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INDONESIAN AGRICULTURAL RESEARCH ABSTRACTS

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INDONESIAN AGRICULTURAL RESEARCH ABSTRACTS

Address :
Jl. Ir. H. Juanda 20, Bogor - 16122
Telepon No.: (0251) 8321746
Faximile : (0251) 8326561
E-mail : pustaka@pustaka.litbang.deptan.go.id

PREFACE

Abstracts of Indonesian Agricultural Research contain the compilation of author abstracts which are synthesizes based on subject and also authors name, and completed with Author Index, Subject Index, and Journal Index.

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Director of Indonesian Center for Agricultural Library and Technology Dissemination

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Determination of national priority commodity in Central Kalimantan Province with location quotient method. ***Penentuan komoditas unggulan nasional di Provinsi Kalimantan Tengah dengan metode location quotient***/ Susilawati; Sabran, M.; Ramli, R.; Utomo, B.N.; (Balai Pengkajian Teknologi Pertanian Kalimantan Tengah, Palangkaraya (Indonesia)). *Jurnal Pengkajian dan Pengembangan Teknologi Pertanian* (Indonesia). ISSN 1410-959X (2006) v. 9(1) p. 1-9, 7 ref. Appendices

RICE; MAIZE; CHICKENS; AGRICULTURAL PRODUCTS; AGRICULTURAL DEVELOPMENT; SOCIOECONOMIC DEVELOPMENT; KALIMANTAN.

In national development as a whole, agricultural sector has a significant role in improving an economic growth because Indonesia is an agricultural country. Because of resource limitation, agricultural development has to be conducted efficiently by determining commodities having biophysics and social economic advantages. One method that constructive in commodity determination is location quotient (LQ) and this method was implemented in order to analyze national priority commodity in Central Kalimantan Province. This analysis presented three national priority commodities, i.e. rainfed rice (LQ=11.67), irrigated rice (LQ=1.45), native chicken (LQ=1.62) and maize (LQ=0.09). Determination of those commodities is considered on technical (land and climate), social economic and institution aspect as well synchronization with agricultural development program in Central Kalimantan Province.

152 SYAFRUDDIN

Strategy for sustainability of food security management in Central Halmahera. ***Strategi pengelolaan dan analisis status keberlanjutan ketahanan pangan di Kabupaten Halmahera Tengah***/ Syafruddin (Dinas Pertanian dan Peternakan Halmahera Tengah (Indonesia)); Sutjahjo, S.H.; Baliwati, Y.F.; Nurmalina, R. *Jurnal Pengkajian dan Pengembangan Teknologi Pertanian* (Indonesia). ISSN 1410-959X (2007) v. 10(1) p. 30-38, 8 tables; 7 ref.

FOOD SECURITY; SUSTAINABILITY; MANAGEMENT.

The aim of the research is to construct the planning of the desirable dietary based on potential area in sustainability of food security development frame. This research was done on a survey research basis. The types of data consist of primary and secondary data. The Rapfish method was used for continuing analysis, whereas the analysis hierarchy process (AHP) method was used to decide the strategy for sustainability of food security management. The results of this research are: (1) the sustainability index or scales value of ecology dimension falls into good category, the cultural-society dimension is in fine category and the economy dimension is included in less category, (2) management strategy in an attempt to achieve the sustainability of food security in Central Halmahera is low food price as the first priority. This is then followed by the increase of food production, farming incentive, environmentally friendly in agriculture, eradication of poor society, and the improvement of human resource quality.

E16 PRODUCTION ECONOMICS

153 ARAFAH

Technological study of agro-enzyme revolution and integrated crop management in South Sulawesi. ***Kajian teknologi enzym revolusi agro dan pengelolaan tanaman terpadu di Sulawesi Selat*** / Arafah; Sahardi (Balai Pengkajian Teknologi Pertanian Sulawesi Selatan, Makassar). *Jurnal Pengkajian dan Pengembangan Teknologi Pertanian*. ISSN 1410-959X (2007) v. 10(1) p. 68-75, 4 tables; 7 ref.

ORYZA SATIVA; INTEGRATED PLANT PRODUCTION; PRODUCTIVITY; SULAWESI.

Technological study of agro-enzyme revolution and integrated crop management (KM) in South Sulawesi was carried out to know the effectiveness and efficiency of Enzyme Revolutionize Agro and ICM as opposed to the increase of paddy production and farmers' earnings. This study was executed in Tabaringan Village, North Galesong Subdistrict, and Takalar District from the plantation date 16 May to the harvest date 11 August 2006. This study was done on farmers' farms with the following treatment formula: (1) enzyme, (2) ICM, and (3) nonenzyme. The results of the study indicated that the highest production of rice was obtained at the ICM treatment which was equal to 8,800 kg/ha compared to enzyme treatment and nonenzyme treatment which produced only 7,040 kg/ha. The highest production cost obtained at enzyme treatment that was equal to Rp 8,526,224.00 followed by ICM treatment that was equal to Rp 5,850,280.00 and the lowest at nonenzyme treatment which yielded Rp 5,551,224.00. The efficiency of production cost at ICM treatment was 31.38% higher compared to enzyme treatment. The highest farmers' earnings was obtained at ICM treatment that was equal to Rp 9,989,720.00/ha, while at enzyme and nonenzyme treatments reached Rp 4,145,776.00 and Rp 7, 120,776.00/ha, respectively. Therefore, the provision of enzyme itself in form of bio-culture cannot improve the paddy production and further does not give any benefit for the farmers.

E20 ORGANIZATION, ADMINISTRATION AND MANAGEMENT OF AGRICULTURAL ENTERPRISES OR FARMS

154 GALIB, R.

Native chicken farm of dryland wet climate and economic feasibility. ***Usahatani ayam buras di lahan kering beriklim basah dan kelayakan ekonominya*** / Galib, R.; Sumanto; Khairuddin (Balai Pengkajian Teknologi Kalimantan Selatan, Banjarbaru). Proceedings of the seminar on agricultural technology inovation transfer for development rural industrial agribusiness in marginal areas: innovation of production technology. Book 2 , Semarang, 8 Nov 2007 / Muryanto; Prasetyo, T.; Prawirodigdo, S.; Yulianto; Hermawan, A.; Kushartanti, E.; Mardiyanto, S.; Sumardi (eds.) Bogor (Indonesia): BBP2TP , 2007 p. 157-161, 2 tables; 7 ref.

CHICKENS; POULTRY FARMING; DRY FARMING; WET SEASON; ECONOMIC ANALYSIS.

Buras chicken is one strategic trade product that can be used to full fill the need of society nutrition, business chance, and to mark up the family income. Beside the simple way to amendable, this trade product have a role as meat and egg distributor for the needs of South Kalimantan community which is having mount up demand. The production enhancement

effort can be done by reconditioning the effort management which has been done in traditional manner (liberated) in to intensive system (pent-up). The technology that been researched in CV Guntala Banjar subdistrict, is chicken crossing seeding between Arabian and Kedu chicken. battery cage system and ren stock yard. Using local substance woof and formulated according to quality. price. and continuity. Vaccination and DOC salary are practicable in periodic time. The economic analysis show that CV Guntala buras chicken comparing with other chicken farmer's at the environment in the Banjar district scope. In the result, had been known that the intensive buras chicken stock raiser by CV Guntala is visible to do. this is because the benefit of R/C ratio more than I, comparing with the traditional manner that have been done by other the farmer's in the environment.

155 IRWANDI, D.

Farming system development of traditional communities in Kuala Kurun, Gunung Mas Regency, Central Kalimantan. ***Pengembangan sistem usaha tani masyarakat tradisional di Kecamatan Kuala Kurun, Kabupaten Gunung Mas Kalimantan Tengah***/ Irwandi, D.; Siahaan, M.; Bhermana, A. (Balai Pengkajian Teknologi Pertanian Kalimantan Tengah, Palangkaraya). *Jurnal Pengkajian dan Pengembangan Teknologi Pertanian* (Indonesia). ISSN 1410-959X (2006) v. 9(3) p. 299-309, 3 tables; 15 ref.

KALIMANTAN; FARMING SYSTEMS; CULTIVATION; TRADITIONAL FARMING.

Kurun Subdistrict is located in Gunung Mas Regency, Central Kalimantan Province. The area is developed for integrated farming system by the government. Mainly dominated by dry land, the farming systems practiced by Dayaks, the local community, are shifting cultivation, agroforestry and permanent farming which have been passed from generation to generation. The aims of this assessment were: (1) to obtain the information on the farming systems; (2) to build a farming system based on the characteristics of the area; and (3) to develop models of farming development suitable for Dayaks. The assessment took place in 4 rural areas that were determined by purposive sampling. Data collection used PRA method, form, and field observation using questionnaires involving 40 respondents. The results of the assessment showed that: (1) the present farming systems developed by the Dayak farmers were extremely traditional, that is, by using shifting cultivation system for a period of 2 - 5 years, agroforestry, and permanent farming; (2) availability of land, labor and property as basic capital were considered by the Dayak people as a tradition; and (3) conventionally, the mixed farming systems were developed and based on land utilization type. The region can be developed by the use of technology in farming systems which integrate the wet land farming model, agroforestry and the dry land farming methods that use perennial and annual crops.

156 KASNO, A.

Prospect of peanut development at the acid soil and tidal swamp. ***Prospek pengembangan kacang tanah di lahan kering masam dan lahan pasang surut*** / Kasno, A. (Balai Penelitian Kacang-kacangan dan Umbi-umbian, Malang). *Buletin Palawija* (Indonesia). ISSN 1693-1882 (2006) (no.11) p. 1-6, 2 tables; 19 ref.

ARACHIS HYPOGAEA; CONTROL METHODS; DISEASE CONTROL; APPLICATION RATES; YIELDS; PESTS OF PLANTS.

Acid dry soil of Ultisols is widely spread in almost 25% of total Indonesia continent. Acid dry soil in Sumatra and Kalimantan reaching 16.8 million ha could be used for the extensification of agriculture areas. Potency of the tidal swamp for the food crops is

approximately 9.34 million ha, up to now of about 3.6 million ha was used for the settlement of transmigration and supporting for farmer agriculture activities. The contribution of this soil to national peanut production at present is less than 10%, though mean national production deficit around 200,000 t/year and peanut farming at this soil type was the most beneficial. Development of peanut at the acid dry soil faced high soil acidity, mean pH < 4.50, high Al saturation, low content of macro nutrients, especially P, K, Ca, and Mg, and low organic materials content, while for the tidal swamp besides those problems also faced problem of water management. Tidal swamp generally have high acidity (low pH), deficiency of essential nutrients for peanut, namely P, K and Ca, and also element of Al and Fe having poisonous character of poisoned to crop. Hence, problem of nutrients and opportunity of poisonous Al and Fe have to be overcome to be suitable for peanut. Those biophysical problems could be anticipated by controlling of pH, Fe, and Al by using soil ameliorant such as manure and lime. Cultivation of tolerant varieties to acid soil, such as Kelinci, Jerapah, and Tapir, could be reduced use of lime. At tidal swamp farm, the problem of water overflowing can be overcome by micro and macro water management technology. To reach peanut yield of 1.5-2.0 t dried unshelled peanuts /ha, fertilizer dose of 45 kg N, 90 kg P_2O_5 and 50 KP per hectare at population 250,000 plants/ha or plant spacing of 40 cm x 10 cm and 1 plant/hole could be used as recommendation.

157 KRISMAWATI, A.

[Assessment of integrated livestock-food crops pattern in dryland of Central Kalimantan]. ***Kajian pola integrasi ternak dengan tanaman pangan di lahan kering Kalimantan Tengah***/ Krismawati, A.; Bambang, N.V. (Balai Pengkajian Teknologi Pertanian Kalimantan Tengah, Palangkaraya). *Jurnal Pengkajian dan Pengembangan Teknologi Pertanian* (Indonesia). ISSN 1410-959X (2006) v. 9(3) p. 264-277, 1 ill., 8 tables; 27 ref.

FOOD CROPS; CATTLE; INTEGRATION; FARMING SYSTEMS; ARID ZONES; DRY FARMING; APPROPRIATE TECHNOLOGY; ORGANIC FERTILIZERS; KALIMANTAN.

More or less 50% (7.7 million hectares) of Central Kalimantan region is dominated by dry land areas. The main problems of the farming system on dry land are unfertile soil, poor in organic matters and high soil acidity. The role of organic fertilizer (compost) becomes very important because without organic fertilizer the production will be relatively low. In the meantime, the excessive use of inorganic fertilizer can increase production cost and decrease soil quality. However, the supply of organic fertilizer is still limited due to the small number of cattle; consequently, the organic fertilizer is supplied by other areas outside Central Kalimantan. Currently, the Central Kalimantan goverment is facing two important problems: (a) supply of young beef and (b) supply of rice and food crops. These problems could be overcome by crop livestock system. The synergism of this pattern is by the utilization of crop wastes for cattle feed and cattle feces as organic fertilizers. This model may lead to sustainable agriculture. This study was the continuation of the previous year's research which was conducted on farm research using participative and interactive approach. The appropriate technology used in this study consisted of organic fertilizer application, high yielding varieties of paddy and corn, management of stable group and utilization of fermentated straw as cattle feed. The results showed that the combination of paddy varieties of Situ Patenggang and the fertilizer of 200 kg urea + 50 kg SP-36 + 50 kg KCl + 1,000 kg of compost, gave paddy seed yield 4.6 ton/ha with R/C = 2.34, whereas combination of corn varieties of Sukmaraga and the fertilizer of 200 kg urea + 100 kg SP-36 + 100 kg KCl + 1.500 kg of compost, gave corn seed yield 4.5 ton/ha with R/C = 2.10. The average weight

gained by female and male cows was 0.26 kg/cow/day and 0.29 kg/cow/day, respectively by grass and rice straw application. The income from the integrated paddy, corn, and cattle farming model was Rp l,140,333,-/month. It could be concluded that there was highly strong relation between cow farming and food crops as an environmentally friendly sustainable farming system.

158 RINA, D.Y.

Analysis of siam banjar citrus farming in monotonous swampy area of South Borneo: a case in Banjar and Hulu Sungai Tengah Regency. ***Analisis usaha tani jeruk siam banjar di lahan lebak Kalimantan Selatan: kasus Kab. Banjar dan Kab. Hulu Sungai Tengah Kalimantan Selatan)*** / Rina, D.Y. (Balai Penelitian Pertanian Lahan Rawa, Banjarbaru). Proceedings of the national seminar of citrus, Jakarta, 13-14 Jun 2009/ Winarno, M.; Sabari; Subandiyah, S.; Setyobudi, L.; Supriyanto, A. (eds.). Jakarta: Puslitbanghorti, 2008: p. 120-132, 3 ill., 3 tables; 13 ref.

CITRUS; FARMING SYSTEMS; CROP MANAGEMENT; LAND MANAGEMENT; LABOUR REQUIREMENTS; FARM INCOME; SWAMP SOILS; KALIMANTAN.

This research aimed to find out the information of farming system feasibility and its contribution to the farmer's income. Both of data and information were collected by participatory rapid appraisal (PRA) method and survey in 2006. Sixty farmers in Pematang Hambawang and Mahang Matang Landung District of Banjar and Hulu Sungai Tengah Regency respectively were chosen as respondents. The result showed that citrus farming on monotonous swampy area was conducted on surjan system with paddy + citrus planting pattern. The seedling used were cutting and marcotting plants. Manpower needed for surjan preparation were 449 man days for 0.37 ha of surjan on Pematang Hambawang and 642.5 man days for 0.33 ha surjan on Mahang Matang Landung, while the preparation was carried out gradually. Paddy + citrus on surjan system was feasible due to B/C > 1, has positive NPV and IRR more than the current bank rate interest. The contribution of citrus farming to farmer income was 47.4% (Pematang Hambawang Village) and 18.7% (Mahang Matang Landung). The main constraint of citrus farming on monotonous swampy area was pests/ diseases.

159 SUPADI

Empowerment of coconut farmers to increase their family income. ***Pemberdayaan petani kelapa dalam upaya peningkatan pendapatan***/ Supadi; Nurmanaf, A.R. (Pusat Analisis Sosial Ekonomi dan Kebijakan Pertanian, Bogor (Indonesia)). *Jurnal Penelitian dan Pengembangan Pertanian* (Indonesia). ISSN 0216-4418 (2006) v. 25(1) p. 31-37, 1 ill., 22 ref.

COCONUTS; FARMERS; FARM INCOME; FARMING SYSTEMS.

Generally small coconut farmings apply monoculture techniques with low productivity, so the farming is not able to support yet the life of farmer's family. Around 60% coconut farmers are poor. Therefore, coconut farmer's empowerment is the crucial effort to increase their income and welfare. Farmer's empowerment can be done by several ways, namely (1) construction and training on how to make production efficiently by applying recommended technologies and diversifying farm products, (2) capital aid for farm business, (3) infrastructure development to support public social-economic activities to accelerate

marketing of input and output, goods and services, and (4) reinforcement of farmer's social institution, not only in economic aspect, such as cooperation, but also in noneconomic aspect, for example farmers' association. By these efforts farmers could use their potency and creativity in responding and accessing available facilities.

E21 AGRO-INDUSTRY

160 HARIS, U.
Strategic alliance model engineering on crumb rubber agroindustry system. *Rekayasa model aliansi strategis sistem agroindustri crumb rubber* / Haris, U. (Institut Pertanian Bogor (Indonesia). Sekolah Pascasarjana)); Sailah, I.; Machfud; Sukardi; Ma'arif, M.S.; Huseini, M. *Jurnal Penelitian Karet* (Indonesia). ISSN 0852-808X (2006); v. 24(1) p. 47-61, 4 ill., 7 tables; 21 ref

RUBBER; AGROINDUSTRIAL SECTOR; MODELS; COMPUTER APPLICATIONS; ENGINEERING.

National rubber agroindustry is still dominated by crumb rubber product. The main constraint of this agroindustry is functionally and spatially separated between production system of raw rubber material and product processing as well as marketing. Vertical coordination with strategic alliance model is expected to optimize the value chain so that it gives proportionally benefits to the business actors. The objective of this research was to engineer strategic alliance model between smallholder rubber as a raw rubber material producer and crumb rubber agroindustry entrepreneur who possessed product processing and marketing competencies. This model were created in expert management system based on computer which could be used interactively by users. The model consisted of several submodels i.e. assessment of strategic alliance potency by independence preference evaluation with OWA (ordered weighted averaging) operator, the structuring of the system which used interpretive structural model, capacity and location of agroindustry by using multiexpert multicriteria decision making modelling. The expert system was used to make alliance strategic performance prediction. The result of validation showed that smallholder rubber and crumb rubber agroindustry had a high potency to arrange in the form of strategic alliance. The main purpose of strategic alliance was a synergy of their resources and competencies. Forming a such strategic had to consider key sub-elements which had strong driving power and independency to the system. The appropriate capacity of the agroindustry developed in the strategic alliance model was medium scale with agroindustry location approaching to raw rubber material sources. Financially, this model was feasible to develop. The prediction of strategic alliance system performance was determined by five main parameters namely transparency, trust (mutual benefit), interlinkages, transaction costs, and sharing benefit and risks.

161 RIDWAN, H.K.
Innovation characteristics and technologies application of integrated crop management for healthy citrus orchad (ICM/IHCO) on the development of citrus agribusiness in Sambas District West Kalimantan (Indonesia*). Sifat inovasi dan aplikasi teknologi pengelolaan terpadu kebun jeruk sehat dalam pengembangan agribisnis jeruk di Kabupaten Sambas, Kalimantan Barat*/ Ridwan, H.K.; Winarno; Muharam, A.; Hardiyanto; Ruswandi, A. (Pusat Penelitian dan Pengembangan Hortikultura, Jakarta). *Jurnal Hortikultura* (Indonesia). ISSN 0853-7097 (2008) v. 18(4) p. 477-490, 6 tables; 12 ref.

VEGETABLES; CONSUMER SURVEYS; COMMODITY MARKETS; MARKET SEGMENTATION; CONSUMER BEHAVIOUR.

The Indonesian Center for Horticulture Research and Development has conducted research and assessment program of Integrated Crop Management for Healthy Citrus Orchad (ICMHCO) in several provinces to increase production and quality of citrus in Indonesia consisting of (a) use of labelled and free diseases planting materials, (b) pests and diseases control especially for the CVPD vector, (c) good field sanitation, (d) optimum cultural practices, and (e) field management consolidation. The objective of this research was to evaluate characteristics of ICMHCO innovation technologies that affect the adoption of the innovations by farmers. The research was conducted in Sambas District, West Kalimantan from April to December 2006, using survey method. The results showed that only a part of the innovatory technologies of ICMHCO were adopted by the citrus farmers in Sambas District. The non-adopted technologies generally have low value of technology characteristics. The non-adopted technologies were labelled free diseases planting materials, yellow trap application, drenching with insecticide solutions, sex pheromon application, pruning, fruit wrapping, irrigation and good harvesting practices. The innovation technologies promptly adopted by the citrus farmers was California (sulphur) paste application. Non-technical factors that affect the adoption of the innovation technologies of ICMHCO were less quality seed support institutionally, less support of production input from the proper institution especially for sulphur, low selling price and less financial capital of the farmers.

E50 RURAL SOCIOLOGY AND SOCIAL SECURITY

162 AZAHARI, D.H.
Indonesian rural women: the role in agricultural development/ Azahari, D.H. (Pusat Analisis Sosial Ekonomi dan Kebijakan Pertanian, Bogor (Indonesia)). *Analisis Kebijakan Pertanian* (Indonesia). ISSN 1693-2021 (2008) v. 6(1) p. 1-10, 12 ref

INDONESIA; RURAL AREAS; AGRICULTURAL DEVELOPMENT; AGRICULTURAL ECONOMICS; ROLE OF WOMEN.

Women involved their roles and differing positions in society, however women are usually neglected in rural development, even they experience equal status in the household decision making process and are often described as the silent head of the home or informal power. Their roles in this societal context cover the spheres of human reproduction and equally important agricultural and household production, self employment in the informal market sector and as wage laborers. The work of women and men differ yet the population is treated as one undifferentiated unit in some subsequent sections education, health and economic development. It is difficult to believe that women and men would play similar roles in economic development if their work ethic is so different. This reflected that women are not included in development planning. The reason why women excluded in development planning are they are not given equivalent access to land, credit or extension services. Women also have potential to contribute to agricultural productivity beside the productivity of domestic activity is another extremely important area which should not be ignored by planners. Gender issues in development are a relatively new area of research of much importance because of its potential impact on shaping the societies of developing countries. Indonesia is in a good position to integrate rural women into development because social

values in its cultures such as the Javanese already provide them with relatively egalitarian status. The lack of consideration, however, for women in the development literature reflects a need for development officials to start including them with the goal of development being one that benefit to the whole rural community. There is evidence to indicate that by eliminating barriers to women's access to productive assets, they can fully participate and be recognized as important partners in the development process.

163 HENDRATNO, S.
Cooperative bargaining power and intrahousehold resource allocation of the South Sumatra rubber smallholder. II. Changes in intrahousehold resource allocation of rubber smallholder. ***Kompromi kooperatif dan alokasi sumber daya intrarumah tangga petani karet di Sumatera Selatan. II. Alokasi sumber daya intrarumahtangga petani karet***/ Hendratno, S.; Hartoyo, S.; Syaukat, Y.; Kuntjoro, S.U. *Jurnal Penelitian Karet* (Indonesia). ISSN 0852-808X (2006); v. 24(1) p. 62-80, 5 tables; 26 ref.

RUBBER CROPS; SMALL FARMS; HOUSEHOLDS; RESOURCES ALLOCATION; ECONOMIC COMPETITION; COOPERATIVE MARKETING.

The success of national development on estate crop subsector is determined by the smallholder household as a subject of development. The household members have a cooperative bargaining power and negotiation, and they can determine the intrahousehold decision making processes and implementations of several activities especially in production, consumption, and labor allocation. The objectives of this research were to estimate the intrahousehold resource allocation if the changes of economic factor and policy occurred, by considering the power of cooperative bargaining among household members. A collective model was used to analyse the issues by accommodating the roles of husband and wife. The levels of cooperative bargaining power of husband and wife, input demand and output supply elasticities of rubber farm, and consumption demand elasticities of household members were estimated using an econometric model. Further, it was used to estimate the impact of economic factor and policy changes on the intrahousehold resource allocation. A survey used data of 1296 owners-tappers of the smallholder rubber household couples in South Sumatra. The results of analyses showed that the cooperative bargaining power of husband and wife existed in decision making and implementation of production and consumption activities. Economic factor and policy changes affected the intrahousehold resource allocation. The government policy to impose sales tax of about 5% and the depreciation of rupiah currency up to 12% could impact the intrahousehold resource allocation and welfare but they were inelastic.

E70 TRADE, MARKETING AND DISTRIBUTION

164 MUSYAFAK, A.
System and agribusiness development model of siam pontianak citrus. ***Model pengembangan sistem dan usaha agribisnis jeruk siam pontianak***/ Musyafak, A.; Jafri; Ibrahim, T.M. (Balai Pengkajian Teknologi Pertanian Kalimantan Barat, Pontianak (Indonesia)). Proceedings of the national seminar of citrus, Jakarta, 13-14 Jun 2009/ Winarno, M.; Sabari; Subandiyah, S.; Setyobudi, L.; Supriyanto, A. (eds.) Jakarta (Indonesia): Puslitbanghorti, 2008; p. 143-167, 7 ill., 1 table; 14 ref.

CITRUS; FRUITS; HANDLING; MARKETING CHANNELS; AGROINDUSTRIAL SECTOR; MARKET INTELLIGENCE; MARKETING MARGINS; WHOLESALE MARKETING; RETAIL MARKETING.

In order to restore the fame of siam pontianak citrus, Government of Sambas District promoted by Government of West Kalimantan Province and Ministery of Agriculture held citrus development and rehabilitation programme and aimed for 10.000 ha planting areas. The development model concepts were needed to support the program and direct the development of siam pontianak citrus system and agribusiness. The model covered agro-input model, agroproduction, agroindustry, agro trade, and supporting subsystem. The aim of this programme was to obtain formulation of system and agribusiness development model of siam pontianak citrus simultaneously. The assessment was held in Sambas District and its surrounding from January to December 2006. Policy analysis was used to synthesize information from survey result, secondary data, and other relevant information. The result showed: (1) agribusiness player of siam pontianak citrus consists of agro-input subsystem (seed producer cooperative, production input groceries, production input distributor, and farmer/manure producer; agroproduction subsystem (growers groups, grower group affiliation, PT Mitra Jeruk Lestari, PT Mitra Rimba Kalimantan Agro); agroindustry subsystem (PT Mitra Jeruk Lestari for waxing and packaging, Citrus Center for citrus juice); agrotrade subsystem (collector, local distributor, inter-island trader, retailer, regional distributor, regional retailer); supporting subsystem (transportation/expedition service provider, cellular phone company, PT. Telkom, Banks, AIAT West Kalimantan, Sambas District Government, West Kalimantan Provincial Government), (2) in agro-input model system of citrus free disease seed production, sustainable production input supply system capitalization system through SP3 and LPKD, and technology supply system should be concerned, (3) agroproduction model needed implementation widely and systematically technology noted in IMHCO SOP; establishment and development of grower groups and grower group affiliation, (4) agro-industry model of siam pontianak citrus was developed through fresh handling fruit industry and fruit processing industry. Fresh handling industry was done by PT Mitra Jeruk Lestari while agroindustry fruit juice was handled by Citrus Center under supervision of IAARD, (5) agrotrade involved collector, distributor, inter island trader, and retailer. Many traders and growers built an association to strengthen bargaining power. There were 25 market chains in siam pontianak citrus marketing either inside or outside West Kalimantan, (6) supporting subsystem included fruit container home industry, telecommunication, agricultural extension, transportation/expedition, banking/capitalization, regulation/policy, infrastructure, and technology producer institution.

165 YUSUF

[Analysis of the marketing chain and efficiency of cashew nut in Sikka Regency, East Nusa Tenggara Province]. ***Analisis pemasaran dan efisiensi pemasaran gelondong jambu mete di Kabupaten Sikka Nusa Tenggara Timur***/ Yusuf; Evert; Hosang, Y.; Saputra, U.A. (Balai Pengkajian Teknologi Pertanian Nusa Tenggara Timur, Kupang (Indonesia)). *Jurnal Pengkajian dan Pengembangan Teknologi Pertanian* (Indonesia). ISSN 1410-959X (2006) v. 9(2) p. 140-151, 1 ill., 8 tables; 11 ref.

ANACARDIUM OCCIDENTALE; MARKETING; MARKET PRICES; MANAGEMENT; MARKET RESEARCH; INDONESIA; EFFICIENCY; TRADE.

Cashew nut (*Anacardium occidentale* I.) is an important plant in East Nusa Tenggara (ENT) and tolerant to dry climate in ENT. On market mechanism of cashew nut, the stakeholders

that involved are producer, trader and consumer that try to obtain maximal return in exchange process. Thus, the purposes of this assessment are (l) to analyze the marketing chain of cashew nut, and (2) to learn efficiency rate of cashew nut marketing in Sikka District, East Nusa Tenggara Province. Samples were taken by using purposive random sampling method. Those data were analyzed by using some methods i.e. (1) descriptive and (2) quantitative analysis. The results revealed three models of cashew nut marketing chain, i.e (i) Farmers --> Small collector traders, --> Medium collector traders --> Great collector traders --> Exporters, (ii) Farmers --> Medium collector traders, --> Great collector traders --> Exporters, and (iii) Farmers --> Great collector traders --> Exporters. Of those models, second and third models are more efficient. The second marketing chain provides price share of 52.99% (Rp 3,550/kg) and margin share of 47.05% (Rp 3,150/kg). Meanwhile, the third model gives price share of 76.87% (Rp 5,150/kg) and margin share of 23.13% (Rp 1,l50/kg). The first model gives price share of 48.2% (Rp 3,227/kg) and margin share of 51.8% (Rp 3,472.72/kg).

E71 INTERNATIONAL TRADE

166 DERMOREDJO, S.K.
Achieving economic benefits through agricultural trade reforms in Indonesia / Dermoredjo, S.K. (Pusat Analisis Sosial Ekonomi dan Kebijakan Pertanian, Bogor). *Analisis Kebijakan Pertanian* ISSN 1693-2021 (2008) v. 6(1) p. 56-74, 4 ill., 4 tables; 8 ref. Appendices

INDONESIA; AGRICULTURAL ECONOMICS; TRADE; LIBERALIZATION.

The Indonesian economy has achieved a remarkable transformation from an agricultural economy to a modern economy that is estimated to grow at a high rate of 6 percent. Sustaining it requires the continual adoption of economic reforms. Part of it requires the adoption of free trade practices in sectors of the economy where resources are retained due to large government assistance. This paper aimed at examining the economy-wide effects of a bilateral agricultural trade liberalization program between Australia and Indonesia. The analytical framework adopted in this paper is a global general equilibrium model known as GTAP (Global Trade Analysis Project). Increasing the agricultural trade between Australia and Indonesia will lead to benefits arising from higher incomes and resource allocation efficiency. In this study, the removal of tariffs on agricultural imports in Indonesia resulted in efficiency gains of US$ 1.67 - 3.35 million and GDP increase by US$ 3.55 - 7.08 million. This shows that free trade practices contribute to the economic growth process in Indonesia.

E73 CONSUMERS ECONOMICS

167 NURMALINA, R.
Analysis of consumer behaviour and price range on purchasing decision of organic rice. ***Analisis sikap konsumen dan rentang harga pada keputusan pembelian beras organik (kasus pada PT Amani Mastra-Bekasi)***/ Nurmalina, R.; Sahertian, Y.C. (Institut Pertanian Bogor (Indonesia)). *Jurnal Pengkajian dan Pengembangan Teknologi Pertanian* (Indonesia). ISSN 1410-959X (2006) v. 9(1) p. 100-110, 3 ill., 3 tables; 9 ref.

RICE; ORGANOLEPTIC PROPERTIES; PRICES; CONSUMER BEHAVIOUR.

Implementation of Go Organic Program on 2010 by Ministry of Agriculture with vision to realize Indonesia as a biggest producer for organic food in the world on the year 2010 has been conducted by PT Amani Mastra as one of market actor in organic food development. One of organic food developed by Amani Mastra is organic rice. This research was conducted by PT Amani Mastra on two locations as consumer survey locations, i.e. Amani's shop on Bekasi and Kemchicks shop with purposes to analyze attribute and price sensitivity on process of consumer's buying decision as well as on step of consumer's buying decision to Amani's organic rice. Collecting data has been done from May to July 2005 with 80 respondents. Data analysis used three analysis tools, i.e. descriptive analysis, Fishbein analysis and price sensitivity analysis. The result of this analysis revealed that characteristics of organic rice consumers were age between 31-40 years, about 3-4 people households, total expenditure between Rp 3.5-5.5 million/month and monthly expenditure for organic rice between Rp 250-350 thousand, main job of respondent was housewife with last education is master education and come from Java tribe. Positive impact of organic rice to health condition to be the main reason in consumption of organic rice. Meanwhile, information on organic rice was obtained from friend or families. Quality of rice in term of taste and aroma and also do not be hackneyed quickly to be main consideration in choosing the organic rice. Purchasing behavior showed that an organic rice buying is done routinely and planned. Attitude analysis by multi attribute Fishbein showed that consumers prefer to choose Amani organic rice (206.26) than the import rice (199.88) and the local rice (190.31) with good consumer assessment interpretation on three types of rice. Based on the lowest price sensitivity result for Rp 7,899 price of Amani organic rice, low price or amount of indifferent pricing point (IPP) is Rp 8,525, amount of optimum pricing point (OPP) equal to Rp 9,124 and amount of marginal expensive price point (MEP) equal to Rp 9,850, so that span relevant or fair price for consumer in buying Amani organic rice is between Rp 8,525 - Rp 9,124.

168 SANTOSO, P.J.

Idiotype of national durian based on consumer's preference. *Idiotipe durian nasional berdasarkan preferensi konsumen* / Santoso, P.J.; Novaril; Syah, M.J.A.; Wahyudi, T.; Hasyim, A. (Balai Penelitian Tanaman Buah Tropika, Solok (Indonesia)). *Jurnal Hortikultura* (Indonesia). ISSN 0853-7097 (2008) v. 18(4) p. 395-401, 2 ill., 2 tables; 16 ref.

DURIO ZIBETHINUS; BIOPHYSICS; CONSUMER BEHAVIOUR.

A survey to determine idiotype characters of Indonesian durian based on consumer's preference on fruit biophysic was conducted from November 2005 to October 2006 in 7 provinces of North Sumatra, West Sumatra, DKI Jakarta, Banten, West Java, East Java, and Central Kalimantan. Samples were determined using purposive random sampling. Data was collected through questionnaire distribution and interview on 430 respondents consisted of active and retirement government official, functionary and entrepreneur, durian trader, grower, nurseryman, student, and housewife. The results indicated that the predominant biophysic characters driving consumer to select durian were medium fruit size (1.6-2.5 kg), strong aroma, thick flesh, fatty flesh texture, and deep-sweet flesh taste. Meanwhile, oblong shape, green brownish skin, medium spine, yellow aril, and small seeds were identified as coidiotype characters. This idiotype was predictedly persistent for next 10-20 years. It is, therefore, recommended as guidance for grower to choose the available durian varieties to be planted, and for durian breeder to establish or select new superior varieties.

F01 CROP HUSBANDRY

169 KARJADI, A.K.
Effect of auxin and cytokinin concentration on shoot induction of garlic. ***Pengaruh penambahan auksin dan sitokinin terhadap pertumbuhan tunas bawang putih***/ Karjadi, A.K.; Buchory, A. (Balai Penelitian Tanaman Sayuran, Lembang (Indonesia*)). Jurnal Hortikultura* (Indonesia). ISSN 0853-7097 (2007) v. 17(4) p. 314-320, 5 ill., 18 ref.

ALLIUM SATIVUM; SHOOTS; PLANT GROWTH SUBSTANCES; AUXINS; CYTOKININS; GROWTH.

