (PPO) activity and incubation resulted in significant reduction of phenolic compounds. Incubation with avocado extract resulted in the

lowest levels of phenolic compounds, as well as the highest amount of in vitro accessible iron. Peroxidase activity and some organic acids in the fruit extracts might also have contributed to the positive effect on iron accessibility. Nevertheless, incubation of the sorghum flour with the fruit extracts under conditions enabling the PPO to oxidize phenolic compounds, resulted in the highest accessibility of iron. The results from this study suggest that the PPO activity in simple fruit extracts can be utilized to increase the accessibility of iron in dephytinized polyphenol-containing cereal foods.
Keywords: Oxidation; Polyphenol oxidase; PPO; Fruits; Sorghum; Tannin; Polyphenol; Iron accessibility; Bioavailability; Peroxidase; Organic acids

Ayhan Demirbas, [beta]-Glucan and mineral nutrient contents of cereals grown in Turkey, Food Chemistry, Volume 90, Issue 4, May 2005, Pages 773-777, ISSN 0308-8146, DOI: 10.1016/j.foodchem.2004.06.003.
(http://www.sciencedirect.com/science/article/B6T6R-4D09GHV-1/2/4ef52d253eac85eb6de008a6ca62fa5e)
Abstract:
Mixed-linked (1 --> 3), (1--> 4)-[beta]-D-glucan contents of 14 selected cereal grains grown in Turkey, such as barley (Hordeum vulgaria), beans, canary seed (Tropaeolum peregrinum), corn/maize (Zea mays), flax, lentil (Lens culinaris), millet (Panicum miliaceum), oat (Avena sativa), peas, rice, rye (Secale cereale), spelt (Triticum spelta), spring wheat and winter wheat, were determined quantitatively using enzymatic methods. By using pure [beta]-D-glucanase and [beta]-D-glucosidase in the experiments, (1 --> 3), (1--> 4)-glycosidic bonds of linear polysaccharides found in cell-wall endosperm of plant seeds were hydrolyzed and the resulting [beta]-D-glucans were determined by using glucose oxidase/peroxidase solution and measuring the absorbances at 510 nm in a UV-spectrophotometer. The nutrient mineral contents of the 14 selected cereal grains were studied. Some macronutrients such as K, Ca, Mg, N, P and S, and some micronutrients, such as Zn, Cu, Fe, Mn, Mo, and B, were analyzed by using atomic absorption spectrometric (AAS) methods. A flame photometer was used for determination of potassium. After oven drying of the samples, P was determined by a colorimetric method.
Keywords: [beta]-glucan; Mineral nutrient; Cereal; Turkey

Y. Cetin, L.B. Bullerman, Cytotoxicity of Fusarium mycotoxins to mammalian cell cultures as determined by the MTT bioassay, Food and Chemical Toxicology, Volume 43, Issue 5, May 2005, Pages 755-764, ISSN 0278-6915, DOI: 10.1016/j.fct.2005.01.016.
(http://www.sciencedirect.com/science/article/B6T6P-4FMBKDH-2/2/c4e84a8e74f91b3f75fa7b6f9922a44c)
Abstract:
Fusarium mycotoxins occur worldwide in cereal grains and animal feeds and cause outbreaks of Fusarium mycotoxicoses in humans and animals. In this study mammalian cell cultures were used to screen the cytotoxicity of the most common Fusarium mycotoxins; deoxynivalenol (DON), zearalenone (ZEN), fumonisin B1 (FB1) and moniliformin (MON). The most sensitive cell line for each Fusarium mycotoxin was determined for further toxicological investigations as an alternative to whole animal testing. Chinese hamster ovary cells (CHO-K1) were found to be the most sensitive for DON and FB1 with IC50 values of 0.27 and 85.5 [mu]g/ml, respectively, after 48-h exposure. The hepatocellular carcinoma cells (HepG2) showed the highest sensitivity to MON with IC50 values of 39.5 for 48 h and 26.8 [mu]g/ml for 72-h exposure. Balb/c mice keratinocyte cell line (C5-O) was found to be the most sensitive to ZEN with IC50 of 24.1 [mu]g/ml after 72-h exposure. DON was found the most cytotoxic to the cell cultures of all the mycotoxins tested, followed by MON, ZEN, and FB1. The results indicated that CHO-K1, C5-O, and HepG2 cells were found to be the sensitive cell lines for preliminary screening of DON, ZEN and MON contaminated feed and food extracts, respectively.

Keywords: Deoxynivalenol; Zearalenone; Fumonisin B1; Moniliformin; MTT bioassay; Fusarium mycotoxins

Valeria Terzi, Caterina Morcia, Antonio Gorrini, A. Michele Stanca, Peter R. Shewry, Primetta Faccioli, DNA-based methods for identification and quantification of small grain cereal mixtures and fingerprinting of varieties, Journal of Cereal Science, Volume 41, Issue 3, May 2005, Pages 213-220, ISSN 0733-5210, DOI: 10.1016/j.jcs.2004.08.003.
(http://www.sciencedirect.com/science/article/B6WHK-4DM29YF-1/2/33bffdf268e8da2adae211fc19e4028b)
Abstract:
The composition of cereal-based foods is a key factor in determining the quality and safety of the final product while the reliable identification of cereal species and cultivars are essential for the handling, marketing and processing of grain and for the protection of plant breeders' rights. Analytical methods have therefore been developed and applied to identify and quantify cereal species in food products and also to fingerprint and identify grain at the genotype and variety levels. DNA-based methods for the detection and quantification of mixtures of small grain cereals are reviewed, together with the recent development of molecular markers for varietal fingerprinting.
Keywords: Variety; Detection methods; Fingerprinting; Real time PCR; Molecular markers

Lynn D. Holappa, M.K. Walker-Simmons, T.H.D. Ho, Dean E. Riechers, Diane M. Beckles, Russell L. Jones, A Triticum tauschii protein kinase related to wheat PKABA1 is associated with ABA signaling and is distributed between the nucleus and cytosol, Journal of Cereal Science, Volume 41, Issue 3, May 2005, Pages 333-346, ISSN 0733-5210, DOI: 10.1016/j.jcs.2004.11.002.
(http://www.sciencedirect.com/science/article/B6WHK-4FC3RWG-3/2/5b1da82a2f51995c460d2a097e54abef)
Abstract:
A new member of the cereal PKABA1 subfamily of protein kinases, TtPK1, was isolated from Triticum tauschii, a diploid progenitor of hexaploid wheat, Triticum aestivum. The full-length TtPK1 cDNA was cloned from a library derived from vegetative tissues from 26 d old light grown T. tauschii seedlings. TtPK1 cDNA hybridizes to transcripts that are upregulated in dehydrated leaves and are abundant in coleoptile tissue of 7 d old T. aestivum seedlings. TtPK1 mRNA has nucleotide identities of 82 and 79% to PKABA1 and TaPK3, respectively, and deduced amino acid sequence identities of 84 and 83% to PKABA1 and TaPK3, respectively. TtPK1 is similar to members of the SnRK2 subfamily of protein kinases in that it contains a unique acidic domain at the carboxyl terminus, and all twelve of the conserved subdomains found in serine/threonine protein kinases. Functional analyses of TtPK1 transiently over-expressed by bombarding barley half-grains showed that TtPK1 could suppress gibberellic acid inducible alpha-amylase gene expression, a suppressive activity similar to that of both PKABA1 and ABA. When transiently expressed in barley aleurone protoplasts, TtPK1-GFP accumulates in the nucleus and cytosol while a mutant TtPK1-GFP was localized only to the cytoplasm and vacuoles.
Keywords: Triticum tauschii; Protein kinase; SNRK; GFP; PKABA1; ABA; Dehydration