The experiment was conducted at tissue culture laboratory of Indonesian Vegetable Research Institute. The objectives of the experiment were to find out the influence of picloram and cytokinin (BAP, 2-ip) concentration on shoot induction of garlic cv. Lumbu Kuning. The experiment consisted of 18 media compositions, those were basal medium of B5 combined with picloram (0, 0.1, and 0.2 mg/l), BAP (0, 1, and 2 mg/l), and 2-ip (0, 1, and 2 mg/l) and the explants were from meristematic tissue/shoot tip. Results of experiment showed that explants could be proliferated in all medium composition. There were no significant differences on medium with hormone picloram, 2-ip, or BAP. However combination of hormone picloram and 2-ip in the medium could accelerate shoot growth of garlic.

170 MUHAMMAD, H.
Assessment of lowland rice cultivation in Jeneponto Subdistrict (Indonesia). ***Pengkajian budi daya padi gogo rancah di Kabupaten Jeneponto (Indonesia)***/ Muhammad, H.; Dewayani, W.; Armiati; Ramlan; Nappu, M.B. (Balai Pengkajian Teknologi Pertanian Sulawesi Selatan, Makassar (Indonesia)). *Jurnal Pengkajian dan Pengembangan Teknologi Pertanian* (Indonesia). ISSN 1410-959X (2006) v. 9(1) p. 37-49, 1 ill., 7 tables; 24 ref.

ORYZA SATIVA; LOWLAND RICE; CULTIVATION; ECONOMIC ANALYSIS; SULAWESI.

One effort to increase food crops productivity is by improving the productivity of rainfed lowland rice. Thus, the aim of this assessment was to obtain (1) technology package for dry seeded rice cultivation suitable to Jeneponto condition; and (2) increasing of a planting index on rainfed lowland rice. The assessment involved ten cooperative farmers on 5.0 hectars rainfed lowland at one coverage area technologies package to be analyzed were plant spacing seed origin, weed control method, fertilizing based on soil nutrients condition, and pests and diseases management. Result of this assessment showed that (1) planting period of paddy by dry seeded rice was quicker about 50 days than transplanting cultivation; (2) paddy cultivation by dry seeded rice has higher productivity/yield of 6.4-6.8 t/ha than that by transplanting; (3) there were positive correlation between appropriate technology application with yield and farmers' income. Farmer who has implemented a whole package of technology appropriately obtained benefit of Rp 5,895,000/ha. Meanwhile, farmer implemented part of technology or delay time of implementation obtained benefit of Rp 4,158,000-Rp 4,183,000/ha, (4) contribution of woman farmer was high especially on planting activities that reach about 75.7%, weeding 40%, harvesting 51.5%, (5) planting index of lowland with dry seeded rice was 250%, meanwhile planting index with transplanting 150%.

F02 PLANT PROPAGATION

171 BAKTI, C.
Aglaonema micropropagation by in vitro culture. ***Mikropropagasi Aglaonema secara in vitro***/ Bakti, C.; Murgayanti; Mubarok, S. (Universitas Padjadjaran, Bandung. Lembaga Penelitian) Bandung : Unpad, 2008 22 p.

AGLAONEMA; MICROPROPAGATION; IN VITRO; CULTURE MEDIA; PLANT GROWTH SUBSTANCES; LEAVES; CALLUS; TISSUE CULTURE; GROWTH.

Aglaonema are to be a potencial indoor ornamental plant. The highly demand more than supply needs there are a big stocks of good quality plant in short term period. Propagation by konvensional way can be used but can't produce a big of numbers in short time period. The aim of reserach was to determine the suitable methodology for in vitro propagation of aglaonema from primordial lateral bud and young leave of Aglaonema rotundum. The MS (Murashige and Skoog) medium supplemented with different plant growth regulator (Benzil Adenin or 2.4-D) at 5, 10, 15, 20 ppm. Although steril culture of aglaonema can be resulted, all of treatment aren't show good responses. There are no shoot or callus can be initiated from this experiment.

172 HUSNI, A.
Study on protoplast isolation of siam citrus. ***Studi isolasi protoplas pada jeruk siam***/ Husni, A.; Kosmiatin, M.; Mariska, I. (Balai Besar Penelitian dan Pengembangan Bioteknologi dan Sumber Daya Genetika Pertanian, Bogor (Indonesia)); Martasari, C. Proceedings of the national seminar of citrus, Jakarta, 13-14 Jun 2009/ Winarno, M.; Sabari; Subandiyah, S.; Setyobudi, L.; Supriyanto, A. (eds.) Jakarta (Indonesia): Puslitbanghorti, 2008; p. 197-208, 1 ill., 4 tables; 20 ref.

CITRUS; CALLUS; TISSUE CULTURE; EMBRYONIC DEVELOPMENT; IN VITRO REGENERATION; CELL CULTURE; PROTOPLASTS; ISOLATION TECHNIQUES.

One problem faced in citrus agribusiness at present and in the future in Indonesia is that our citrus products compete with the imported ones. Nowadays, world market of fresh citrus has tendencies to seedless citrus, easy to be peeled off and have interesting color. Siam citrus of Banjar is one of local commercial citrus in Indonesia which has sweet taste, however, it does not suitable with world market requirement because of its relatively plenty of seeds (15-20 seeds per fruit) and no interesting color. One way that can be conducted efficiently and effectively was by making new type of local citrus plant which are seedless, easy to be peeled off and have interesting color. To accelerate the required characteristic that gained efficiently and effectively, protoplast fusion technology could be used to put good characteristic of satsuma citrus (seedless) into local siam citrus, so that it would be obtained local citrus which was suitable with market demand. From the gene introgression result, it was expected to gain new type of local citrus which were sweet, seedless, has mandarin type and easy to be peeled off. Early stage of fusion was embryonic callus induction with solid regeneration system, protoplast isolation with high density to conduct fusion and the final stage was fusan culture. Callus induction of siam citrus was conducted by culturing embryo and young nucellus on media formulation MS + BA 3 mg/l + malt extract 500 mg + sucrose 3%; MS + vitamin Morrel + BA 3 mg/l + sucrose 3%; MS + 2,4-D2 + casein hydrolisat 200 mg/l. Protoplast isolation was conducted by testing several formulation of macerozym

enzyme, cellulose, or pectiolase which can produce the highest protoplast density. The study result showed a quite good response on siam banjar where media with addition of 2,4-D gave the highest callus induction percentage, but the callus was compact. Callus induced in media with addition of BA 3 mg/l had more embryogenic performance, indicated with globular structure. Protoplast fusion with high density was reached by cellulose enzyme combination 0.5% and macerozym 0.5%, that was washed by CPW+Mannitol 0,5 M solution and was purified by sucrose 5% + Mannitol 13% solution.

173 SAMANHUDI

In vitro multiplication of citrus mandarin cv. tawangmangu to support citrus agribusiness development in Indonesia. ***Perbanyakan cepat jeruk keprok tawangmangu secara in vitro untuk mendukung pengembangan agribisnis jeruk di Indonesia***/ Samanhudi (Universitas Negeri Sebelas Maret, Solo (Indonesia). Fakultas Pertanian). Proceedings of the national seminar of citrus, Jakarta, 13-14 Jun 2009/ Winarno, M.; Sabari; Subandiyah, S.; Setyobudi, L.; Supriyanto, A. (eds.) Jakarta (Indonesia): Puslitbanghorti, 2008; p. 209-218, 4 ill., 16 ref.

CITRUS RETICULATA; PLANT PROPAGATION; IN VITRO CULTURE; EXPLANTS; PLANT GROWTH SUBSTANCES; NAA; GROWTH; CALLUS; YIELDS; AGROINDUSTRIAL SECTOR; INDONESIA.

The mandarin citrus cv. tawangmangu was one of horticulture commodities that was formerly popular and become prime fruit in Karanganyar. Nevertheless, limited knowledge of farmers on cultivation, limited growing area, and the CVPD attack in several years ago resulted in the diminishing population of this cultivar. As an effort to save the germplasm of the cultivar, a research on rapid seedling production having similar characteristics with its parent should be conducted. The rapid and considerable production of citrus mandarin cv. tawangmangu was conducted through *in vitro* culture. The research was conducted in the Plant Physiology and Biotechnology Laboratory of Agriculture Faculty of Sebelas Maret University, from November 2006 to April 2007. The general aim of the research was to obtain a precise *in vitro* technology for citrus cv. tawangmangu multiplication. Whereas, the specific aim was to determine an exact concentration of BAP and NAA. The result indicated that the addition of 2 ppm BAP and 2 ppm NAA in the medium showed the best growth and development of citrus cv. tawangmangu explant.

174 SUPRIYANTO, A.

Growth performance of siam banjar citrus on 11 varieties of rootstocks in tidal swamp land. ***Keragaan pertumbuhan jeruk siam banjar pada 11 varietas batang bawah di lahan pasang surut***/ Supriyanto, A.; Setiono (Balai Penelitian Tanaman Jeruk dan Buah Subtropika, Tlekung (Indonesia). Proceedings of the national seminar of citrus, Jakarta, 13-14 Juni 2009/ Winarno, M.; Sabari; Subandiyah, S.; Setyobudi, L.; Supriyanto, A. (eds.) Jakarta (Indonesia): Puslitbanghorti, 2008; p. 228--234, 2 ill., 1 table; 8 ref.

CITRUS; VARIETIES; ROOTSTOCKS; GROWTH; VEGETATIVE PERIOD; AGRONOMIC CHARACTERS; GRAFT COMPATIBILITY; CROP PERFORMANCE; INTERTIDAL ENVIRONMENT.

Research was conducted at experimental garden of Belandean, Alalak Subdistrict, Barito Kuala Regency which was acid sulfide tidal swamp land of type B flooded water. It was aimed to understand the vegetative growth of siam banjar citrus which was grafted on 11

varieties of rootstocks. The research was held on November 2003 until November 2006. The research was arranged in split plot design with 3 replications and 1 plant as experiment unit. Treatment on the main plot was land arrangement system of individual pile and embankment that known as *surjan* and *tukungan*, while treatment on sub plot use 11 varieties of rootstocks, they were: Japansche Citroen (JC), Rough Lemon (RL), Sweet Orange, Sweet Orange AA23, Sweet Orange AA32, *Poncirus trifoliata*, Citrumello 4475, Volkameriana, Emperor, Benton, and Kunci-01. Vegetative growth of 3 year old plant showed that plant height, scion and rootstock diameter and canopy width of siam banjar citrus on rootstock of Volkameriana, Rough Lemon, Bento, Japansche Citroen and Citrumello 4475 had the best vegetative growth, while Sweet orange AA23, Sweet Orange AA32, Sweet Orange, Emperor and *Poncirus trifoliata* had medium vegetative growth, and Kunci-01 had the lowest growth. Rootstock of Citrumello and *Poncirus trifoliata* with siam banjar tended to give incompatible effect, showed on grafted spot, a phenomena like elephant foot. During the growth phase, plant was affected by the high tide with persisted for 1-2 months for 3-4 hours every day so that the plant root was overfilled by water. This condition caused different tolerance level of rootstock varieties and root rot attack. As a consequence, most plant of Volkameriana, Rough Lemon and Sweet Orange were dead because of root rot and collar rot attack. Evaluation of plant growth and productivity should be further performed until it was obtained stable result.

175 SYAHID, S.F.

Shoot multiplication, analysis of simplicia quality of ceylon leadwort (*Plumbago zeylanica* L.) from long period of *in vitro* culture. *Multiplikasi tunas, aklimatisasi dan analisis mutu simplisia daun encok (Plumbago zeylanica L.) asal kultur in vitro periode panjang*/ Syahid, S.F.; Kristina, N.N. (Balai Penelitian Tanaman Obat dan Aromatik, Bogor (Indonesia)). *Buletin Penelitian Tanaman Rempah dan Obat* (Indonesia). ISSN 0251-0824 (2008) v. 19(2) p. 117-127, 2 ill., 8 tables; 12 ref.

DRUG PLANTS; IN VITRO CULTURE; SHOOTS; PLANT ANATOMY; PLANT PROPAGATION; ADAPTATION; QUALITATIVE ANALYSIS.

The experiment was conducted at Tissue Culture Laboratory of Indonesian Medicinal and Aromatic Crops Research Institute (IMACRI) from June 2005 - July 2006. The aim of this research was to find out the effect of *in vitro* culture on multiplication, acclimatization, quality and active compound of ceylon leadwort. The material used was ceylon leadwort from long period *in vitro* culture. The treatments for shoot multiplication were SA 0.1 mg/l (control); SA 0.1 mg/l + thidiazuron 0.01 mg/l; BA 0.1 mg/l + thidiazuron 0.05 mg/l; BA 0,1 mg/l + thidiazuron 0.1 mg/l and SA 0.1 mg/l + thidiazuron 0.15 mg/l. The experiment was arranged in completely randomized design with ten replications. The number of shoots, leaves, roots and plant height in vitro were observed, and then the plants were acclimatized in the greenhouse. Total number of tiller, leaves, and plant height were observed. Analysis of plant quality was conducted on water and ash content, alcohol and water soluble extracts, phytochemistry screening and active compound content (using GCMS). The result showed that benzyl adenine at 0.1 mg/l combined with Thidiazuron 0.05 mg/l could increase the number of shoots and leaves much higher than other treatments for two months period of culture. The long period of *in vitro* culture did not affect the morphological performance of ceylon leadwort in the greenhouse and field conditions. Extracts of plant from *in vitro* culture contain higher water soluble alcohol than that of conventional plant and MMI. In addition, steroid compound level was also detected from *in vitro* culture of ceylon leadwort.

GCMS analysis indicated that phytol was identified with the highest concentration (26.13%).

F03 SEED PRODUCTION AND PROCESSING

176 MUHARAM, A.
Revitalization of the system and seed production of citrus mandarin cv. garut in West Java (Indonesia). ***Revitalisasi sistem dan produksi benih jeruk keprok garut di Jawa Barat***/ Muharam, A. (Pusat Penelitian dan Pengembangan Hortikultura, Jakarta (Indonesia)); Ruswandi, A.; Subarna, T. Proceedings of the national seminar on citrus, Jakarta, 13-14 Jun 2009/ Winarno, M.; Sabari; Subandiyah, S.; Setyobudi, L.; Supriyanto, A. (eds.) Jakarta (Indonesia): Puslitbanghorti, 2008; p. 87-99, 1 ill., 5 tables; 12 ref.

CITRUS RETICULATA; SEED PRODUCTION; VIRUSFREE PLANTS; MERISTEM CULTURE; GRAFTING; SCIONS; PROTECTIVE SCREENS; SEED CERTIFICATION; IDENTIFICATION; PLANT VIRUSES; JAVA.

Citrus mandarin cv. garut has a unique taste. Therefore it has its own market with higher price than other cultivars. In the last 4 years, there have been losses in the field management of citrus mandarin cv. garut caused by CVPD. To accelerate the blue label seedling supply of citrus mandarin cv. garut, besides the foundation block (FB) indexing, based on citrus development team's agreement, it is necessary to carry out a negative estimation of citrus mandarin cv. garut purity and health of citrus plant in Cisurupan bud multiplication block (BMB). To obtain healthy seedlings of citrus mandarin cv. garut, a revitalization should be performed covering: a) the procurement of healthy seedlings through shoot tip grafting (STG); b) FB improvement; c) improvement and management of Cisurupan BMB; d) the development of seed producers association. The research was held through expert meeting and action research. The result indicated: 1) seed purification of the single mother plant (SMP) was selected by BPSB, and then the healthy buds from the SMP were obtained through STG in ICSFRI. The process took 1.5 years and later Garut District will have pure citrus mandarin cv. garut trees that free from CVPD and Tristeza, 2) FB trees indexing and negative estimation method of citrus mandarin non-garut cultivars which suffered CVPD, 3) Improvement of either techniques or non techniques in seed/seedling procurement, 4) the synchronization of growing period management in BMB or FB so the scion will be available at any time.

F04 FERTILIZING

177 BASUKI, W.W.
Effect of fertilizing time and soil texture on the productivity of *Setaria splendida* Staft. ***Pengaruh waktu pemupukan dan tekstur tanah terhadap produktivitas rumput Setaria splendida Staft***/ Basuki, W.W. (Politeknik Negeri Jember (Indonesia). Jurusan Peternakan). *Majalah Ilmiah Peternakan* (Indonesia). ISSN 0853-8999 (2006) v. 9(2) p. 60-63, 2 tables; 9 ref

SETARIA (GRASS); FERTILIZER APPLICATION; APPLICATION DATE; SOIL TEXTURE; GROWTH; PRODUCTIVITY.

A pot experiment was carried out at the Farm Station of the Faculty of Animal Husbandry University of Udayana to find out the effect of time of fertilizing and soil textures on the growth and yield of *Setaria splendida* Staft. The CRD experiment consisted of two factors:

(1). Fertilizing time (W1= one week after planting), W2, W3, W4, W5, and W6. (2). Soil textures: T1 (Sandy loam), T2 (loamy sand); with 3 replications each. The results showed that the faster growth (plant height, number of tiller, leaf area 42.17 cm, 27 plants and 9990,33 cm^2, respectively) was found on W2T1. The highest yield also was found to the 56,09 g DM/pot on W2T1. This indicated that time of fertilizing and soil textures were not significantly correlated.

178 ELIARTATI

Rice straw utilization on lowland rice in irrigated land. ***Penggunaan jerami pada tanaman padi sawah di lahan irigasi***/ Eliartati; Empersi; Bestina (Balai Pengkajian Teknologi Pertanian Riau, Pekanbaru (Indonesia)). *Jurnal Pengkajian dan Pengembangan Teknologi Pertanian* (Indonesia). ISSN 1410-959X (2006) v. 9(1) p. 60-67, 3 tables; 10 ref.

ORYZA SATIVA; RICE STRAW; FERTILIZER APPLICATION; WASTE UTILIZATION; LOWLAND RICE; IRRIGATED LAND.

Assessment of rice straw utilization on irrigated lowland rice was conducted to find out the effective and efficient combination of rice straw with inorganic fertilizer to support lowland rice growth and productivity. The plot site depends on plot area in the field, which total area of research plot was about 1 ha. This trial was carried out in randomized block design with 5 treatments and 4 replications. The treatments were a) 150 kg/ha urea, 125 kg/ha KCl, 175 kg/ha SP-36, b) 2 t/ha rice straw, 150 kg/ha urea, 125 kg/ha KCl, 175 kg/ha SP-36, c) 2 t/ha rice straw, 112.5 kg/ha urea, 93.75 kg/ha KCl, 131.25 kg/ha SP-36, d) 2 t/ha rice straw, 75 kg/ha urea, 62.5 kg/ha KCl, 87.5 kg/ha SP-36, and e) 2 t/ha rice straw, 37.5 kg/ha urea, 31.25 kg/ha KCl, 43.75 kg/ha SP-36. The result showed that application of 2 t/ha rice straw combined with 150 kg/ha urea, 125 kg/ha KCl, 175 kg/ha SP-36 (B treatment) gave the highest yield (5.51 t/ha), net income (Rp 4,582,931), and benefit cost ratio of 1.25.

179 HARTATI, S.

Response of corn on phosphate fertilizer on Red-Yellow Podzols and Regosols soil. ***Tanggapan jagung terhadap pemupukan fosfat pada Podzolik Merah Kuning dan Regosols***/ Hartati, S. (Institut Ilmu Pemerintahan, Jakarta (Indonesia)). *Agrivet* (Indonesia). ISSN 1410-3796 (2006) v. 10 (1) p. 44-57, 4 ills., 6 tables; 9 ref. Appendix

ZEA MAYS; FERTILIZER APPLICATION; PHOSPHATE FERTILIZERS; REGOSOLS; PODZOLS; PLANT GROWTH SUBSTANCES; GROWTH; YIELDS; PLANT ANATOMY.

The pot experiment to study the response of corn of Arjuna variety to phosphate fertilizer was conducted on strongly acid red-yellow podzols and regosols soils. The highest plant growth (dry weight) on a strongly acid Red-Yellow Podzols found at 9.072 kg superphosphate fertilizer/ha (7.65 g/pot) and on the Regosols soil found at 336 kg superphosphate fertilizer/ha (4.77 g/pot). Plant growth on a strongly acid Red-Yellow Podzols was 60% higher than that on a Regosols, although it was found at very high level of phosphorus fertilizer (9.072 kg superphosphate/ha).

180 JULIATI, S.

Effect of Zn and P on the growth of japansche citroen (JC) seedling in Inceptisol soil. ***Pengaruh pemberian Zn dan P terhadap pertumbuhan bibit jeruk varietas japansche citroen pada tanah Inseptisol***/ Juliati, S. (Balai Penelitian Tanaman Buah Tropika, Solok (Indonesia)). *Jurnal Hortikultura* (Indonesia). ISSN 0853-7097 (2008) v. 18(4) p. 409-419, 4 ill., 2 tables; 27 ref.

CITRUS; VARIETIES; SEEDLINGS; GROWTH; ZINC; PHOSPHATE FERTILIZERS; NUTRIENT UPTAKE.

The objective of the research was to study the status and availability of Zn and P using isotop technology, and to know the effect of Zn and P application on the growth of JC seedling. The research was conducted at the Department of Soil Science, Bogor Agricultural University using Inceptisol soil from Pasir Pangaraian, Riau. The treatments were combination of Zn (0, 10, 20, 30, and 40 ppm) and P (0, 0.5, 1.0, and 1.5 x maximum sorption of P), with 3 replications. The results showed that the treatment significantly increased Zn and P uptake. On the contrary, the application of Zn and P did not show any significant effect on plant height and trunk diameter. Positive correlations were recorded between Zn uptake and total dry matter ($r= 0.470^{**}$) as well as between P uptake and total dry matter ($r= 0.836^{**}$). While P uptake had a negative correlation to Zn uptake (r= -0.042) and the efficiency of Zn uptake (r= -0.012). The results of this study described that Zn and P have an antagonistic correlation, so when applying P, the availability of Zn should be considered. The study also indicated that Zn was very important micronutrient besides P in increasing plant dry weight.

181 MURNI, A.M.

Nitrogen phosphorus and potassium fertilizer use efficiencies in maize. ***Efisiensi penggunaan pupuk nitrogen,posfor dan kalium pada tanaman jagung (Zea mays)*** / Murni, A.M. (Balai Pengkajian Teknologi Pertanian Lampung, Bandar Lampung). Proceedings of the seminar on agricultural technology inovation transfer for development rural industrial agribusiness in marginal areas: innovation of production technology. Book 2, Semarang, 8 Nov 2007 / Muryanto; Prasetyo, T.; Prawirodigdo, S.; Yulianto; Hermawan, A.; Kushartanti, E.; Mardiyanto, S.; Sumardi (eds.) Bogor (Indonesia): BBP2TP , 2007 p. 147-152, 3 tables; 8 ref.

ZEA MAYS; NITROGEN FERTILIZERS; PHOSPHATE FERTILIZERS; POTASH FERTILIZERS; APPLICATION RATES; EFFICIENCY; YIELDS.

Maize need a lot of nitrogen (N), phosphorus (P) and potassium (K) of fertilizer for growth and produce high grain, in spite of the use of high rate fertilizer will not efficient without consider the soil fertility and the plant nutrients requirement. To evaluate and understand the nutrient use eficiencies in maize an omission plot trial was conducted in five sites i.e. Sidowaras, Binjai Ngagung, and Watu Agung, Balai Rejo village, Central Lampung district and trimulyo village, South Lampung district during the wet season of three years (2005-2007). The experiment was designed in omission plot include no N fertilizer (only P and K = PK), PK+lime, no P (only N and K = NK), NK+lime, no K (only N and P =NP), NP +lime, complete fertilizers (NPK), and NPK+lime, those were conducted in each site for replication. The amount of lime (dolomite) applied was 1.1 t per ha per crop (season). Grain yield was measured from each treatment to calculate the nutrient use efficiencies. The results showed that the nutrient use efficiencies were N = 18 ± 4, P = 43±20 and K = 19±4 kg grain per kg nutrient of fertilizer. Nutrient use efficiencies in the lime treatments were lower than that of without lime i.e: N+lime = 14±4, P+lime = 28±II, K+lime = 8±4, indicated that the rate of nutrients fertilizer must be decreased when lime is applied.

182 NAINGGOLAN, P.
Assessment of NPK fertilizer dosage based on fruit harvested on citrus cv. siam madu in the Karo Regency (Indonesia). ***Pengkajian pemupukan NPK berdasarkan panen buah tanaman jeruk siam madu di Kabupaten Karo***/ Nainggolan, P. (Balai Pengkajian Teknologi Pertanian Sumatera Utara, Medan (Indonesia)). Proceedings of the national seminar of citrus, Jakarta, 13-14 Jun 2009/ Winarno, M.; Sabari; Subandiyah, S.; Setyobudi, L.; Supriyanto, A. (eds.) Jakarta (Indonesia): Puslitbanghorti, 2008; p. 292-301, 4 tables; 1 ref. Appendices.

CITRUS RETICULATA; NPK FERTILIZERS; DOSAGE EFFECTS; FERTILIZER APPLICATION; HARVESTING DATE; YIELDS; FRUITS; SUMATRA.

The assessment was carried out to determine the dosages of NPK fertilizers based on fruit harvested on citrus cv. siam madu in Karo Regency. The objective of the assessment was to obtain a simple fertilizer application by farmers at Karo Regency. The assessment was conducted in the citrus farms in Surbakti Village at 1,200 m asl, from January to December 2006. Observation was done on 10 year old grafted seedlings. A randomized block design with four replications was set up in the field. The treatment on dosage of N, P, and K consisted of: A) 1% of harvested fruits, B) 3% of harvested fruits, C) 6% of harvested fruits, D) 9% of harvested fruits, E) based on plant age, and F) based on farmers treatment (control). Selection was carried out to obtain relatively 48 homogen trees in 1 ha of land. Determining the dosage of the fertilizer was based on the average harvested fruits data in 2005, which were 60 kg/tree. Result indicated that the dosage of N, P and K fertilizers application based on harvested fruits was better than that based on the age of citrus and farmer methods. The dosage of 3% of the harvested fruit weight was recommended for citrus cv. siam madu in Simpang Empat Subdistrict, Karo Regency.

183 NAINGGOLAN, P.
Assessment of fertilizer packages on citrus cv. siam madu in Karo Regency (Indonesia). ***Studi tentang paket pemupukan tanaman jeruk siam madu di Kabupaten Karo***/ Nainggolan, P.; Napitupulu, D.; Yupdi, M.P. (Balai Pengkajian Teknologi Pertanian Sumatera Utara, Medan (Indonesia)). Proceedings of the national seminar of citrus, Jakarta, 13-14 Jun 2009/ Winarno, M.; Sabari; Subandiyah, S.; Setyobudi, L.; Supriyanto, A. (eds.) Jakarta (Indonesia): Puslitbanghorti, 2008; p. 282-291, 1 ill., 4 tables; 14 ref. Appendix.

CITRUS; FERTILIZER APPLICATION; APPLICATION RATES; PLANT RESPONSE; PRODUCTION; SUMATRA.

The assessment on fertilizer packages of mandarin citrus cv. siam madu was conducted in Surbakti Village at 1,200 m asl, from 2004 to 2006 in Karo Regency. The objective of the assessment was to observe the response of citrus plant on the fertilizer packages. The 6 years old grafted seedlings with JC rootstock were applied in this experiment. The packages of fertilizer were: I (NPK plus, Alamphos, ZA, and KCl), II (Mutiara, Hydrokarate + boron, Patenkali granular and Hydro complex); III (Phonska and ZA); IV (urea, ZA, SP-36, ZK, kieserite and dolomite); and V (urea, ZA, SP-36, ZK, kieserite and dolomite with double dosage from package IV). Results showed that based on the last 3 years observation, package II produced high yield of 26.80 t/ha in 2006 with fruits grade size of A and B was 57.59% from total fruit weight in average. Based on farming system analysis, high cost production was gathered from package II which was Rp 1,002/kg of harvested fruit with B/C ratio 1.5.

The lowest cost production obtained from package IV which was Rp 733/kg fruit with B/C ratio 1.24.

184 NURBAITY, A.

Production of mychorrhiza arbuscular inoculant based on local organic matter of Tasikmalaya.*Produksi inokulan mikoriza arbuskula berbasis bahan organik lokal Tasikmalaya*/ Nurbaity, A.; Herdiyantoro, D.; Mulyani, O. (Universitas Padjadjaran, Bandung. Fakultas Pertanian). Bandung (Indonesia) : UNPAD, 2008 37 p.

BIOFERTILIZERS; MYCORRHIZAE; INNOCULATION; ORGANIC MATTER; ZEOLITES; RICE HUSK; CHARCOAL; CULTURE MEDIA.

Arbuscular mycorrhizal fungi (AMF) is known as one of the type of biofertilizer. The carrier for this biofertilizer is usually made from inorganic material such as zeolite. It is important now to find alternative materials to be used as biofertilizers carrier due to the need of lower cost and easily available materials such organic matter. Rice straw and husk are some of the organic matter sources than can be used as carrier of FMA. A glass house experiment was conducted to determine the effectiveness of different organic matter originally from Tasikmalaya, West Java, i.e. rice straw and burnt rice husk (alone and combination of both) as carrier of FMA's inoculum. The experiment used factorial randomized block design with two factors. The first factor was type of organic matter, consisted of 4 levels i.e. zeolite as control (BO), straw (B1), rice husk (B2) and combination of straw and rice husk 50/50 v/v (B3); while the second factors was type of FMA's mixed inoculum from different host which were *Jatropha* sp. (M1) and *Sorghum* sp. (M2). Results of experiment showed that application of burnt rice husk alone was better to be used as carrier of FMA inoculum instead of straw or combination of straw and burnt rice husk. The quality of FMA inoculum with burnt rice husk as a carrier was as good as the control inoculum that used zeolite as a carrier, in terms of the number of spores, the percentage of root colonization, root length, root length colonized and the biomass of plants. In summary, burnt rice husk has an excellent potential to be used as a carrier for FMA biofertilizer.

185 PURWOTO, H.

Bioconversion of municipal solid wastes as soil ameliorants for marginal land rehabilitation. *Biokonversi limbah padat sampah kota sebagai bahan pembenah tanah untuk perbaikan lahan marjinal*/ Purwoto, H.; Dharmawati, N.D.; Soeharsono (Institut Pertanian STIPER, Yogyakarta (Indonesia). Fakultas Pertanian). Yogyakarta (Indonesia): INSTIPER, 2006; 72 p.

URBAN WASTES; SOLID WASTES; BIOCONVERSION; WASTE UTILIZATION; SOIL CONDITIONERS; SOIL IMPROVEMENT; COMPOSTS; COMPOSTING; ORGANIC FERTILIZERS; MARGINAL LAND.

Study of municipal solid wastes as soil conditioner is important to ensure sustainability of natural resources such as chemicals use of fertilizer or pesticides, increasing farming efficiency and production from the higher fertilizer price, hence increasing farmers income. The biological process by composting is a potential method for reducing municipal solid waste volumes and converting the wastes to useful product because composting is a process in which organic wastes undergoes biological degradation change into a stable end product, and can be used for alternative solution to anticipate the limited availability area of dumping, the characterized waste materials and generally uneconomical to utilize. This research aimed

to develop biological conversion method of municipal solid wastes, which can be used to municipal waste site and can be determined the optimum utilization. Field observation at three government regions, i.e. Yogyakarta City, Bantul District and Sleman District revealed that disposal of municipal solid wastes are still using sanitary landfill method. Management of municipal landfills are not coordinated yet through managing network among regional government, although the technical operation become responsibility of each government with the protection of public health and environment, so the government coordination among them is necessary required. From data analysis and discussion above, it can be concluded as follows: (a) Municipal solid wastes can be potentially processed as soil conditioner and compost to replace chemical fertilizer because of the cost effective and environmentally sound alternate for stabilization and ultimate disposal of solid wastes, (b) Based on potentially used for organic fertilizer, hence the municipal solid wastes from: (1) Municipal landfill sites of Yogyakarta Region produced : (a) N elements which are suitable by adding manure, (b) P elements which are siutable by adding ruminant microorganism, (c) K elements which are suitable by adding manure; (2) Municipal landfill sites of Bantul District produced: (a) N elements which are suitable by adding ruminant microorganism, (b) P elements which are suitable by adding manure, (c) K elements which are suitable by adding EM-4 microorganism; (3) Municipal landfill sites of Sleman District produced, (a) N elements which are suitable by adding of stardec, (b) P elements which are suitable by adding manure, (c) K elements which are suitable by adding EM-4 microorganism.

186 TUHERKIH, E.

Formulation of compound fertilizer for keprok citrus plant based on crop requirement and soil characteristics. ***Formulasi pupuk majemuk untuk tanaman jeruk keprok berdasarkan kebutuhan tanaman dan karakteristik tanah***/ Tuherkih, E.; Santoso, D.; Purnomo, J. (Balai Penelitian Tanah, Bogor (Indonesia)). Proceedings of the national seminar of citrus, Jakarta, 13-14 Jun 2009/ Winarno, M.; Sabari; Subandiyah, S.; Setyobudi, L.; Supriyanto, A. (eds.) Jakarta (Indonesia): Puslitbanghorti, 2008; p. 254-265, 5 ill., 7 ref. Appendices.

CITRUS RETICULATA; COMPOUND FERTILIZERS; FORMULATION; INORGANIC FERTILIZERS; NUTRITIONAL REQUIREMENTS; FERTILIZER APPLICATION; SOIL CHEMICOPHYSICAL PROPERTIES.

Soil fertility, type and amount of fertilizer applied on the crop are some of the factors which determining productivity and fruit quality. Many kind of compound fertilizers in the market are not specific for a crop and a soil type, therefore it is necessary to conduct some studies to make particular formulation for citrus. The formulations were arranged based on the soil characteristics and leaf nutrients at some keprok production areas in East Java, North Sumatra and South Kalimantan. The research's goal was to arrange inorganic fertilizer formulation for keprok based on crop requirement and soil characteristics. The steps were (1) desk work about the fertilizer application and nutrient requirement, (2) fertilizer formula arrangement, (3) determination of fertilizer types, components, and carrier ingredients, (4) making compound fertilizer, and (5) analysis in laboratories. The result has been obtained six fertilizer formulas for the keprok in 3 provinces, each province has 2 formulas which contain N, P_2O_5, K_2O, Mg, and S, of 8-20%, 8-10%, 14%, 2%, and 2%, respectively.

F08 CROPPING PATTERNS AND SYSTEMS

187 PUSTIKA, A.B.
Diaphorina citri* and greening disease on citrus plant interplanting with guava. *Insidensi Diaphorina citri dan CVPD pada tanaman jeruk interplanting jambu biji/ Pustika, A.B. (Balai Pengkajian Teknologi Pertanian Yogyakarta (Indonesia)); Purwanto, M.E.; Subandiyah, S.; Beattie, G.A.C. Proceedings of the national seminar of citrus, Jakarta, 13-14 Jun 2009/ Winarno, M.; Sabari; Subandiyah, S.; Setyobudi, L.; Supriyanto, A. (eds.) Jakarta (Indonesia): Puslitbanghorti, 2008; p. 371-376, 5 ill.; 5 ref.

CITRUS; PSIDIUM GUAJAVA; MIXED CROPPING; DIAPHORINA CITRI; INTERCROPPING; PEST CONTROL; VECTORS; MORBIDITY.

Within these 2 years, citrus orchard has been developed up to 30 ha by several farmers, supported by Kulonprogo District, in Panjatan and Galur Subdistrict which had already been cultivated with established orchard (6 years age of citrus). Undoubtly, *Diaphorina citri* as CVPD vector were found in the established citrus orchard location. Based on Vietnamese ACIAR Researcher Team result, citrus planted with guava was safe from *D. citri* invasion. Concerning the result and local condition, Indonesian AClAR Researcher Team interplanted guava among the young citrus plant. The ratio of guava : citrus population is 1:8. Up to the next 6 months, there was no *D. citri* and CVPD found in the location, whilst CVPD symptoms (was confirmed with PCR) and 0.4 imago of *D. citri* with 0.3 nymph colony and 0.1 egg colony were found in the orchard planted with 50-200 citrus trees of 3-6 years age in 100-1000 m apart. Considering this condition, *D. citri* and CVPD observation will be continued up to the next two years.