M.N. Emmambux, M. Stading, J.R.N. Taylor, Erratum to 'Sorghum kafirin film property modification with hydrolysable and condensed tannins' [Journal of Cereal Science 2004 (40) 127-135], Journal of Cereal Science, Volume 41, Issue 3, May 2005, Page 385, ISSN 0733-5210, DOI: 10.1016/j.jcs.2005.01.001.
(http://www.sciencedirect.com/science/article/B6WHK-4FD79KC-1/2/684baf5bb9ff6f62ebb85b25eeb4cf52)

Sarah J. Kemmitt, David Wright, David L. Jones, Soil acidification used as a management strategy to reduce nitrate losses from agricultural land, Soil Biology and Biochemistry, Volume 37, Issue 5, May 2005, Pages 867-875, ISSN 0038-0717, DOI: 10.1016/j.soilbio.2004.10.001.
(http://www.sciencedirect.com/science/article/B6TC7-4DVT5D5-3/2/f7abdbeeeda51103aa91c8c680da1c00)
Abstract:
pH is known to be a primary regulator of nutrient cycling in soil. Increasing soil acidity in agricultural systems has the potential to slow down N cycling and reduce N losses from leaching thereby enhancing sustainability and reducing pollution. We conducted a field experiment to investigate the impact of acidity on N leaching in arable and grassland agricultural systems. The results showed that nitrate (NO_3^-) concentrations in soil water were greater under arable than under grassland. Soil acidification significantly lowered NO_3^- concentrations in soil water over winter and spring under grassland, whilst in cereal plots a similar effect was only observed in spring. Our results suggest that soil acidification decreased nitrification causing an accumulation of NH_4^+ which was not subject to leaching. Dissolved organic nitrogen (DON) concentrations in soil water were significantly greater under arable than grassland. Soil acidification lowered concentrations of DON in soil water, usually to a greater extent in grassland than in arable plots. It was concluded that it may be possible to use careful soil pH management as a tool to control NO_3^- leaching without compromising the quality of drainage water, and that this may be more effective on grassland than on arable crops.
Keywords: Acidification; Nitrate leaching; Nitrate vulnerable zones; Nitrogen cycling; pH; Soil acidity

Y. Estrada-Giron, B.G. Swanson, G.V. Barbosa-Canovas, Advances in the use of high hydrostatic pressure for processing cereal grains and legumes, Trends in Food Science & Technology, Volume 16, Issue 5, May 2005, Pages 194-203, ISSN 0924-2244, DOI: 10.1016/j.tifs.2004.10.005.
(http://www.sciencedirect.com/science/article/B6VHY-4G1R3PS-1/2/23346436adef37253c600a0871facd91)
Abstract:
On a world scale, cereal grains and legumes are the main source of calories in the human diet. They provide most of the energy needed and about 8% of the proteins and vitamins. Grains usually undergo some type of processing involving heat treatment, which improves digestibility and removes allergens.
Recent studies have demonstrated that under optimal conditions, high hydrostatic pressure (HHP), a promising nonthermal technology applied to food products, may inactivate the anti-nutritional factors of grains while preserving food quality and constituents. During HHP treatment, allergenic proteins from rice grains are solubilized, particularly the 7S globulins; while no apparent alteration in color, shape, or size of treated seeds occurs at moderate pressure. The vegetable protein in soybeans (tofu) is usually preserved if refrigerated under vacuum conditions; however, tofu subjected to HHP treatment has been shown to reduce microbial population while increasing protein digestibility. Other constituents of grains such as vitamin A are not significantly affected, while water soluble vitamins (B1, B6, and C) are well retained (85%). Other applications of HHP for cereals include wheat and barley flours, and activity of amylases. A further possibility of creating new textured products from doughs subjected to HHP is being studied as well.

Anida M.M. Gomes, Claudio E. Mendes da Silva, Nagila M.P.S. Ricardo, Effects of annealing on the physicochemical properties of fermented cassava starch (polvilho azedo), Carbohydrate Polymers, Volume 60, Issue 1, 7 April 2005, Pages 1-6, ISSN 0144-8617, DOI: 10.1016/j.carbpol.2004.11.016.
(http://www.sciencedirect.com/science/article/B6TFD-4FHJYCD-1/2/8e21c387120a2206adb49e9af6088577)

Abstract:
The fermented cassava starch (polvilho azedo) in 1:5 starch to water ratio (w/v), was subject to annealing treatment at 50 [degree sign]C for 72, 96, 144 and 240 h. The annealing treatment changed the internal structure of polvilho azedo when the time was increased. Peak viscosities decreased significantly, denoting that there was a decreasing in leaching of amylose from the granules. The pasting temperature was increased, while hold, final viscosities, and breakdown were reduced showing an enlargement on the stability of the paste. The swelling power and the solubilities underwent reductions in all temperatures. The DSC data showed that there was an increased on To, Tp, Tc and [Delta]H in all samples annealed. The X-ray diffraction pattern did not change but crystallinity increased (all samples annealed), denoting increase in organization of double helical of amylopectin. The polvilho azedo samples submitted to annealing treatment acquired some characteristics of cereal starches (waxy starches).
Keywords: Annealing of starch; Relative crystallinity; Fermented cassava starch

Aaron J. Cowieson, Factors that affect the nutritional value of maize for broilers, Animal Feed Science and Technology, Volume 119, Issues 3-4, 4 April 2005, Pages 293-305, ISSN 0377-8401, DOI: 10.1016/j.anifeedsci.2004.12.017.
(http://www.sciencedirect.com/science/article/B6T42-4FBW5WW-1/2/a0182bc4f281471e6fa21ce1ee512cfb)
Abstract:
Maize contributes approximately 65% of the metabolisable energy and 20% of the protein in a broiler starter diet and is by far the most commonly used cereal grain in the diets of intensively reared poultry. One reason for the widespread use of maize in the diets of farmed livestock is that there is a perception that maize is of a consistent and high nutritional value. However, recent studies have demonstrated that the chemical composition and nutritional value of maize is variable, making generic matrix values for maize inaccurate. The nutritional value of maize for poultry is a function of the content of starch, oil, protein and antinutrients (primarily phytate, enzyme inhibitors and resistant starches). The effect of these nutritional components and antinutrients on the nutritional value of maize are discussed as well as strategies to improve the nutritional value of maize for poultry.
Keywords: Broiler; Maize; Starch; Variation; Enzyme; Nutrition; Digestibility; Energy; Protein

Hugo De Groote, Oumar Traore, The cost of accuracy in crop area estimation, Agricultural Systems, Volume 84, Issue 1, April 2005, Pages 21-38, ISSN 0308-521X, DOI: 10.1016/j.agsy.2004.06.008.
(http://www.sciencedirect.com/science/article/B6T3W-4D48YV3-1/2/feac22fcc4574fb19e19e4416654b924)
Abstract:
Accuracy and cost of direct crop area measurement are compared with those of farmers' estimates after visual inspection, in this methodological study conducted in southern Mali. The observational error, the difference between the area measured and the area estimated, was first studied at the plot level. Average observational error or bias was -11% of the average area measured, indicating an average underestimation of plots by 11%. This observational error is strongly related to plot size, with smaller plots being overestimated and larger plots underestimated, in an approximately negative linear relationship. The observational error is also smaller for cotton fields than for cereals. The analysis was repeated at the farm level, where the bias in estimating the total area per farm was -8%. At this level, total error or accuracy was calculated by the relative total error (RTE), the square root of the mean square error, divided by the mean. The farmers' estimate was found to be less accurate (RTE = 9.4% of the mean) than physical measurement (RTE = 6.6%), but at a cost of only $370 as compared with $2328 (for a sample of 96 farms in 11 villages). The coefficient of variation (CV) of most surface variables was

found to lie between 60% and 100%, and their relative bias (average observational error divided by the mean area) between 2% and 10%. For crop area per farm, the physical measurement of plots resulted in a gain of accuracy of 2-4%, as compared with the farmers' estimate after visual inspection. A general model was developed in which these calculated parameters are used to predict the accuracy in future surveys and to compare the accuracy with the survey's cost. It is shown how the survey design can be optimized based on acceptable error, sample size and cost for each measurement technique. Simulations demonstrate that the total error for biased estimators, even for variables with small CVs, hardly decreases above sample sizes of 100-150 farmers.
Keywords: Area estimation; Crop area; Error; Survey accuracy; Cost

Esperanza Ursua, David Serrano, Jose L. Tella, Does land irrigation actually reduce foraging habitat for breeding lesser kestrels? The role of crop types, Biological Conservation, Volume 122, Issue 4, April 2005, Pages 643-648, ISSN 0006-3207, DOI: 10.1016/j.biocon.2004.10.002.
(http://www.sciencedirect.com/science/article/B6V5X-4DN9X7S-1/2/9da242975d3b7d56b7e795d2e17f738b)
Abstract:
The lesser kestrel is a Globally Threatened Species which large decline has been related to recent agricultural changes in European pseudo-steppes. Irrigation is considered as one of the major threats for this and other steppe birds, but the actual effects of irrigation on foraging habitat selection have been scarcely examined. We studied the selection of traditional dry cereal farming and irrigated habitats by foraging lesser kestrels during the breeding cycle, paying especial attention to possible differences among crop types. Field margins were the scarcest but the most positively selected habitat, and different stages of cereals cultivated following traditional practices were selected depending on the breeding and agriculture cycles. Effects of irrigation were dual. While irrigated maize and other crop types were avoided, alfalfa was used in proportion to its availability and later highly selected after harvesting. Moreover, field margins in irrigated land were selected in a similar way than in traditional dry farmland. Therefore, although maintaining low-intensity farming is still the main recommendation for this species, new management options arise when social pressure makes irrigation unavoidable. Further agri-environmental schemes in these circumstances should thus promote cultivation of alfalfa with a low input of biocides while avoiding maize, together with increasing field margins, to make compatible irrigation with lesser kestrel conservation.
Keywords: Habitat selection; Irrigation; Falco naumanni; Crop types; Alfalfa; Field margins

A. Oswald, Striga control--technologies and their dissemination, Crop Protection, Volume 24, Issue 4, April 2005, Pages 333-342, ISSN 0261-2194, DOI: 10.1016/j.cropro.2004.09.003.
(http://www.sciencedirect.com/science/article/B6T5T-4DTKXWD-2/2/8f469a7b7e36d2636d7c58ed5ef66ce5)
Abstract:
Striga spp. are endemic in Sub-Saharan Africa and pose one of the most severe biological constraints to cereal production in low-potential areas. Although the level of Striga infestation and damage is increasing, farmers rarely adopt Striga control methods. The paper discusses various Striga control methods for their effectiveness and adoption potential by small-scale farmers. It further addresses the specific constraints to the adoption of improved farming techniques in low-potential areas. A Striga control program in western Kenya is presented, which tackled various aspects of the development of a Striga control strategy, including adapted control methods, training materials and concepts for farmers and extension agents, the implementation of technology diffusion approaches and the implementation of stakeholder fora to raise awareness.
Keywords: Striga; Extension; Participatory research; Farmer training; Technology diffusion

Katrien M Devos, Updating the `Crop Circle', Current Opinion in Plant Biology, Volume 8, Issue 2, Genome studies and molecular genetics / Plant biotechnology, April 2005, Pages 155-162, ISSN 1369-5266, DOI: 10.1016/j.pbi.2005.01.005.
(http://www.sciencedirect.com/science/article/B6VS4-4FC3S64-6/2/a9c40810b43638b197db7873466e007c)
Abstract:
Comparative analyses unravel the relationships between genomes of related species. The most comprehensive comparative dataset obtained to date is from the grass family, which contains all of the major cereals. Early studies aimed to identify chromosomal regions that have remained conserved over long evolutionary time periods, but in recent years, researchers have focused more on the extent of colinearity at the DNA-sequence level. The latter studies have uncovered many small rearrangements that disturb colinearity in orthologous chromosome regions. In part, genomes derive their plasticity from genome- and gene-amplification processes. Duplicated gene copies are more likely to escape selective constraints and thus move to other regions of the genome, where they might acquire new functions or become deleted. These rearrangements will affect map applications. The most popular applications, especially since the complete rice genomic sequence has been available, are the use of comparative data in the generation of new markers to tag traits in other species and to identify candidate genes for these traits. The isolation of genes underlying orthologous traits is the first step in conducting comparative functional studies.

Matthew K Morell, Alan M Myers, Towards the rational design of cereal starches, Current Opinion in Plant Biology, Volume 8, Issue 2, Genome studies and molecular genetics / Plant biotechnology, April 2005, Pages 204-210, ISSN 1369-5266, DOI: 10.1016/j.pbi.2005.01.009.
(http://www.sciencedirect.com/science/article/B6VS4-4FD0NH5-2/2/7ed41505c0c11aedb1a9151d202ec67c)
Abstract:
A major challenge in cereal biotechnology is to achieve the rational design of renewable polymers to meet specific requirements for improving human health, nutrition, and food quality, to increase the energy supply, and to provide safer and more profitable industrial inputs. The field of starch synthesis research has advanced at a rapid pace over the past decade, and many core observations about the pathway are well established over a range of species. Owing to the complexity of the starch-synthesis process, in which suites of enzymes act at the interface between soluble and insoluble phases, the rational design of starch granules with specific functionality is still in its infancy. Our fundamental biochemical knowledge of starch biosynthesis has recently advanced, and this new information could be exploited to create novel variability in carbohydrate polymers in cereal grains. We propose two strategies for moving more rapidly towards truly rational design of starch. First, the focusing of fundamental research on processes that are involved in the regulation of starch synthesis and granule assembly. Second, the development of iterative strategies, exploiting new molecular genetics tools, to screen for desired properties in high-throughput systems.

Marcos Barbosa-Ferreira, Maria Lucia Zaidan Dagli, Paulo Cesar Maiorka, Silvana Lima Gorniak, Sub-acute intoxication by Senna occidentalis seeds in rats, Food and Chemical Toxicology, Volume 43, Issue 4, April 2005, Pages 497-503, ISSN 0278-6915, DOI: 10.1016/j.fct.2004.11.017.
(http://www.sciencedirect.com/science/article/B6T6P-4F7Y91M-2/2/af1cce02df476113e51e125ad455a743)
Abstract:
Senna occidentalis (So) is a weed that grows in pastures along fences and in fields cultivated with cereals such as corn and soybean, and many reports have been showing intoxication with this plant in different animal species. It is also used in many medicinal purposes. The objective of the present study was to better evaluate the toxic effects of prolonged administration of So seeds to

rats. Forty male Wistar rats were divided into four groups of 10 animals each, three of them respectively fed rations containing 1%, 2% and 4% So seeds, and the last one (control) fed commercial ration for a period of 2 weeks. Fourteen rats were also used in a pair-feeding (PF) experiment. The rats of the experimental groups showed lethargy, weakness, recumbency, depression and emaciation. Two rats of the 4% group and two of the PF group died during the experiment. Histopathological study showed fiber degenerations in the skeletal (Tibial, pectoral and diaphragm) and cardiac muscles. In the liver parenchyma, was observed vacuolar degeneration and, in the kidney, mild nefrosis in the proximal convoluted tubules. All of these alterations occurred in a dose-dependent fashion. Moderate to severe degeneration and spongiosis in the central nervous system, especially in cerebellum. Electron microscopy revealed mitochondrial lesions in all analyzed tissues.
Keywords: Senna occidentalis; Rats; Hepatic degeneration; Cardiac degeneration; Muscle degeneration; CNS toxicity; Mitochondrial degeneration