F30 PLANTS GENETICS AND BREEDING

188 AGISIMANTO, D.
Induced mutagenesis and application of PCR marker to accelerate the invention of new superior citrus variety. *Induksi mutagenesis dan aplikasi penanda PCR mempercepat penemuan calon varietas unggul jeruk baru*/ Agisimanto, D. (Balai Penelitian Tanaman Jeruk dan Buah Subtropika, Tlekung (Indonesia)); Sutarto. Proceedings of the national seminar of citrus, Jakarta, 13-14 Jun 2009/ Winarno, M.; Sabari; Subandiyah, S.; Setyobudi, L.; Supriyanto, A. (eds.) Jakarta (Indonesia): Puslitbanghorti, 2008; p. 235-246, 4 ill., 2 tables; 37 ref.

CITRUS; INDUCED MUTATION; GENETIC MARKERS; PCR; GENETIC VARIATION; DNA; NUCLEOTIDE SEQUENCE; HIGH YIELDING VARIETIES.

Induced mutagenesis combined with molecular markers was equipped to improve vegetative propagated plants faster than conventional methods. Varietal improvement for citrus was focused on improving new genetic variation having high qualities fruit, earlier maturity and disease resistance through radiation, protoplasm fusion and cross-hybridization. Most of citrus have close relatedness due to natural mutagenesis which is increasing their variation. The advance of biotechnology methods provided high contribution in induce mutation methods such as radiation and chemical mutagen application in creating new variation commercial lines. Combination of mutagenesis techniques and tissue culture and also integrated molecular from inducing variation, plant development and selection have accelerated breeding program of such citrus characters. New variants were detected due to chromosomal rearrangement, point mutation, mitosis recombination, delection transposition

or methylation of DNA sequences, mitochondria and chloroplast. It is difficult to use morphological characters on mutant's selection. PCR based markers was frequently used to select mutants such as RAPD SSR, AFLP and also retrotransposons. Introducting this markers for mutants selection would increase the chance to obtain new mutant; earlier, faster, accurate, stable and accountable.

189 AGISIMANTO, D.
Genetic diversity of pummelo based on primer random amplified polymorphic DNA. ***Keragaman genetik pamelo Indonesia berdasarkan primer random amplified polymorphic DNA***/ Agisimanto, D.; Supriyanto, A. (Balai Penelitian Tanaman Jeruk dan Buah Subtropika, Tlekung (Indonesia)). *Jurnal Hortikultura* (Indonesia). ISSN 0853-7097 (2007) v. 17(1) p. 1-7, 2 ill., 2 tables; 27 ref.

CITRUS GRANDIS; VARIETIES; PUMMELOS; RAPD; DNA; GENETIC VARIATION; INDONESIA.

Genetic variabilitiy is needed to understand relationship among 18 pummelo varieties in Indonesia. The objective of the research was to characterize genetic diversity of some pummelo varieties in Indonesia based on RAPD primer. Leaves from young flush, 20-25 days, were extracted and amplified by 15 RAPD primers. Bands of DNA were scored based on their presence and absence. Two primers of OPN 14 and OPN 16 were selected to visualize band pattern of pummelo varieties. At least, 3 groups of pummelos were clustered that showed closely relationship and highly similarity by place of origin and fruit characteristics.

190 AMBARWATI, E.
Genetic variability of Dendrobium species based on morphological characters. ***Keragaman genetik anggrek Dendrobium spesies berdasarkan karakter morfologi***/ Ambarwati, E.; Purwantoro, A. (Universitas Gadjah Mada, Yogyakarta (Indonesia). Fakultas Pertanian); Setyaningsih, F. *Agrivet* (Indonesia). ISSN 1410-3796 (2006) v. 10 (1) p. 10-24, 5 tables; 21 ref.

DENDROBIUM; SPECIES; GENETIC VARIATION; PLANT ANATOMY; ORCHIDACEAE; AGRONOMIC CHARACTERS

It is important to know morphological variability of Dendrobium species for recognizing much kind of Dendrobium species grow in this country. The aims of this research were to know genetic variability and particular characteristics of ten types of Dendrobium species. The quantitative traits were analyzed by using variance analysis according to the completely randomized design and Duncan's multiple range test if the effect of the treatments were significant at 5% significance level, respectively (Gomez and Gomez, 1995). The mean square value could be used for estimating genotype and environment variance in onder to know the heritability value (Allard, 1992; Stanfield, 1991 cit. Pinaria et al., 1995). The standard deviation of genotype variance was known according to Anderson and Bancroft Method's (1952) cit. Wahdah (1996). Morphological observation of ten types of Dendrobium species revealed that every Dendrobium species had particular characters, such as deciduous of tree (*D. anosmum*, *D. scundum* and *D. brachteosum*); fur existence at labellum (*D. anosmum*) and at sepal and petal flowers (*D. macrophyllum*); various flower's colour and aroma in each type of Dendrobium species. Eight quantitative traits had genotype variance value higher than variance of morphological variability in ten types of Dendrobium species.

Heritability value was more affected by genotype factor than environmental factor. A broad genetic variability was found on eight quantitative traits.

191 BERMAWIE, N.
Variation in morphological characteristics, yield and quality of asiatic pennywort (*Centella asiatica* (L.) Urban) germplasm. *Keragaan sifat morfologi, hasil dan mutu plasma nutfah pegagan (Centella asiatica (L.) Urban* / Bermawie, N.; Purwiyanti, S.; Mardiana (Balai Penelitian Tanaman Obat dan Aromatik, Bogor (Indonesia)). *Buletin Penelitian Tanaman Rempah dan Obat* (Indonesia). ISSN 0251-0824 (2008) v. 19(1) p. 1-17, 2 ill., 8 tables; 21 ref.

DRUG PLANTS; GERMPLASM; PLANT ANATOMY; AGRONOMIC CHARACTERS; YIELDS; QUALITY.

Characterization and evaluation were undertaken to obtain morphological characteristics, yield and quality of 16 asiatic pennywort accessions collected from Sumatra, Java, Bali and Papua. The experiment was carried out from January to December 2006 in Cicurug Experimental Station, Sukabumi at 550 m above sea level. Randomized block design was used, consisting of 16 treatments and three replications, 20 cm x 20 cm plant spacing, and 100 plants/plot. Cultural practices used was reffered to SOP. Fertilizer used were cow dung manure 20 t/ha, urea. SP-36 and KCl 200 kg/ha each, respectively. Quantitative and qualitative observations were made on 10 plants/plot (3.5 months old plant) on characters, fresh and dry weight, and quality. Data resulted analyzed by DMRT statistical analysis indicated variation on a number of characters such as plant height, leaf size and colour, number, length, diameter and colour of *geragih*, node length, number of flower per *geragih,* fresh and dry weight. Accessions CASI 002 has the biggest leaf size, whereas the accessions from West Irian Jaya has the smallest leaf size, and appeared to be very different from the other accessions. The high fresh weight was shown by accessions CASI 016 and CASI 011. Accession CASI 011 has the highest dry weight. Asiaticoside content varied from 0.15% - 1.49%. Alkaloid, saponin, tannin, flavonoid, triterpenoid, steroid and glycoside levels detected gave very strong reaction (4+), while triterpenoid gave very weak reaction (1+ - 2+). The information gathered from this activity is expected to be a recommendation superior asiatic pennywort on varieties selection.

192 ERNAWATI, R.
Performance of hybrid rice varieties in two farmers group planting. *Penampilan padi hibrida pada pertanaman dua kelompok tani* / Ernawati, R.; Irawati, A. (Balai Pengkajian Teknologi Pertanian Lampung, Bandar Lampung). Proceedings of the seminar on agricultural technology innovation transfer for development rural industrial agribusiness in marginal areas: innovation of production technology. Book 2, Semarang, 8 Nov 2007 / Muryanto; Prasetyo, T.; Prawirodigdo, S.; Yulianto; Hermawan, A.; Kushartanti, E.; Mardiyanto, S.; Sumardi(eds.). Bogor (Indonesia): BBP2TP, 2007 p. 170-173, 3 tables; 7 ref.

ORYZA SATIVA; VARIETIES; HYBRIDS; CROP PERFORMANCE; PLANTING; FARMERS; YIELDS.

The increasing of rice productivity must be supported by introduction of new technology. Planting of hybrid rice varieties is very important to increase rice production more than 10%. The trial of hybrid rice varieties of Bernas Prima, Pioner-l, and Intani-2, was carried out on Rukun Maju and Rukun Sentosa farmers group planting in Karang Endah Village, Central

Lampung District on dry season 2007 (April-Agustus 2007). The objective of the assessment was to find out performance of hybrid rice varieties on two farmers group planting. Assessment was conducted in randomized block design with two replications. The result showed that there was different response of the hybrid rice varieties by location. Hybrid rice varieties of Bernas Prima showed highest yield of 4.41-4.78 t/ha.

193 GALINGGING, R.Y.
Potency of medicinal plants germplasm as biopharmaceutical source in Central Kalimantan (Indonesia). ***Potensi plasma nutfah tanaman obat sebagai sumber biofarmaka di Kalimantan Tengah (Indonesia)***/ Galingging, R.Y. (Balai Pengkajian Teknologi Pertanian Kalimantan Tengah, Palangkaraya (Indonesia)). *Jurnal Pengkajian dan Pengembangan Teknologi Pertanian* (Indonesia). ISSN 1410-959X (2007) v. 10(1) p. 76-83, 2 tables; 7 ref.

DRUG PLANTS; GERMPLASM CONSERVATION; PLANT INTRODUCTION; AGRONOMIC CHARACTERS; KALIMANTAN.

Central Kalimantan Province covers an area of 15,380,000 ha or about 7.93% of Indonesian area and consists of coastal region open waters and open land area, owns a potential biodiversity such as herbal medicine. This massive land area consists of various types of land. The wide area combined with high variability of land may resulted in a variability of genetic diversity of medicinal resources which were found in Central Kalimantan. Due to the increasing rate of forest exploitation such as illegal logging and land clearing or burning, those medicinal and ornamental crops are in an endangered phase of extinction. To conserve these medicinal plants or germplasms some critical steps such as exploration, collection and conservation should be taken. The purpose of this study is to explore, collect, conserve and document of medicinal plants species and to find out the potency of such plants in Central Kalimantan as well. The exploration and colection were conducted at five districts, i.e., Kotawaringin Timur, Kotawaringin Barat, Barito Selatan, Barito Utara and Murung Raya. The aim of this study were as follows: (1) The exploration process, (2) The ex-situ and in-situ conservation, (3) The characterization process, and (4) The documentation process. The results of these activities showed that there was an ex situ collection of 5 accessions of medicinal plants that can be used as a source of biopharmaceutical uses.

194 KOSMIATIN, M.
Genetic diversity improvement of citrus rootstock for resistance on acid soil. ***Peningkatan keragaman genetika pada jeruk batang bawah untuk ketahanan terhadap lahan masam***/ Kosmiatin, M.; Husni, A.; Yunita, R. (Balai Besar Penelitian dan Pengembangan Bioteknologi dan Sumber Daya Genetika Pertanian, Bogor (Indonesia)); Martasari, C. Proceedings of the national seminar on citrus, Jakarta, 13-14 Jun 2009/ Winarno, M.; Sabari; Subandiyah, S.; Setyobudi, L.; Supriyanto, A. (eds.) Jakarta (Indonesia): Puslitbanghorti, 2008; p. 219--227, 1 ill., 3 tables ; 15 ref.

CITRUS; ROOTSTOCKS; GENETIC VARIATION; BREEDING METHODS; IN VITRO CULTURE; SOMATIC EMBRYOGENESIS; CALLUS; GAMMA RADIATION; GENETIC RESISTANCE; ACID SOILS.

The change of function of fertile land for agriculture into other sectors made citrus planting development should be directed to marginal lands usage, which were spread out in Sumatra,

Kalimantan, Papua, Sulawesi, Java and Maluku (± 50.94 billions ha). This condition has demanded the citrus breeder to produce new varieties or new cultivar of rootstock which are tolerant and stable in acid land. One of techniques that can be applied to obtain the rootstocks effectively and efficiently was by using *in vitro* culture technology which was combined with mutation. By using this technology, the characteristic change can be conducted in cell level so that the changing can be expressed in all parts of the plants. Technique which applied to obtain characteristic change effectively and efficiently was by simulating the acid land condition into media with Al and low pH by *in vitro*. The mutant cells which were resistant in this Al and low pH then regenerated by somatic embryogenesis technique until plantlets or somatic seeds were obtained. This regeneration technique was selected to ensure the vigor has genetical characteristic and can be descended to the progenies. Research was carried out in the laboratory of *in vitro* culture and greenhouse of researcher group of Biology Cell and Tissue of ICANIOGRAD from May to September 2007. Induction of embryonic callus on JC rootstock was conducted by culturing nucellus explant and young embryo on all kinds of media formulations while basic media MT and MS combined with NAA. The increase of genetic variation was conducted by gamma radiation of cobalt cell 60 with mutation dosage 0-3000 rad. Research result showed that induction of embryogenic callus was well succeed on media MS + vitamin Morrel + NAA 7.5 mg/l + K 0.5 mg/l + sucrose 3%. Radiation dosage that enabled to be regenerated was 1000 rad while LD_{50} obtained from dosage 3000 rad.

195 KUSMANA

Selection of potato lines from progenies crossbred. *Seleksi galur kentang dari progeni hasil persilangan*/ Kusmana; Sofiari, E. (Balai Penelitian Tanaman Sayuran, Lembang (Indonesia)). *Buletin Plasma Nutfah* (Indonesia). ISSN 1410-4377 (2007) v. 13(2) p. 56-61, 6 tables; 8 ref.

SOLANUM TUBEROSUM; INBRED LINES; SELECTION CRITERIA; PROGENY; AGRONOMIC CHARACTERS; GROWTH.

Selection was performed at Indonesian Vegetable Research Institute (IVEGRI), Lembang (1250 asl) in 2006. Seven F1 progenies obtained from previous crossing were grown with population ranging from 50 to 200 seedlings. From the first selection 183 accessions were defined. Out of these selected accessions, 173 accessions were planted with population ranging from 5 to 30 tubers. There were 55 promising lines selected with tuber yield more than 300 g/plant, shallow to medium depth of tuber eyes, medium to large tuber size and good taste. There were four lines showed good quality for potato chips.

196 SUDJIJO

Characterization and evaluation of several accessions of *Salacca edulis*. *Karakterisasi dan evaluasi beberapa aksesi tanaman salak*/ Sudjijo (Balai Penelitian Tanaman Buah Tropika, Solok (Indonesia)). *Jurnal Hortikultura* (Indonesia). ISSN 0853-7097 (2008) v. 18(4) p. 373-379, 5 tables; 22 ref.

SALACCA EDULIS; TROPICAL FRUITS; AGRONOMIC CHARACTERS; EVALUATION.

Salacca is one of tropical fruits that is native of Indonesia and preferred by consumers due to the specific fruit flesh taste. The objective of the research was to obtain superior characteristics of salacca accessions potentially for parent lines in breeding program of new superior varieties. The research was conducted at the Sumani Experimental Garden of

Indonesian Tropical Fruits Research Institute from November 2006 - June 2007 using randomized block design with 8 salacca accessions as the treatments and 3 replications. The results showed that all the plants produced sterile hermaphrodite flowers. Indigenous accessions from Sumatra (SSDM-01 and SSDP-06) produced sweet and astringently fruit while accessions (SNJK-01, SPHK-03, SPHP-04, and SSMT-07) produced sweet fruit. No accessions produced big size of fruits (> 61 g). Friable fruit texture was obtained from SPHP-04 and SSMT-07. Meanwhile, SPHK-04 accession potentially was able to be used as parent lines because it produced the highest number of fruits per cluster (22 fruits), TSS 16.77° Brix, friable fruit texture, and attractively creamy color fruit flesh.

197 WOELAN, S.

Improving plant characteristics through genetic recombination. II. Studies on pollen germination to increase fruit set of *Hevea brasiliensis*. *Perbaikan karakteristik tanaman melalui rekombinasi genetik. II. Kajian terhadap perkecambahan tepung sari dalam upaya meningkatkan persentase buah jadi tanaman karet* / Woelan, S.; Tistama, R. *Jurnal Penelitian Karet* (Indonesia). ISSN 0852-808X (2006); v. 24(1) p. 33-46, 11 ill., 2 tables; 17 ref.

HEVEA BRASILIENSIS; AGRONOMIC CHARACTERS; RECOMBINATION; GERMINATION; POLLEN; FRUITING.

Pollen is one of the most important factors in producing rubber fruit set. The average fruit set percentage of rubber only reaches around 3%. There are three limiting factors in forming fruit set in rubber namely the lowest number of pollen drops on stigma, low viability of pollen germination, and low distribution of pollen on stigma hole. The research was conducted to find optimal media and suitable temperature for pollen germination. Pollens were suspended in media enriched with many levels of sugar and 1% boric-acid (H_3BO_3). Clones used as female parent were BPM 24, BPM 101, PB 86, PB 260, and PR 300, and pollen source was obtained from BPM 13, BPM 101, F4542, FX 636, IAN 873, ORT. 5, ORT. 2018, and PB 260 clones. The results showed that media with 10% sucrose was the optimum level for pollen germination, while the optimum temperature was around 30-34°C. The efficient pollen number to reach pollination success was 2000 pollens. A total of 2000 pollens could be found from 300 male flowers with dye solution 2 x (17,854 micron l) or 400 male flowers with dye solution 1 x (8,927 micron l) centrifuged at 3000 rpm for 30 minutes. Pollen suspension enriched with 10 - 15% sucrose could produce fruit set around 3.5 - 5.1%, while without sucrose enrichment was only 0.80%.

F50 PLANT STRUCTURE

198 BASWARSIATI

Morphological and superiority characters of *Mangifera indica* L. cultivar Podang Urang. *Karakter morfologis dan beberapa keunggulan mangga Podang Urang (Mangifera indica L.)* / Baswarsiati; Yuniarti (Balai Pengkajian Teknologi Pertanian Jawa Timur, Malang). *Buletin Plasma Nutfah* (Indonesia). ISSN 1410-4377 (2007) v. 13(2) p. 62-69, 7 tables; 8 ref.

MANGIFERA INDICA; PLANT ANATOMY; AGRONOMIC CHARACTERS; HIGH YIELDING VARIETIES; QUALITY; PEST RESISTANCE; DISEASE RESISTANCE.

Podang Urang mango is one of the local superior fruit from Kediri regency, East Java. This mango has attractive appearance with red-orange skin colour, orange flesh, beautiful shape, medium size (about 200-250 g per fruit), sweet taste, strong smell, soft fibre and enough water content, so that it is appropriate for both fresh and processed fruit. Although most of the plants are hundred years old, they can produce about 60,200 kg mango per tree. Podang variety has been developed in East Java, especially in Kediri regency with total plants as many as 524,126 trees in Kediri. They were planted on hilly land as conservation plants as well as homeyard plants. The mango have good market at national level; especially in the big cities and has been exported in a small quantity to Singapore. It's appearance seems suitable to the demands of consumers from Korea, Japan, and Singapore, so that there will be a large opportunity for export. Based on those prospective chances, this mango variety should be produced in large scale to supply export market. Lack of promotion was one of the key factor that limit the market of this mango.

199 HARDIYANTO

Identification of JC citrus rootstock of zygotic and nucellar based on its morphology and isozymes analysis. ***Identifikasi batang bawah jeruk JC (Japanche Citroen) zigotik dan nucellar berdasarkan morfologi dan analisis isozim***/ Hardiyanto (Pusat Penelitian dan Pengembangan Hortikultura, Jakarta (Indonesia)); Mila; Lestarai, S. Proceedings of the national seminar on citrus, Jakarta, 13-14 Jun 2009/ Winarno, M.; Sabari; Subandiyah, S.; Setyobudi, L.; Supriyanto, A. (eds.) Jakarta (Indonesia): Puslitbanghorti, 2008; p. 181-196, 11 ill., 14 ref.

CITRUS; PROPAGATION MATERIALS; IDENTIFICATION; ROOTSTOCKS; ISOENZYMES; ESTERASES; ASPARTATE AMINOTRANSFERASE; PLANT ANATOMY.

The use of rootstock of JC (Japanche citroen) variety which is ‘true to type’ has important meaning to reach success in agribusiness citrus development in Indonesia, therefore the identification of JC seedlings are needed. The research was aimed to find out the information on morphological characteristics and the band pattern and its spread in JC seedlings which were resulted from zygotic and nucellar embryo. The research was conducted at Punten Field Experiment of ICISFRI and Molecular Biology Laboratory of Mathematics and Natural Science Faculty of Brawijaya University. The 2 and 4 months old JC seedling, enzyme esterase (EST) and aspartate amino transferase (AAT) were used for this research. The nucellar seedlings have morphological characteristics that is different from the zygotic on plant height, node length, branches, thorn, leaf color and shape. The zygotic seedlings have morphological variation which can be grouped into 8 types. Based on isozyme analysis, the band pattern of zygotic and nucellar seedlings were different. The number of bands in EST and AAT of the 4 months old seedlings were 8 and 6, respectively. In EST, the spread of the band of nucellar seedlings were observed in 3 locations: top, middle, and bottom while on the zygotic seedlings were 2 locations: top and bottom. The best band pattern showed by AAT enzyme; either on 2 or 4 months old seedlings, and either on young or old leaf samples. Morphological characteristics could not use for the identification of JC seedlings yet. The other research for identification of JC seedlings using another molecular probe and primer need to be conducted to obtain an obvious band pattern as a guide to differ zygotic and nucellar seedlings.

200 HARDIYANTO

Genetic relationship among several citrus species based on taxonometry. *Kekerabatan genetik beberapa spesies jeruk berdasarkan taksonometri*/ Hardiyanto (Balai Penelitian Tanaman Jeruk dan Buah Subtropika, Malang (Indonesia)); Mujiarto, E.; Sulasmi, E.S. *Jurnal Hortikultura* (Indonesia). ISSN 0853-7097 (2007) v. 17(3) p. 203-216, 1 ill., 6 tables; 22 ref.

CITRUS; VARIETIES; PLANT ANATOMY; TAXONOMY.

Characterization method applied on citrus collection in Indonesian Citrus and Subtropical Fruit Research Institute, up to now was only based on morphological observation. Therefore, the obtained data have not really described the citrus relationship because the descriptions have not yet expressed the real characters of collected citrus species. The aim of this research was obtain some information on morphological characteristics and a hierarchy taxon status of local varieties derived from several species. The research was carried out at Biology Laboratory, Malang University and Indonesian Citrus and Subtropical Fruit Research Institute. Three citrus species with 3 varieties, respectively, were used in this research, those were *Citrus reticulata* Blanco (Cinakonde, Batu, and Pulung), *C. maxima* Merr. (Nambangan, Sambas, and Sri Nyonya), and *C. sinensis* Osbeck (Pacitan, Kupang, and Punten). The results indicated that there were morphological and anatomical different among citrus species as well as local citrus varieties. The level of genetic relationship among three citrus species was also very low. Moreover, the level of genetic relationship of local citrus varieties of *C. maxima* Merr, *C reticulata* Blanco. and *C. sinensis* Osbeck was 68, 54, and 47%, respectively. Nevertheless, Nambangan (*C. maxima* Merr.) and Cinakonde (*C. reticulata* Blanco) were separated from its group based on cluster analysis and showed different characters. It seems that not all citrus varieties studied were categorized as varieties. It was only Nambangan and Cinakonde were categorized as varieties, while others were categorized as subspecies because there was no different character identified within their groups.

201 HARYUDIN, W.

Morphological characteristic of Indian galanga flower (*Kaempferia galanga* L.). *Karakteristik morfologi bunga kencur (Kaempferia galanga L.)*/ Haryudin, W.; Rostiana, O. (Balai Penelitian Tanaman Obat dan Aromatik, Bogor (Indonesia)). *Buletin Penelitian Tanaman Rempah dan Obat* (Indonesia). ISSN 0251-0824 (2008) v. 19(2) p. 109-116, 3 ill., 3 tables; 8 ref.

KAEMPFERIA; PLANT ANATOMY; FLOWERS; AGRONOMIC CHARACTERS.

The flower of Indian galanga is a complete flower having stamen and pistil reproduction. The research on biology of Indian galanga flower was conducted in the Greenhouse of Plant Breeding Division, Indonesian Medicinal and Aromatic Crops Research Institute (IMACRI) Bogor from January to December 2007. The parameters observed were number, color, length, and width of petals, color and number of crowns, length and width of crowns, length and width of anthers, length of filament, length of flower, length of receptacle, the diameter of receaptacle, number of fertile and sterile pollens, percentage of pollen fertility and sterility. The obtained data were analyzed using ANOVA. If there was a significant difference, Duncan double distance test would be provided. The result showed that the longest petal morphology at VI (2.30 cm) was significantly different from V5 but not significantly different from other numbers. Meanwhile, the length of crown in V4 (1.61 cm)

is different from V5, but not different from other numbers. The width and number of petal and crown were not significantly different among all plant's number. The morphology of male and female flowers of each number analyzed parameter showed no significant difference. The V2 number produced white color of flower while V1, V3, V4 and V5 produced violet color. The Indian galanga had complete flower because the stamen and pistil were found in one flower. Male and female flowers bloomed in the same time and required 5 hours for receptivity period. Male flower receptivity was shown by yellow color on the anther. On the other hand, receptivity of female flower was shown by ligula on the anther which then falls down and leaves was a hole on the anther. Pollen fertility level was very high, ranging between 97.20 - 99.14%.

F60 PLANT PHYSIOLOGY AND BIOCHEMISTRY

202 DIANTINI, A.
Cytotoxic activity of schima leaves on breast cancer cell MCF-7 and imaging of cell morbility mechanism. ***Aktivitas sitotoksik daun puspa terhadap sel kanker payudara MCF-7 dan gambaran mekanisme kematian selnya*** / Diantini, A; Julaeha, E.; Lestari, K.; Sriwidodo (Universitas Padjadjaran, Bandung (Indonesia). Fakultas Farmasi). Bandung(Indonesia) : UNPAD, 2008. 47 p. 633.884/UNI/a

SCHIMA; DRUG PLANTS; TOXICITY; APOPTOSIS; ISOLATION; IN VITRO; EXTRACTS; ENZYMES; NEOPLANSMS; ETHANOL; ENZYME ACTIVITY; CHEMICAL COMPOSITION; ANTIMUTAGENS.

Puspa (*Schima wallichii* Korth.) is an Indonesia medicinal plant which is known as primate's food. Previous research showed that puspa leaves has a high cytotoxicity as anti-tumor promoting activity (*in vitro*) against Epstein-Barr virus. Puspa leaves extract has an antimutagenic activity and can induce proapoptotic activity in tail shortening of Rana catesbeiana larvae in climax methamorphosis. Based on these results, we performed further research to know anticancer activity of puspan leaves on adenocarcinoma mamae and phytochemical screening to know the secondary metabolites content of these leaves. This research include extraction of puspa leaves using 70% ethanol followed by fractionation extract using increasing gradient polarity of organic solvent (n-hexan, ethyl acetate, and water). Cytotoxix activities against MCF-7 cells were determined using MTT assay after 24 and 48 hours contact between extract/fraction and MCF-7 cells. Proapoptotic activity against leukimia HL-60 cell was determined using double staining annexin-V/propidium iodide and were measured by flowcytometry. Cytotoxic activity showed by IC_{50} value, a concentration which can inhibit 50% proliferation of the cells. After 24 hours contact with cells, puspa leaves showed IC_{50} of value of 102.16 microgram/ml (ethanol extract), 126.45 microgram/ml (n-hexsan fraction), 19.89 microgram/ml (ethyl acetate) and 69.72 (water) and after 48 hours, puspa leaves showed IC_{50} value: 103.78 (ethanol extract), 124.68 microgram/mL (n-hexan fraction), 41.20 microgram/ml (ethyl acetate fraction) and 65.84 microgram/ml (water fraction). Flowcytometry analysis showed that ethanol and ethyl acetate fraction of puspa leaves can induce apoptotic in leukemia HL-60 cells.

203 INDRAWATI, I.
Sensitivity of pathogenic bacteria on red fruits (*Pandanus conoideus* Lam.) extracts. ***Sensitivitas bakteri patogen terhadap buah merah (Pandanus conoideus Lam.)/.*** Indrawati, I.; Ratningsih, N. (Universitas Padjadjaran, Bandung (Indonesia). Fakultas Matematika dan Ilmu Pengetahuan Alam). Bandung (Indonesia): UNPAD, 2008 52 p. 633.8-235/IND/s

PANDANUS; DRUG PLANTS; FRUIT; PLANT EXTRACTS; BACTERIOSES; PATHOGENS; SALMONELLA TYPHIMURIUM; ESCHERICHIA COLI; KLEBSIELLA PNEUMONIAE; BACILLUS CEREUS; STAPHYLOCOCCUS AUREUS; STREPTOCOCCUS; CHEMICAL COMPOSITION; PATHOGENECITY; ANTIBIOTICS.

This writing views the research on the sensitivity of pathogenic bacteria to red fruits (*Pandanus conideus* Lam.) The method used is Kirby-Bauer method and the results show that all bacteria were sensitively tested toward 30 µg chloramphenicol antibiotic, 10 µg streptomisin, 30 µg vankomisin, 10 µg gentamisin, 300 µg sulfonamida. The results also illustrated that the water fraction of red fruits can impede S. typhi (14.78 mm), B. cereus (15.72 mm) and S. pyogenes (14.44 mm), hexane fraction of red fruits can hamper *S. typhi* (9.94 mm), E. coli (8.94 mm), B. cereus (9.33 mm), and S. pyogenes (9.94 mm), butanol fraction can hamper *E. coli* (14.56 mm), ethilacetate fraction can resist *K. pneumoniae* (14.56 mm), and S. aureus (14.39 mm) and ethanol extract can impede *K. pneumoniae* (8.28 mm) and *S. aureus* (8.67 mm). The effective concentration of red fruits in impeding the nurture of bacteria was 80% on *S. typhy* (32 mm), *E. coli* (20.87 mm), *K. pneumoniae* (20.27 mm), *S. aureus* (21.13 mm) and *S. pyogenes* (19.47 mm). There was a difference in relation with the pattern of resistance between red fruits and antibiotic. A side from that, there was a different sensitivity between red fruits and antibiotic toward the bacteria, on red fruits smaller than antibiotic.

204 MISWAR

Isolation and purification of phitase from cotyledon of germinating soybean (*Glycine max* (L.) Merr). ***Isolasi dan purifikasi fitase dari kotiledon kedelai (Glycine max (L.) Merr.) hasil perkecambahan***/ Miswar (Universitas Jember (Indonesia). Fakultas Pertanian). *Majalah Ilmiah Peternakan* (Indonesia). ISSN 0853-8999 (2006) v. 9(2) p. 45-49, 3 ill., 1 table; 19 ref.

GLYCINE MAX; COTYLEDONS; SHOOTS; ISOLATION TECHNIQUES; PURIFICATION; PHYTASE; NUTRITIVE VALUE; FEEDS; DIGESTIVE SYSTEMS.

Phytic acid (myo-inositol hexakisphosphate) is the major storage form of phosphorus in the seeds of legume and cereal. During germination, P-phytic acid is used as a source of nutrients for growth and development of seedlings. Hydrolysis of phytic acid seeds by the activity of phytase will release inositol and free phosphate. The absence of the activity of phytase in the non-ruminant digestive tract causes minerals and other nutrient bounds in phytic acid not to be absorbed. The use of phytase to hydrolyze phytic acid increases the capacity of intestines to absorb minerals and other nutrients. The objective of this research was to study the activity of phytase from cotyledon of germinating soybean. Soybean seeds were grown on the wet cotton for 14 days, and the cotyledon were harvested every 2 days. The research result showed that soybean seeds var. Bromo germinated for 10 days produced the highest level of phytase activity. Purification of cotyledon phytase by using ammonium sulphate and DEAE-cellulose obtained three forms of phytase. Phytase 2 had the highest specific activity (35.96 micron g Pi/hour/mg protein), km and V max as 0.221 mM of phytic acid and 0.383 micron g Pi/hour, respectively.

F61 PLANT PHYSIOLOGY - NUTRITION

205 WIEDOSARI, E.
Role of natural immunomodulator (*Aloe vera*) in cellular and humoral immune responses. ***Peranan imunomodulator alami (Aloe vera) dalam sistem imunitas seluler dan humoral*** / Wiedosari, E. (Balai Besar Penelitian Veteriner, Bogor (Indonesia)). Wartazoa (Indonesia). ISSN 0216-6461 (2007) v. 17(4) p. 165-171, 41 ref.

ALOE BARBADENSIS; ACETYLENE; CELL STRUCTURE; CYTOKINES.

Aloe vera belongs to a group of Liliaceae family plant and cultivated worldwide. It possesses acemannan (acetylated mannan), which has a significant pharmacological property. The acemannan has an immunomodulatory activity when administered to animals. The major immunomodulating effect includes the activation of immune effector cells, such as lymphocytes and macrophages, resulting in the production of cytokines, interleukin (IL)-I, IL-6, IL- I2 and tumor necrosis factor alpha (TNFa). In particular, this extract can modulate the differentiation capacity of CD_4^+T cells to mature into Thl subsets and enhance the innate cytokine response. As a consequence, this extract will have a profound effect in controlling disease, caused by intracellular infectious agents (bacteria and viruses). However, further studies are needed to determine the immunomodulating effects of *Aloe vera* in multi-component extracts equivalent to what are being used commonly in traditional medicine.

F62 PLANT PHYSIOLOGY – GROWTH AND DEVELOPMENT

206 SUHARIYONO
Phenology and bloom regulation on tangerine cv. siam. ***Fenologi dan pengaturan pembungaan pada jeruk siam***/ Suhariyono; Pangestuti, R.; Sutopo; Supriyanto, A.; Budiyati, E. (Balai Penelitian Tanaman Jeruk dan Buah Subtropika, Tlekung (Indonesia)). Proceedings of the national seminar of citrus, Jakarta, 13-14 Jun 2009/ Winarno, M.; Sabari; Subandiyah, S.; Setyobudi, L.; Supriyanto, A. (eds.) Jakarta (Indonesia) : Puslitbanghorti, 2008; p. 310-323, 5 ill., 2 tables; 11 ref.

CITRUS RETICULATA; PHENOLOGY; FLOWERING; ROOT PRUNING; BRUNCHES; GROWTH; SPROUTING; FRUITING; FRUIT DROP.

Annual phenology of tangerine cv. siam is important to know in order to manage bloom, harvest and other cultivation technique. This first year phenology study of tangerine cv. siam was conducted starting on April - December 2006 at Sendang Village - Jambon Subdistrict, Ponorogo, East Java. It aimed to obtain growth phenology and bloom on the plant of tangerine cv. siam furnished by rhizocton glass installation, and plant physical manipulation activity with the treatment of root and branch pruning at Tlekung Experimental Field - ICISFRI which aimed to find out description of bloom physiology change occurred resulted from root and branch pruning. Research result in Ponorogo showed that plant growth on May until September 2006 in fruit development stage reached maximum fruit diameter by 5.3 cm with 79.65 g/fruit in weight. This fruit development was also followed by root growth phenomena emerging on rhizocton glass over June until December 2006 with 18 roots average number and maximum root length reached 57.6 cm. Harvest was carried out on October 2006 with 24 kg/tree in production. First rain that took place on November 29 followed by heavy rain during December 2006 by total rainfall at 1135 mm triggered shoot growth, flower and fruit in fruit set type, but higher rainfall caused flower and young fruit dropped approximately 90% at the end of December 2006.

207 SYAKIR, M.
Effect of salinity on the growth, production and quality of king of bitter (*Andrographis paniculata* Nees). ***Pengaruh salinitas terhadap pertumbuhan, produksi dan mutu sambiloto (Andrographis paniculata Nees)***/ Syakir, M.; Maslahah, N.; Januwati, M. (Balai Penelitian Tanaman Obat dan Aromatik, Bogor (Indonesia)). *Buletin Penelitian Tanaman Rempah dan Obat* (Indonesia). ISSN 0251-0824 (2008) v. 19(2) p. 129-137, 2 ill., 3 tables; 14 ref.