Janos Varga, Zsanett Peteri, Katalin Tabori, Jozsef Teren, Csaba Vagvolgyi, Degradation of ochratoxin A and other mycotoxins by Rhizopus isolates, International Journal of Food Microbiology, Volume 99, Issue 3, 1 April 2005, Pages 321-328, ISSN 0168-1605, DOI: 10.1016/j.ijfoodmicro.2004.10.034.
(http://www.sciencedirect.com/science/article/B6T7K-4F2V5B1-1/2/e7ae3f28cdeffdc76c95aa82ad46b35f)
Abstract:
Several filamentous fungi representing the genera Rhizopus and Mucor were examined for their ability to degrade ochratoxin A (OTA), aflatoxin B1, zearalenone and patulin in a liquid medium. While none of the isolates exhibited aflatoxin degrading activity, ochratoxin A, zearalenone and patulin were decomposed by several isolates. Ochratoxin A was successfully degraded by Rhizopus stolonifer, R. microsporus, R. homothallicus and two R. oryzae isolates, and by four unidentified Rhizopus isolates. Kinetics of ochratoxin A detoxification of selected Rhizopus isolates was also examined. Rhizopus isolates were able to degrade more than 95% of ochratoxin A within 16 days. A R. stolonifer isolate could also effectively decompose ochratoxin A on moistened wheat. Further studies are in progress to identify the enzymes and genes responsible for ochratoxin detoxification and to transfer these genes to other Rhizopus isolates or microbes which could be used safely for decontamination of cereal products.
Keywords: Ochratoxin; Degradation; Rhizopus; Mycotoxins

Russell D. Monds, Matthew G. Cromey, Denis R. Lauren, Margaret Di Menna, John Marshall, Fusarium graminearum, F. cortaderiae and F. pseudograminearum in New Zealand: molecular phylogenetic analysis, mycotoxin chemotypes and co-existence of species, Mycological Research, Volume 109, Issue 4, April 2005, Pages 410-420, ISSN 0953-7562, DOI: 10.1017/S0953756204002217.
(http://www.sciencedirect.com/science/article/B7XMR-4RRXX8N-5/2/5359c109526acafcf4e5fa29df4c4b25)
Abstract:
Fusarium graminearum and F. pseudograminearum are important plant pathogens in New Zealand and around the world. Headblight and crown rot diseases of cereals caused by these species are responsible for large economic losses due to reduction in seed quality and contamination of grain with tricothecene mycotoxins. In the current study we have used two different molecular phylogenetic approaches, AFLPs and gene genealogies, to gain insight into the evolutionary relationships between F. graminearum, and F. pseudograminearum in New Zealand. The worldwide genetic diversity of F. graminearum clade is represented by at least eight biogeographically distinct species (previously designated as lineages of F. graminearum). Our analysis demonstrated that this clade is represented by F. graminearum (= F. graminearum

Lineage 7) and F. cortaderiae (= F. graminearum Lineage 8) in New Zealand. Through our analysis we also confirm the presence of F. pseudograminearum in New Zealand as a first record for this organism. Information on species is necessary for preventing the inadvertent intercontinental introduction of genetically unique foreign pathogens associated with world trade. The ability to place species information into a worldwide context enabled postulation that the New Zealand representatives of F. graminearum clade originated from at least two regions, and probably on at least two hosts. Correlation of species descriptions with biogeographical and host information revealed evidence for co-localisation of F. graminearum clade species with potential for genetic outcrossing in the field. Mycotoxin analysis showed F. graminearum (= lineage 7) isolates produce either nivalenol (NIV) or deoxnivalenol (DON). In contrast, F. cortaderiae isolates produced only NIV. These findings support earlier observations that mycotoxin production in the F. graminearum clade is not species specific, but suggest maintenance of chemotype diversity through speciation may have been restricted to a subset of species.

Paul C. Marino, P.R. Westerman, C. Pinkert, W. van der Werf, Influence of seed density and aggregation on post-dispersal weed seed predation in cereal fields, Agriculture, Ecosystems & Environment, Volume 106, Issue 1, 30 March 2005, Pages 17-25, ISSN 0167-8809, DOI: 10.1016/j.agee.2004.07.001.
(http://www.sciencedirect.com/science/article/B6T3Y-4DB568P-2/2/886d4a40f2a10b9a721ef365ccaf7700)
Abstract:
The importance of density dependence, aggregation and background density of seeds on intensity of seed predation in cereal fields were examined in central Netherlands. Four sequential 1-week trials were conducted from 9 July to 8 August 2001 and lamb's quarters (Chenopodium album) was used as the test species. C. album was offered to potential predators by lightly adhering seeds to small strips of sand paper. The interaction between spatial scale and density dependence was tested at a large (varying seed density/block) and a small (varying seed density/card) spatial scale. Three distributions (random, even, aggregated) and two background (seed cards presented in plots with none versus many C. album seeds added to the soil) treatments were tested, all experiments being conducted simultaneously but in different fields. There was no large spatial scale density effect but in Week 4, a higher proportion of seeds was removed from the low-density seed cards. In the distribution study, significantly more seeds were removed from the aggregated distribution treatment in Week 2. In the background density study, predation was highest in Week 2 of the high background density treatment. In all experiments, there was considerable temporal and spatial variation in the intensity of seed predation. The importance of seed in the diet of seed predators declined with time, whereas the presence or the absence of density dependent predation was likely to be a function of the spatial scale at which densities were enhanced.
Keywords: Cereal fields; Chenopodium album; Density dependence; Seed predation; Weed seeds

Frederic Fabre, Manuel Plantegenest, Lucie Mieuzet, Charles A. Dedryver, Jean-Luc Leterrier, Emmanuel Jacquot, Effects of climate and land use on the occurrence of viruliferous aphids and the epidemiology of barley yellow dwarf disease, Agriculture, Ecosystems & Environment, Volume 106, Issue 1, 30 March 2005, Pages 49-55, ISSN 0167-8809, DOI: 10.1016/j.agee.2004.07.004.
(http://www.sciencedirect.com/science/article/B6T3Y-4DB59N9-4/2/2a31ab66c18432c29b835d8cb3727187)
Abstract:
Barley yellow dwarf (BYD) disease is one of the most severe viral diseases in autumn sown cereals. In Western Europe, crop losses are mainly due to the PAV species of BYD viruses transmitted by Rhopalosiphum padi, the most abundant aphid in autumn. The proportion of migrant winged aphids that carry viruses in autumn is considered a major epidemiological factor for determining the disease incidence. In the main French cereal areas, during a 6-week period in

autumn 1999-2002, the proportion of viruliferous R. padi assessed using a TAS-ELISA technique was on average of 4.98% (range 2.01-9.91%). Variations according to trap location were correlated with land use at the regional scale, annual variations being correlated with the climate of the year. Implementations of these results to improve BYD disease management program are discussed.
Keywords: Integrated pest management; Landscape ecology; Rhopalosiphum padi; Viruliferous aphids; Virus epidemiology; TAS-ELISA

Zvonko Burkus, Feral Temelli, Rheological properties of barley [beta]-glucan, Carbohydrate Polymers, Volume 59, Issue 4, 15 March 2005, Pages 459-465, ISSN 0144-8617, DOI: 10.1016/j.carbpol.2004.10.012.
(http://www.sciencedirect.com/science/article/B6TFD-4F29SP4-4/2/a2f72ea4b55a0229c341a0dab8b0b42f)
Abstract:
Health benefits of cereal [beta]-glucan are linked to its high viscosity. Although viscosity of [beta]-glucan gum solutions has been reported previously, there are conflicting reports about its behavior at elevated temperatures. Therefore, the viscosity behavior of barley [beta]-glucan gum obtained in a pilot plant (PP) or in a laboratory (LAB) was determined at different shear rates (1.29-129 s-1) and temperatures (0.1-75 [degree sign]C) in this study. Viscosity decrease with temperature was demonstrated for both gums and activation energy Ea was calculated from the Arrhenius equation. None of the fresh gum solutions exhibited thixotropic behavior at <=1% (w/w) concentration, but the measurement demonstrated that increased shear rate is not applicable to polymer solutions of low viscosity. Information about rheological properties of [beta]-glucan will lead to better understanding of its behavior under physiological and processing conditions.
Keywords: Activation energy; Barley; [beta]-Glucan; Rheology; Thixotropy; Viscosity