DRUG PLANTS; SALINITY; GROWTH; PLANT PRODUCTION; QUALITY.

The aim of pot experiment was to observe the effect of salinity on the growth, production, and quality of sambiloto. The experiment was conducted at the greenhouse of Indonesian Medicinal and Aromatic Crops Research Institute (IMACRI) since July to November 2007. The experiment was arranged in randomized block design (RBD) consisting of 13 treatments of NaCl application with 3 replications. Each treatment consisted of 6 plants. The treatments were: N0= water (without NaCl) sprinkled in two days interval, N1= sprinkled with 1 g NaCl/l solution in two days interval, N2= sprinkled with 1 g NaCl/l solution in three days interval, N3= sprinkled with 1 g NaCl/l solution in four days interval, N4= sprinkled with 2 g NaCl/l solution in two days interval, N5= sprinkled with 2 g NaCl/l solution in three days interval, N6= sprinkled with 2 g NaCl/l solution in four days interval, N7= sprinkled with 3 g NaCl/l solution in two days interval, N8= sprinkled with 3 g NaCl/l solution in three days interval, N9= sprinkled with 3 g NaCl/l solution in four days interval, N10= sprinkled with 4 g NaCl/l solution in two days interval, N11= sprinkled with 4 g NaCl/l solution in three days interval, N12= sprinkled with 4 g NaCl/l in solution four days interval. All treatments were maintained with 4 ml of water per day. Parameters observed were plant growth (such as plant height, number of branch. leaf area). production (fresh and dry weights) and quality of simplisia. The results indicated that NaCl solution has no effect on the plant growth and number of branch, however, 2 g NaCl/l/crop sprinkled in two days interval application showed the best effect to total fresh weight (69.14 g/plant) and increased 17.80% compared than optimal water sprinkled (52.33 g). Sprinkle NaCl condensation 1 g/plant twice a day gave the highest rate of andrograpolida (1.18%), increased 69% higher compared to sprinkled requirement irrigation (0.70%).

H10 PESTS OF PLANTS

208 BALIADI, Y.
Soybean pod borer, *Etiella zinckenella* Treitschke (Lepidoptera: Pyralidae), and its control strategy in Indonesia. ***Penggerek polong kedelai, Etiella zinckenella Treitschke (Lepidoptera: Pyralidae), dan strategi pengendaliannya di Indonesia***/ Baliadi, Y.; Tengkano, W.; Marwoto (Balai Penelitian Tanaman Kacang-kacangan dan Umbi-umbian, Malang (Indonesia)). *Jurnal Penelitian dan Pengembangan Pertanian* (Indonesia). ISSN 0216-4418 (2008) v. 27(4) p. 113-123, 1 table; Bibliography: p. 119-123.

GLYCINE MAX; VARIETIES; ETIELLA ZINCKENELLA; BIOLOGICAL CONTROL; INTEGRATED PEST MANAGEMENT; INDONESIA.

Soybean pod borer (*Etiella zinckenella* Treitschke) is an important pest and its existence is reported from all of soybean planting areas in Indonesia. Besides *E. zinckenella,* there are

four others pod borer species identified in Indonesia, namely *E. hobsoni* Butler, *E. chrysoporella* Meyrick, *E. grisea drososcia* Meyrick Stat.n., and *E. behrii* Zeller. *E. zinckenella* is widely causing severe damage to soybean seeds in many soybean areas. Up to 80% yield losses of soybean have been reported in Indonesia. Damage by *E. zinckenella* is resulted from the larvae boring into pods and seeds. A brown spot on the pod indicates the point of larva entry, and left large hole where the mature larva moves to pupae in the soil. Feeding marks are rough and the injured pod contains large and round fecal pellets. Pods often rot away as a result of the accumulation of these fecals. This present report discussed the research progress of soybean pod borer in Indonesia, included on pest bioecology (biology, population dynamic, soybean pod development, climates, natural enemies, host plants, response of varieties), pest control (sanitation, simultaneous planting, crop rotation, trapping crops, botanical pesticide, resistant variety, biological, and chemical control), and the recommendation of integrated pest management (IPM) of soybean pod borer.

209 DWIASTUTI, M.E.

Alertness of citrus root rot and stem rot disease and its controlling principle on citrus plant. ***Kewaspadaan terhadap penyakit busuk akar dan pangkal batang serta prinsip pengendaliannya pada tanaman jeruk***/ Dwiastuti, M.E. (Balai Penelitian Tanaman Jeruk dan Buah Subtropika, Tlekung (Indonesia)). Proceedings of the national seminar of citrus, Jakarta, 13-14 Jun 2009/ Winarno, M.; Sabari; Subandiyah, S.; Setyobudi, L.; Supriyanto, A. (eds.) Jakarta (Indonesia): Puslitbanghorti, 2008; p. 377-387, 4 ill., 4 tables; 7 ref.

CITRUS; ARMILLARIA MELLEA; PHYTOPHTHORA; BOTRYTIS; ROSELLINIA; DISEASE CONTROL; DISEASE SURVEILLANCE; SYMPTOMS; NATURAL ENEMIES; BIOLOGICAL CONTROL AGENTS.

Alertness of citrus root rot and stem rot diseases are highly recommended because the diseases cause death. The diseases are caused by *Phytophthora* spp, *Armillaria mellea*, *Phymatotrichum omnivora* and *Rosellinia* spp, but the last two have never been found in Indonesia yet. The principle of the disease control include monitoring, technically control (citrus plantation management, drainage arrangement, mulch and organic fertilizer usage), resistant varieties usage and environmentally friendly control (natural enemies, biocomponents, generic ingredients), and also fungicides. The strategies applied for the disease control were adjusted to the disease cycles, citrus plant and plantation condition.

210 DWIASTUTI, M.E.

Pathogenicity test of entomopathogens of *Hirsutella citriformis*, *Beauveria bassiana*, *Metarhizium anisopliae* with single and double infection to control *Diaphorina citri* Kuw. ***Uji patogenisitas jamur entomopatogen Hirsutella citriformis, Beauveria bassiana, dan Metarhizium anisopliae secara eka dan dwi infeksi untuk mengendalikan Diaphorina citri Kuw***./ Dwiastuti, M.E.; Nawir, W.; Wuryantini, S. (Balai Penelitian Tanaman Jeruk dan Buah Subtropika, Malang (Indonesia)). *Jurnal Hortikultura* (Indonesia). ISSN 0853-7097 (2007) v. 17(1) p. 75-80, 1 ill., 3 tables; 12 ref.

CITRUS; ACARINA; PREDATORS; IDENTIFICATION; DEVELOPMENTAL STAGES; BIOLOGICAL CONTROL AGENTS; HIRSUTELLA; BEAUVERIA BASSIANA; METARHIZIUM ANISOPLIAE; PATHOGENICITY.

The chemical control of *D. citri*, CVPD disease vector was one of major method applied in the field, but it has several side effects, such as of insect resistance or environmental pollution. Control measures of *D. citri* by using biological agents have the potency to reduce insecticide application, especially use of *H. citriformis* entomopathogen, besides *M.*

anisopliae and *B. bassiana*, that were popular before. Several field pest observers indicated that natural infection of *H. citriformis* could accelerate the mortality of *D. citri* if combined with other entomopathogens. The objectives of this study was to measure entomopathogenicity of *H. citriformis* in controlling *D. citri* in combination with other entomopathogens. The research was conducted at the Mycology Laboratory, Indonesian Citrus and Subtropic Fruit Research Institute and Jombang citrus farmer field. The treatments tested were *H. citriformis, B. bassiana, M. anisopliae* and their combination. The randomized block design with 3 replications was used in this experiment. The results showed that double infection of *B. bassiana* and *H. citriformis* was the most sinergism than others treatments, which caused the highest mortality of *D. citri*, followed by single infection of *H. citriformis*.

211 ENDARTO, O.

Effect of application of bait insecticide with active substance spinosad to fruit fly *Bactrocera* sp. on siam citrus crop. *Pengaruh aplikasi insektisida umpan berbahan aktif spinosad terhadap lalat buah Bactrocera sp. pada tanaman jeruk siam*/ Endarto, O.; Wuryantini, S.; Supriyanto, A. (Balai Penelitian Tanaman Jeruk dan Buah Subtropika, Tlekung (Indonesia)). Proceedings of the national seminar of citrus, Jakarta, 13-14 Jun 2009/ Winarno, M.; Sabari; Subandiyah, S.; Setyobudi, L.; Supriyanto, A. (eds.) Jakarta (Indonesia): Puslitbanghorti, 2008; p. 388-399, 3 ill., 5 tables; 8 ref.

CITRUS; BACTROCERA; INSECTICIDES; ATTRACTANTS; SPRAYING; MIGRATORY PESTS; FRUIT DROP; APPLICATION RATES.

Field experiment to observe the effect of bait insecticide spraying with active substance spinosad on fruit fly (*Bactrocera* sp.) in siam citrus crops was conducted at farmer's plantation in Surbakti Village, Simpang Empat, Tanah Karo District since April to August 2006. The research was arranged in randomized block design with 4 replications and 6 treatments. The experiments were the concentrations of the bait insecticide with active substance spinosad of 100, 75, 50, and 25 ml/l, methyl eugenol 1 ml/trap and control without spraying treatment. The results showed that the bait insecticide spraying treatment with spinosad was effective to control the fruit fly population. Of ten times application, average effication value of insecticide from 100, 75, 50, and 25 ml/l concentrations were 92.2%, 88.7%, 80.5%, and 89.4%, respectively. The level of fruit fly attack in spinosad application with 25-100 ml/l concentrations in the end of observations was 4.3%-8.3%, methyl eugenol treatment 21.8% and control 21%.

212 MAMAHIT, J.M.E.

Biology of mealybug *Dysmicoccus brevipes* Cockerell (Hemiptera: Pseudococcidae) at pineapple and lesser galangal. *Biologi kutu putih Dysmicoccus brevipes Cockerell (Hemiptera: Pseudococcidae) pada tanaman nenas dan kencur*/ Mamahit, J.M.E. (Universitas Sam Ratulangi, Manado (Indonesia). Fakultas Pertanian); Manuwoto, S.; Hidayat, P.; Sobir. *Buletin Penelitian Tanaman Rempah dan Obat* (Indonesia). ISSN 0251-0824 (2008) v. 19(2) p. 164-173, 3 tables; 22 ref.

ANANAS COMOSUS; KAEMPFERIA; PSEUDOCOCCIDAE; PESTS OF PLANTS; BIOLOGY.

Mealybug, *Dysmicoccus brevipes* Cockerell is main pest in the pineapple plantation. Its hosts are more than 100 plant species. The research aimed to know some biological parameters of

mealybug at pineapple (*Ananas comosus* L. Merr) and lesser galanga (*Kaempferia galanga* I.). The research was conducted in Laboratory of Pests and Diseases Department, Bogor Agricultural University since May to July 2007 and using two species of host plants, namely pineapple and lesser galangal. The sample of mealybug was taken from the field and then identified. Crawler (nymph of first instar) was reared in petrydish until reach adult phase in both pineapple leaf and rhizome of lesser galangal. The result showed that mealybug was able to live and reproduce on pineapple and lesser galangal plants. The nymphs molted three times with total development time of 32.10 ± 0.33 days at pineapple which was significantly different from that on lesser galangal (35.55 ± 0.30 days). Development time of the first instar nymph was about 11.45 ± 0.29 days at pineapple and 12.95 ± 0.33 days at lesser galangal. Development time of the second instar nymph was about 9.85 ± 0.29 days at pineapple and 11.05 ± 0.34 days at lesser galangal. Development time of the third instar nymph was about 10.80 ± 0.31 days at pineapple and 11.55 ± 0.20 days at lesser galangal. The live time of the adult was about 20.40 ± 0.74 days at pineapple and 20.20 ± 0.57 days at lesser galangal. The analysis showed that preoviposition and nymph laying periods were significantly affected by host plant species.

213 MARDININGSIH, T.L.

Potency of fungus of *Synnematium* sp. to control cashew flatids (*Sanurus indecora* Jacobi). *Potensi cendawan Synnematium sp. untuk mengendalikan wereng pucuk jambu mete (Sanurus indecora* Jacobi)/ Mardiningsih, T.L. (Balai Penelitian Tanaman Obat dan Aromatik, Bogor (Indonesia)). *Junal Penelitian dan Pengembangan Pertanian* (Indonesia). ISSN 0216-4418 (2007) v. 26(4) p. 146-152, 4 ill., 1 table; 25 ref.

ANACARDIUM OCCIDENTALE; HOMOPTERA; ENTOMOGENOUS FUNGI; BIOLOGICAL CONTROL AGENTS; HOST PLANTS; PEST CONTROL; CONTROL METHODS.

Cashew plant (*Anacardium occidentale*) is one of estate crops that has high economic value and as a source of state exchange. One of constraints in increasing cashew production and planting area is the attack of pests and diseases. One of the important pests is *Sanurus indecora* causing yield loss up to 57.83%. The insect belongs to order of Homoptera, family Flatidae. *S. indecora* experiences incomplete metamorphose, i.e. eggs, nymphs, and adults. The eggs are white, oval, laid under surface of leaf, leaf petiole, or petiole of shoot, in cluster and covered by wax. The body of the nymph is also covered by wax so that it is sticky. The adults are white, white reddish or green pale. Both nymphs and adults are inactive, however, they will jump if disturbed. The pest can be controlled physically/mechanically or biologically using entomopathogen fungi *Synnematium* sp. and egg parasitoids (*Aphanomerus* sp.). Biological control by using natural enemies is prospective to be developed because it is environmentally friendly. Using synthetic insecticides is effectively proved, however, if they are used unwise, they will cause negative impacts such as environmental pollution, resistance and resurgence of insects, killing natural enemies and toxic to farmers. Based on those, control of insect pests on cashew plant is recommended to apply integrated pest control by integrating several components that is environmentally friendly. One of which is by using fungus of *Synnematium* sp. that is available in nature.

214 MARWOTO

Strategy and technology for controlling armyworm (*Spodoptera litura*) in soybean. *Strategi dan komponen teknologi pengendalian ulat grayak (Spodoptera litura Fabricius) pada tanaman kedelai*/ Marwoto; Suharsono (Balai Penelitian Tanaman Kacang-kacangan dan Umbi-umbian, Malang (Indonesia)). *Jurnal Penelitian dan Pengembangan Pertanian* (Indonesia). ISSN 0216-4418 (2008) v. 27(4) p. 131-136, 2 ill., 2 tables; 24 ref.

GLYCINE MAX; SPODOPTERA LITURA; INTEGRATED PEST MANAGEMENT; ECOSYSTEMS; HARVESTING LOSSES.

Indonesia needs approximately 2.20 tons of soybean/year. The domestic production only meets 35-40% of the demand and the remaining 60-65% are imported from foreign countries. Therefore, through various programmes, the government put strong efforts to increase soybean production toward self-sufficiency in 2010-2012. The armyworm (*Spodoptera litura*), the leaf feeder pest of soybean, is a constraint in soybean production in Indonesia. In severe damage, the armyworm cause significantly yield loss up to 80-100%. Most of the farmers apply a synthetic insecticide to control soybean armyworm. On the other hand, their frequent application, moreover, could not control the insect effectively. To anticipate the soybean armyworm attack and to develop an effective control measures, thus the biological aspects, damage, yield loss and farmer control practice have to be understood. Implementation of integrated pest management (IPM) on soybean armyworm control would support the compatibility of all IPM components or methods that match to ecological and economic principles.

215 MUHARAM, A.

Mass propagation technique of *Menochilus sexmaculatus*, the predator of *Bemisia tabaci*, the chili-yellow-viruses transmitting vector. ***Teknik perbanyakan masal predator Menochilus sexmaculatus pengendali serangga Bemisia tabaci vektor virus kuning pada tanaman cabai***/ Muharam, A. (Pusat Penelitian dan Pengembangan Hortikultura, Jakarta (Indonesia)); Setiawati W. *Jurnal Hortikultura* (Indonesia). ISSN 0853-7097 (2007) v. 17(4) p. 365-373, 4 ill., 10 tables; 24 ref.

CAPSICUM ANNUUM; PREDATORS; MENOCHILUS SEXMACULATUS; BIOLOGICAL CONTROL; BEMISIA TABACI; MYZUS PERSICAE; VIRUSES.

Bemisia tabaci is apparently known as one of the major pests on chilli pepper. Another important role of the pest is the capability of transmitting gemini virus on chilli pepper causing yellow diseases. A study on mass propagation of *M. sexmaculatus*, the predator of *B. tabaci*, was carried out in screenhouses of Indonesian Vegetable Research Institute, Lembang, from April to November 2006. Consecutive steps of the study were (1) propagation of the predator using a factorial randomized block design, with 4 host plants and 2 preys, and (2) test the capability of *M. sexmaculatus* as the predator of *B. tabaci* and *Myzus persicae*, utilizing a randomized block design with 6 treatments and 4 replications. The results indicated that a correlation was occurred between host plants and preys. The combination of *Brassica sinensis* as a host plant with *M. persicae* as a prey resulted in the best treatment for propagation of the predator with eggs production of 893.33, followed by combinations of *Zea mays* with *M. persicae*, and *B. sinensis* with *B. tabaci*. One female of *M. sexmaculatus* was able to produce 140 to 975 eggs within 8 to 11 days, or 12 to 89 eggs per day. The peak of egg production was occurred from the 5^{th} to 7^{th} day. Mortality of *M. sexmaculatus* larvae was 28.66-45.47%. The best ratio of female and male of the predator was 1:1. Within 24 hours the predator was able to attack *B. tabaci* and *M. persicae* up to 51.50 and 168.50 larvae, respectively. Life cycle of the predator was 56-78 days: egg 4-5 days, larvae 20-25 days, pupa 4-6 days, and imago for 28-42 days. Female predators attacked *B. tabaci* much more than male and larvae. Female predators found preys faster than male ones and larvae, 20.33 seconds for 120 preys. The application of *M. sexmaculatus* for biological control of *B. tabaci* will obviously decrease use of synthetic insecticides.

216 MUSTIKA, I.
Control strategy of parasitic nematodes on patchouli. ***Strategi pengendalian nematoda parasit pada tanaman nilam***/ Mustika, I.; Nuryani, Y. (Balai Penelitian Tanaman Rempah dan Obat, Bogor (Indonesia)). *Jurnal Penelitian dan Pengembangan Pertanian* (Indonesia). ISSN 0216-4418 (2006) v. 25(1) p. 7-15, 2 ill., 1 table; Bibliography p. 13-15

POGOSTEMON CABLIN; NEMATODE CONTROL; PARASITES; NATURAL ENEMIES; INTEGRATED CONTROL; BIOLOGICAL CONTROL.

Patchouli (*Pogostemon cablin* Benth.) is an important export commodity in Indonesia. One of the problems in increasing patchouli productivity is plant parasitic nematodes, namely *Meloidogyne* spp., *Pratylenchus brachyurus*, and *Radopholus similis*. These nematodes reduce patchouli production of 75%. Control strategy of nematodes on patchouli in Indonesia must be conducted integrate by combining available components, such as tolerant varieties (Sidikalang, Lhokseumawe, and Tapaktuan), culture methods (fertilizers, organic matter, mulch, dolomite), botanical pesticides (castor meal, neem powder), natural enemies (*Pasteuria penetrans*, endophytic bacteria, *Arthrobotrys* spp., *Dactylella* spp.), chemical pesticides, and preventing nematodes spreading from infested to non-infested areas.

217 PRAJITNO, Al K.S.
Growth and incidence of pest and disease on several citrus varieties. ***Pertumbuhan dan insidensi hama penyakit beberapa varietas jeruk dari bibit bebas CVPD***/ Prajitno, Al K.S.; Pustika, A.B. (Balai Pengkajian Teknologi Pertanian Yogyakarta (Indonesia)). Proceedings of the national seminar on citrus, Jakarta, 13-14 Jun 2009/ Winarno, M.; Sabari; Subandiyah, S.; Setyobudi, L.; Supriyanto, A. (eds.) Jakarta (Indonesia): Puslitbanghorti, 2008; p. 400-407, 5 ill., 6 ref.

CITRUS; VARIETIES; VIRUSFREE PLANTS; PAPILIO; TOXOPTERA; DIAPHORINA CITRI; LEAF EATING INSECTS; MORBIDITY; GROWTH RATE.

Citrus cultivation had been initiated by a farmer in Garongan Village, Panjatan District, Kulonprogo Regency since 6 years ago. Within these 2 years, the citrus orchard has been developed up to 30 ha by several farmers in Panjatan and Galur District. This paper informed the phenology and the pest and disease incidence of 10 months age (after planting) of citrus tree at Yogyakarta AIAT assessment location. Average trees height development was 9.34 cm, 30.41 cm and 24.9 cm, while average canopy for tejakula keprok, madura keprok, and siam was 79.6 cm; 74.1 cm and 52.8 cm, respectively. The dominant pest was leaf miner, whilst *Papilio memnon* and Toxoptera were found as minor pest. *Diaphorina citri* was found only on tejakula keprok. Greasy spot were found as dominant disease on madura keprok and siam, meanwhile vein-banding symptom was found many on tejakula keprok.

218 SJAFARUDDIN, M.
Assessment of the integrated pest management (IPM) technology to increase production and farmer cocoa income in South Sulawesi. ***Pengkajian aplikasi teknologi PHT dalam rangka meningkatkan produksi dan pendapatan petani kakao di Sulawesi Selatan***/ Sjafaruddin, M.; Ramlan; Baco, D.; Kanro, B.M.; Armiati (Balai Pengkajian Teknologi Pertanian Sulawesi Selatan, Makassar (Indonesia)). *Jurnal Pengkajian dan Pengembangan Teknologi Pertanian* (Indonesia). ISSN 1410-959X (2006) v. 9(2) p. 118-128, 3 ill., 6 tables; 14 ref.

THEOBROMA CACAO; PRODUCTION; INCOME; INTEGRATED CONTROL; INTEGRATED PEST MANAGEMENT; SULAWESI; PRODUCTIVITY; COST BENEFIT ANALYSIS.

Assessment of the integrated pest management (IPM) technology to increase production and income of the cocoa farmer in South Sulawesi was conducted. The aims of this activity were to study (1) the effectiveness and efficiency of the IPM system of the pod pest, and (2) the adoption rate of those technology on the farmer level. The assessment was conducted on 20 ha of the farmer field at Kurma village, Mapilli subdistrict, Polewali Mandar District, West Sulawesi. All members of "Mau Dibina" farmer group were involved on this activity. The components of IPM consisted of frequent harvesting, pod sleeving, pruning, fertilizing and black ant release. The first action was socialization of all steps of activities that will be implemented on the field. The observation result showed that the integrated cocoa pod borer control management gave about 5.2-17.6% infestation intensity, while for non IPM, the infestation intensity was about 49.7-73.9%. Integrated cocoa pod borer control management increased production and income of 25.50% and 23.22%, respectively. The percentage of farmers adopted all components was 20%, and for adopted partial components were 6.67-13.33%. The restriction and problem faced in this activity were vascular streak dieback (YSD), rat and farmer organization strengthening especial1y on financial of the group and infrastructure of IPM for the pod borer control.

219 SUBARNA, T.

Technology innovation characteristics of CVPD vector controlling. ***Sifat inovasi teknologi dalam pengendalian serangga penular CVPD***/ Subarna, T.; Ruswandi, A.; Darajat (Balai Pengkajian Teknologi Pertanian Jawa Barat, Lembang (Indonesia)). Proceedings of the national seminar on citrus, Jakarta, 13-14 Jun 2009/ Winarno, M.; Sabari; Subandiyah, S.; Setyobudi, L.; Supriyanto, A. (eds.) Jakarta (Indonesia) : Puslitbanghorti, 2008; p. 110-119, 1 ill., 7 tables; 6 ref.

CITRUS; DIAPHORINA CITRI; VECTORBORNE DISEASES; INSECT CONTROL; TRAPS; BOTANICAL PESTICIDES; BOTANICAL INSECTICIDES; INNOVATION ADOPTION; TECHNOLOGY TRANSFER.

Diaphorina citri is a CVPD vector. Several methods to inhibit the insect growth are implemented such as the use of insect trap (yellow trap), insecticide application including organic pesticides, and as a control observation was conducted at farmers' farm without technology introduction. The innovation technology was measured in the following aspects: the relative benefit level, the technique compatibility with local environment, the application difficulties, the easiness to observe the advantage, and the easiness to try by the users. The measurements of each aspect were made in 1-4 scale. Each aspect has its own value that affected the farmers' decision to adopt the technology. The expected value of each aspect was the multiplication of the highest scale with the aspect value. The innovation characteristics were the sum of the aspects values. The easier the technology and the more advantage the technology, the bigger chance to adopt the technology.

220 UDIARTO, B.K.

Susceptibility and quantification of resistance in 4 strains of *Plutella xylostella* L. to insecticide. ***Suseptibilitas dan kuantifikasi resistensi 4 strain Plutella xylostella L. terhadap beberapa insektisida***/ Udiarto, B.K.; Setiawati, W. (Balai Penelitian Tanaman Sayuran, Lembang (Indonesia)). *Jurnal Hortikultura* (Indonesia). ISSN 0853-7097 (2007) v.

17(3) p. 277-284, 1 ill., 5 tables; 25 ref.

BRASSICA OLERACEA CAPITATA; PLUTELLA XYLOSTELLA; PEST RESISTANCE; PESTICIDE RESISTANCE.

The susceptibility to spinosad, fipronil, abamectin, deltamethrin, profenofos, and *Bacillus thuringiensis* was assessed in the laboratory/screenhouse of Indonesian Vegetable Research Institute against field strains of diamondback moth, *Plutella xylostella* (L.) from Lembang, Pangalengan, Garut, and Buleleng in cabbage growing areas from December 2005 to March 2006. The objectives of this study were to evaluate the susceptibility and resistance of several field populations of *P. xylostella* to spinosad, profenofos, and *Bacillus thuringiensis*. The test method employed was the IRAC no. 7 of leaf dip method with second-third instar larvae. The data was analyzed using probit analyzing program. Results indicated that there were differences in DBM susceptibility depending upon their origin. Field populations of *P. xylostella* from Lembang, Garut, Pangalengan, and Buleleng were still susceptible to spinosad and least susceptible to profenofos and deltamethrin insecticides. Field population of *P. xylostella* from Pangalengan had already developed resistance to fipronil, abamectin, and *B. thuringiensis, while* from Garut had already developed resistance to abamectin, and from Lembang, Pangalengan, and Buleleng had already developed resistance to fipronil. The hypothesis showed that this population was resistant to various insecticide, because the collection were taken from the region of highly intensive insecticide use and severe insect resistance problems. Therefore, routine monitoring of *P. sylostella* for baseline and changing levels of susceptibility to spinosad, fipronil, abamectin, deltamethrin, profenofos, and *B. thuringiensis*, and the implementation of insecticide resistance management strategy are urgently needed.

221 UHAN, T.S.

Effectivity of mixture of *Steinernema carpocapsae* and *Bacillus thuringiensis* application on the mortality of *Crocidolomia pavonana* F. on cabbage in the greenhouse. *Efektivitas aplikasi kombinasi Steinernema carpocapsae dan biopestisida Bacillus thuringiensis terhadap mortalitas Crocidolomia pavonana F. pada tanaman kubis di rumah kaca*/ Uhan, T.S.; Sulastrini, I. (Balai Penelitian Tanaman Sayuran, Lembang (Indonesia)). *Jurnal Hortikultura* (Indonesia). ISSN 0853-7097 (2008) v. 18(1) p. 38-45, 3 tables; 28 ref.

BRASSICA OLERACEA; CROCIDOLOMIA; STEINERNEMA CARPOCAPSAE; BACILLUS THURINGIENSIS; ENTOMOPHILIC NEMATODES; MORTALITY; BIOPESTICIDES; GREENHOUSES.

A greenhouse experiment was conducted at the Indonesian Vegetable Research Institute, Lembang from October to December 2006. The aim of this study was to observe the effectivity of different concentrations of *S. carpocapsae* and *B. thuringiensis* mixture against *C. pavonana* larvae. The experiment was arranged in a factorial randomized block design with 2 factors and 3 replications. The first factor was the population density of *S. carpocapsae*, with 4 levels: 0, 400, 800, and 1,600 JI/plant, while the second factor was the concentration of *B. thuringiensis*, with 3 levels: 0; 0.1; and 0.2 g/100 ml. The results showed that *S. carpocapsae* and *B. thuringiensis* were much better than that of control *C. pavonana* if they were applied in mixture rather than applied in single treatment. Combination of 400 JI/plant *S. carpocapsae* with 0.1 g/100 ml *B. thuringiensis* resulted in 53.33% mortality of *C. pavonana* larvae; 800 JI/plant *S. carpocapsae* with 0.1 g/100 ml resulted in 66.67% mortality of *C. pavonana*; and 1,600 JI/plant *S. carpocapsae* with 0.1 g/100 ml resulted in 90% mortality of *C. pavonana*. The highest mortality (100%) was showed by the treatment of

1,600 JI/plant of *S. carpocapsae* mixed with 0.2 g/100 ml *B. thuringiensis* at 96 hours after application.

222 WINARTO, L.
[Assessment of biological control agents application for *Conopomorpha cramerella* control in North Sumatra]. *Pengkajian penggunaan agensia hayati untuk pengendalian hama penggerek buah kakao Conopomorpha cramerella Snellen di Sumatera Utara*/ Winarto, L.; Harahap, S.M. (Balai Pengkajian Teknologi Pertanian Sumatera Utara, Medan (Indonesia)). *Jurnal Pengkajian dan Pengembangan Teknologi Pertanian* (Indonesia). ISSN 1410-959X (2006); v. 9(3) p. 240-246, 3 tables; 11 ref.

THEOBROMA CACAO; BIOLOGICAL CONTROL; CONOPOMORPHA CRAMERELLA; BEAUVERIA BASSIANA; PAECILOMYCES; BACILLUS THURINGIENSIS; SUMATRA.

Conopomorpha cramerella is the most important pest in cocoa plant in North Sumatra. This pest may result in yield loss by 82.2 % - 92 %. Farmers generally control the pest using synthetic pesticide; however, the price of the pesticide keeps increasing. In addition, pesticide might also endanger the environment. Therefore there should be a certain technology which is not only cheap but also safe to the environment. The objective of the study was to evaluate biological agents to control *Conopomorpha cramerella* pest, cocoa moths in the nucleus of cocoa plants, in North Sumatra. The treatments were Decis 2,5 EC, *Bacillus thuringiensis, Beauveria bassiana, Paecilomyces fumosoroseus,* and control. The experimental design used was randomized block design (RBD), with 5 replications which consisted of 10 cooperators. The results indicated that *Beauveria bassiana*, *Paecilomyces fumosoroseus* and *Bacillus thuringiensis* could reduce the moth attacks below the threshold level. The percentage of cocoa moth attacks could be decreased so that the production of cacao increased.

H20 PLANT DISEASES

223 CICU
Clubroot disease (*Plasmodiophora brassicae* Wor.) on crucifers and its control. *Penyakit akar gada (Plasmodiophora brassicae Wor.) pada kubis-kubisan dan upaya pengendaliannya*/ Cicu (Balai Pengkajian Teknologi Pertanian Sulawesi Selatan, Makassar (Indonesia)). *Jurnal Penelitian dan Pengembangan Pertanian* (Indonesia). ISSN 0216-4418 (2006) v. 25(1) p. 16-21, 1 ill., 2 tables; 42 ref

BRASSICACEAE; PLASMODIOPHORA BRASSICAE; DISEASE CONTROL; CHEMICAL CONTROL; BIOLOGICAL CONTROL.

The clubroot disease caused by *Plasmodiophora brassicae* Wor., a soilborne pathogen, is a serious disease on cabbage and other cruciferous crops worldwide. The disease causes swelling of parts of the roots and sometimes of the stem base. These clubs inhibit nutrient and water transport, stunt the growth of the plant, and increase the susceptibility to wilting. After some weeks the clubbed roots decay, weakening the support of the plant. Resting spores of the pathogen can survive for more than 17 years in the soil and have highly variable pathogenicity within field populations, making disease control was difficult. The use of resistant cultivars is suggested as measures for integrated disease control. Nevertheless,

only small number of resistant cultivars have been released; beside they may be uselessness in long term due to the developing capability of pathogen in many physiological races. In many cases, limes and fungicides gave a good control, but in other case, their effect was poor or negligible. Biological control using antagonistic microbes has been explored, though still at greenhouse and limited field experiments. Utilization of suppressive soils, organic amendments, soil solarization, and antiauxin substance of microbes will be important components of clubroot disease management in the future.

224 DJATNIKA, I.
Effect of banana rachis on the development of powdery mildew and black spot on rose plant. ***Pengaruh rachis pisang terhadap perkembangan penyakit embun tepung dan bercak hitam pada daun mawar***/ Djatnika, I. (Balai Penelitian Tanaman Hias, Cianjur (Indonesia)). *Jurnal Hortikultura* (Indonesia). ISSN 0853-7097 (2008) v. 18(2) p. 221-226, 2 tables; 17 ref.

ROSA; EXTRACTS; MUSA PARADISIACA; PLANT DISEASES; MILDEWS; DISEASE CONTROL.

Powdery mildew and black leaf spot are the important diseases on rose plant. Banana rachis was reported to be able to reduce some plant diseases and has the potencial to be developed for disease control method which is easy to apply and environmentally friendly. The objective of the research was to find out the effect of banana rachis extract to control powdery mildew and black spot on rose plant var. Black Magic. The results indicated that 10% of banana rachis extract was able to control the powdery mildew, but dit not have an effect on the black spot disease intensity.

225 DWIASTUTI, M.E.
Effectivity of entomophatogen of *Hirsutella citriformis* (Deuteromycetes: Moniliales) on Psyllid *Diaphorina citri* Kuw. ***Keefektipan entomopatogen Hirsutella citriformis (Deuteromycetes: Moniliales) pada kutu Psyllid Diaphorina Kuw***/ Dwiastuti, M.E. (Balai Penelitian Tanaman Jeruk dan Buah Subtropika, Malang); Kurniawati, M.Y. *Jurnal Hortikultura* (Indonesia). ISSN 0853-7097 (2007) v. 17(3) p. 244-252, 6 ill., 7 tables; 20 ref.

CITRUS; DIAPHORINA CITRI; PEST CONTROL; ENTOMOPATHOGENIC FUNGI; APPLICATION RATES; HIRSUTELLA; MORTALITY.

Diaphorina citri Kuw (Homoptera: Psyllidae) is one of the important pest in citrus, and the vector of CVPD disease. *D. citri* is normally controlled by using insecticide, parasitoid, predator, and insect pathogen. The control measured using insect pathogen, especially entomopathogen fungi has still being developed. The entomopathogen which was found attacking *D. citri* was *H. citriformis*. The research was intended to know which stadium of *D. citri* can be infected by *H. citriformis*. The study was design in a complete randomized factorial with 2 factors. The first factor was *D. citri* stadium, i.e. adults, nymphs instar 3, instar 4, and instar 5. While the second factor was concentration of *H. citiformis* conidium, consisted of control (untreated), 10^5 conidia/ml, 10^6 conidia/ml 10^7 conidia/ml, and 10^8 conidia/ml. The results showed that *H. citriformis* was more pathogenic on the adults of *D. citri* than the nymphs, and at 10^8 conidia/ml was the most effective concentration to kill *D. citri* with 11.72 days of mediuan lethal time. The pathogenicity of *H. citriformis* on *D. citri* was affected by concentration of conidia rather than *D. citri* stadium.

226 MIFTAKHUROHMAH

Effectiveness of citronella oil formula on the growth of mould from red papua and sambiloto. ***Efektivitas formula minyak serai wangi terhadap pertumbuhan kapang asal buah merah dan sambiloto***/ Miftakhurohmah; Noveriza, R.; Kardinan, A (Balai Penelitian Tanaman Obat dan Aromatik, Bogor (Indonesia)). *Buletin Penelitian Tanaman Rempah dan Obat* (Indonesia). ISSN 0251-0824 (2008) v. 19(2) p. 138-144, 5 ill., 1 table; 8 ref.