Elzbieta Barbara Kosiak, Arne Holst-Jensen, Thomas Rundberget, Maria Teresa Gonzalez Jaen, Mona Torp, Morphological, chemical and molecular differentiation of Fusarium equiseti isolated from Norwegian cereals, International Journal of Food Microbiology, Volume 99, Issue 2, 15 March 2005, Pages 195-206, ISSN 0168-1605, DOI: 10.1016/j.ijfoodmicro.2004.08.015.
(http://www.sciencedirect.com/science/article/B6T7K-4DS98YD-2/2/452ab637395bb8e22e53d536f97f855d)
Abstract:
The morphological variation, secondary metabolite profiles and restriction fragment length polymorphisms (RFLPs) of PCR amplified intergenic spacer (IGS) ribosomal DNA (rDNA) were studied in 27 isolates of Fusarium equiseti, 25 isolated from Norwegian cereals and 2 from soil obtained from the IBT culture collection (BioCentrum, Technical University of Denmark). All 27 isolates were tested for production of fusarochromanone (FUSCHR), zearalenone (ZEA) and the trichothecenes: 15-monoacetoxy-scirpentriol (MAS), diacetoxy-scirpenol (DAS), T-2 and HT-2 toxins, T2-triol, neosolaniol (NEO), deoxynivalenol (DON), nivalenol (NIV) and 4-acetylnivalenol (Fus-X). The trichothecenes were analysed by GC-MS in a selected ion monitoring mode, while FUSCHR was determined by ion pair HPLC with fluorometric detection and production of ZEA by TLC. For amplification of IGS rDNA primers CNL12 and CNS1 were applied. IGS rDNA was digested with the four restriction enzymes: AvaII, CfoI, EcoRI and Sau3A. In addition, we sequenced the IGS rDNA region of three of the Norwegian isolates. There were two morphological types among the Norwegian strains of F. equiseti, type I with short apical cells (dominating) and type II with long apical cells, with four haplotypes identified based on the RFLP data. Variation in secondary metabolite profiles within and between the morphological groups was observed and the levels of produced toxins were: FUSCHR 3000-42,500 and 25-30 ng/g, NIV 20-2500 and 120-700 ng/g, FUS-X 20-15,000 and 0 ng/g, DAS 30-7500 and 0-600 ng/g, and MAS 10-600 and 0-500 ng/g, for strains with short and long apical cells, respectively. NEO was detected in 16/27 strains

tested (all morphotype I). All but four strains of type I (these four lacked a restriction site for EcoRI) had identical RFLP profiles. The isolates of type II had two haplotypes. The IGS sequence similarity data indicated differences between these morphotypes corresponding to two separate lineages apparently at the species level.
Keywords: Fusarium equiseti; Mycotoxins; Norwegian cereals

M.E. Bechmann, D. Berge, H.O. Eggestad, S.M. Vandsemb, Phosphorus transfer from agricultural areas and its impact on the eutrophication of lakes--two long-term integrated studies from Norway, Journal of Hydrology, Volume 304, Issues 1-4, Nutirent Mobility within River Basins: A European Perspective, 10 March 2005, Pages 238-250, ISSN 0022-1694, DOI: 10.1016/j.jhydrol.2004.07.032.
(http://www.sciencedirect.com/science/article/B6V6C-4DXT815-2/2/42186e4f55c1cd3ec827a48df0ec76ca)
Abstract:
Eutrophication of most fresh water systems is limited by phosphorus (P) concentration. High P concentrations originate from external and internal sources. In most Norwegian lakes, agriculture is a main external contributor of P. Two long-term, integrated studies of the relationship between agricultural management, transfer of P and suspended sediments (SS) from agricultural areas and the total P (TP) and chlorophyll-a (Chl-a) concentrations of the receiving lake were carried out in Norway. The Grimestad subcatchment/Aker Lake system (1993-2000) represents a cereal-growing area with mixed livestock production, while the Time subcatchment/Froyland Lake (1986-2000) system represents a grass and dairy cow production system. A comparison of the two systems showed that the mean annual concentration of SS in the Grimestad Stream was 20 times the corresponding concentration in the Time stream. The difference in transparency (secchi depth) of the two lakes reflected this difference. The losses of TP and SS from the Grimestad subcatchment increased significantly during the monitoring period. In the Time stream, there was a significant downward trend in concentrations of TP. Corresponding to the measured inputs, the TP concentration of the Aker Lake (recipient of Grimestad Stream) increased slightly during the monitoring period, while the TP concentration of the Froyland Lake (recipient of Time Stream) showed a slightly decreasing trend. Loads of TP from the Grimestad subcatchment during spring (March-April) described 70% of the variation in TP concentration of the Aker Lake the following summer. The TP concentration in the Time stream in November-December also were correlated ($r^2=0.6$) to the TP concentration in the Froyland Lake the following summer. The annual TP concentrations of the lakes were not very well correlated to the measured Chl-a in the lakes, partly because of bio-manipulation, which was performed in both lakes during the monitoring period.
Keywords: Eutrophication; Agriculture; Stream; Lake; Phosphorus; Chlorophyll-a

K. Kyllmar, K. Martensson, H. Johnsson, Model-based coefficient method for calculation of N leaching from agricultural fields applied to small catchments and the effects of leaching reducing measures, Journal of Hydrology, Volume 304, Issues 1-4, Nutirent Mobility within River Basins: A European Perspective, 10 March 2005, Pages 343-354, ISSN 0022-1694, DOI: 10.1016/j.jhydrol.2004.07.038.
(http://www.sciencedirect.com/science/article/B6V6C-4F0GBXT-8/2/bea14714da404ecc399a5c6439ead21e)
Abstract:
A method to calculate N leaching from arable fields using model-calculated N leaching coefficients (NLCs) was developed. Using the process-based modelling system SOILNDB, leaching of N was simulated for four leaching regions in southern Sweden with 20-year climate series and a large number of randomised crop sequences based on regional agricultural statistics. To obtain N leaching coefficients, mean values of annual N leaching were calculated for each combination of main crop, following crop and fertilisation regime for each leaching region and soil type.

The field-NLC method developed could be useful for following up water quality goals in e.g. small monitoring catchments, since it allows normal leaching from actual crop rotations and fertilisation to be determined regardless of the weather. The method was tested using field data from nine small intensively monitored agricultural catchments. The agreement between calculated field N leaching and measured N transport in catchment stream outlets, 19-47 and 8-38 kg ha-1 yr-1, respectively, was satisfactory in most catchments when contributions from land uses other than arable land and uncertainties in groundwater flows were considered.
The possibility of calculating effects of crop combinations (crop and following crop) is of considerable value since changes in crop rotation constitute a large potential for reducing N leaching. When the effect of a number of potential measures to reduce N leaching (i.e. applying manure in spring instead of autumn; postponing ploughing-in of ley and green fallow in autumn; undersowing a catch crop in cereals and oilseeds; and increasing the area of catch crops by substituting winter cereals and winter oilseeds with corresponding spring crops) was calculated for the arable fields in the catchments using field-NLCs, N leaching was reduced by between 34 and 54% for the separate catchments when the best possible effect on the entire potential area was assumed.
Keywords: Process-based model; Coefficient method; Nitrogen leaching; Arable field; Catchment; SOILNDB