CYMBOPOGON; DRUG PLANTS; ESSENTIAL OIL; MOULDS; GROWTH.

Essential oil of citronella grass provides potential alternative as botanical control agents due to its main antifungal and antibacterial components, citronella and geraniol. The aim of this research was to find out the inhibitory capacity of citronella oil formula (water + emulsifier + 1% of citronella oil) against contaminant mould from fresh red papua (*Geotrichum* sp., *Fusarium culmorum*, *Ulocladium* sp. and *Fusarium* sp.) and from product of sambiloto powder (*A. flavus*). This experiment was conducted in Phytopathology Laboratory of Indonesian Medicinal and Aromatic Crops Research Institute (IMACRI) from December 2007 to April 2008. The research was performed by using 2 methods: (1) inhibitory zone with 20 micron l of citronella oil formula and the moulds from fresh red papua as contaminants and (2) petridish with serial dilution method, *A. flavus* as the mould and 0; 2; 5 and 10% doses of citronella oil formula. The analysis showed that citronella component in formula of citronella oil was 1.54%. The formula of citronella oil was able to reduce the growth of *Geotrichum* sp., *Fusarium culmorum*, *Ulocladium* sp. and *Fusarium* sp. The percentage of growth inhibition was 16.07-66.67% at the 7th day after treatment, the lowest was *Fusarium* sp, and the highest was on *Ulocladium* sp. The growth of *A. flavus* completely inhibited at 10% of citronella oil formula, while at doses 2% and 5% the growth of *A. flavus* was inhibited up to 11.78% and 13.85%, at the 5th day after treatment.

227 RUSTAM

Inoculation methods and inoculum densities tests of blood disease bacterium on banana. ***Uji metode inokulasi dan kerapatan populasi blood disease bacterium pada tanaman pisang***/ Rustam (Balai Pengkajian Teknologi Pertanian Riau, Pekanbaru (Indonesia)). *Jurnal Hortikultura* (Indonesia). ISSN 0853-7097 (2007) v. 17(4) p. 387-392, 2 ill., 3 tables; 19 ref.

MUSA PARADISIACA; INOCULATION; PSEUDOMONAS SOLANACEARUM.

An experiment was conducted to test inoculation methods and inoculum densities of blood disease bacterium (BOB) on banana under a glasshouse condition. Inoculation methods of BOB tested were root wounding, root without wounding, corm injection, and control. Inoculum densities of BOB tested were 10^7, 10^6, 10^5, 10^4, 10^3 cfu/ml and control. The results showed that corm injection and root wounding were gave similar disease incidence (100%). The incubation phase was faster for corm injection method than root wounding method. Inoculum densities of 10^4, 10^5, 10^6, 10^7 cfu/ml of BOB could develop disease incidence of 20%, 40%, 60%, and 100%, respectively.

228 WAHYUNO, D.

Morphological variance and virulence of *Phytophthora capsici* isolated from pepper plant. ***Variasi morfologi dan virulensi Phytophthora capsici asal lada***/ Wahyuno, D.

Manohara, D. (Balai Penelitian Tanaman Obat dan Aromatik, Bogor (Indonesia)); Susilowati, D.N. *Buletin Plasma Nutfah* (Indonesia). ISSN 1410-4377 (2007) v. 13(2) p. 70-81, 9 ill., 2 tables; 21 ref.

PIPER NIGRUM; PHYTOPHTHORA CAPSICI; PARASITIC PLANTS; FUNGI; PATHOGENICITY; ISOLATION.

Phytophthora capsici is the most important plant parasitic fungus causes stem rot disease in black pepper cultivation in Indonesia. The objective of the present study was to observe morphological variation and virulence of *Phytophthora* isolated on black pepper from various areas in Indonesia. Fifty isolates of *Phytophthora* were observed under light microscope. The observed morphological characteristics of each isolate, i.e. sporangiophore branching type, colony type, mating type and shape of sporangium after they were grown in growth medium of V8 juice agar, while length and width of sporangium, length of sporangiophore, and papilla were measured by micrometer. The variation of their virulence was observed by inoculating the hypha of each isolate on detached leaves of black pepper that incubated in damped boxes in room conditions. The width of necrotics were measured with leaf area meter after incubated for four days. The results indicated, those morphological characteristics of the isolates were vary in size, shape, colony pattern, mating type and sporangiophore branching pattern, which those characteristics were belong to *P. capsici*. Those morphological characteristics were not related with the mating type, isolated plant parts and its geographic distribution. The virulence of the tested isolates were also vary from low to high, and their virulence were also not related with the mating type, isolated plant parts and its geographic distribution.

H50 MISCELLANEOUS PLANT DISORDERS

229 PRABAWARDANI, S.
Effect of water stress on the yield and organic content of sweet potato (*Ipomoea batatas* (L) Lam.) tubers. *Pengaruh kekeringan terhadap hasil dan kandungan bahan organik ubi jalar (Ipomoea batatas (L) Lam.)*/ Prabawardani, S. (Universitas Papua (Indonesia), Fakultas Pertanian dan Teknik). *Agrivet* (Indonesia). ISSN 1410-3796 (2006) v. 10 (1) p. 68-76, 4 ill., 19 ref.

IPOMOEA BATATAS; VARIETIES; DROUGHT STRESS; STARCH; SUCROSE; YIELDS; GROWTH.

The research was aimed at observing the various levels of soil moisture content to the yield of tuber and its organic content (starch and sugar) of sweet potato cultivars. The research was carried out in the glasshouse with two sweet potato cultivars, Lole and Wanmun. Each cultivar was planted in the three levels of soil moisture (20%, 40% and 80% soil field capacity). The results showed that Lole cultivar was more tolerant to water stress than Wanmun cultivar. Wanmun cultivar produced the highest yield when planted under 80% soil field capacity. On the other hand, Lole was more tolerant to water stress by producing the greatest weight per tuber under 40% soil field capacity, which compare to tuber weight of Wanmun cultivar produced under 80% soil field capacity. Lole cultivar, therefore, demonstrated more tolerant to water stress than Wanmun. At harvest time, the sugar concentration increased, while starch concentration decreased. Under water stress, Lole cultivar produced sugar content greater and starch content lower than that of Wanmun cultivar.

J11 HANDLING, TRANSPORT, STORAGE AND PROTECTION OF PLANT PRODUCTS

230 FUADI, M.

Effect of benzyl adenine concentration on postharvest quality of *Dracaena sanderiana* and *Codiaeum variegatum*. *Pengaruh konsentrasi benzil adenin terhadap kualitas pascapanen Dracaena sanderiana dan Codiaeum variegatum*/ Fuadi, M.; Hilman, Y. (Universitas Muhammadiyah Medan (Indonesia). Pascasarjana). *Jurnal Hortikultura* (Indonesia). ISSN 0853-7097 (2008) v. 18(4) p. 457-465, 8 ill., 27 ref.

DRACAENA; CODIAEUM; BA; GROWTH; QUALITY; POSTHARVEST TECHNOLOGY.

The main objective of this study was to find out effects of benzyl adenine (BA) on the growth and quality retention of *Dracaena sanderiana* and *Codiaeum variegatum* during simulation of subsequent shipping conditions (in the dark chamber). Concentrations of BA applied were 0 (control), 75, 150, 225, and 300 mg/l. The results showed that the growth and plant quality of *D. sanderiana* and *C. variegatum* in terms of photosynthesis rate, stomatal conductance, chlorophyll content, plant height, and plant grade were significantly ($p<0.05$) affected by BA. The highest photosynthesis rate (6.74 micromol/m^2/sec.) and chlorophyll content were found on *D. sanderiana* sprayed with 300 mg/l BA, while *C. variegatum* gave the highest photosynthesis rate (5.40 micromol/m^2/sec.) at application of 150 mg/l BA. As expected, photosynthesis rate increased with higher chlorophyll content. The photosynthesis rate for both treatments were double compared to the other treatments. Stomatal conductance, leaf fresh weight, and plant grade were also significantly ($p<0.05$) affected with different concentrations of BA. Similar to the photosynthesis and chlorophyll content of *D. sanderiana*, plants sprayed with 300 mg/l BA showed a better growth response, while *C. variegatum* needs lower concentrations (150 mg/l BA). In order to obtain a good plant grade in term of leaf freshness, *D. sanderiana* and *C. variegatum* required BA concentration of 300 mg/l (4.50 = excellent quality) and 150 mg/l (4.17= excellent quality), respectively.

231 LOPPIES, J.E.

Fat content change trend of cocoa bean during storage. *Model perubahan kadar lemak biji kakao selama penyimpanan*/ Loppies, J.E.; Yumas, M. (Balai Riset dan Standardisasi Industri, Makassar). *Majalah Kimia* (Indonesia). ISSN 0126-0170 (2006) v. 34(1) p. 18-24, 1 ill., 3 tables; 18 ref

COCOA BEANS; STORAGE; LIPID CONTENT; MODELS; FERMENTATION.

The research to determine fat content change trend of cocoa bean during storage has been conducted, with treatments of fermentation and non fermentation of the beans. The method used to determine fat change trend is by mean of determination coefficient. The determination test will show the trend of fat change during 30 days storage, whereas to determine the correlation between fat content and storage time was used Product Moment Correlation Test and T-test to show the difference between the treatment. The results showed that there was a positive and significant correlation of fat content during storage time, whereas fermentation and non fermentation treatment was no significant (correlation negative). The result of determination test showed that the proper line trend to describe the fat change during storage was quadratic, in trend given by the equation: $Y = - 0.09X^2 +$

0.421X + 51.251

232 RAMLAH, S.
Drying of cashew nuts using a simple solar dryer to accelerate the shelling and peeling processes. ***Pengeringan mete (gelondong dan biji) dengan alat pengering surya sederhana untuk mempercepat proses pengupasan kulit***/ Ramlah, S.; Yunus, M.R. (Balai Besar Industri Hasil Perkebunan, Makassar (Indonesia)). *Jurnal Industri Hasil Perkebunan* (Indonesia). ISSN 1979-0023 (2007) v. 35(2) p. 58-62, 2 ill., 3 tables; 8 ref.

CASHEWS; NUTS; KERNELS; NATURAL DRYING; SHELLING; PEELING; ECONOMIC ANALYSIS.

Sun drying is a common method practiced by the small scale cashew nut processing industries. This process is applied prior to the shelling process. A study of drying cashew nut using a simple solar dryer to accelerate the shelling process of the nuts for small scale industry has been carried out. The time periods for shelling in terms of shelling and peeling capacity of the nuts using the solar dryer to reduce the moisture were compared with those using sun drying method. The results of this study showed that the use of the solar dryer could increase the shelling capacity of the nuts from 3 to 4 kg/hour/man at 4.93% moisture, and the peeling capacity of the kernels from 2.5 to 3.5 kg/hour/man at 3.74% moisture. Therefore, it was possible to save the shelling and the peeling costs by Rp 1,225.00 per kg cashew kernel.

233 THAMRIN, I.
Study on the pressure strength of candle nut shell toward drying durations of the nuts. ***Mempelajari kuat tekan kulit batok biji kemiri (Aleurites moluccana) terhadap waktu pengeringan biji***/ Thamrin, I. (Balai Besar Industri Hasil Perkebunan, Makassar (Indonesia)). *Jurnal Industri Hasil Perkebunan* (Indonesia). ISSN 1979-0023 (2007) v. 35(2) p. 42-46, 4 ill., 8 ref.

ALEURITES MOLUCCANA; NUTS; SHELL; DRYING; DURATION; PRESSURE; STRENGTH.

The process of shelling of candle nuts (*Aleurites moluccana*) which have been pre-treated before is to apply impact principles to break or crack the hard shell which covers the kernel. A study on the pressure strength of the candle nut shell toward drying durations of the nuts has been carried out. The nuts were taken randomly from Maros (Camba) Regency of South Sulawesi and from Mamuju Regency of West Sulawesi at the collector level. The drying of the nuts used an electrical oven at 70-80°C with the drying durations of 0, 2, 4, 6, and 8 hours, The pressing strength tests of the nuts shell used a pressing testing machine with 500 kg in capacity in which the nuts were set in vertical and in side horizontal positions each with 15 to 16 replication. As expected before, the pressure strength of the nut shell would decrease as the drying durations increased or as the moisture of the shell felt down. The average pressure strength reduction of the nut shell were 8.0 and 7.6 kg/hour of drying for the Maros (Camba) and Mamuju candle nut respectively for the nut vertical position and 9.1 kg and 4.8 kg respectively for the side-horizontal position. Without drying in the oven, the strength of the nut shell in the vertical nut position were 139.5 kg for the Maros (Camba) and 176.9 kg for the Mamuju candle nuts respectively. In the side-horizontal position, the strengths were 139.5 and 176,9 kg/hours of drying respectively.

K10 FORESTRY PRODUCTION

234 SIAGIAN, N.

Study of rubber sawntimber production at smallholder level. ***Studi produksi kayu karet gergajian di tingkat petani***/ Siagian, N.; Agung-Wibowo, S.; Suhendry, I.; Rachmawan, A.; Supriadi. *Jurnal Penelitian Karet* (Indonesia). ISSN 0852-808X (2006); v. 24(1) p. 1-16, 5 ill., 10 tables; 11 ref.

RUBBER; SAWNWOOD; WOOD PRODUCTION; SAWMILLS; CHEMICOPHYSICAL PROPERTIES; FOREST MENSURATION; FARMERS; ECONOMIC ANALYSIS.

Generally, rubber smallholder uses seedlings as planting material. Besides, it is lack of agromanagement practices (minimum weeding and no fertilizing) and does not follow the tapping requirements. The variation in rubber smallholder management causes variation in rubber growth and finally not all rubberwood could be used by rubberwood-based industry (low recovery). Location of rubber smallholder in remote area, far from wood-based industry and low recovery are the reasons for rubberwood buyer to determine low rubberwood price. Usually the price of old rubberwood is only determined by the buyer and the bargaining position of farmer is weak. The utilization of smallholder rubberwood could be increased if there is wood industry near the smallholder plantation or mobile sawmill in the center of smallholder rubber plantation. If smallholder rubberwood could be used by wood industry, then the smallholder income would increase that could be used as capital for replanting program. The objectives of this research were to examine the effect of plantation management level of smallholder on the sawntimber recovery and volume of sawntimber produced per hectare of rubber plantation. This research was carried out in rubber smallholder plantation that adopted different cultural managements. The first location was in the rubber smallholder plantation that used seedlings (rubber forestation). The second was in the rubber smallholder plantation that used clone and as control was the old rubber plantation in Sungei Putih Reseach Center. Variables observed were the condition of rubber smallholder plantation, plant density, tree growth, log volume, volume of sawntimber produced and simple financial analysis. The results showed that the smallholder rubberwood of both plantations (rubber forestation and clonal plantation) could be used for medium density fibreboard (MDF) production. Production of log of girth sized up to 30 cm of the rubber smallholder plantation ranged from 80.44 to 131.4 m^3/ha. It was estimated that from one hectare it could be produced as much as 35-58 m^3 MDF. The highest log volume per tree of 0.4061 m^3 was obtained on RRIM 600 clone, followed by PR 255, GT1, seedlings and BPM 107. Log volume per hectare was strictly influenced by tree density at the replanting time. From samples observed it was known that log volume per hectare ranged from 44.69 to 7.17 m^3. Sawntimber produced from one hectare of rubber smallholder varied from 11.45 to 18.81 m^3. The highest production was found on RRIM clone, followed by seedlings, PR 255, GT 1 and the lowest was on BPM 107 clone. Sawntimber recovery calculated from log ranged from 21.28 to 28.31%. Deep tapping could reduce sawntimber recovery. Smallholder income from old rubberwood in remote area could be increased by processing it into sawntimber using mobile sawmill. To help farmer do replanting of their old rubber tree, this method should be developed in collaboration with rubberwood industry.

L01 ANIMAL HUSBANDRY

235 KRISMAWATI, A.
Assessment on farming system technology of patchouli (*Pogostemon cablin* Benth) in dryland Central Kalimantan. ***Kajian penerapan teknologi usahatani nilam (Pogostemon cablin Benth) di lahan kering Kalimantan Tengah***/ Krismawati, A.; Bhermana, A. (Balai Pengkajian Teknologi Pertanian Kalimantan, Palangkaraya (Indonesia)). *Jurnal Pengkajian dan Pengembangan Teknologi Pertanian* (Indonesia). ISSN 1410-959X (2006) v. 9(2) p. 160-173, 1 ill., 30 tables; 30 ref.

POGOSTEMON CABLIN; ECONOMICS; INCOME; FARMING SYSTEMS; TECHNOLOGY; ARID ZONES; FERTILIZER APPLICATION; COST BENEFIT ANALYSIS; AGRONOMIC CHARACTERS; KALIMANTAN.

Patchouli oil is utilized for perfume, raw material for cosmetic industries, pharmaceutical and preservatives due to antifungal and anti bacterial properties. The increase of patchouli oil productivity and quality could be attained by applying appropriate technology such as high yielding varieties, cultural practice, processing as well as postharvest technology. In addition, the strengthening of institutional and marketing system is also required. According to that circumstances, AIAT of Central Kalimantan conducted an assessment on selected five cooperator farmers due to the various studies as follows: plant growing, productivity and farmers income, processing and raw material handling, institutional and marketing. Social and economic analysis consisted of R/C, B/C, MSCR, Net B/C and NPY. The marketing analysis for patchouli used desk study approach as reviewed of various literatures and survey. Data collecting and analysis used participatory rural appraisal (PRA). The result of this assessment showed that (a) Introduced technology was able to increase patchouli oil yield by 2.16 point, i.e. 117.60 kg/ha compared with 54.50 kg/ha, (b) introduced technology could improve profit value added by Rp 11,043,875/harvest/ha with R/C of 2.09; B/C 1.07; MBCR 2.38; Net B/C 1.95 and NPY Rp 9,086,910, respectively. To accelerate technology innovation, it needs supply of affordable input close to the farm areas, direct supervision, and periodic monitoring. The problems on producing-farmers were lack of extension in plant practice, harvest and postharvest. While on intermediate sellers and owners of patchouli oil processing industry were lack of knowledge on patchouli oil processing technology.

236 WIRDAHAYATI, R.B.
Improving buffalo milk production to sustain the production of dadih by small farmers in West Sumatra. ***Upaya peningkatan produksi susu kerbau untuk kelestarian produk dadih di Sumatera Barat***/ Wirdahayati, R.B. (Balai Besar Pengkajian dan Pengembangan Teknologi Pertanian, Bogor (Indonesia)). *Wartazoa* (Indonesia) ISSN 0216-6461 (2007) v. 17(4) p. 178-184, 22 ref.

WATER BUFFALOES; MILK; FEEDS; SUPPLEMENTS; SUMATRA.

The swamp buffalo which is found in many Asian regions is mainly raised for meat and draft purposes. However, in West Sumatera, it is also milked and the milk is mostly consumed as "dadih", a well known traditional product from this area. Dadih is actually a product made from fresh buffalo milk, which is kept in bamboo tube for about 2-3 days under room temperature, without any application or addition of bacteria starter although the end product of this fermentation contains various bacteria, mould and khamir. As the natural fermented milk product, dadih is white in colour and the curd texture like tofu, tastes like yoghurt, and it is generally served as a complementing meal in some traditional occasion as well as

delicacy from West Sumatra. Dadih is highly nutritive product, protein and fat contents are higher than those of yoghurt, rich in amino acids and bacteria such as *Lactobacillus* sp. and low in cholesterol. The raw material for dadih is limited due to the low productivity of fresh buffalo milk which is generally collected for about 0.5-2.0 litres/head/day. The effort in sustaining "dadih product" is directed to the improving the management of the buffalo condition particularly those in lactating period. Feeding improvement is recommended in order to provide an adequate milk for raising its calf and to be milked for making dadih and to support the optimal reproductive activity of the buffalo dam. In future, the assessment on "dadih" should also include the packaging improvement which can improve and prolong the storage time for the benefit of marketing purposes.

L02 ANIMAL FEEDING

237 GARSETIASIH, R.
Digestibility of corn and grass as deer feed (*Cervus timorensis*). *Daya cerna jagung dan rumput sebagai pakan rusa (Cervus timorensis)*/ Garsetiasih, R. (Pusat Penelitian dan Pengembangan Hutan dan Konservasi Alam, Bogor (Indonesia)). *Buletin Plasma Nutfah* (Indonesia). ISSN 1410-4377 (2007) v. 13(2) p. 88-92, 4 tables; 12 ref.

CERVUS; MAIZE; FEED GRASSES; RATIONS; DIGESTIBILITY; ANIMAL FEEDING; ANIMAL HUSBANDRY METHODS. CERVUS TIMORENSIS.

The experiment was done on two couples of deer to determine digestilibities and consumption of grass and corn. Each heads of deers of 12-14 months, each couple was managed on difference model of stable (mini ranch and traditional stable) the grass was kept available to deers during the periods of observation and corn was given every two days (250 g). Description analysis and Tillman et.al. formula (1984) were implemented to know the level of consumption and digestibility of feed on difference model of stable. Quantitatively, the deers on the mini ranch were the best; the digestilibities of its constituents were 58.4% crude fibre; 58.9% organic matter and 47.7% dry matter, digestilibities on the traditional stable were 49.2% crude fibre; 52.2% organic matter and 50.7% dry matter. Feed consumption of the deers on the mini ranch and traditional stable were 1,570 kg and 1,440 kg.

238 MULLIK, M.L.
Supplementation strategies to improve efficiency of rumen microbial protein synthesis on cattle fed with tropical grass hay. *Strategi suplementasi untuk meningkatkan efisiensi sintesis protein mikroba rumen pada ternak sapi yang mengkonsumsi rumput kering tropis*/ Mullik, M.L. (Universitas Nusa Cendana, Kupang (Indonesia). Fakultas Peternakan). *Jurnal Ilmu Ternak dan Veteriner* (Indonesia). ISSN 0853-7380 (2006) v. 11(1) p. 15-23, 4 tables; 44 ref.

CATTLE; MICROBIAL PROTEINS; RUMEN; SUPPLEMENTS; FEED GRASSES; HAY; DIGESTIBILITY.

This experiment aimed at increasing rumen microbial protein supply into intestine through ration manipulation. Four Santa Gertrudis steers with a mean liveweight (W) of 218 (±5.6) kg were used in a latin square design (4x4) to observe the effect of four diets on the efficiency of rumen microbial protein synthesis (MPS). The steers were given pangola grass

hay (8.5% protein) as the basal diet. The treatments were: 1) only pangola grass hay (KON), 2) pangola grass hay + 19 g urea/kg dry matter (DM) hay (URE), 3) same as for URE treatment + a supplement mix at 0.5% W (SUP), and 4) same as for SUP treatment + salt at 0.15% W (SUG). Urea was added into the hay to support a theoretical MPS of 160 g MCP/kg digestible organic matter (DOM) whereas supplement mix contains fast, medium, and slow rumen fermentable energy and protein to synchronize energy and protein release in the rumen. Salt was added to alter passage rate of digesta. Addition of urea merely or with supplement mix increased MPS significantly compared to KON (77 g MCP/kg DOM) but no difference between URE (199 g MCP/kg DOM) and SUP (110 g MCP/kg DOM). Addition of salt into supplement mix increased MPS by 84% (140 g MCP/kg DOM). It might be concluded that rumen degradable protein (RDP) was deficient in steers fed low quality grass hay hence urea supplementation significantly increased MPS to a similiar extent as that of the supplement mix formulated to have a synchrony in protein and energy release. Increasing fluid dilution rate, by adding salt, also had a dramatic effect on MPS as observed in treatment SUG. It increased up to the level suggested in the internasional feeding standards.

239 WIDJAJA, E.

Oil palm byproduct as an alternative feedstuff in Central Kalimantan: 1. The effect of feeding palm oil mill effluent on broiler's performance. ***Produk samping kelapa sawit sebagai bahan pakan alternatif di Kalimantan Tengah: 1. Pengaruh pemberian solid terhadap performans ayam broiler***/ Widjaja, E.; Utomo, B.N. (Balai Pengkajian Teknologi Pertanian Kalimantan Tengah, Palangkaraya (Indonesia)); Piliang, W.G.; Rahayu, I. *Jurnal Ilmu Ternak dan Veteriner* (Indonesia). ISSN 0853-7380 (2006) v. 11(1) p. 1-5, 1 ill., 4 tables; 15 ref

BROILER CHICKENS; FEEDS; OIL PALMS; OIL MILL BYPRODUCTS; PROXIMATE COMPOSITION; WEIGHT GAIN; FEED CONVERSION EFFICIENCY; MORTALITY; KALIMANTAN.

Palm oil mill effluent as a byproduct of crude palm oil processing, is found in an excessive amount in Central Kalimantan. It is estimated that 400 ton of these materials was produced per day by crude palm oil (CPO) factory in this region. This material contained 12.63-17.41% crude protein, 9.98-25.79% fiber, 7.12-15.15% crude fat and 3217-3454 kCal/kg (gross energy). An experiment was conducted on broiler chickens of hubbard strain in Kapuas District. The objective of the experiment was to study the performance of broilers fed solid in the diet. The experiment was arranged in a completely randomized design. The treatment was level of solid in the diet, i.e., 12.5, 25.0 and 37.5%. Four hundred broilers were divided into 4 treatment groups with 5 replications, consisted of 20 chickens in each replication. The results of this experiment showed that diet containing 12.5, 25.0 and 37.5% of solid respectively produced final live weight of broilers 2508, 2229 and 1880 g, respectively, whereas control (0.0% of solid) was 2,712 g. Feed conversion of the treatments were 2.39, 2.76, and 3.24, respectively and without solid as control was 2.36. It is concluded that diet containing 12.5% of solid can be used in broiler ration.

240 YADNYA, T.G.B.

Effect of substitution of rice bran with rice hull or wood sawdust supplemented with starbio on feed efficiency and uric acid concentration in the blood of balinese duck. ***Pengaruh penggantian dedak padi dengan sekam padi atau serbuk gergaji kayu yang disuplementasi dengan probiotik terhadap efisiensi penggunaan ransum dan kadar asam urat darah itik bali***/ Yadnya, T.G.B.; Sukmawati, N.M.S. (Universitas Udayana, Denpasar

(Indonesia). Fakultas Peternakan). *Majalah Ilmiah Peternakan* (Indonesia). ISSN 0853-8999 (2006) v. 9(2) p. 40-44, 5 tables; 18 ref.

DUCKS; FEEDS; PROBIOTICS; SUPPLEMENTARY FEEDING; RICE HUSKS; RATIONS; WOOD CHIPS; BYPRODUCTS; BLOOD COMPOSITION.

This experiment was carried out to study the effect of substitution of rice bran with rice hull or wood sawdust supplemented with starbio on feed efficiency and uric acid concentration in the blood of balinese ducks at Gianyar, Bali. This experiment was designed in a completely randomized design (CRD) with three treatments. Each treatment consisted of four replicates at four ducks each. The treatment were diets without rice hull or wood sawdust supplemented with starbio as control (A), diets which contained substitutions of 50% rice bran with rice hull supplemented with starbio (B), and wood sawdust supplemented with starbio (C), respectively. Feed and water was offered ad libitum. Result of this experiment showed that body weights and feed efficiencies in treatment B and C were decreased and were significantly different ($P<0.05$) on the control (A), but feed and water consumptions were increased ($P<0.05$). Uric acid concentration in the blood of treatment B was increased ($P<0.05$), but in treatment C was decreased and was significantly different ($P<0.05$) than control (A). It was concluded that subtitution of 50% rice bran with rice hull or wood sawdust supplemented with starbio probiotics decreased body weight and feed efficiencies. Uric acid concentration in the blood of duck was increased with rice hull, but was decreased with wood sawdust supplemented with starbio.

L10 ANIMAL GENETICS AND BREEDING

241 HERIANTI, I.

Exploitation of swamp buffaloes for development and conservation of germplasm resources: the case study in Kendal Central Java (Indonesia). ***Pemanfaatan ternak kerbau dalam upaya pengembangan dan pelestarian sumber daya plasma nutfah studi kasus di Kabupaten Kendal Jawa Tengah***/ Herianti, I.; Pawarti, MD.M.; Prawirodigdo, S. (Balai Pengkajian Teknologi Pertanian Jawa Tengah, Ungaran). Proceedings of the seminar on agricultural technology innovation transfer for development rural industrial agribusiness in marginal areas: innovation of production technology. Book 2, Semarang, 8 Nov 2007/ Muryanto; Prasetyo, T.; Prawirodigdo, S.; Yulianto; Hermawan, A.; Kushartanti, E.; Mardiyanto, S.; Sumardi(eds.) Bogor (Indonesia): BBP2TP, 2007 p. 183-190, 1 ill., 4 tables; 12 ref.

WATER BUFFALOES; GERMPLASM CONSERVATION; POPULATION STRUCTURE; REPRODUCTIVE PERFORMANCE; DEVELOPMENT; JAVA.

Refering to their high adaptability, development of swamp buffaloes can be implemented in several kinds of agroecosystem even in dryland with available the mudholes. Therefore, the development of swamp buffalo in marginal area can be considered. The swamp buffalo is one of germplasm resources having a socio-economical role for farmer. The mechanization in agricultural development reduces role of swamp buffalo as animal worker although it was still exist in several areas. The study was conducted in Kedungsuren, West Kaliwungu Subdistrict, Kendal, Central Java. The considerable bull's trading caused reduction of utilizating young of bulls for mating the females and declining productivity of livestock. The scarcity of the bulls will also caused long calving interval. Although it was categorized in

secure status, the fact that population of swamp buffalo was declining year by year should be overcome. The development and sustainable exploitation of swamp buffaloes resource will be needed some actions, that are increasing productivity through improvement of raising management and reproduction, genetic quality with introducing superior breeds from selection product, servicing animal health, empowering livestock frmers by improving the groups cooperation, establishment and assistance through increasing performance of extension and dissemination, financial capital support, mapping of the deve!opment location adjusted to the carrying capacity of resources, policies support such as slaughter control and livestocks traffic.

242 ISKANDAR, S.
Effect of kinds and concentration of cryoprotectant and thawing methods on frozen semen of arab chicken. ***Pengaruh jenis, konsentrasi krioprotektan dan metode thawing terhadap kualitas semen beku ayam arab*****/** Iskandar, S.; Mardalestari, R.; Hernawati, R.; Mardiah,; E. Wahyu, E. (Balai Penelitian Ternak, Ciawi (Indonesia)). *Jurnal Ilmu Ternak dan Veteriner* (Indonesia). ISSN 0853-7380 (2006) v. 11(1) p. 34-38, 3 tables; 19 ref.

CHICKENS; SEMEN; SEMEN PRESERVATION; CRYOPROTECTANTS; THAWING; MOVEMENT; QUALITY.

The success of freezing chicken semen is the hope for preserving Indonesia native chickens. Semen from twenty arab roosters were collected using massage technique once in a week. Cryoprotectant DMA (dimethyl acetamide) or DMF (dimethyl formaldehyde) of 7 or 9% and thawing A at temperature of 30^{o}C for 30 seconds or in B at 5^{o}C for 5 minutes. The volume of fresh semen was 0.3 ± 0.072 ml/ejaculate, white colour, rather thick to thick, with 2,200 ± 372 millions sperms/ml and pH 6.95 ± 0.32, 4+/3+ mass movement, 80% motility, 84 ± 4.48% and abnormality of 14.75 ± 1.28%. There were not statistically significant (P>0.05) effect of interaction of treatments (kinds and concentrations of cryoprotectant, and thawing methods) on motility and live-sperms. Sperm motility preserved with DMA (34.69%) was significantly higher than that with DMF (29.84%). Sperm motility was also significantly higher (34.53%) when preserved with 7% cryoprotectant than that with 9% (30%). Thawing-A significantly gave higher motility (35.31%) than thawing -B (29.22%). Live-sperms of semen preserved with DMA (46.75%) was significantly higher than that with DMF (41.72%). Cryoprotectant concentration of 7% gave higher live-sperms (46.98%) than of 9% (41.48%). Thawing-A left live-sperms of 47.14%, which was significantly higher than thawing-B (41.30%).

L20 ANIMAL ECOLOGY

243 INOUNU, I.
Lambing behaviour of garut ewes and its crosses with St. Croix and Moulton Charollais. ***Tingkah laku beranak domba garut dan persilangannya dengan St. Croix dan Moulton Charollais*** / Inounu, I. (Balai Penelitian Ternak, Ciawi (Indonesia)); Kurniawan, W.; Noor, R. *Jurnal Ilmu Ternak dan Veteriner* (Indonesia). ISSN 0853-7380 (2006) v. 11(1) p. 39-51, 6 ill., 9 tables; 17 ref.

EWES; PARTURITION; BEHAVIOUR; CROSSBREDS; BODY WEIGHT; BIRTH WEIGHT; PARTURITION INTERVAL.

Lamb mortality is highly related to ewe behavior at lambing. The purpose of this research was to study ewe lambing behavior and lamb behavior after birth of garut (GG) sheep and its crosses with St. Croix (HH) and Moulton Charollais (MM). The number of observation were

106 heads, consisted of 32 GG; 23 of HG; 14 of MG; 31 of MHG and 6 of HMG crossed ewes. Analysis of variance of general linear model (GLM) for different number of sample was used to study ewe behavior of different group of ewes. Linear regression was used to analyze relationships between lambing behavior; times from birth to stand up and ewe body weight. While relationship between labor time and parity or type of birth were analyzed descriptively. Before lambing, ewes stood up, laying down, walked in circle, vocalized, urinated, flehmened, and pawed. HG and HMG ewes stood up less often than other breeds ($P<0.05$). Lambing time was distributed randomly for GG, HG, MG and MHG ewes, but HMG ewes was mostly lambed at night (66.67%). Labor time of HMG ewes was significantly shorter than other breeds ($P<0.05$) and was not affected by birth weight, birth type and neither by parity. The ewes generally lambed in lay down position. After lambing, ewe normally stood up and cleaned the lamb immediately. The cleaning generally begin from the head progressed down to the whole body. The success for lamb to stand up was not significantly different among breeds.

L51 ANIMAL PHYSIOLOGY AND BIOCHEMISTRY

244 BELLI, H.L.L.

Pre and postcalving supplementation of multinutrient blocks on lactation and reproductive performances of grazing bali cows. ***Suplementasi blok multinutrien terhadap laktasi dan tampilan reproduksi dari induk sapi bali yang digembalakan sebelum dan sesudah melahirkan***/ Belli, H.L.L. (Universitas Nusa Cendana, Kupang (Indonesia), Fakultas Peternakan). *Jurnal Ilmu Ternak dan Veteriner* (Indonesia). ISSN 0853-7380 (2006) v. 11(1) p. 6-14, 4 ill., 4 tables; 30 ref.

BEEF CATTLE; NUTRIENTS; SUPPLEMENTS; LACTATION; BODY WEIGHT; REPRODUCTIVE PERFORMANCE; GRAZING; MILK PRODUCTION; OESTRUS

The influence of multinutrient blocks during pre and postcalving on lactation and reproductive perfomances of bali cows were evaluated. Seventeen multiparous pregnant cows with body condition score (BCS) 1 to 2, approximately 90 d before the expected date of calving, were divided randomly into groups A (n=9) and B (n=8), and were grazed on the native pasture as a basal diet, while those of Group B received 1.25 kg multinutrient blocks, consisting of molasses (28%), urea (5%), coconut cake (15%), fishmeal (5%), rice bran (25%), lime (8.5%), salt (7.5%), grit (5%) and ultramineral (1%). Cows were weighed and assessed for BCS (on a five-points scale) every two weeks, commencing at 12 weeks prior to calving, within 24 h after calving up to 16 weeks after calving. Milk production and composition were assessed by the weighed-suckle-weighed technique four times, i.e. 2, 4, 8 and 12 weeks after calving. Suckling behavior, i.e frequency of suckling, duration of nursing and total time nursed were observed 6 times in the course of lactation at weekly intervals commencing at 1 week after calving. Calf birth weight was measured within 24 h after calving and continued at weekly intervals until 12 weeks of age. Uterine involution was determined by rectal palpation at 7 d postcalving. The interval from calving to first oestrus was monitored by oestrus observation twice a day. Conception at first service was assessed by pregnancy diagnosis 45 to 60 d after insemination. Cows fed multinutrient blocks supplement had higher liveweight, BCS throughout the experiment. The cows produced significantly more milk and had higher growth rates of the calves than the unsupplemented cows. The mean values of the characteristics of suckling were influenced by supplementation. The rate of uterine involution and conception to first service were similar

in the two treatment groups, but interval from calving to the exhibition of the first oestrus was shorter in supplemented cows.