P. Fox, J. Rockstrom, J. Barron, Risk analysis and economic viability of water harvesting for supplemental irrigation in semi-arid Burkina Faso and Kenya, Agricultural Systems, Volume 83, Issue 3, March 2005, Pages 231-250, ISSN 0308-521X, DOI: 10.1016/j.agsy.2004.04.002.
(http://www.sciencedirect.com/science/article/B6T3W-4CHHR31-1/2/0855cf8704b52bc27ab6585d194b7db8)
Abstract:
Food insecurity affects a large portion of the population in sub-Saharan Africa (SSA). To meet future food requirements current rainfed farming systems need to upgrade yield output. One way is to improve water and fertiliser management in crop production. But adaptation among farmers will depend on perceived risk reduction of harvest failure as well as economic benefit for the household. Here, we present risk analysis and economical benefit estimates of a water harvesting (WH) system for supplemental irrigation (SI). Focus of the analysis is on reducing investment risk to improve self-sufficiency in staple food production. The analysis is based on data from two on-farm experimental sites with SI for cereals in currently practised smallholder farming system in semi-arid Burkina Faso and Kenya, respectively. The WH system enables for both SI of staple crop (sorghum and maize) and a fully irrigated off-season cash crop (tomatoes). Different investment scenarios are presented in a matrix of four reservoir sealants combined with three labour opportunity costs. It is shown that the WH system is labour intensive but risk-reducing investment at the two locations. The current cultivation practices do not attain food self-sufficiency in farm households. WH with SI resulted in a net profit of 151-626 USD year-1 ha-1 for the Burkina case and 109-477 USD year-1 ha-1 for the Kenya case depending on labour opportunity cost, compared to -83 to 15 USD year-1 ha-1 for the Burkina case and 40-130 USD year-1 ha-1 for the Kenyan case for current farming practices. Opportunity cost represents 0-66% of the investment cost in an SI system depending on type of sealant. The most economical strategy under local labour conditions was obtained using thin plastic sheeting as reservoir sealant. This resulted in a net profit of 390 and 73 USD year-1 ha-1 for the Burkina Faso and Kenyan respective site after household consumption was deducted. The analysis suggests a strong mutual dependence between investment in WH for SI and input of fertiliser. The WH system is only economically viable if combined with improved soil fertility management, but the investment in fertiliser inputs may only be viable in the long term when combined with SI.
Keywords: Water harvesting; Supplemental irrigation; Semi-arid; Labour cost; Cost-benefit

R. La Rovere, P. Hiernaux, H. Van Keulen, J. B. Schiere, J. A. Szonyi, Co-evolutionary scenarios of intensification and privatization of resource use in rural communities of south-western Niger, Agricultural Systems, Volume 83, Issue 3, March 2005, Pages 251-276, ISSN 0308-521X, DOI: 10.1016/j.agsy.2004.04.003.
(http://www.sciencedirect.com/science/article/B6T3W-4CHHR31-2/2/fd952d2e36f4a5c5e425b04d3e9bdaa1)
Abstract:
Agricultural production in the semi-arid agro-ecosystems of the Sahel centres on cereal staple crops and pastoralism with increasing crop-livestock integration. Animals mobilize soil fertility through manure production, graze crop by-products, and transfer nutrients from distant pastures to cropped areas. Yet in these systems various interacting factors, i.e. climate variability, poor soil fertility, poverty, and institutional constraints limit the capacity of agriculture to keep pace with the growing needs of an increasing human population.
The major trends associated with population growth are (1) increasing area cropped at the expense of rangelands; (2) reduced availability of and access to good quality grazing resources, and (3) seasonal migration of labourers and transhumance of herds. These trends lead to co-evolution of farming systems towards increased privatisation of resource use.
This study examines the implications of the development processes where farming systems co-evolve with their surroundings. It explores the impact of integrated management of livestock and crops in rural communities on both the livelihoods of differently endowed farms, and on the agro-ecosystem. Different scenarios explored the co-evolution of three sites situated in Western Niger with their environment. The sites differ in relative area cropped. The scenarios simulate the different future outcomes for varying socio-economic and biophysical criteria with either current or more intensive management.
Explorative bio-economic models are used to compare a range of farm, livelihood and ecological indicators, and to reveal social and ecological trade-offs.
If current agro-ecosystems and their environments co-evolve towards increased privatisation of grazing resources, then soil fertility is likely to deteriorate on the lands managed by the agro-pastoral groups. Soil fertility may improve on lands managed by the livestock-scarce farmers settled in villages, at the cost of declining farm incomes. The agro-pastoral groups are likely to resort to more distant pastures for feed. The village-based, livestock-endowed farms will resort to feeding on on-farm crop residues. Intensification, though associated with relative decreases in real incomes, will enhance food security in these new systems, except for the poorer settled farmers.
Keywords: Farming systems co-evolution; Sahel; Crop-livestock integration; Bio-economic modelling; Privatisation; Intensification

I.M. Scotford, P.C.H. Miller, Applications of Spectral Reflectance Techniques in Northern European Cereal Production: A Review, Biosystems Engineering, Volume 90, Issue 3, March 2005, Pages 235-250, ISSN 1537-5110, DOI: 10.1016/j.biosystemseng.2004.11.010.
(http://www.sciencedirect.com/science/article/B6WXV-4FFX956-1/2/bceee1b9fb147c4c12b221cd02616ce5)
Abstract:
This review describes the theory and basic principles of spectral reflectance measurements including the advantages and disadvantages of different sensing platforms either space, aerial or ground based. The use of spectral reflectance techniques for aiding decisions relating to crop establishment, weed control, crop protection and crop nutrition are discussed, indicating the uses, limitations, areas requiring further work and future potential as a commercial tool for precision agriculture.
It is concluded that spectral reflectance techniques are unlikely to be used for measuring soil properties as other technologies are better suited to this application. Spectral reflectance techniques can be used to detect weeds against a soil background but with current approaches

cannot reliably identify weeds at sufficiently low populations (plants m-2) in a growing crop to control commercial herbicide applications. Spectral reflectance techniques also provide useful information about the crop canopy that can be used as a component in determining the fungicide, growth regulator and nitrogen inputs to a cereal crop.

P.C. Mercer, A. Ruddock, Disease management of winter wheat with reduced doses of fungicides in Northern Ireland, Crop Protection, Volume 24, Issue 3, March 2005, Pages 221-228, ISSN 0261-2194, DOI: 10.1016/j.cropro.2004.07.009.
(http://www.sciencedirect.com/science/article/B6T5T-4DFT3FC-1/2/ab070aa159fb723a0dbd3362c5ff4e80)
Abstract:
Trials in Northern Ireland from 1994-2002 with a range of fungicides, applied at a range of doses to winter wheat, generally showed improved retention of green leaf area (GLA) due to good control of the principal pathogen Mycosphaerella graminicola. This led to significant increases in yield, thousand grain weight and profitability particularly when cultivars susceptible to M. graminicola were treated. Frequently, the maximum profitability was achieved with fungicides applied at 50% or less of the manufacturer's recommended dose. Overall profitability with cultivars resistant to M. graminicola was higher than with susceptible cultivars and treatment of resistant cultivars with fungicides did not significantly increase profitability any further. This indicates that, for cereal growers in N. Ireland, use of resistant cultivars should be the primary method of control of M. graminicola. A comparison of a spray programme at GS 32 and 39 compared with one with an extra spray at GS 59, showed tendencies towards improvement in GLA retention and yield with a susceptible cultivar, but none with a resistant. However, this was not statistically significant and with current grain prices would not have been translated into increased profitability. Results generally point to the importance in N. Ireland of using resistant cultivars and to applications at GS 32 and 39 if susceptible cultivars are grown.
Keywords: Winter wheat; Triticum aestivum; Leaf blotch; Mycosphaerella graminicola; Septoria tritici blotch; Fungicides; Reduced doses