245 PAMUNGKAS, D.
Changes in rumen ecosystem and feed dry matter degradability of buffalo which received rumen content of cattle through cross inoculation. ***Perubahan ekosistem rumen dan kecernaan bahan kering pakan pada kerbau yang mendapat transfer isi rumen sapi melalui inokulasi silang***/ Pamungkas, D. (Loka Penelitian Sapi Potong, Grati (Indonesia)); Sevilla, C.C; Lustria, U.M. *Jurnal Ilmu Ternak dan Veteriner* (Indonesia). ISSN 0853-7380 (2006) v. 11(1) p. 24-33, 1 ill., 7 tables; 40 ref.

DOMESTIC BUFFALOES; RUMEN; FEEDS; BIODEGRADABILITY; RUMEN DIGESTION; RUMEN MICROORGANISMS.

The research was done to identify changes in rumen ecosystem of buffalo which received rumen content of cattle. As much as three head of fistulated male buffaloes (live weight of 450-550 kg) and three fistulated female cattle (live weight of 250-380 kg) were used. This experiment was done three stages as follows: preinoculation, inoculation and postinoculation. In preinoculation, the sample of rumen content was taken two hours before morning feeding and directly observed for pH rumen liquor, ammonia nitrogen (NH_3-N) and total volatile fatty acid (VFA). During the last three days of the first week of pre and postinoculation, the in situ dry matter digestibility was conducted. The samples were incubated for 0, 3, 6, 9, 12, 24, 48 and 72 hours in the rumen of the experimental animals. Napier grass, leucaena, and wheat pollard were incubated separately in the nylon bags to determine DM digestibility. The cross inoculation (total of rumen content) was done less than 10 minutes. In postinoculation, the sample of rumen content was taken at two hours before morning feeding as long as two days of two weeks after inoculation. Changes in rumen ecosystem (pH, NH_3-N and total VFA) were tested by using completely randomized design. Result showed that the transfer of rumen content from cattle to buffalo significantly reduced the pH level in the rumen of buffalo. However, it had no significant effect on the ammonia concentration in the rumen of buffalo and showed significantly decreased of bacteria, but it did not affect the total count of protozoa and fungi. The transfer of rumen content from cattle to buffalo significantly decreased the value of insoluble and potential digestible fraction of leucaena. The DM effective degradability of napier grass was significantly increase ($P<0.05$) within outflow rate 0.02 and 0.04/h after cross inoculation. In wheat pollard, a significantly decrease ($P<0.05$) was occurred when outflow rate was observed at 0.04, 0.06 and 0.08/h.

L52 ANIMAL PHYSIOLOGY – GROWTH AND DEVELOPMENT

246 SUTHAMA, N.
Physiological function development of digestive tract of starting kedu chicken. ***Perkembangan fungsi fisiologis saluran pencernaan ayam kedu periode starter***/ Suthama, N.; Ardiningsasi, S.M. (Universitas Diponegoro, Semarang (Indonesia). Fakultas Peternakan). *Majalah Ilmiah Peternakan* (Indonesia). ISSN 0853-8999 (2006) v. 9(2) p. 35-39, 2 tables; 17 ref.

CHICKENS; DIGESTIVE SYSTEM; PHYSIOLOGICAL FUNCTIONS; YOUNG ANIMALS; ENZYME ACTIVITY.

Kedu chickens, as an indigenous poultry type in Central Java, are believed to have higher genetic potential when compared to other native chickens, but scientific investigation is very limited. Either in situ or ex situ breeding methods of kedu chickens indicated high mortality with low productivity. The present study evaluated the physiological function of digestive tract based on the activity of total protease enzymes in the small intestine and pancreas, weight and length of small intestine of kedu chickens obtained from an in situ breeding system. The improvement of the digestive tract growth indicates the ability of nutritional uptake to meet the requirements for maintenance, production and health. Studies on digestive tract development followed the pattern of age difference (time course) starting at 2 weeks of age (2 weeks interval) and completed at 10 weeks. The total number of chickens used in the present study were 100 birds (divided into 4 groups representing replication) and were decapitated at 2 weeks intervals. Age or time of observation was created as experimental treatment. Activity of total proteases enzyme in the intestine and pancreas, weight and lenght of intestine were the parameters observed in the presen study. Activity of total proteases was measured according to the method of Colowick and Kaplan (1985). Data was subjected to analysis of variance and continued to the Duncan test to compare between time or age of observation. In order to estimate the maximum development of the digestive tract in relation to enzyme activity, the activity of total proteases was tested by regression analysis. The results showed that the activity of total proteases enzyme, as an indicator of physiological development of the digestive tract, increased significantly ($P<0.05$) both in the small intestine and pancreas with increasing age. Weight and lenght of the intestine, were significantly increased ($P<0.05$) with increasing age until 10 weeks old, except length of intestine between the ages of 2 and 4 weeks. The increase in total proteases activity at 8 or 10 weeks old chickens between 3-3.5 and 4-4.5 times higher for small intestine and pancreas, respectively, as compared to that of young chickens (2 weeks old). In general, it was observed that the physiological development rate of smal intestine was increased by age, but the increase in length tended to be slow in young chickens.

L53 ANIMAL PHYSIOLOGY - REPRODUCTION

247 ARIFIANTINI, R.I.

Morphological and morphometrical aspects of swamp buffalo (Bubalus bubalis) sperm collected with the massage technique. ***Tinjauan aspek morfologi dan morfometri spermatozoa kerbau rawa (Bubalus bubalis) yang dikoleksi dengan teknik masase***/ Arifiantini, R.I.; Ferdian, F. (Institut Pertanian Bogor (Indonesia). Fakultas Kedokteran Hewan). *Jurnal Veteriner* (Indonesia). ISSN 1411-8327 (2006) v. 7(2) p. 83-91, 5 ill., 3 tables; 17 ref

WATER BUFFALOES; SPERMATOZOA; ANIMAL MORPHOLOGY; SEMEN COLLECTION; MEASUREMENT.

The objectives of the research were to study the sperm morphology and morphometry of swamp buffaloes spermatozoa kept on swampy river banks of South Kalimantan. Semen was collected from seven buffalo bulls by the massage technique at the accessory gland and ampulla was deferens region. The collected semen was then stained using 2% eosin. Sperm morphology was evaluated using biological microscope, 200 cells for each bull. Morphometry of spermatozoa was conducted by using micrometer, the length and width of sperm head and the length of the tail were measured on 200 cells for each bull. Result of the research indicated that the total sperm abnormality of the swamp buffalo bull was 31.86%,

with primary and secondary abnormalities of 9.93% and 21.93%, respectively. Sperm head length and width were 6.24 ± 0.33 and 3.31 ± 0.37 µm. The total tail length was 42.47 µm, with the length of middle; principle piece were 10.07 ± 0.10 µm and 32.4 ± 1.62 µm, respectively. It is concluded that the sperm morphology of the swamp buffalo kept in river banks of South Kalimantan was not better than that of other swamp buffaloes.

248 HERIANTI, I.
Sustainable rabbit raising by reproduction efficiency for fulfilled familys nutrition. ***Budidaya kelinci secara rasional berkelanjutan melalui efisiensi reproduksi untuk memenuhi gizi keluarga***/ Herianti, I. (Balai Pengkajian Teknologi Pertanian Jawa Tengah, Ungaran (Indonesia)). Proceedings of the seminar on agricultural technology inovation transfer for development rural industrial agribusiness in marginal areas: innovation of production technology. Book 2, Semarang (Indonesia), 8 Nov 2007 / Muryanto; Prasetyo, T.; Prawirodigdo, S.; Yulianto; Hermawan, A.; Kushartanti, E.; Mardiyanto, S.; Sumardi(eds.) Bogor (Indonesia): BBP2TP, 2007 p.174-182, 3 ill., 4 tables; 12 ref.

RABBITS; ANIMAL HUSBANDRY; REPRODUCTIVE PERFORMANCE; HUMAN NUTRITION.

Unsuitable management of land will be declined in quality of resources. therefore in marginal area especially. need full farmland exploitation that can be improved productivity of land, as continuously source of income and source of food all at once. Rabbit raising is alternative income for farm household and full fill animal protein requirement for a village people which never slaughter their cattles. Rabbits are species of livestock has potential healty-meat production with lower fat and higher protein content than cow. sheep. goat or pig. In addition to produce several kinds of product (meat. full and manure). rabbit as a prolific and fast growing animal with short gestation period have an competitive opportunity as a meat production substitute chicken meat in hurly-burly incidence of Avian Influenza. Household scale raising with the possession of rabbits are 6 head (ratio buck to doe is I : 5) able to prepare the meat continuously. slaughter one rabbit evelY other days begins at 6th month. The number of rabbit population have been settled ranges from 60 to 90 head. Low investment and operating cost, if converted the operating cost to purchase of chicken meat able to thrifty about 41,8%. The kinds of feed selection must be adjust with available sources around the farmers. The herbage cut from harvested rice field and other area. vegetable waste and rice bran makes the rabbit an ideal species for village production. One of the major constrains in the rabbit farming development is unwillingness to consuming rabbit meat, nevertheless from the aspect of taste is not matter. Attempt promoting to eat and processing rabbit meat product to become attractive product and financial capital support can be applied to rabbit farming development for achieving standard of animal protein which have proclaimed. The technological innovation to process of rabbit waste as organic fertilizer be needed introduce to develop integrated crop-livestock system and caused the farmers autonomically to exploite limited land resourches.

249 PIRAKSA, I W.
Effect of FSH (follicle stimulating hormone) and LH (luteinizing hormone) injection on bali duck delayed egg production on ovarium weight, follicle growth and oviduct weight. ***Pengaruh penyuntikan FSH (follicle stimulating hormone) dan LH (luteinizing hormone) terhadap berat ovarium, jumlah folikel yang berkembang dan berat saluran reproduksi itik bali yang mengalami keterlambatan masa produksi***/ Piraksa, I W.; Bebas, W. (Universitas Udayana, Denpasar (Indonesia). Fakultas Kedokteran Hewan); 9 tables; 10 ref. *Jurnal Veteriner* (Indonesia). ISSN 1411-8327 (2006) v. 7(2) p.75-82

DUCKS; REPRODUCTIVE PERFORMANCE; OVARIES; OVARIAN FOLLICLES; HORMONES; FSH; LH; FERTILIZATION.

The objective of this study was to find out the effect of FSH and LH injection into bali duck with delayed egg production on ovarium weight, follicle growth and oviduct weight. The experimental design used in this study was a completely randomized design with four groups. Group I (T_0) : 0.1 ml PBS (phosphate buffer saline), Group II (T_1) : 5 IU FSH with eight times injection of 0.625 IU at twelve hours interval for four days, Group III (T_2) : injection 10 IU FSH with eight times injection of 1.25 IU FSH at twelve hours interval for four days, Group IV (T_3) : 20 IU FSH with eight time injection of 2.5 IU FSH at twelve hours interval for four days. Each group was injected with various concentration of LH i.e. : 0 IU (T_0), 5 IU (T_1), 10 IU (T_2), and 20 IU (T_3). Twelve hours after the LH injection the treated ducks were killed and examined for the ovarium weight, follicle growth and oviduct weight. The result showed that the FSH and LH injection into Bali duck with delayed egg production could significantly increased ($P<0.01$) ovarium weight, follicle growth and oviduct weight.

250 SUYADNYA, P.
Effect of time and frequency of mating to the number and mortality of embryos in bali gilts. ***Pengaruh waktu dan frekuensi kawin terhadap jumlah dan kematian embrio pada babi bali dara***/ Suyadnya, P. (Universitas Udayana, Denpasar (Indonesia), Fakultas Peternakan). *Majalah Ilmiah Peternakan* (Indonesia). ISSN 0853-8999 (2006) v. 9(2) p. 64-67, 1 table; 16 ref

SOWS; REPRODUCTIVE PERFORMANCE; COPULATION; SEXUAL BEHAVIOUR; FOETAL DEATH; MORTALITY; OESTRUS.

The aim of this study was to ascertain the proper time and frequency of mating of bali gilts to minimize embryonic mortality. A total of 18 bali gilts and one mature bali boar were used on this study. The study used completely randomized design (CRD) with three treatments and six replications. Treatment 1 (T1) was a single mating on day-1 of oestrus; treatment 2 (T2) was a single mating on day-2 of oestrus; treatment 3 (T3) was double mating on day-1 and day-2 of oestrus. Calculations on the number and mortality of embryos were carried out on day-25 of gestation. The percentage of embryonic mortality was known by calculating the difference between the number of corpora lutea in the ovary and number of embryos in the uterus divided by the number of corpora lutea in the ovary, multiplied by 100%. The result of this study showed that the average number of embryos in bali gilts in T1, T2, and T3 was 2.66, 7.00, and 7.17 embryos, whereas the average mortality of embryos in T1, T2 and T3 was 70.14%, 24.45%, and 21.13%, respectively. There was a significant ($P<0.05$) increase in the embryo number when a single mating was conducted on day-2 of oestrus and highly significant ($P<0.01$) when a double mating was conducted on day-1 and day-2 of oestrus in bali gilts. On the contrary, there was a highly significant ($P<0.01$) decrease in embryo mortality both on a single mating on day-2 of oestrus or a double mating on day-1 and day-2 oestrus compared to a single mating on day-1 of oestrus.

L72 PESTS OF ANIMALS

251 AHMAD, R.Z.
Reduction potency of ***Duddingtonia flagrans*** **and** ***Saccharomyces cerevisiae*** **fungi against larvae** ***Haemonchus contortus*** **in sheep.** ***Daya reduksi cendawan Duddingtonia***

flagrans dan Saccharomyces cerevisiae terhadap larva cacing Haemonchus contortus pada domba/ Ahmad, R.Z. (Balai Besar Penelitian Veteriner, Bogor (Indonesia)); Satrija, F.; Sukarno, N; Pasaribu, F.H. *Jurnal Veteriner* (Indonesia). ISSN 1411-8327 (2007) v. 8(1) p. 36-40, 2 tables; 20 ref.

SHEEP; HAEMONCHUS CONTORTUS; LARVAE; BIOLOGICAL CONTROL; SACCHAROMYCES CEREVISIAE; REDUCTION; ANTHELMINTICS.

One of the problems in sheep is worm disease (Haemonchosis) caused by *Haemonchus contortus* nematode. Commonly the control of the disease is done by using anthelmintic chemical. The biological control was done by using *Duddingtonia flagrans* and *Saccharomyces cerevisiae* fungi. This research was done in two experiments as followed: the first experiment, 20 sheep were divided into 4 groups. Each group (5 sheep) for 5 weeks was treated following; (A) group as the control; (B) group was given 1 x 10^6 *D. flagrans*; (C) group was given 1 x 10^6 *S. cerevisiae*; and (D) group was given 1 x 10^6 *D. flagrans*, and 1 x 10^6 *S. cerevisiae*. The second experiment was done by using uninfected 5 sheep with (nil) EPG of *H. contortus*. Each sheep was treated in the following; (A) sheep was given 1 x 10^6 D. Fragrans, (B) sheep was given 1 x 10^7 *D. flagrans*, (C) sheep was given 1 x 10^6 *S. Cerevisiae,* (D) sheep was given 1 x 10^{12} *S. cerevisiae* and (E) sheep was as the control. The experiment was done in completely randomized design (CRD). The first experiment result showed that the number of *H. contortus* larvae in sheep treated was not differ significantly ($P>0.05$) compared to the control. The result of the second experiment showed that number of *H. contortus* larvae in gram in feces in sheep treated was significantly lower ($P<0.05$) compared to the control. From this experiment it can be concluded that *D. flagrans* and *S. cerevisiae* can reduce *H. contortus* larvae in sheep.

252 KAMARUDDIN, M.

Intensity of ganstrointestinal nematode larvae in Aceh Besar (Indonesia). ***Intensitas cemaran larva nematoda gastrointestinal pada rumput gembalaan ternak domba di Aceh Besar***/ Kamaruddin, M.; Hanafiah, M.; Nurdianti (Universitas Syiah Kuala Nanggroe Aceh Darussalam, Banda Aceh (Indonesia). Fakultas Kedokteran Hewan). *Jurnal Veteriner* (Indonesia) ISSN 1411-8327 (2007) v. 8(1) p. 31-35, 3 ill., 1 table; 18 ref.

SHEEP; GRASSLANDS; GRAZING SYSTEMS; DIGESTIVE SYSTEM; NEMATODA; STRONGYLOIDES; HAEMONCHUS; CONTAMINATION.

A study was conducted to investigate the intensity of larvae contamination and the predominant species of nematode larvae found in the grassland used to feed sheep in Aceh Besar. Grass samples were collected from 4 villages, i.e. Meunasah Papeun, Lamreung, Leung Ie and Cot Leupan. The grass samples were collected by making W-shaped plots. Each grassland location was divided into four plots and each plot was further subdivided into 3 subplots. The intensity of larvae contamination and the predominant species of nematode larvae were determined and identified by examination under stereo microscope. The results showed that the grasslands used to feed sheep were contamined by gastrointestinal nematode larvae. The highest larvae contamination was found in grass collected from Meunasah Papeun Village with the intensity of 46 larvas per 50 grams of grass and the lowest were found in grass collected from Cot Leupan Village with the intensity of 40 larvas per 50 grams of grass. The highest larvae contamination was detected in the morning (at 06.00-08.00 a.m), and the lowest was detected in the afternoon (at 04.00-06.00 p.m.). Two species of nematode larvas detected in Aceh Besar were *Strongyloides* spp. and *Haemonchus* spp.

This study indicates that sheep on grassland in Aceh Besar are at risk of being infected by nematode larvae.

253 TARIGAN, S.
Identification and characterization of heat-stable allergens from *Sarcoptes scabiei*. *Identifikasi dan karakterisasi alergen Sarcoptes scabiei*/ Tarigan, S. (Balai Penelitian Veteriner, Bogor (Indonesia)). *Jurnal Ilmu Ternak dan Veteriner* (Indonesia). ISSN 0853-7380 (2006) v. 11(1) p. 52-60, 3 ill., 2 tables; 33 ref

GOATS; SARCOPTES SCABIEI; ALLERGENS; ACARINA; HAPTENS.

Animals or human recovered from *Sarcoptes scabiei* infestation acquired protective immunity against reinfestation. The protective immunity is considered to be associated with a type-1-hypersensitivity reaction against allergens instigated by the mites during infestation. It is assumed that these allergens have the potential to be used as the main component of an anti-scabies vaccine. The purpose of this study was to identify and characterize the sarcoptic allergens. For this purpose, 645 mg of mites collected from mangy goats, were homogenised in PBS to prepare soluble mite proteins. Fractionation of proteins was initially performed on a Q-sepharose column but the results were unsatisfactory. Consequently, SDS PAGE was used as an alternative. Proteins from the gel were transferred onto a nitrocellulose membrane. The membrane was cut into strips so each strip contained proteins with molecular weight of > 90, 80-90, 70-80, 60-70, 50-60, 40-50, 30-40, 25-30, 20-25, 15-20 and 10-15 kDa, respectively. The heat stability of the allergen was determined by heating the suspension at 60^{o}C for 60 minutes, whereas their dialysability was evaluated using a 10-kDa-cut off ultramembrane. The activity of the allergens was assayed by an intradermal test on sensitised goats. This study showed that mite protein extract was very potent allergens since mite extract containing as little as 1 ng mite proteins still caused an obvius hypersensitive reaction. The mite extract contained heat-stable, dialysable and nondialysable alergions. All fractions recovered from a Q-sepharose column contained allergens with almost equal potency. Fractionation with the SDS-PAGE revealed that the allergens had molecular weights 35 and <10 kDa. The former allergen is assumed to be a member of group 10 allergens, whereas the later belong to haptenic allergens.

L73 ANIMAL DISEASES

254 ARIYANTI, T.
Control of infectious coryza in chicken. *Pengendalian coryza infeksius pada ayam*/ Ariyanti, T.; Supar (Balai Besar Penelitian Veteriner, Bogor (Indonesia)). *Wartazoa* (Indonesia). ISSN 0216-6461 (2007) v. 17(4) p. 185-191, 32 ref.

CHICKENS; HAEMOPHILUS PARAGALLINARUM; CORYZA; DISEASE CONTROL; VACCINES.

Infectious coryza or infectious snot is a disease caused by *Haemophilus paragallinarum* (HPG), that infects upper respiratory tract of either layer or broiler chickens or other poultry raised under small and large farm conditions. Infection on growing chicken caused reduction of weight gain, whereas in adult layer chicken caused decreasing egg productions, and hence significantly caused economic'losses in poultry industries. Coryza cases in the farms are

difficult to control by antibiotic treatments. Control by vaccination programmes using appropriate vaccines are the only ideal method, but vaccination failure using trivalent of classical serovar A, B and C of H paragallinarum products from USA and European countries still occurred. This might probably due to the presence of new serovar Band C raised in the poultry farms in the fields, of which their antigenicity, immunogenicity and also immunoprotection of classical coryza vaccines are different from the new serovar in the fields. Research on coryza conducted at the Indonesian Research Center for Veterinary Science during the last 2 decades, resulted in some HPG isolates (belong to the classical serovar A, B or C) and these isolates were kept at the Balitvet Culture Collection (BCC) Unit. Studies on local isolate of HPG vaccine productions had been conducted to determine their efficacy in experimental chickens. At the same period, it was reported from Latin America and South Africa countries that new serovars B and new serovar C were found in that regions. These new serovars B and C were identified different to that of the classical serovar B or C antigenicity and immunogenicity which lead to the failure of coryza vaccination with classical serovar A, B and C imported from USA and Europe. These retrospective studies recommend that coryza is an important disease in poultry industries in this country causing a signifinant economic losses which need to be controlled properly. Further research is needed to measure the effectiveness of local isolate vaccines. Surveillance must also be conducted in order to anticipate the emerge of new HPG variant, therefore a new type of vaccine could be developed accordingly using recent local isolate.

255 ASTAWA, N. M.

Serological evidences for the presence of a non-pathogenic bovine lentivirus in bali cattle population in Nusa Penida, a jembrana disease-free island. ***Keberadaan lentivirus sapi yang nonpatogenik secara serologis di Nusa Penida, suatu pulau yang bebas penyakit jembrana***/ Astawa, N.M.; Berata, K. (Universitas Udayana, Denpasar (Indonesia). Fakultas Kedokteran Hewan); Tenaya, W.M.; Agustini, L.P.; Hartaningsih, N. *Jurnal Veteriner* (Indonesia). ISSN 1411-8327 (2007) v. 8(1) p. 1-7, 1 ill., 3 tables; 19 ref.

CATTLE; LENTIVIRUS; IMMUNOLOGICAL TECHNIQUES; ELISA; IMMUNOBLOTTING; ANTIGENS; SPECIFIC PATHOGEN FREE STATE; BALI.

A study to detect the presence of non-pathogenic bovine lentivirus in bali cattle population in Nusa Penida has been carried out. Sera samples were collected from 200 bali cattles in Nusa Penida and were tested for the presence of antibodies against the virus by enzyme-linked immunosorbent assay (ELISA) using recombinant surface unit protein of jembrana disease virus (SU-JDV) and recombinant capsid protein of JDV (Ca-JDV) and bovine immunodeficiency virus (Ca-BIV). The ELISA positive sera samples were further confirmed using western blotting technique. In ELISA test, none of the sera samples was antibody positive to SU-JDV antigen. Nine sera samples were confirmed positive to Ca-JDV antigen and 5 were antibody positive to Ca-BIV. In western blotting 4 sera samples were weakly positive to Ca-DJV and Ca-BIV. The result of this study provides a clear serological evidence for the presence of non-pathogenic bovine lentivirus in Nusa Penida.

256 PRIADI, A**.**

Infection of *Ornithobacterium rhinotracheale* (ORT) in chickens in Indonesia. ***Infeksi Ornithobacterium rhinotracheale (ORT) pada ayam di Indonesia***/ Priadi, A.; Natalia, L. (Balai Penelitian Veteriner, Bogor (Indonesia)). *Jurnal Ilmu Ternak dan Veteriner* (Indonesia). ISSN 0853-7380 (2006) v. 11(1) p. 61-68, 3 ill., 4 tables; 27 ref.

CHICKENS; ORNITHOBACTERIUM RHINOTRACHEALE; INFECTION; BIOCHEMICAL REACTIONS.

Ornithobacterium rhinotracheale is a bacterium identified as a new species in 1994 and generally associated with respiratory distress in chickens. From 214 of sinus swabs, tracheal swabs, lungs, airsac, liver, heart blood samples and yolk sacs of chickens suffered from respiratory distresses, 6 isolates of *O. rhinotracheale* were isolated. These isolates were obtained from tracheal swabs of broiler chickens aged between 28-35 days old and broiler breeder of 32 weeks old. Upon incubated on blood agar for 48 hours at 37°C in a 5 % CO_2 atmosphere, round, convect and grey colonies with diameters of 1-2 mm were observed. The bacteria were pleomorphic, gram negative rods, negative catalase and positive oxidase. Biochemically, the bacteria did not change potassium nitrate, tryptophan, glucose, arginine, urea, esculin, gelatine, arabinose, mannose, mannitol, N-acetyl glucosamine, maltose, gluconate, caprate, adipate, malate, citrate and phenyl-acetate in API 20 NE system but beta-galactosidase was produced. In the API 20 NE system, the isolates were identified as 0020004, 0060004, 0020104 codes. Tracheitis, air sacculitis, pneumonia and cheesy air sacs were pathological changes generally found in chickens infected with *O. rhinotracheale*. Trachea is the most important organic for the isolation of *O. rhinotracheale*.

257 SENDOW, I.

Sentinel herd, a model to study epidemiology of arbovirus. ***Sentinel ternak, model untuk mempelajari epidemiologi penyakit arbovirus***/ Sendow, I. (Balai Penelitian Veteriner, Bogor (Indonesia)). *Jurnal Penelitian dan Pengembangan Pertanian* (Indonesia). ISSN 0216-4418 (2006) v. 25(1) p. 1-6, 3 tables; 27 ref.

INDICATOR ANIMALS; EPIDEMIOLOGY; ORBIVIRUS; VIROLOGY.

Sentinel herd is a model to study epidemiology of virus infection, mainly diseases that do not produce clinical signs such as arboviruses. Sentinel herd is a group of animals which is observed regularly for a certain interval period. Sentinel samples can be used and analyzed to study several aspects such as immune status, evaluation of vaccination program, dynamics of diseases, and conventional and molecular methods and application of diagnostic techniques. However, identify the sentinel herds, communication with the farmers and local livestock services staffs must be considered.

258 SUARJANA, I G.K.

Molecular characterization of beta haemolytic Streptococci of Bali isolates. ***Karakterisasi molekular Steptococcus beta hemolitik isolat Bali***/ Suarjana, I G.K. (Universitas Udayana, Denpasar (Indonesia). Fakultas Kedokteran Hewan). 3 ill., 6 ref. *Jurnal Veteriner* (Indonesia). ISSN 1411-8327 (2006) v. 7(2) p. 62-65

ANIMAL DISEASES; BACTERIA; STREPTOCOCCUS; ANAEMIA; HAEMOLYSIS; MOLECULAR GENETICS; ISOLATION.

The main objevtive of this study was to characterize the molecular weight of muramidase released protein (MRP) and extracellular factor (EF) of beta haemolytic Streptococcus of Bali isolates isolated from pigs and monkeys. The MRP was isolated from the cell walls of bacteria by means of muramidase (lysosyme) and the EF was obtained from supernatant of bacteria precipitated with 70% ammonium sulphate and then dyalised. These protein were then identified by using SDS-PAGE. The result of this research showed that all of beta

haemolytic Streptococci isolated from pigs and monkeys were consisted eight bands protein of MRP and one EF band of 110 kDa. There are two major protein bands of MRP (76 kDa and 45 kDa) and six other protein bands (125 kDa, 60 kDa, 57 kDa, 48 kDa, 30 kDa, and 28 kDa). Whether MRP protein played an important role in the pathogenecity process, a further investigation was still needed. All pathogenic beta haemolytic Streptococci of Bali isolates only had one EF protein band of 110 kDa. This protein might also serve as a pathogenicity marker of *Streptococcus suis* type 2.

259 SUARSANA, I N.

Utilization of tempe [soyfood] extract on the liver function rat under stress condition. ***Penggunaan ekstrak tempe terhadap fungsi hati tikus dalam kondisi stres***/ Suarsana, I N.; Susari, N.N.W. (Universitas Udayana, Denpasar (Indonesia), Fakultas Kedokteran Hewan) Wresdiyati, T.; Suprayogi, A.; 1 ill., 3 tables; 24 ref. *Jurnal Veteriner* (Indonesia). ISSN 1411-8327 (2006) v. 7(2) p. 54-61

RATS; LABORATORY ANIMALS; LIVER; LIVER DISEASES; DIAGNOSIS; BODY CONDITION; SOYFOODS; EXTRACTS; ANTIOXIDANTS; CHEMICOPHYSICAL PROPERTIES

A study to determine antioxidant activities of bioactive component of tempe in rat under stress condition was carried out. The aim of this study was to find out the effect of tempe extract of the SGPT and SGOT levels on the liver function rat under stress condition. Firstly, the concentration of phenol compound of tempe were determined, then their antioxidant activities were determined in vitro by thyosinate method. Finally, the effect of tempe extract on the rat liver function under stress condition was determined by examining the SGPT and SGOT level in serum. A total of sixty Spraque dawly rats were used in this study. They were divided into six groups; I control group; II stress group; While III - VI treated by stress and tempe extract doses of 20, 40, 60, and 80 mg/kg BW/day, respectively. Stress condition was induced by fasting for 5 days and swimming for 5 minutes/day and drinking water was provided ad libitum. The result showed that the phenol concentrations of tempe was 0.142 mg/ml. Its antioxidant activities in vitro was also high but was lower than tocopherol. Rat under stress condition for 5 days showed a significantly ($P<0.05$) higher level of SGOT and SGPT (240.00 ± 35.50 and 171.80 ± 36.08) than those without stress condition (184.80 ± 23.42 and 97.20 ± 21.23). The rat treated with tempe extract after fasting stress showed decrease SGOT and SGPT level. The decrease was significant in the rat treated with dose 80 mg per body weight with SGOT and SGPT level 190.20 ± 23.81 and 117.60 ± 21.93, respectively which was significantly ($P<0.05$) lower than rat in stress condition without tempe extract (dose 0 mg/kg bw), 240.00 ± 35.50 and 171.80 ± 36.08.

260 SUPAR

Molecular characterization Pasteurella multocida: Its implication with epidemiology and the development of local isolate vaccines. ***Karakterisasi molekuler Pasteurella multocida: Kaitannya dengan epidemiologi dan pengembangan vaksin isolat lokal***/ Supar; Ariyanti, T. (Balai Besar Penelitian Veteriner, Bogor (Indonesia)). *Wartazoa* (Indonesia). ISSN 1410-959X (2007) v. 17(4) p. 147-155, 1 table; 49 ref.

RUMINANTS; PASTEURELLA MULTOCIDA; MOLECULAR BIOLOGY; EPIDEMIOLOGY; DNA; VACCINES.

Pasteurella multocida strains are the causative agents of pasteurellosis attacking wide range domestic and wild animals. The important pasteurellosis in animals in Indonesia are *Haemorrhagic septicaemic* (HS) or *Septicaemia epizootica* (SE) in large and small ruminants, fowl cholera in poultry and water powls. HS associated with *P. multocida* in large ruminants was controlled by killed whole cell vaccines produced by the use of *P. multocida* Katha strain, whereas fowl cholera was controlled by antimicrobial drugs. At present, there are only a limited molecular biology techniques have been applied to investigate P. multocida isolates from different geographic locations in Indonesia. Genomic DNA of *P. multocida* from HS cases from various provinces which were treated with restriction endonuclease Apal and ana lysed by means of pulsed-field gel electrophoreses (PFGE) demonstrated the presence of high degree distinctive DNA pattern compared to that of the vaccine (Katha) strain from Burma and other reference strains. Similar different patterns were found in genomic DNA of local *P. multocida* isolates from cholera disease of chicken and ducks. *P. multocida* isolates from some provinces showed different DNA patterns to each other. These DNA pattern differences were probably associated with the alteration of their pathogenicity, antigenicity and immunogenicity, but it has not been confirmed yet. Vaccines prepared from *P. multocida* isolate originated from local HS cases and local cholera demonstrated better protection in experimental animals against heterologous and homologous challenges, in terms of higher and consistency antibody responses compared to that of Katha strain or imported *P. multocida* poultry strains. This supports the potential aspects of molecular characterization of local *P. multocida* isolates kept at the BCC Unit. These isolates may play an important role in developing local master seeds to produce pasteurellosis local vaccines which would be more promising to be used in Indonesia in the future but further field trials are still needed.

L74 MISCELLANEOUS ANIMAL DISORDERS

211 YUNINGSIH

Nitrate-nitrite poisoning on livestock and their prevention. *Keracunan nitrat-nitrit pada ternak ruminansia dan upaya pencegahannya*/ Yuningsih (Balai Besar Penelitian Veteriner, Bogor). *Junal Penelitian dan Pengembangan Pertanian* (Indonesia). ISSN 0216-4418 (2007) v. 26(4) p. 153-159, 2 ill., 7 tables; 32 ref.

RUMINANTS; POISONING; NITRITES; NITRATES; FORAGES; DRINKING WATER; SYMPTOMS; DIAGNOSIS; CONTROL METHODS.

Keracunan nitrat merupakan masalah utama pada ternak ruminansia. Keracunan disebabkan ternak mengkonsumsi hijauan yang mengandung nitrat tinggi akibat pemupukan. Di dalam rumen, nitrat akan direduksi menjadi nitrit yang toksik. Jika diabsorpsi darah, nitrit akan mengubah pembentukan Hb ($Fe2^{+}$) menjadi MetHb ($Fe3^{+}$) dalam darah sehingga darah tidak mampu membawa oksigen. Akibatnya jaringan kekurangan oksigen (*hypoxia*). Bila kandungan MetHb dalam darah mencapai 80-90% maka ternak akan mati. Untuk mengatasi masalah tersebut, perlu diketahui proses keracunan nitrat pada ternak dengan menganalisis kandungan nitrat dalam pakan (hijauan) dan air minum. Perlu pula mendiagnosis keracunan nitrat berdasarkan gejala yang timbul dan menganalisis kandungan nitrat dalam pakan. Pengobatan keracunan nitrat pada ternak dilakukan dengan menginjeksikan larutan *methylene blue* untuk mereduksi MetHb menjadi Hb. Pencegahan yang utama ialah dengan memantau kandungan nitrat dalam hijauan sebelum diberikan pada ternak.

N20 AGRICULTURAL MACHINERY AND EQUIPMENT

262 MUSSINAI, R.
Prospect of agricultural equipment and machinery development on supporting agricultural development in Central Kalimantan. ***Prospek pengembangan alat dan mesin pertanian dalam mendukung pembangunan pertanian Kalimantan Tengah*** Mussinai, R. (Balai Pengkajian Teknologi Pertanian Kalimantan Tengah, Palangkaraya (Indonesia)). *Jurnal Pengkajian dan Pengembangan Teknologi Pertanian* (Indonesia). ISSN 1410-959X (2006) v. 9(2) p. 184-192, 3 tables; 16 ref.

AGRICULTURAL DEVELOPMENT; FARM EQUIPMENT; ARIZONES; TIDES; KALIMANTAN.