Irfan Ozberk, Ayhan Atli, Wolfgang Pfeiffer, Fethiye Ozberk, Yalcin Coskun, The effect of sunn pest (Eurigaster integriceps) damage on durum wheat: impact in the marketplace, Crop Protection, Volume 24, Issue 3, March 2005, Pages 267-274, ISSN 0261-2194, DOI: 10.1016/j.cropro.2004.07.013.
(http://www.sciencedirect.com/science/article/B6T5T-4DCDCDR-2/2/24e8b08b30201f6c2f05fce378ca0a17)
Abstract:
This study looked at the factors, affecting the price estimation of durum wheat in the commodity market in Sanliurfa, Turkey. The study was carried out in June and July of 2003 using a randomized complete block design with 3 factors (traders, varieties and purchase time) and 4 replications.
The variance analysis results indicated that all factors (traders, varieties and weekly market prices) and interactions were found to be significant statistically. Some visual characteristics of grain lots subjected to study were scored in laboratory and the relationship between market pricing and those characteristics were further investigated through correlation/path and regression analysis. These results showed the presence of statistically significant positive correlations between marketing price and vitreousness (r=0.313*). Although, it was negative for starchy grain (r=-0.472**), sunn pest damaged kernels (r=-0.608**) and other cereals (r=-0.487** to -0.456**).
It was concluded that amber grain and semolina colour and kernel vitreousness increased market prices whereas increasing yellow berry, starchy grain, sunn pest damaged kernel and other contaminants (barley grains and red kernels of bread wheat) affected it negatively. Some

regression equations, obtained from this study might be used for price estimation in such commodity markets and as practical guidance for plant breeding programmes.
Keywords: Durum wheat; Price estimation; Sunn pest; Commodity market; Purchasing criteria

Sofia Delin, Borje Linden, Kerstin Berglund, Yield and protein response to fertilizer nitrogen in different parts of a cereal field: potential of site-specific fertilization, European Journal of Agronomy, Volume 22, Issue 3, March 2005, Pages 325-336, ISSN 1161-0301, DOI: 10.1016/j.eja.2004.05.001.
(http://www.sciencedirect.com/science/article/B6T67-4D04YVX-1/2/729a7bed0ced6bf39e73e14dd2349ca6)
Abstract:
Crop response to fertilizer nitrogen (N) may vary within a field due to variations in soil N and potential yield. To study this, a 3-year field investigation was started in 1998 on a 15 ha arable field with large texture variability in south-west Sweden. Winter wheat was grown in 1998 and 2000 and spring barley in 1999. Using annual field trials with seven N application levels at five sites, curves for yield and crude protein (CP) response to N application were created and economic optimum N fertilization rates calculated. Plant-available soil N (Np), soil moisture, frequency of weeds and diseases, N accumulation in the crop and residual soil mineral N were measured at each site. Differences in potential yield were small between sites, obviously due to sufficient soil moisture. Observed differences between yield response curves could instead be explained by variations in Np, local infections of fungal diseases or probable losses of fertilizer N due to excess soil moisture. The fertilization had no clear effect on CP in 1998 and 1999, probably due to unfavourable weather, bad timing of the fertilization and low N efficiency. In conclusion, N efficiency and yield but not always CP can be improved and fertilizer N saved with site-specific fertilization, but in practice uncertainty in predicting is an obstacle.
Keywords: Barley; Fertilization; Nitrogen response; Protein; Site-specific crop management; Wheat; Yield

George. E. Inglett, Steven C. Peterson, Craig J. Carriere, Saipin Maneepun, Rheological, textural, and sensory properties of Asian noodles containing an oat cereal hydrocolloid, Food Chemistry, Volume 90, Issues 1-2, March-April 2005, Pages 1-8, ISSN 0308-8146, DOI: 10.1016/j.foodchem.2003.08.023.
(http://www.sciencedirect.com/science/article/B6T6R-4D982JN-1/2/9b107179fc514f68bdf959b8e99a37cc)
Abstract:
The purpose of this study was to use an oat hydrocolloidal fibre composition, called Nutrim-5, for extending the use of rice flour in making Asian noodles. Nutrim-5 is one of a family of [beta]-glucan-containing hydrocolloids that is prepared by thermo-shear processing of oat flour or bran. The rheological properties of the noodle flour composites indicated that Nutrim-5 contributed binding qualities to the composites. Nutrim-5 appeared to contribute functionality to the rice flour, allowing for larger quantities to be used in the making of Asian noodles. The noodles were prepared in 20 kg batches by mixing blends of wheat flour, rice flour, and Nutrim-5 with alkali, salt solution, and egg. After mixing and kneading into smooth sheets, the noodles were cut, curled, and deep fat-fried. By using 10% by weight Nutrim-5 in the formulation, it was possible to satisfactorily make noodles using 50% rice flour. The cooking loss and tensile strength were measured and found to be satisfactory for this amount of rice flour in the noodles. A trained sensory panel also indicated that these noodles did not reveal any difference in taste.
Keywords: Nutrium-5; Noodles; Hydrocolloidal fibres; Wheat flour; Rice flour; Rheology

Raci Ekinci, The effect of fermentation and drying on the water-soluble vitamin content of tarhana, a traditional Turkish cereal food, Food Chemistry, Volume 90, Issues 1-2, March-April 2005, Pages 127-132, ISSN 0308-8146, DOI: 10.1016/j.foodchem.2004.03.036.
(http://www.sciencedirect.com/science/article/B6T6R-4CJ46YF-1/2/c604e8d79059344dd29ef1276a34f426)
Abstract:
Tarhana is a popular and widely consumed traditional Turkish fermented wheat-flour-yoghurt mixture. The effects of fermentation (30 [degree sign]C for 4 days) and drying (50, 60 and 70 [degree sign]C) on the contents of several water-soluble vitamins (ascorbic acid, niacin, pantothenic acid (vitamin B5), pyridoxine (vitamin B6), thiamine (vitamin B1), folic acid and riboflavin (vitamin B2)) in tarhana, a traditional Turkish cereal food, have been studied. The contents of water-soluble vitamins was analyzed by HPLC. Statistical analysis of the data showed that a 4-day fermentation and drying had a significant effect ($p<0.05$) on the contents of water-soluble vitamins of tarhana. The fermentation resulted in significant increases of riboflavin, niacin, pantothenic acid, ascorbic acid and folic acid contents of the samples, but no significant differences, with thiamine and pyridoxine. Highest losses of the water-soluble vitamins were at 70 [degree sign]C for the 35 h drying period.
Keywords: Tarhana; Fermentation; Drying; Vitamin; HPLC

B. Drzikova, G. Dongowski, E. Gebhardt, A. Habel, The composition of dietary fibre-rich extrudates from oat affects bile acid binding and fermentation in vitro, Food Chemistry, Volume 90, Issues 1-2, March-April 2005, Pages 181-192, ISSN 0308-8146, DOI: 10.1016/j.foodchem.2004.03.041.
(http://www.sciencedirect.com/science/article/B6T6R-4CBV31M-C/2/cd35d32e0c0d4bd9e24f1c91c80021cb)
Abstract:
A series of extrudates was prepared from oat meal, oat bran and Novelose 330(R), differing in concentrations of individual dietary fibre (DF) components, such as [beta]-glucan and resistant starch, as well as total DF. After simulated digestion, the digested DF-rich oat-based extrudates were used to evaluate their physiological effects in vitro. A strong interaction occurred between the digested extrudates and bile acids (BA). The binding of BA increased with increasing proportions of oat bran, total DF, insoluble DF and [beta]-glucan in the extrudates. Dihydroxy-BA was more strongly bound to the extrudates than trihydroxy-BA. Interactions at pH 5.0 were greater than at pH 6.5. During fermentation of digested extrudates with human faecal samples, concentrations of short-chain fatty acid (SCFA) formed and the molar proportion of butyrate increased continuously. Higher SCFA concentrations were found when extrudates contained more oat bran, soluble and insoluble DF and [beta]-glucan. Extrudates, on the basis of oat, have several beneficial nutritional and protective effects in vitro. Therefore, physiological effects occurring in the small and large intestine are also related to the DF composition of the cereal products.
Keywords: Oat extrudate; Dietary fibre; [beta]-Glucan; Resistant starch; Bile acid binding; Fermentation