The farming constraint on dry land and tidal area is mainly limited by human labor. Almost 15 millions ha of total area of Central Kalimantan consist of dry land 7.7 millions ha and tidal land 5.5 million ha. Those land have potencial to be developed for food crop (rice, maize, and soybeans). Unfortunately, the land resource is not supported by labor availability. There is only 60% of total population (1.8 million people) considered as productive labor. Therefore, the technology that economizes labor, cost and time is needed. The assessment of agricultural equipment and machinary for dry land was conducted in Pundu village, Cempaga, East Kotawaringin Regency. Meanwhile, for tidal land, the assessment was conducted in Kapuas. The objective of this assessment was to solve the problem related to farming activities. The agricultural machinary tested involved seed planting machine and ertilizing machine that run by four wheels tractor > 40 HP for dry land and hand tractor for tidal land. The equipment modified by Indonesian Center for Agricultural Engineering Research and Development Serpong was then assessed to find out its performance as planting machines for rice, soybean and also for fertilizing.

P01 NATURE CONSERVATION AND LAND RESOURCES

263 BUDHI, G.S.
Concept and implementation of PES program in the Cidanau Watershed West Java (Indonesia): a lesson learned for future environmental policy/ Budhi, G.S.; Iqbal, M. (Pusat Analisis Sosial Ekonomi dan Kebijakan Pertanian, Bogor (Indonesia)); Kuswanto S.A. *Analisis Kebijakan Pertanian* (Indonesia). ISSN 1693-2021 (2008) v. 6(1) p. 37-55, 1 ill., 1 table; 8 ref

JAVA; WATERSHEDS; ENVIRONMENTAL FACTORS; POLICIES.

The aim of the paper is to depict the concept of PES (Payment for Environmental Services) and its implementation in the Cidanau Watershed. This paper is a success story of PES implementation starting from the early adoption of the concept. The study shows that PES has impressed many institutions, which was then initiated by PT KTI (Krakatau Tirta Industri) as a pilot project of the concept implementation. The main step of PES implementation activities was promoting conservation farming, including transfering of conservation technology and trees growing. The conservation farming showed good development, which was characterized by more trees planted, more conservation technology applied, and more optimistic expectation for income increase. Moreover, PES Program will not only attract the farmers who participated in the program, but also other farmers who were not included in it. With such promising performance, PES Program can potentially be

adopted by farmers and provide solution to various problems encountered in the Cidanau Watershed.

264 DJAENUDIN, D.
Development of land resources research and its contribution to exceed requisite of agricultural land in Indonesia. ***Perkembangan penelitian sumber daya lahan dan kontribusinya untuk mengatasi kebutuhan lahan pertanian di Indonesia***/ Djaenudin, D. (Balai Besar Penelitian dan Pengembangan Sumberdaya Lahan Pertanian, Bogor (Indonesia)). *Jurnal Penelitian dan Pengembangan Pertanian* (Indonesia) ISSN 0216-4418 (2008) v. 27(4) p. 137-145, 4 ill., 28 ref. Appendices

INDONESIA; LAND RESOURCES; LAND CLASSIFICATION; LAND SUITABILITY; LAND EVALUATION; AGRICULTURAL DEVELOPMENT.

The availability of potential agricultural land is limited due to land conversion and degradation. Progressive soil mapping is an effective approach to looking for potential land. Indonesia region is formed from various geology formation (lithology), terrain and climate. The west parts generally belong to wet climate, while the east parts mostly have dry climate. Soil classification, mapping, and land evaluation methods have been developed following persecution of agricultural land requisites. Remote sensing technology could quicken soil mapping and land evaluation, especially for the east Indonesia region which has limited infrastructure facilities. To allow information on quantitative land potentiallity, thus land evaluation should be carried out including physical and economic aspects. Semidetailed even detailed soil mapping for island province will be more contribute to region development program.

P10 WATER RESOURCES AND MANAGEMENT

265 TAMPUBOLON, R.
Analysis of environmental quality changes of Citarum Watershed of West Java and their effects on operational costs of hydroelectric power plants and the regional drinking water companies (case study at Saguling, Cirata, and Jatiluhur hydroelectric power plants and Purwakarta and Jakarta drinking water companies). ***Analisis perubahan kualitas lingkungan daerah Sungai Citarum Jawa Barat dan pengaruhnya terhadap biaya produksi PLTA dan PDAM (studi kasus PLTA Saguling, PLTA Cirata, PLTA Jatiluhur, PDAM Purwakarta, dan PDAM DKI Jakarta)***/ Tampubolon, R.; Sanim, B.; Saeni, M.S.; Boer, R. (Institut Pertanian Bogor (Indonesia). Pusat Studi Lingkungan). Jurnal Tanah dan Iklim (Indonesia). ISSN 1410-7244 (2007) (no. 26) p. 47-62, 7 ill., 5 tables; 18 ref.

JAVA; ENVIRONMENTAL IMPACT ASSESSMENT; WATERSHED; LAND USE; HYDROLOGICAL CYCLE; ECONOMIC VALUE; WATER RESOURCES; ELECTRICAL ENERGY; WATER POWER; DRINKING WATER; WATER QUALITY.

The objectives of this research were to analyze land cover changes, hydrological characteristics changes, and their effects on the economic value of water resources for environmental services beneficiaries (Hydroelectric Power Plant, HEPP and Drinking Water Companies, DWC). This research was conducted from January to December 2006 in the

upper Citarum Watershed, covering the Saguling, Cirata, and Jatiluhur catchments, with total area of 486,237 ha. The economic factors under this study are Saguling HEPP, Cirata HEPP, and Jatiluhur HEPP as well as Tirta Dharma DWC (Purwakarta) and PT Thames Jaya DWC (Jakarta) which are located downstream of Citarum Watershed as the beneficiaries of environmental services of Citarum Watershed. The methodology and analysis technique used in this research were: a) supervised classification analysis to find out land cover changes; b) GR4J model to predict water discharge, water volume, and sedimentation; and c) water chemical analysis and replacement cost method for economic valuation of environmental services among the beneficiaries (HEPP, DWC). The results showed that during the 1992 to 2002 period, there has been a reduction of forest (tree) area at the rate of 2.23% (3,804.2 ha) annually. The reduction of forest area was mainly caused by increasing of land clearing for settlement and other infrastructure which grew at the rate of 9.81% (2,404.5 ha) annually. This land use change has influenced on hydrological characteristics of the upper Citarum Watershed as shown by the reduction of local water discharge as high as 1.49% (3.14 m^3/sec) and the volume of local water input 4.20% (275.26 million m^3), the increasing ratio of Qmax/Qmin 5.99% (at the average of 131.94), the increasing of sediment yield as high as 10.20 to 12.86 million m^3 annually (for the three dams) which is very dangerous, especially for Saguling and Cirata dams, as well as the decreasing of chemical water quality of Citarum River. Land use and hydrological characteristics changes has caused an economic loss (opportunity cost) among the HEPPs and DWCs. The amount of the opportunity cost due to environmental degradation of upper Citarum watershed suffered by the HEPPs was Rp 43.44 billion (equivalent with Rp 9,538 /MWh electricity or Rp 3.29 m^3 water used by HEPP). Whereas economic loss suffered by DWC were Rp 212.43/m^3 (Purwakarta DWC) and Rp 821.48 m^3 (Jakarta DWC), respectively. Based on significant economic loss caused by environmental degradation of the upper Citarum Watershed on HEPP and DWC, the efforts for controlling land use allocation and soil conservation seem very necessarily, by assigning permanent forest cover area. The amount as reflected by opportunity cost could be used as environmental investment for improving environmental quality (replacement cost) in the upper Citarum watershed.

P33 SOIL CHEMISTRY AND PHYSICS

266 ACHMADI

Relationship between characteristics of soil chemistry and quality of citrus fruit in monotonous freshwater swamp. ***Hubungan sifat kimia tanah terhadap kualitas buah jeruk di lahan rawa lebak***/ Achmadi; Anisa, W.; Maftuah, E. (Balai Penelitian Pertanian Lahan Rawa, Banjarbaru (Indonesia)). Proceedings of the national seminar on citrus, Jakarta, 13-14 Jun 2009/ Winarno, M.; Sabari; Subandiyah, S.; Setyobudi, L.; Supriyanto, A. (eds.) Jakarta (Indonesia): Puslitbanghorti, 2008; p. 247-253, 2 ill., 1 table; 8 ref.

CITRUS; SOIL CHEMICOPHYSICAL PROPERTIES; ASCORBIC ACID; QUALITY; FRUITS; SWAMP SOILS.

Freshwater swamp area can be developed for agriculture. Citrus is one of fruit crops that can grow in freshwater swamp area. The research aims were to study relationship between characteristics of soil chemistry and quality of citrus fruit in freshwater swamp. A survey was conducted in five villages, i.e. Batalas (Tapin District), Lokgabang, Pematang Hambawang (Banjar District), Mahang Matang Landung and Tabu Darat Hilir (HST District). The result showed that the total soluble solid (TSS) and the ascorbic acid were positively correlated with the soil Ca. The higher soil Ca, the higher TSS and ascorbic acid content of the fruits.

267 HAKIM, M.L.

Effects of soil texture on characteristics of hydrograph unit and flood prediction modelling (case study in Separi Watershed, Kutai Kartanegara, East Kalimantan (Indonesia)). ***Pengaruh tekstur tanah terhadap karakteristik unit hidrograf dan model pendugaan banjir (studi kasus di DAS Separi, Kutai Kartanegara, Kalimantan Timur)***/ Hakim, M.L. (Balai Pengkajian Teknologi Pertanian Kalimantan Timur, Samarinda (Indonesia)); Haridjaja, O.; Sudarsono; Irianto, G. *Jurnal Tanah dan Iklim* (Indonesia). ISSN 1410-7244 (2007) (no. 26) p. 71-85, 8 ill., 6 tables; 12 ref.

KALIMANTAN; SOIL TEXTURE; HYDROGRAPHY; FLOODING; FORECASTING; LAND USE; FLOOD CONTROL; WATERSHED MANAGEMENT; MODELS

A research on effects of soil texture on hydrograph unit characteristic and flood prediction modelling in East Kalimantan need to be developed, because intensity and area of flood progressively increased. The objectives of this research are: 1) to study the effects of soil texture on the characteristic of hydrograph unit, 2) to develop flood prediction models (peak discharge and time to peak discharge) of Separi Watershed, and 3) to determine an optimal land use area composition in line with flood and Separi Watershed management. The location of research site is on Separi Watershed in Kutai Kartanegara, East Kalimantan at 00°03'-00°38' S and 117°08'-117°31' E coordinate position. Field research has been conducted from January to June 2006. The methodology of the research based on several steps, ie : 1) data collecting, 2) flood prediction models development, 3) model accuration testing, and 4) model application. The model of flood prediction based on: 1) modelling of production function and 2) modelling of transfer function. The result showed that soil texture has an effect towards peak discharge and time to peak discharge. Soil with loam texture has higher peak discharge than soil with sand and clay texture, whereas time to peak discharge of soil with clay texture is higher than that of soil with loam and sand texture. Flood prediction (peak discharge and time to peak discharge) based on land characteristics and watershed geomorphology was able to simulate peak discharge and time to peak discharge, which has no different result compared with result from measurement. Analysis of optimum composition land use with decreasing peak discharge and time to peak discharge indicated that compositions of land use in Separi Watershed are 54% for forest area, 1.9% for farm/garden, 0.12% for urban, 0.5% for paddy field, 42% for shrubs/underbrush, and 1.99% for coal-mining.

268 NURSYAMSI, D.

Dominant soil characteristics that affect available K at smectitic soils. ***Sifat-sifat tanah dominan yang berpengaruh terhadap K tersedia pada tanah-tanah yang didominasi smektit***/ Nursyamsi, D. (Balai Penelitian Tanah, Bogor (Indonesia)); Idris, K.; Sabiham, S.; Rachim, D.A.; Sofyan, A. *Jurnal Tanah dan Iklim* (Indonesia). ISSN 1410-7244 (2007) (no. 26) p. 13-28, 6 ill., 9 tables; 31 ref.

SMECTITES; CLAY MINERALS; SOIL CHEMICOPHYSICAL PROPERTIES; POTASSIUM; CATIONS; ION EXCHANGE CAPACITY; BUFFERING CAPACITY

Research aimed to study dominant soil characteristics that affect available K of smectitic soils was conducted in Laboratory of Research and Soil Test, Indonesian Soil Research

Institute. The soil characteristics analyzed were soil texture (pipette), organic-C (Kjeldahl), and CEC (NH_4OAc); mineralogical analyses of clay fraction (X-ray diffraction); K fractionation: soil soluble-K (0.0002 M $CaCl_2$), exchangeable-K (NH_4OAc), and total-K (HNO_3 + $HClO_4$); and potassium sorption. The results showed that the content of soil soluble, exchangeable, non-exchangeable, and total-K was in order of Vertisols > Alfisols > Inceptisols. The percentage of soil K fraction of the soils, however, was in order of soluble-K < exchangeable-K < non-exchangeable-K. Although the soils had high content in total K but most of them were in non-exchangeable form, thus they were not available for plant growth. Soil K buffering capacity and maximum sorption were in order of Vertisols > Alfisols > Inceptisols. The bond energy constant of Vertisols, however, was similar with that of Alfisols but it was about twice with that of inceptisols. Soil clay, organic-C, and CEC affected the availability of soil K significantly. Smectite contributed significantly to soil negative change so that it held an important role in controlling soil K buffering capacity and maximum sorption. To increase the efficiency of K fertilizer, plant species that can produce organic acid exudated from roots in high quantity can be developed in smectitic soils. The use of Na, NH_4, and Fe cations need also to be considered for K management in the soils as well.

269 SUMANTRI

Relationship between quality of citrus var. siam banjar (*Citrus suhuiensis* Tan.) with soil and water characteristic on swampy land. *Hubungan kualitas buah jeruk varietas siam banjar (Citrus suhuiensis Tan.) dengan sifat kimia tanah dan air di lahan pasang surut*/ Sumantri (Balai Pengawasan dan Sertifikasi Benih Tanaman Pangan dan Hortikultura, Banjarbaru (Indonesia)). Proceedings of the national seminar of citrus, Jakarta, 13-14 Jun 2009/ Winarno, M.; Sabari; Subandiyah, S.; Setyobudi, L.; Supriyanto, A. (eds.) Jakarta (Indonesia): Puslitbanghorti, 2008; p. 324-338, 10 ill., 7 ref.

CITRUS; VARIETIES; SOIL CHEMICOPHYSICAL PROPERTIES; WATER QUALITY; ELECTRICAL CONDUCTIVITY; CARBOHYDRATE CONTENT; FRUITS; QUALITY; INTERTIDAL ENVIRONMENT.

The research aims were to find out (a) several characteristics of soil and water, (b) the quality of citrus cv. siam banjar, and (c) relation between soil and water characteristics and quality of citrus grown on tidal area. The research was conducted on siam banjar production center, Tarantang and Sungai Kambat Village for six months with pre and survey method. The nature of soil and water was characterized by pH, electric conductivity, sulphate, magnesium and calcium, while the quality of citrus was measured as total soluble solid (TSS), acid content, juiciness and ratio sugar/acid. The research results showed that (a) high variability of nutrient status on each soil type. Magnesium status was high on type A and low on type B and C. Calcium status was low on type A and very low on type B and C. pH were very acid on all three types of soils, electric conductivity were low on all three types of soils. Sulphate was lower on type A than that on type Band C; (b) the quality of citrus cv. siam banjar measured as TSS was higher on type A (14.88%) than that on type C (11.9%) and type B (11.59%), while ratio of sugar/acid of citrus cv. siam banjar grown on type A was also higher than that on type B and C; and (c) soil and water characteristics affected the TSS. The research also showed that the electric conductivity and pH of soil and water were the most dominant factor affecting the TSS.

P34 SOIL BIOLOGY

270 SUBOWO G.

Prospect of earthworm using as biological infiltration technology development for upland farming systems. ***Prospek cacing tanah untuk pengembangan teknologi resapan biologi di lahan kering***/ Subowo G. (Balai Pengkajian Teknologi Pertanian Yogyakarta (Indonesia)). *Jurnal Penelitian dan Pengembangan Pertanian* (Indonesia). ISSN 0216-4418 (2008) v. 27(4) p. 146-150, 1 ill., 1 table; 17 ref.

OLIGOCHAETA; SOIL BIOLOGY; INFILTRATION; SOIL CONSERVATION; UPLAND SOILS; DRY FARMING.

Indonesia faces dilemmatic situation, such as drought during dry season and flood during rainy season. The main problems in occurrence of flood, land slide and water body's sedimentations are rain, weathering rate, soil argilic layer, and planting annual crops during rainy season without water and land conservation construction. Soil is easy to be eroded by runoff and sedimented in the water bodies causing flood and reduction of upland soil productivity. Earthworm can make hole in the soil layer and will reduce soil compaction, increase water infiltration, and improve soil fertility through continuous biological processes that fit the soil carrying capacity. Biological infiltration technology by using endogeic-geophagus earthworm as soil processing agent and supplying organic matter vertically through drilling up to compact soil layer may reduce run off and soil erosion.

271 SUSILOWATI, D.N.

Increasing of N-uptake by inoculation of diazotroph endophytic bacteria in vermiculite media. ***Peningkatan serapan N pada kedelai yang diinokulasi bakteri diazotrof endofit di medium vermiculit***/ Susilowati, D.N. (Balai Besar Penelitian dan Pengembangan Bioteknologi dan Sumberdaya Genetik Pertanian, Bogor (Indonesia)); Saraswati, R.; Hastuti, R.D.; Yuniarti, E. *Jurnal Tanah dan Iklim* (Indonesia). ISSN 1410-7244 (2007) (no. 26) p. 41-46, 3 tables; 11 ref.

GLYCINE MAX; INOCULATION; NITROGEN FIXING BACTERIA; ENDOPHYTES; NUTRIENT UPTAKE; NITROGENASE; GROWTH; VERMICULITES

Intensive selection of selected 15 isolates on N_2-fixing activities and auxin production to diazotroph endophytic bacteria showed that five isolates were superior, that is KACPI2 (0.2569 µmol/hour/culture), KACP13 (0.3026 µmol/hour/culture), KACP21 (0.4592 µmol/hour/culture), KACP32 (0.3131 µ mol/hour/culture), and KAMG2 (0.4843 µmol/hour/culture). Inoculation of five superior isolates into soybean seeds in vermiculite media showed that soybean plant inoculated by KAMG2 has the highest nitrogenase specific activity compared to others and control, that is 2.54±1.2 µmol/hour plant. However inoculation with KACM and KACP32 showed higher N-uptake of soybean plant. Although this research has conducted within the early stage of soybean plant growth, it is obvious that inoculated diazotroph endophytic bacteria in vermiculite media seem to be a good method to introduce selected strain envisaging growth promoting and nitrogen fixation.

P35 SOIL FERTILITY

272 INDRIYATI, L.T.

Nitrogen transformation in flooded soil: application of rice straw and rice straw composts and its effect on nitrogen uptake and acetylene reduction activity in rice plant rhizosphere. ***Transformasi nitrogen dalam tanah tergenang: aplikasi jerami padi dan kompos jerami padi serta pengaruhnya terhadap serapan nitrogen dan aktivitas penambatan N_2 di daerah perakaran tanaman padi*** / Indriyati, L.T.; Sabiham, S.; Situmorang, R.; Sudarsono; Darusman, L.K. (Institut Pertanian Bogor (Indonesia). Fakultas Pertanian); Sisworo, W.H. *Jurnal Tanah dan Iklim* (Indonesia). ISSN 1410-7244 (2007) (no. 26) p. 63-70, 2 ill., 4 tables; 7 ref.

IRRIGATED RICE; RICE STRAW; COMPOSTS; NITROGENASE; NUTRIENT UPTAKE; NUTRIENT AVAILABILITY; NITROGEN FIXING BACTERIA; RHIZOSPHERE; FLOODED LAND

The use of organic materials aimed in reducing the dependence on inputs such as chemical fertilizers can contribute to sustainability and improving the low N fertilizer efficiency of rice plants in paddy soils. Therefore, better understanding of N transformation in flooded soils, particularly the microbial transformation of N-organic amendments to plant-available N, is needed for the most efficient use of soil and organic materials N for the selection of N management practices in supporting sustainable agriculture. The experiments were conducted at the laboratory and in the greenhouse of Soil Department, Faculty of Agriculture, Bogor Agricultural University. Incubation experiment was conducted at room temperature for 120 days to observe the availability of N-NH_4^+ in soil amended rice straw or rice straw composts and its combination with urea. After 21 days of incubation period, the rice straw amended soils showed that N- NH_4^+ release was higher than the other treatments. The 4-months and 8-months compost of rice straw showed that N mineralization rate was lower and the N availability was lower than rice straw. The results of pot experiment in greenhouse revealed that the added rice straw was comparable with urea in its effect on the increase of dry matter weight of rice plants, number of tillers, N uptake of rice, and recovery N efficiency. The application of rice straw, however, promoted the activity of nitrogenase enzyme higher than rice straw composts. The effect of rice straw on observed parameters were much better than composts.

273 PURNOMO, J.

Soil and leaf nutritions status of citrus mandarin in Karo Regency, North Sumatra (Indonesia). ***Status hara tanah dan daun jeruk keprok di Kabupaten Karo, Sumatera Utara***/ Purnomo, J.; Tuherkih, E. (Balai Penelitian Tanah, Bogor (Indonesia)); Nainggolan, P. Proceedings of the national seminar of citrus, Jakarta, 13-14 Jun 2009/ Winarno, M.; Sabari; Subandiyah, S.; Setyobudi, L.; Supriyanto, A. (eds.) Jakarta (Indonesia): Puslitbanghorti, 2008; p. 266-281, 6 ill., 1 table; 9 ref. Appendices.

CITRUS RETICULATA; SOIL FERTILITY; PHOSPHATE FERTILIZERS; POTASH FERTILIZERS; FERTILIZER APPLICATION; SOIL DEFICIENCIES; SUMATRA.

Research on soil and leaf nutrient status was conducted at Karo District, North Sumatra in 2005-2006. The research used survey method by taking the soil composite and leaf samples at farmer's farms. The samples were analyzed in the laboratory, the soil samples analysis based on PPT criteria (1993) while the leaf samples analysis based on IFA criteria (1992). The result showed that P and K applications were already intensive at the farms, P and K elements in soil and leaf were at optimum concentration, and even some samples contained

high concentration of them. Most of the farmers used plate method to apply the fertilizer, which was lack in efficiency. Some of the farms were deficient in K and S elements. K deficiency was found on soil that has sediment components. High content of P and K in soil and leaf made Zn deficiency. Besides that, soil nutrients under the tree canopy were higher than that of the space between the plantation rows.

P36 SOIL EROTION, CONSERVATION AND RECLAMATION

274 FIRMANSYAH. M.A.

Prediction of Red Yellow Podzolic erosion based of USLE method on different of farming system: Case study in North Barito Regency and Gunung Mas Regency, Central Kalimantan. ***Prediksi erosi tanah podsolik merah kuning berdasarkan metode USLE di berbagai sistem usahatani: Studi kasus di Kabupaten Barito Utara dan Gunung Mas (Kalimantan Tengah, Indonesia)***/ Firmansyah, M.A. (Balai Pengkajian Teknologi Pertanian Kalimantan Tengah, Palangkaraya (Indonesia)). *Jurnal Pengkajian dan Pengembangan Teknologi Pertanian* (Indonesia). ISSN 1410-959X (2007) v. 10(1) p. 20-29, 8 tables; 15 ref.

PODZOLS; EROSION; FARMING SYSTEMS; KALIMANTAN.

The USLE (universal soil loss equation) method is generally used to predict the soil erosion. The aim of this study is to apply this method to predict the erosion rate of soil in RYP (red yellow podzolic or ultisols) on different of farming systems (FS), i.e. rice upland-cassava, rice-corn-peanut, oil palm, and rubber with low capital. The soil samples used are taken from different precipitation location, i.e. North Barito Regency and Gunung Mas Regency in Central Kalimantan Province. The results indicated that the soil loss in R YP in North Barito is higher than that in Gunung Mas. The land use on FS of food crops without soil conservation can decrease the sustainability time of soil from 250 years to 38 years on rice upland - cassava in North Barito. This indicates that the land use on FS of estate crops is in line with the sustainability program. The improvement of soil conservation by building up the bench terrace can support the sustainability of soil in RYP on different FS of food crops.

275 IDJUDIN, A.A.

Impact of the soil conservation practices on the upland productivity. ***Dampak penerapan teknik konservasi terhadap produktivitas lahan kering***/ Idjudin, A. A.; Notohadikusumo, T.; Dradjat, M.; Sunarminto, B.H. (Balai Penelitian Tanah, Bogor (Indonesia)). *Agrivet* (Indonesia). ISSN 1410-3796 (2006) v. 10 (1) p. 77-88, 3 tables; 17 ref.

SOIL CONSERVATION; ARID ZONES; DRY FARMING; LAND MANAGEMENT; FARM INCOME; PRODUCTIVITY.

Part of the upland areas in Special Territory of Yogyakarta Province (DIY) which are located in the hilly formation with steep slope (>15%) have been degraded its soil chemical and physical properties. The main problems of degraded uplands in DIY among others were due to the erosion rate which was more than the soil formation rate and poor management in soil conservation practices. To improve the degraded uplands, soil conservation techniques practices (by mechanic and vegetative planting) has been carried out in the three

representative upland locations, i.e. in Karangasem, Gunung Kidul District (MA II); in Nawungan, Bantul District (MA III) and in Glagahardjo, Sleman District (MA Va), DIY Province. The soil conservation techniques practices after 9 to 10 years of practice had improved the tracts of lands, improved annual tree crops growth, and had increased the perennial crops farming incomes. The tracts of land has increased in the three research locations. In Karangasem site, the tracts of lands increased 50.96% compared to lands which was not conserved and increased 100.31% compared to the beginning of the research. In Nawungan site, the tracts of lands increased 101.52% compared to lands which was not conserved and increased 248.59% compared to the beginning of the research. In Glagaharjo site, the tracts of lands increased 96.45% compared to lands which was not conserved and increased 206.14% compared to the beginning of the research. The height and diameter of tree crops showed growth increased. *Gnetum gnemon*, *Mangifera indica* and *Parkia speciosa* tree crops growth increased 22 to 85% (Karangasem), *Gnetum gnemon* and *Mangifera indica* growth increased 39 to 62% (Nawungan), and *Gnetum gnemon*, *Persea americana* and *Durio zibethinus* growth increased 32 to 69 % (Glagaharjo). Farming income of the perennial crops (food crops and vegetable crops) has been increased in the three sites of Karangasem, Nawungan, and Glagaharjo. In Karangasem site, the farming income of food crops in 1997 increased 139% (Rp1,880,475/year), in Nawungan site, 993 % (Rp 1,082,700/year), and in Glagaharjo 360% (Rp 17,256,858/year). The soil conservation techniques practices had increased farming income in the three research sites of Karang asem, Nawungan, and Glagaharjo. This was caused by the soil conservation techniques practiced which has increased the farm productivity.

P40 METEOROLOGY AND CLIMATOLOGY

276 FIRMANSYAH, M.A.

Determination of available growth period on shifting cultivation in Central Kalimantan. ***Penentuan periode tumbuh tersedia (PTT) pada perladangan berpindah di Kalimantan Tengah***/ Firmansyah, M.A. (Balai Pengkajian Teknologi Pertanian Kalimantan Tengah, Palangkaraya (Indonesia)). *Jurnal Pengkajian dan Pengembangan Teknologi Pertanian* (Indonesia). ISSN 1410-959X (2006) v. 9(1) p. 77-86, 3 ill., 4 tables; 16 ref.

SHIFTING CULTIVATION; WATER AVAILABILITY; SOIL WATER CONTENT; WATER BALANCE; UPLAND SOILS; KALIMANTAN

Available water content can be used to determine the available growth period. By other word, available growth period is influenced by available water from precipitation and water holding capacity by soils. The aim of this research was to determine available growth period based on precipitation probability of > 50%, 75%, and 90%, FAO method (1978) and Sys *et all*. (1991) method, in Ultisols from Teweh Tengah and Manuhing, and Oxisols from Kotawaringin Lama, Central Kalimantan. Primary data used to determine a water balance consist of water content of field capacity (pF 2.53) that analyzed by using pressure plate apparatus, water content of permanent wilting point (pF 4.2) used pressure membrane apparatus. Other primary data on this study soil texture used pipette method and soil organic matter used Walkly and Black method. Secondary data is monthly precipitation average and monthly air temperature average until ten years. Result of this research showed that the available growth period have longer period on probability precipitation > 50% than >75% and >90%. FAO method (1978) provided longer available growth period than Sys *et al*. method (1991). Oxisols location on Kotawaringin Lama has the longest available growth period, and the shortest available growth period happened on Ultisol from Manuhing. Collaboration of FAO (1978) and Sys et al. (1991) method seemingly can be used to

determine the starting of planting. Commonly, water stressing is beginning on precipitation probability >70%, and the longest water stress happened on precipitation probability >90%.

277 RUNTUNUWU, E

Rainfall pattern change and its impact on length of growing period. *Perubahan pola curah hujan dan dampaknya terhadap periode masa tanam*/ Runtunuwu, E.; Syahbuddin, H. (Balai Penelitian Agroklimat dan Hidrologi, Bogor). *Jurnal Tanah dan Iklim* (Indonesia). ISSN 1410-7244 (2007) (no, 26) p. 1-12, 6 ill., 7 tables; 22 ref.

JAVA; CLIMATE; RAIN; CLIMATIC CHANGE; GROWTH PERIOD; EFFICIENCY; WATER USE; IRRIGATION WATER.

Informasi mengenai dampak perubahan iklim global terhadap sektor pertanian sangat diperlukan untuk perencanaan strategi adaptasi. Studi ini bertujuan untuk menganalisis perubahan pola hujan (*rainfall pattern*), serta dampaknya terhadap periode masa tanam. Data yang digunakan adalah data curah hujan bulanan selama periode 1879-2006 dari Stasiun Manonjaya, Kabupaten Tasikmalaya, Provinsi Jawa Barat. Pola hujan dianalisis dengan menggunakan metode *Oldeman*, yang sekaligus dapat menghitung periode masa tanam. Pola hujan telah ditentukan berdasarkan tahun basah, tahun normal, tahun kering pada masing-masing periode tiga puluh tahunan: 1879-1910, 1911-1940, 1941-1970, dan 1971-2006. Hasil studi menunjukkan bahwa telah terjadi perubahan pola hujan selama periode 128 tahun di Tasikmalaya, dengan rincian sebagai berikut: pada tahun basah pola hujan tetap A, tetapi bulan basah berkurang dua bulan; pada tahun normal, pola hujan berubah dari B1 menjadi B2, dan pada tahun kering dari C2 menjadi D3. Terjadinya perubahan pola hujan tersebut telah mengakibatkan penurunan periode masa tanam. Pada tahun basah, lahan yang awalnya dapat ditanami padi tiga kali, telah berkurang menjadi dua kali setahun. Pada tahun normal, terutama pada masa tanam yang kedua perlu teknologi irigasi untuk tetap mempertahankan periode tanam dua kali setahun. Pada tahun kering, pengaruhnya lebih serius lagi karena yang pada awalnya dapat ditanami padi sekali setahun, menjadi tidak mungkin. Implikasi hasil penelitian ini terhadap pertanian, bahwa kegiatan adaptasi perlu dilakukan untuk mengurangi dampak negatif, bahkan sekaligus juga berusaha mencari manfaat dari perubahan tersebut.

Q02 FOOD PROCESSING AND PRESERVATION

278 DUMA, N.

Trend of moisture and glucose value change of powdered ginger - chocolate drink during storage. *Model perubahan kadar air dan kadar gula minuman serbuk jahe (Zingiber officinale) cokelat selama penyimpanan*/ Duma, N.; Loppies, J.E. (Balai Besar Industri Hasil Perkebunan Makassar (Indonesia)). *Jurnal Industri Hasil Perkebunan*. ISSN 1979-0023 (2007) v. 35(2) p. 52-57, 3 ill., 1 table; 10 ref. Appendix.

GINGER; CHOCOLATE; POWDERS; BEVERAGES; GLUCOSE; MOISTURE CONTENT; TRENDS; STORAGE; FOOD TECHNOLOGY.

Sebuah model perubahan kadar air dan kadar gula minuman serbuk jahe, cokelat selama penyimpanan telah di teliti. Minuman serbuk diformulasikan dari jahe, cokelat dan gula dengan metode pemasakan dan pengadukan dengan suhu dan waktu tertentu sampai

membentuk kristal. Cokelat divariasikan pada 50, 100, 150, dan 200 g, sementara jumlah bahan-bahan lainnya tetap. Waktu penyimpanan divariasikan pada 0, 2, 4 dan 6 minggu. Hasil studi yang diolah dengan rancangan acak lengkap (RAL) mengindikasikan bahwa Penambahan cokelat ke dalam formula, lama penyimpanan dan interaksi kedua faktor ini berpengaruh sangat nyata terhadap kadar air dan kadar gula. Uji perbedaan dari kedua faktor menunjukkan bahwa kadar air dari keempat formula minuman serbuk jahe cokelat meningkat secara linier seiring dengan bertambahnya waktu penyimpanan. Rata-rata peningkatan kadar air adalah 0,04; 0,9; 0,07; 0,12%/minggu, sedangkan kadar gula berkurang secara linier dengan nilai rata-rata adalah 1,5; 1,1; 0,9; 0,4%/minggu. Penambahan jumlah cokelat pada formula minuman serbuk jahe cenderung menaikkan kadar gula. Dari formula ini, penambahan konsentrasi cokelat 200 g sangat efektif untuk menghasilkan formula minuman jahe-cokelat.

279 LA TENG, P.N.

Use of coconut water as the source of microbe starter in producing virgin coconut oil (VCO) for household scale industry. ***Pemanfaatan air kelapa sebagai sumber mikroba starter pada pembuatan virgin coconut oil (VCO) skala industri rumah tangga***/ La Teng, P.N.; Mamang (Balai Riset dan Standardisasi Industri, Makassar (Indonesia)). *Majalah Kimia* (Indonesia). ISSN 0126-0170 (2006) v. 34(1) p. 6-11, 2 ill., 2 tables; 17 ref

COCONUT WATER; COCONUT OIL; STARTER CULTURES; COTTAGE INDUSTRY; FERMENTED PRODUCTS; FERMENTATION; PROCESSING.

Virgin Coconut Oil (VCO) is one of the processed products from coconuts which has good prospect. Several methods to convert coconuts into VCO have been developed from simple technology to capital intensive technology. One of the methods which is suitable for household scale industry is fermentation method. The method is simple and requires relatively small processing costs. In this research, the fermentation method has been applied utilizing coconut water as the source of microbe starter. Variables studies were fermentation periods with the levels of 6, 8 and 10 hours, and the ratio of coconut milk cream and the starter with the levels of 6/1, 6/2 and 6/3. The results showed that the coconut milk cream and starter ratio of 6/2 and the fermentation period of 10 hours were able to break the coconut milk emulsion, so that the water can be separated optimally from the coconut oil and protein mixture. The VCO resulted from that treatment contains 1.17% moisture and rather muddy in the purity. By improving the filtering method, it is possible to make the moisture content lower and improve the purity of the VCO.

280 LA TENG, P.N.

Reduced of water content and improvement of the virgin coconut oil's purity for small-scale industry. ***Penurunan kadar air dan peningkatan kejernihan virgin coconut oil (VCO) produksi industri kecil***/ La Teng, P.N.; Mamang (Balai Besar Industri Hasil Perkebunan, Makassar (Indonesia)). *Jurnal Industri Hasil Perkebunan* (Indonesia). ISSN 0126-0170 (2006) v. 34(2) p. 47-53, 2 ill., 2 tables; 15 ref.

COCONUT OIL; PURIFICATION; FERMENTATION; MOISTURE CONTENT; PROCESSING; METHODS; COTTAGE INDUSTRY.