Joseph M. Awika, Lloyd W. Rooney, Ralph D. Waniska, Anthocyanins from black sorghum and their antioxidant properties, Food Chemistry, Volume 90, Issues 1-2, March-April 2005, Pages 293-301, ISSN 0308-8146, DOI: 10.1016/j.foodchem.2004.03.058.
(http://www.sciencedirect.com/science/article/B6T6R-4CNJ9FH-1/2/74e15148a9cf6a153dcfb8b47addd1ce)
Abstract:
A black, high anthocyanin sorghum variety (Tx430) grown in several environments was analyzed for anthocyanins by spectrophotometric and HPLC methods. The samples were also analyzed for antioxidant activity using the 2,2'-azinobis (3-ethyl-benzothiaziline-6-sulfonic acid) method. Two extracting solvents, 1% HCl in methanol and 70% aqueous acetone, were compared. Sorghum

brans had three to four times higher anthocyanin contents than the whole grains. The brans were a good source of anthocyanin (4.0-9.8 mg luteolinidin equivalents/g) compared to pigmented fruits and vegetables (0.2-10 mg/g), fresh weight basis. Acidified methanol extracted the anthocyanins better than aqueous acetone. Luteolinidin and apigeninidin accounted for about 50% of the anthocyanins in the black sorghums. The sorghum grains and their brans had high antioxidant activity (52-400 [mu]mol TE/g) compared to other cereals (<0.1-34 mg TE/g). Black sorghum should be useful in food and other applications, because it is a valuable source of anthocyanins with good antioxidant activity.
Keywords: Sorghum; Anthocyanins; Antioxidant activity; HPLC; ABTS

E.-L. Ryhanen, K. Tallavaara, J.M. Griinari, S. Jaakkola, S. Mantere-Alhonen, K.J. Shingfield, Production of conjugated linoleic acid enriched milk and dairy products from cows receiving grass silage supplemented with a cereal-based concentrate containing rapeseed oil, International Dairy Journal, Volume 15, Issue 3, March 2005, Pages 207-217, ISSN 0958-6946, DOI: 10.1016/j.idairyj.2004.07.003.
(http://www.sciencedirect.com/science/article/B6T7C-4DKH04K-1/2/244e7e0167f0849bff76aae9226b2284)
Abstract:
Opportunities for the production of milk and dairy products enriched with cis-9, trans-11 conjugated linoleic acid (CLA) were investigated. Eighteen mid-lactation cows were used in a continuous-design for 7 weeks. During the first week, cows received grass silage ad libitum supplemented with 10 kg per day of a cereal-based concentrate (control) that was replaced with a concentrate containing 50 g kg-1 of rapeseed oil (RO). Changes in milk fatty acid composition were monitored on a weekly basis and milk produced was used to manufacture Edam cheese and butter. Inclusion of RO in the concentrate supplement increased the mean levels of trans-octadecanoic, monounsaturated, CLA and polyunsaturated fatty acid in the milk fat from 1.6, 25.7, 0.46 and 2.8 to 4.3, 35.3, 1.02 and 3.9 g 100 g-1 total fatty acids, respectively. In contrast, the mean level of saturated fatty acids decreased from 71.4 to 60.7 g 100 g-1 total fatty acids. Changes in milk fatty acid composition due to RO occurred within 7 days, with responses reaching a plateau after 21 days. Furthermore, the CLA concentrations in the milk fat from individual cows ranged between 0.37 and 0.65 and 0.43 and 2.06 g 100 g-1 total fatty acids for the control and RO diet, respectively. CLA enriched milk was used successfully to manufacture of Edam cheese and butter with softer textures but with acceptable organoleptic and storage properties. Processing milk into butter or cheese had no effect on the CLA concentrations indicating that enrichment of dairy products is dependent on the content in raw milk fat.
Keywords: Conjugated linoleic acid; Cheese; Butter; Milk fat

D.J. Skylas, D. Van Dyk, C.W. Wrigley, Proteomics of wheat grain, Journal of Cereal Science, Volume 41, Issue 2, New Approaches in Cereal Science, March 2005, Pages 165-179, ISSN 0733-5210, DOI: 10.1016/j.jcs.2004.08.010.
(http://www.sciencedirect.com/science/article/B6WHK-4DS6JFX-1/2/a7e3f8fb87d2c005adff60eb8b0698af)
Abstract:
The central dogma of molecular biology describes the flow of genetic information from DNA to RNA and to proteins in living biological systems. Newly emerging technologies are being applied, and continually developed, to elucidate interactions between these biomolecules at all stages during the flow of genetic information in biological systems, and in relation to specific conditions (the growth conditions of plants). These newly emerging technologies encompass genomics, transcriptomics and proteomics, as well as the rapidly expanding and exciting field of bioinformatic tools and interactive databases.

With the recent completion of the sequence of the genome of the `model' plant Arabidopsis thaliana, a basis has been provided for the analysis of gene function in plants, which will no doubt have an impact on cereal plants as well. The importance of this `model' genome project is enormous, as many important cereal crops, such as wheat, maize and rice, have large genomes and in some cases such as wheat are also polyploid, with related genes present on the different genomes. This may provide problems for the efficient and economical attempts to completely sequence these genomes, in the near future.
With the combination of these newly emerging technologies, the stage is now set for cereal chemistry to capitalise on advances being made widely in protein chemistry, to apply these new methods, and thereby bridge the traditional gap between DNA and proteins, between the genome and proteome. In doing so, we stand to learn more about the inheritance of grain-quality attributes, and also, possibly more importantly, to discover more about the effect of growth and storage conditions on grain quality, and their effects on processing. In this review, the main aspects of proteomics are discussed, as well as the current and future applications of proteomic technologies to cereal grain science.
Keywords: Grain quality; Wheat; Barley; Endosperm proteins; alpha-Amylase inhibitors; Puroindolines; Protein disulfide isomerase; Heat-shock proteins; Cultivar identification

E.N.C. Mills, M.L. Parker, N. Wellner, G. Toole, K. Feeney, P.R. Shewry, Chemical imaging: the distribution of ions and molecules in developing and mature wheat grain, Journal of Cereal Science, Volume 41, Issue 2, New Approaches in Cereal Science, March 2005, Pages 193-201, ISSN 0733-5210, DOI: 10.1016/j.jcs.2004.09.003.
(http://www.sciencedirect.com/science/article/B6WHK-4F08536-1/2/1da6b9ec8542755b8e6c550f765ccc4d)
Abstract:
The ability to combine topographical and in situ chemical analysis of individual cereal grains, without recourse to fractionation, offers an opportunity to determine the distribution of functionally- and nutritionally-important components. Three such technologies are reviewed, including immunolocation using monoclonal antibodies specific for different types of wheat prolamins, secondary ion mass spectroscopy (SIMS) to detect the presence of inorganic elements such as sodium and sulphur, and infrared (including Raman and Fourier-transform infrared [FT-IR]) microspectroscopy to determine the distribution of biopolymers across the grain. Immunolabelling has shown that the distribution of prolamin proteins changes across the endosperm, with the outer endosperm containing a much greater proportion of prolamins than the inner endosperm. SIMS has shown, for the first time, the presence of Na+ in the phytin granules and that sulphur is enriched at the boundary between the starch granules and the protein matrix. Raman microspectroscopy has been used to investigate the distribution of proteins and the phenolic compound, ferulic acid, across the grain, whilst FT-IR has been used to define the microheterogeneity of arabinoxylans in endosperm cell walls. These methods highlight how in situ analysis can yield new insights into grain composition and how this may be altered by environmental conditions during grain development.
Keywords: Wheat; Grain development; Microscopy; Spectroscopy