Conversion of coconuts into virgin coconut oil (VCO) has been carried out using various methods, from high technology to small-scale industry levels, such as by centrifugation, semi-wet condition, enzymatic, elicitation and acidity methods. Although the centrifugation method can produce high quality VCO, the method is not able to be applied in the farmer

levels as the greatest owner for coconut plantations in Indonesia. Other methods in producing VCO were still resulting in high water content with low VCO's purity. To overcome this problem without ignoring the VCO's quality, a study to reduce water content and purity's improvement of VCO for small-scale industry has been conducted. The processing of VCO included fermentation technique using coconut milk as the source of the microba starter. The treatment applied is expected to reduce water content and purity's improvement of VCO, that consisted of three stage filtering processes namely: first stage by gravitation method using tissue paper; second stage by vacuum treatment using membrane paper of gasoline filter, as well as third stage by vacuum treatment using filter paper No. 42. The results showed that the VCO's water content resulted from each filtering stage were 1.15%, 0.60% and 0.31 %, respectively, whereas the VCO's purity from each filtering stage has the respected appearance as rather muddy; rather transparent and transparent. Although the VCO's water content has not yet complied with the Codex Alimentary Commision (CAC) standard (<0.05 %), at least this study has reduced the water content and improved the VCO's purity. In this case, the VCO's purity will be able to get further improvement, especially by means of the filtering modification for the stage II and III.

281 NGATIRAH

Probiotic encapsulation using alginates and chitosan to increase its viability. ***Enkapsulasi probiotik dengan menggunakan alginat dan chitosan untuk meningkatkan viabilitasnya***/ Ngatirah; Ulfah, M. (Institut Pertanian STIPER, Yogyakarta (Indonesia). Fakultas Pertanian). Yogyakarta: INSTIPER, 2006. 31 p.

YOGHURT; LACTOBACILLUS BULGARICUS; STREPTOCOCCUS THERMOPHILUS; PROBIOTICS; ENCAPSULATION; ALGINATES; CHITOSAN; KEEPING QUALITY; SURVIVAL; BILE SALTS; VIABILITY.

The attention to functional food and healthy food have been increasingly. One of the healthy food is probiotic foods. Yoghurt is one of probiotic foods that was popular and contain *Lactobacillus bulgaricus* and *Streptococcus thermophilus*. The survival of *Lactobacillus bulgaricus* and *Streptococcus thermophilus* in yoghurt has been shown to be a problem, due to environmental factors such as pH of stomach and bile salt. So, their intolerance of acid conditions and the presence of bile salt causing lost of their viability. However, microencapsulation techniques could provide protection to acid sensitive and thus increase their survival rate during the shelflife of the yoghurt and their passage through the gastrointestinal tract. The polysaccharide sodium alginate and chitosan have been most widely used as a microencapsulation vehicle. This research was aimed to study of sodium alginate and chitosan as a microencapsulation vehicle, and the effect of microencapsulation on cell viability during storage time, low pH and bile salt tolerance. This research was divided into two steps. The first step was conducted to obtain the optimum concentration of microencapsulation vehicle and the second step was conducted to know the effect of storage time on biocapsul characteristics. The randomized completely block design was used as experimental design in the first step; and the split plot design was used in the second step. The result showed that the kind of probiotic bacteria did not affect biocapsule characteristic (weigth, diameter, viability and tolerance of low pH and bile salt). *L. bulgaricus* cell count was higher than *S. thermophilus* but did not significantly different. The concentration of microencapsulation vehicle did not affect viability and biocapsule characteristics, but the higher concentration tended to increasing of beads size and low pH and bile salt tolerance. The storage time affected weight and size of alginate beads, but did not affect chitosan beads. The longer of storage time tended to decrease cell viability, but did not significantly

and did not affect low pH and bile salt tolerance.

282 NURDJANNAH, N.

Influence of soaking process in organic acid and drying methods on the quality of dehydrated green pepper. ***Pengaruh perendaman dalam asam organik dan metode pengeringan terhadap mutu lada hijau kering***/ Nurdjannah, N.; Hoerudin (Balai Besar Penelitian dan Pengembangan Pascapanen Pertanian, Bogor (Indonesia)). *Buletin Penelitian Tanaman Rempah dan Obat* (Indonesia). ISSN 0251-0824 (2008) v. 19(2) p. 181-195, 2 ill., 5 tables; 26 ref.

PEPPER; QUALITY; DRYING; SOAKING; ORGANIC ACIDS.

Browning process usually happened in dehydrated green pepper process resulted in losses of green color and unattractive appearance. A study on browning process prevention was done using citric, malic and tartaric acid. Treatments applied consisted of 3 kinds of organic acid (citric, malic and tartaric acids) with 3 concentration levels (2%, 3%, and 4%), and 2 kinds of drying method (oven and sun drying). The experimental design used was factorial completely randomized design with 2 replications. The results showed that the use of citric, malic and tartaric acid in 2%, 3%, and 4% concentration effectively decreased the enzymatic browning process. Oven drying method gave better green color dehydrated green pepper compare to that of sun drying. The result of sensory test based on color, taste, odor and general acceptance on dehydrated green pepper showed that the product obtained from combination treatment of 2% tartaric acid and oven drying was more acceptable than other products. The main characteristic of dehydrated green pepper produced in this research met the characteristic of the ones available in the market.

283 ROSNIATI

Relation between fermentation periods on polyphenol contents and flavor of cocoa beans. ***Hubungan antara waktu fermentasi terhadap kandungan polifenol dan cita rasa biji kakao***/ Rosniati (Balai Riset dan Standardisasi Industri, Makassar (Indonesia)). *Majalah Kimia* (Indonesia). ISSN 0126-0170 (2006) v. 34(1) p. 12-17, 2 ill., 3 tables; 14 ref

COCOA BEANS; FLAVOUR; POLYPHENOLS; TIME; FERMENTATION; FERMENTED PRODUCTS; ORGANOLEPTIC TESTING.

Polyphenol is an antioxidant agent is that found in cocoa beans. It has been known that non fermented cocoa beans contain 12 to 18 % polyphenol compounds. This polyphenol is responsible for the astringent and green flavor. Generally fermentation will improve flavor but in the other side will reduce polyphenol contents of the beans. The aim of this study is to investigate the relation between fermentation periods and polyphenol content and flavor of cocoa beans. The fermentation was carried out in 40 cm bean layer in three fermentation boxes (80 cm x 60 cm x 50 cm) with capacity 200 kg. Variable studied was fermentation periods with the levels of 0, 1, 3, and 5 days. The flavor of cocoa beans evaluated were aromatic, chocolate, acid, bitter; astringent and color. The results showed that the polyphenol content of the cocoa beans decreased from 8.75 % before fermentation to 8.23 %, 6.57 % and 4.95 %, respectively after 1, 3 and 5 day fermentation. The aromatic and chocolate flavors of the beans improved after 3 and 5 day fermentation, while the acid, bitter and astringent decreased after 3 and 5 day fermentation. Based on the trends of the polyphenol, flavor and color of the beans, it can be concluded that the beans of the three day fermentation are suitable for producing chocolate products as functional foods for their relatively high polyphenol and fairly accepted flavor.

284 ROSNIATI

Effects of fermentation period of cocoa beans on polyphenol and flavor of dark chocolate. ***Pengaruh waktu fermentasi biji kakao terhadap kandungan polifenol dan cita rasa pasta cokelat/*** Rosniati (Balai Besar Industri Hasil Perkebunan, Makassar (Indonesia)). *Jurnal Industri Hasil Perkebunan* (Indonesia). ISSN 0126-0170 (2006) v. 34(2) p. 39-46, 4 ill., 3 tables; 13 ref

COCOA BEANS; FERMENTATION; CHOCOLATE; POLYPHENOLS; FLAVOUR; FOOD TECHNOLOGY.

Polyphenol or flavonoids is an antioxidant agent that occurs widely in fruit, vegetable, tea, red wine and chocolate. Dark chocolate has the highest antioxidant agent among commonly consumed food items. The effects of fermentation period of cocoa beans on polyphenol and flavor of dark chocolate has been studied. Variable studied was fermentation with the levels of 0, 1, 3 and 5 days. Parameters evaluated were water content, fat content, sugar content, free fatty acid, total microbe, polyphenol and flavor (aromatic, chocolate, acid, bitter, astringent, nutty), and color of dark chocolate. The results showed that the water content, sugar content, free fatty acid, and total microbe were fairly constant except for fat content which increased during the fermentation. However, all the parameters met the SNI 01-4458-1998 standards for dark chocolate. In general the flavor of dark chocolate from the third and fifth day fermentation were accepted by the panelist, though its bitterness and astringency of the third day fermentation were rather high.

285 SAFITRI, R.

Hydrolysis of sago pith powder (*Metroxyloon sago* Rottb.) acidicly, acid-enzyme combination, and optimization of enzyme combination and fermentation of hydrolyizate by some strain lactic acid bacterium. ***Hidrolisis tepung empulur batang sagu (Metroxylon sagu Rottb) secara asam kombinasi asam enzim dan optimasi kombinasi enzim serta fermentasi hidrolisatnya oleh beberapa strain bakteri asam laktat/*** Safitri, R.; Andayaningsih, P.; Miranti, M. (Universitas Padjadjaran, Bandung (Indonesia). Fakultas Matematika dan Ilmu Pengetahuan Alam). Bandung (Indonesia): UNPAD, 2008. 57p. 633.683:661/SAF/h

METROXYLON; STARCH CROPS; HYDROLYSIS; LACTIC ACID; ENZYMES; FERMENTATION; LACTOBACILLUS BULGARICUS; PH.

The research of sago pith powder (*Metroxyloon sago* Rotth.) hydrolysis using sulfuric acid and enzyme also lactic fermentation from its hydrolysates by *Lactobacillus bulgaricus* ssp delbrueckii FNCC 0035 has been conducted. The method of this research was conducted descriptively. The research was conducted by hydrolysing sago pith powder into reduction sugar with 10 percent (b/v) gelatine concentration. The catalyst used in this research are sulfuric acid and commercial enzyme that is used in this research was cellulase enzyme (Celluclast 1.5 l.), alpa-amilase enzyme (Liquozyme Supra), and amyloglucosidase enzyme (dextroyme DX). The bacteria for fermentating hydrolyzed sugar was Lactobacillus bulgaricus ssp delbrueckii FNCC 0035. The research showed that hydrolysis using 6 M sulfuric acid with optimum temperature for hydrolysis was 120°C results the highest reduction sugar about 47,98% (b/b), whereas combination of hydrolysis using 6 m sulfuric acid, cellulase enzyme (0.55 µl/g), and amyloglucosidase enzyme (0.37 µl/g) for 48 hours hydrolysis time results the highest reduction sugar about 69.7% (b/b) with glucose

concentration about 7.39% (b/v). Fermentation process using pH control will produce lactic acid with concentration about 2.73% (b/v) for 108 hours fermentation time, whereas fermentation without using pH control will not produce lactic acid.

286 SETYADJIT

Implementation of innovation processing techniques of citrus cv. siam. ***Implementasi inovasi teknologi pengolahan jeruk siam***/ Setyadjit; Prabawati, S. (Balai Besar Penelitian dan Pengembangan Pascapanen, Bogor (Indonesia)). Proceedings of the national seminar on citrus, Jakarta (Indonesia), 13-14 Jun 2009/ Winarno, M.; Sabari; Subandiyah, S.; Setyobudi, L.; Supriyanto, A. (eds.) Jakarta (Indonesia): Puslitbanghorti, 2008; p. 100-109, 11 ref.

CITRUS; MANDARINS; PROCESSING; POSTHARVEST TECHNOLOGY; BITTERNESS; INNOVATION; AGROINDUSTRIAL SECTOR; TECHNOLOGY TRANSFER.

An innovative processing technique of citrus cv. siam has been implemented in Citrus Centre, Tebas, West Kalimantan. The main innovation was at the formula integrated to the process to produce less bitter and more edible juice. The innovation has also been supported by scale up processes. Evaluation has been done on the performance of citrus center as a commercial unit and alliance citrus processing industry. Management, production and marketing aspect indicated the unit is active but it still requires further training in business planning, practice and marketing for the people in charge. Alliance citrus processing industry at non-research aspect, the steering committee and working group have actively supported the implementation; but it still needs development of policy, regulation and standard and more attention to the commercial unit. On the research aspect, the innovation required an adjustment during application, but it is still under control. Research to gain further innovative techniques and preference test is still required to reach success. An agroindustry processing of citrus has reached the last phase of development and has been adopted by other production center. But it still requires further supportive programme to guarantee the sustainability.

287 SUPRAPTI

Effects of alkalization of cocoa cake on quality and flavor of cocoa powder. ***Pengaruh alkalisasi bungkil kakao terhadap mutu dan cita rasa bubuk cokelat***/ Suprapti (Balai Besar Industri Hasil Perkebunan, Makassar (Indonesia)). *Jurnal Industri Hasil Perkebunan* (Indonesia). ISSN 0126-0170 (2006) v. 34(2) p. 32-38, 3 ill., 3 tables; 7 ref.

COCOA POWDER; ALKALINIZATION; QUALITY; FLAVOUR.

Alkalization is used mainly to improve color and flavor and the process is conducted by the beans, nib or powder (cake) with solutions or suspensions of alkali, usually in the form of K or sodium bicarbonate. An experiment on the effects of cake alkalization on quality and flavor of cocoa powder has been conducted in order to find out the influence of cake alkalization ($NaHCO_3$ and $KHCO_3$) and its concentration (4%, 6%, and 8%) on the quality (water content, ash content, pH, and total plate count) and taste of cocoa powder. The experiment was conducted using a completely randomized design with two factors and two replications. Factor A: alkali A1 = $NaHCO_3$ and A2 = $KHCO_3$. Factor B: alkali concentration B1 = 4%, B2 = 6%, and B3 = 8%. The results indicate that cake alkalization ($NaHCO_3$ and $KHCO_3$) and its interaction do not have any significant effect on ash content. However, these concentrations (4%, 6%, and 8%) show significant effect. Total plate count on the range 1.3 x 10^3, 6.1 x 10^3 meets SNI 01-3747-1995. Cake alkalization ($NaHCO_3$ and

$KHCO_3$) and the concentration (4%, 6%, and 8%) do not have any significant effect on water content, but show significant effect on pH. $NaHCO_3$ with 4% and 6% concentration result score 2 (low medium) for aromatic, chocolate, and color, and score 1; 2; and 2 for acid, bitter, and astringent, respectively. $KHCO_3$ with 8% concentration result score 2 (low-medium) for aromatic, chocolate, and color, and score 3; 4; and 3 for acid, bitter, and astringent, respectively.

288 SUPRAPTI

Effects of sugar supplement and pH control on the quality of jelly processed from cocoa pulp liquid. ***Pengaruh penambahan gula dan pengaturan pH terhadap mutu jelly pulp kakao***/ Suprapti (Balai Riset dan Standardisasi Industri, Makassar (Indonesia)). *Majalah Kimia* (Indonesia). ISSN 0126-0170 (2006) v. 34(1) p. 25-31, 8 ill., 13 ref

COCOA BEANS; JELLIFICATION; SUGAR; PH; QUALITY; FLAVOUR; ORGANOLEPTIC TESTING.

The effect of sugar supplement and pH control on the quality of jelly processed from cocoa pulp liquid have been investigated. The research was run with completely randomized factorial design with two factors, i.e. sugar supplements with the levels of 30, 40, and 50% and pH controls with the levels of 2.9; 3.2 and 3.5 each with three replications. The results indicated that the sugar supplements and pH controls had significant effects on sugar content, color, aroma, taste, pectin content, viscosity and total microbe of the jelly. The panelists showed the highest scores of 3.25 (satisfied) for aroma and 3.91 (satisfied) for the color of the jelly with 50% sugar and pH 3.5. At 50% sugar, total microbe was 35 colony/gram, while at pH control 2.9 total microbe was 50 colony/gram which fulfilled SNI 01-3552-1994 for jelly. At 40% sugar supplement and pH control 3.2 resulted in pectin content of jelly 1.01% which was considered as fairly good jelly with viscosity 46.6 cps.

289 YUNUS, M.R.

Techno-economic feasibility assessment of fermented cocoa beans processing with capacity of 250 t. ***Asesmen kelayakan tekno-ekonomi prosesing biji kakao fermentasi kapasitas 250 t.*** / Yunus, M.R. (Balai Besar Industri Hasil Perkebunan, Makassar). *Jurnal Industri Hasil Perkebunan*. ISSN 1979-0023 (2007) v. 35(2) p. 34-41, 3 ill., 4 tables; 14 ref.

COCOA BEANS; FERMENTATION; PROCESSING; TECHNOLOGY; FARM EQUIPMENT; FEASIBILITY STUDY; PRODUCTION ECONOMICS.

Masalah klasik perkakaoan Indonesia untuk bersaing di pasar kakao dunia adalah masih rendahnya kualitas biji kakao yang dihasilkan ditandai oleh relatif masih tingginya kadar air, serangga, jamur, benda asing dan kulit disamping tidak difermentasi. Biji kakao fermentasi terutama dibutuhkan oleh industri-industri cokelat. Untuk meningkatkan kualitas kakao, penggunaan teknologi prosesing yang tepat dan telah terbukti keandalannya menjadi sangat penting. Namun penggunaan teknologi ini berkaitan dengan besarnya investasi yang harus dikeluarkan berhadapan dengan tingkat keuntungan yang dapat dihasilkan. Pada studi ini dilakukan pengkajian kelayakan teknoekonomi prosesing biji kakao fermentasi kapasitas 250 ton. Estimasi biaya dan harga didasarkan pada biaya dan harga pada pertengahan tahun 2007 yang berlaku di Kabupaten Mamuju Provinsi Sulawesi Barat, salah satu sentra utama penghasil kakao di Indonesia. Kebutuhan investasi termasuk modal kerja sebesar Rp 990 juta dengan rasio kredit dan modal sendiri sebesar 90:10%. Tingkat suku bunga 12%/th. Hasil pengkajian menunjukkan nilai NPV Rp 963 juta, BCR 1,45%, IRR 33,58%, BEP 24% dan

PBP 3,5 tahun yang berarti unit prosesing biji kakao fermentasi ini cukup layak. Kenaikan harga buah kakao dari Rp 350 menjadi Rp 375 dan Rp 400/buah menyebabkan tingkat kelayakan prosesing biji kakao fermentasi menurun. Bahkan pada harga buah kakao Rp 400 pendapatan setiap tahunnya dari hasil penjualan biji kakao dikhawatirkan tidak dapat menutupi besarnya pengeluaran. Namun jika pada harga buah kakao Rp 400 harga biji kakao fermentasi dapat dinaikkan dari Rp 15.000 menjadi Rp 17.000/kg, tingkat kelayakan unit prosesing kembali membaik.

290 YUNUS, M.R.
Control variable of the evaporation rates in the cocoa beans drying operation. ***Variabel kontrol laju penguapan air pada operasi pengeringan biji kakao***/ Yunus, M.R. (Balai Besar Industri Hasil Perkebunan Makassar (Indonesia)). *Jurnal Industri Hasil Perkebunan* (Indonesia). ISSN 0126-0170 (2006) v. 34(2) p. 54-58, 2 ill., 13 ref.

COCOA BEANS; DRYING; EVAPORATION; STORAGE; FLAVOUR; QUALITY.

The high moisture of the cocoa beans after fermentation step or after pod breaking step for non-fermentation requires beans drying to a safe moisture of 6 to 7% for storage. Otherwise, the mould will develop and ruin the appearance and flavor of the beans. This article discuss variables that control the evaporation rates in the beans drying operation that may affect quality of the final beans. Those variables are temperature, relative humidity and velocity or flow rate of the drying air and the spread out area of the beans on the drying floor or the drying beds including the raking intervals of the beans as well.

Q03 FOOD CONTAMINATION AND TOXICOLOGY

291 NUGROHO, W.S.
Analysis of Salmonella contamination rate and associated factors in laying-hen's egg in the District of Sleman, Yogyakarta. ***Analisis tingkat cemaran Salmonella dan faktor-faktor pencemarannya pada telur ayam ras di Kabupaten Sleman, Yogyakarta***/ Nugroho, W.S. (Universitas Gadjah Mada, Yogyakarta (Indonesia), Fakultas Kedokteran Hewan); 15 ref. *Jurnal Veteriner* (Indonesia). ISSN 1411-8327 (2006) v. 7(2) p. 47-53

LAYER CHICKENS; ANIMAL DISEASES; SALMONELLA; EGGS; TOXICITY; CONTAMINATION

The objectives of this study were to investigate (1) the prevalence of Salmonella contamination in eggs of layers in Sleman District, Yogyakarta, (2) farm's risk factors associated with the prevalence, and (3) bird's risk factors associated with the odds of the eggs to get contaminated with salmonella. A total of 709 eggs were collected by a combination of multistage, proportional, simple random and convenient sampling strategy from a total of 35 farms. Salmonella was detected by culturing eggshells and yolks in tetrathionate broth base (1:10), brilliant green agar, xylose lysine deoxycholate agar and triple sugar iron agar. A sample was designated as Salmonella contaminated if salmonella was detected in the respective material. A farm having at least one contaminated egg was designated as Salmonella contaminated. The prevalence of the contamination in farm and bird of eggs were 11.4% in farm level and 1.4% in bird level. In farm level the prevalence of the Salmonella contamination in eggs was increased by the education of the owner, barn clean-up, rodent control, 3 times daily egg pick up, and cloacal Salmonella contamination. Bird density, drinking water sanitation and once or twice daily egg pick up decreased the prevalence. In bird's level, salmonella contaminated of the cloacal increases the odds of egg

to get contamination with salmonella, while picking up the eggs twice a day decreased the odds.

292 PARAMAWATI, R.

Effort to minimize aflatoxin B1 contamination in peanut by postharvest technology: case study in Lampung (Indonesia). ***Upaya menurunkan kontaminasi aflatoksin B1 pada kacang tanah dengan teknologi pascapanen: studi kasus di Lampung***/ Paramawati, R.; Triwahyudi, S. (Balai Besar Pengembangan Mekanisasi Pertanian, Serpong (Indonesia)); Arief, R.W. *Jurnal Enjiniring Pertanian* (Indonesia). ISSN 1693-2900 (2006) v. 4(1) p. 1-8, 4 ill., 2 tables; 10 ref.

GROUNDNUTS; AFLATOXINS; CONTAMINATION; ASPERGILLUS FLAVUS; ASPERGILLUS PARASITICUS; POSTHARVEST TECHNOLOGY.

Peanut is one of the important commodity in Lampung which commonly planted in dry land area. In the tropical country with high temperature and humidity, peanuts are highly susceptible to aflatoxin contamination caused by *Aspergillus flavus* and *A. parasiticus*. To minimize the aflatoxin contamination, a quick postharvest process likely to be done. In this study, a research to shorten the postharvest processing was carried out by using the postharvest processing machinery. The result was then compared to the traditional technology that commonly use by farmers. The result showed that traditional technology produced pods with low level aflatoxin B1 contamination, but kernel in high contamination. In contrast, quick postharvest produced low level aflatoxin B1 contamination both in pods and kernels. This research also preceeded with peanut sampling at selected markets in Lampung. The result of peanut sampling at several markets from 4 prefectures showed varies contamination level of aflatoxin B1 from 4.4 to 205 ppb with 69.76 ppb in average. Kernel stored with hermetic package showed high contamination level compare to that of pod. The contamination was still continue during the storage period.

293 SUARDANA, I W.

Isolation and identification *Escherichia coli* 0157:H7 on beef at Badung Regency Province of Bali. ***Isolasi dan identifikasi Escherichia coli 0157:H7 pada daging sapi di Kabupaten Badung Provinsi Bali***/ Suardana, I W. (Universitas Udayana, Denpasar (Indonesia), Fakultas Kedokteran Hewan); Sumiarto, B.; Lukman, D.W. *Jurnal Veteriner* (Indonesia). ISSN 1411-8327 (2007) v. 8(1) p. 13-18, 4 ill., 12 ref.

BEEF MEAT; ESCHERICHIA COLI; COLIFORM BACTERIA; IDENTIFICATION; ISOLATION TECHNIQUES; AGGLUTINATION TESTS; IMMUNE SERUM; BIOLOGICAL CONTAMINATION; BALI.

The food safety is an important for both consumers and industries. Coliform and *Escherichia coli* have been used as sanitary indicator of food processing industries. The detection of foodborne pathogens, including those capable of infecting human such as *Escherichia coli* O157:H7 have also been conducted. The bacteria produce toxin known as Shiga toxin which can cause bloody diarrhea to more serious clinical conditions such as hemorrhagic colitis hemolytic uremic syndrome. In this study the correlation of contamination levels with incidence of coliform, *E. coli*, *E. coli* O157 and O157:H7 in beef meat were examined. The bacteria were firstly cultured in eosin methylene blue agar (EMBA) medium, then in sorbitol MacConkey agar (SMAC) medium and finally tested by latex agglutination test to confirm the presence of *E. coli* O157. A complete assay was carried by H7 antiserum for the

presence of *E. coli* O157:H7. From 89 beef samples examined, it was shown that the average of Coliform and *E. coli* contaminations were 93.01 ± 2,64 x 10^3 cfu/g and 47,82 ± 32,34 x 10^2 cfu/g, respectively. Analysis by Spearman's rho test indicated that there was no significant (P>0.05) correlation between Coliform contamination levels and the presence of *E. coli*, *E. coli* O157 and O157:H7. On the other hand, *E.coli* contamination levels correlated significantly (P<0.01) with the presence of *E. coli* O157 and *E. coli* O157:H7. Wilcoxon test indicated that the percentage of Coliform was significantly higher (P<0.01) than the percentage of *E. coli*, *E. coli* O157 and *E. coli* O157:H7 contamination.

Q04 FOOD COMPOSITION

294 ANTARLINA, S.S.

Siam banjar citrus fruit quality on monotonous swampland. ***Kualitas buah jeruk siam banjar dari lahan rawa lebak***/ Antarlina, S.S.; Noor, I. (Balai Penelitian Pertanian Lahan Rawa, Banjarbaru (Indonesia)). Proceedings of the national seminar of citrus, Jakarta, 13-14 Jun 2009/ Winarno, M.; Sabari; Subandiyah, S.; Setyobudi, L.; Supriyanto, A. (eds.) Jakarta (Indonesia): Puslitbanghorti, 2008; p. 447-459, 5 ill., 2 tables; 9 ref.

CITRUS FRUITS; CHEMICOPHYSICAL PROPERTIES; QUALITY; ORGANOLEPTIC ANALYSIS; CONSUMER BEHAVIOUR; SWAMP SOILS.

Siam banjar (*Citrus suhuiensis*) citrus plant grow well on monotonous swampland. The objective of the research was to identify siam banjar citrus fruit quality planted on monotonous swampland. The research was conducted on July - September 2006, in South Kalimantan. Citrus fruit samples were obtained from farmer field in five locations of monotonous swampland that are Batalas Village (Tapin District), Lokgabang, Pematang Hambawang (Banjar District), and Mahang Matang Landung, Tabu Darat Hilir (Hulu Sungai Tengah District). The citrus fruits were harvested at optimum maturity stage according to local farmer criteria. The result showed that the quality of citrus fruit varied between locations. The individual weight of citrus fruits was 101.73 - 135.52 g. Percentage of flesh fruit 79.63 - 80.67%, juice content 39.66 - 62.35%, moisture content 87.11 - 88.14%, total soluble solid (TSS) 10.2 - 12.06%, acidity 0.24 - 0.41%, ratio TSS/acidity 25.71 - 50.46, vitamin C content 29.59 - 39.80 mg/100 g, and Fe content 0.12 - 0.24 mg/100 ml. Siam banjar citrus fruit have good quality and acceptable taste. Of 5 locations, citrus fruit from Pematang Hambawang has the best quality, as showed by panelist on organoleptic test.

295 HERAWATI, H.

Shelf life determination for food product. ***Penentuan umur simpan pada produk pangan***/ Herawati, H. (Balai Pengkajian Teknologi Pertanian Jawa Tengah, Ungaran (Indonesia)). *Jurnal Penelitian dan Pengembangan Pertanian* (Indonesia). ISSN 0216-4418 (2008) v. 27(4) p. 124-130, 3 ill., 7 tables; 29 ref.

FOODS; FOOD TECHNOLOGY; STORAGE; DURATION; QUALITY; PACKAGING.

Commercial food processing aimed to extend shelf life of product. Information on shelf life product is required before the product is launched in the market to guarantee the consumers. Broaden knowledge about shelf life of food product is reviewed in which include regulation, shelf life criteria, shelf life prediction principles, shelf life analysis, packaging criteria, and extending food shelf life efforts. Processing activities to extend product shelf life should anticipate another quality degradation sources. Shelf life analysis should consider several

technical and economic factors which related to the responsibility of management decision on product distributions.

296 SUPRAPTI

Effects of alkalization of cocoa cake on quality and flavor of cocoa powder. *Pengaruh alkalisasi bungkil kakao terhadap mutu dan cita rasa bubuk cokelat* / Suprapti (Balai Besar Industri Hasil Perkebunan, Makassar). *Jurnal Industri Hasil Perkebunan*. ISSN 0126-0170 (2006) v. 34(2) p. 32-38, 3 ill., 3 tables; 7 ref.

COCOA POWDER; ALKALINIZATION; QUALITY; FLAVOUR.

Alkalisasi digunakan terutama untuk memperbaiki warna dan cita rasa, dan prosesnya dilakukan terhadap biji, liquor, nib, atau bubuk (bungkil) dengan larutan atau suspensi alkali biasanya K atau Na bikarbonat. Penelitian pengaruh alkalisasi bungkil terhadap mutu dan cita rasa bubuk cokelat bertujuan untuk mengetahui pengaruh $NaHCO_3$ dan $KHCO_3$ dengan konsentrasi 4%, 6%, dan 8% terhadap mutu (kadar air, kadar abu dari bahan kering tanpa lemak, pH, dan angka lempeng total) dan cita rasa bubuk cokelat. Penelitian menggunakan rancangan acak kelompok pola faktorial dengan dua faktor dan dua kali ulangan. Faktor A: jenis alkali $A_1 = NaHCO_3$ dan $A_2 = KHCO_3$. Faktor B: konsentrasi alkali $B_1 = 4\%$, $B_2 = 6\%$, dan $B_3 = 8\%$. Hasil penelitian menunjukkan bahwa jenis alkali tidak berpengaruh nyata terhadap kadar abu bubuk cokelat sedangkan konsentrasinya (4%, 6%, dan 8%) berpengaruh nyata. Angka lempeng total bubuk cokelat antara $1{,}3 \times 10^3$, $6{,}1 \times 10^3$ yang memenuhi syarat SNI 01-3747-1995. Jenis alkali dan konsentrasinya tidak berpengaruh nyata terhadap kadar air, berpengaruh sangat nyata terhadap pH bubuk cokelat. Perlakuan $NaHCO_3$ dengan konsentrasi 4% dan 6% memberikan skor aromatic, chocolate, dan colour masing-masing dua = low-medium, dengan cacat citarasa acid, bitter, dan astringent masing-masing dengan skor = 1; 2; dan 2. Perlakuan $KHCO_3$ dengan konsentrasi 8% memberikan skor aromatic, chocolate, dan colour masing-masing dua = low-medium, dengan cacat cita rasa: acid, bitter dan astringent masing-masing skor 3; 4; dan 3.

297 TRISNAWATI, W.

Quality and panelist preferences of juice and syrup of siam orange during storage. *Mutu dan preferensi panelis terhadap sari dan sirop buah jeruk siam selama penyimpanan*/ Trisnawati, W. (Balai Pengkajian Teknologi Pertanian Bali, Denpasar (Indonesia)). Proceedings of the national seminar of citrus, Jakarta, 13-14 Jun 2009/ Winarno, M.; Sabari; Subandiyah, S.; Setyobudi, L.; Supriyanto, A. (eds.) Jakarta (Indonesia): Puslitbanghorti, 2008; p. 460-468, 4 tables; 10 ref.

CITRUS FRUITS; FRUIT JUICES; FRUIT SYRUPS; STORAGE; KEEPING QUALITY; DURATION; ORGANOLEPTIC PROPERTIES; CONSUMER BEHAVIOUR.

The excessive production of citrus fruit during harvest season resulted in a wasted fruits, even more off grade fruits. This wasted citrus could be processed into valuable products such as juice and syrup. The aim of research was to observe the quality alteration and panelist preferences of the siam juice and syrup during storage. The juice was stored for 6 weeks, while syrup was stored for 9 weeks. The results showed that vitamin C level, pH and total acid were standard. Organoleptic test results showed that no differences between the treatments at score 3-4 which are between neutral to prefer. Organoleptic test for syrup color

had significant difference in the sixth week storage with score 3.07 (neutral). The juice and syrup stored for 6 and 9 weeks were still palatable based on the juice quality of pH 3.83, total acid 1.13%, vitamin C 64.90 mg/100 g, and TSS 12.8 w/w, panelist preferences were neutral to prefer, while the syrup has pH 3.65, total acid 1.62%, vitamin C 64.90 mg/100 g and TSS 63.00 w/w, panelist preferences gave score 4.07 (prefer to most prefer).

Q52 FEED PROCESSING AND PRESERVATION

298 PUGER, A.W.
Effect of conservation methods on the chemical composition and nutrients recovery of 16 provenances of *Gliricidia sepium*. *Pengaruh cara pengawetan terhadap komposisi kimia dan efisiensi dalam bentuk hay dan silase pada daun 16 provenan*/ Puger, A.W. (Universitas Udayana, Denpasar (Indonesia), Fakultas Peternakan). *Majalah Ilmiah Peternakan* (Indonesia). ISSN 0853-8999 (2006) v. 9(2) p. 50-55, 5 tables; 20 ref

GLIRICIDIA SEPIUM; FEEDS; HAYLAGE; SILAGE; FEED PROCESSING; KEEPING QUALITY; CHEMICAL COMPOSITION.

An experiment to study the effect of conservation methods on the nutrients content and nutrients recovery of 16 provenance's of *Gliricidia sepium* was carried out for 3 months. Completely randomized block design arrangement consisting of 3 conservation treatments was undertaken (gliricidia fresh, gliricidia hay, gliricidia silage) and 3 blocks as replications. Each treatment consisted of 16 provenance's of *Gliricidia sepium*, six from Mexico (M), four from Guatemala (G), and one each from Colombia (C), Indonesia (I), Nicaragua (N), Panama (P), Costa Rica (R), and Venezuela (V). Sample of each gliricidia provenance leaves (blade and petiole) before and after conservation were analyzed to determine the chemical composition and calculate the nutrients recovery. Contents of DM and CP of hay was higher ($P<0.05$) than those of gliricidia fresh and silage, while for the GE content, gliricidia hay was the lowest ($P>0.05$). Gliricidia silage contain the lowest OM ($P<0.05$) than gliricidia fresh and hay. The GE recovery was similiar ($P>0.05$) when conserved into hay and silage, while the DM, OM and CP recovery were higher ($P<0.05$) when conserved into hay compared with silage. Provenance P13, R12, and M34 contained higher nutrients; while provenance G14 and G17 were more efficient when conserved into hay and silage. In dryland farming area, conservation of gliricidia into hay was more effective and more efficient than conservation into silage.

Q53 FEED CONTAMINATION AND TOXICOLOGY

299 INDRANINGSIH.
Pesticide residues in brain tissues of dairy cattle in Lembang, West Java. *Residu pestisida dalam jaringan otak sapi perah di Lembang, Jawa Barat*/ Indraningsih; Sani, Y. (Balai Penelitian Veteriner, Bogor (Indonesia)). *Jurnal Ilmu Ternak dan Veteriner* (Indonesia). ISSN 0853-7380 (2006) v. 11(1) p. 76-83, 4 ill., 2 tables; 22 ref

DAIRY CATTLE; FEEDS; PESTICIDES; RESIDUES; BRAIN; HISTOLOGICAL ANALYSIS; JAVA.

The use of pesticides to control plant diseases may cause residual formation in crops, its byproduct and environment. Furthermore, the use of agriculture byproduct as animal feed may cause poisoning or residual formation in animal products. The purpose of this study was

to investigate of pesticide residues in brain tissues of dairy cattle in relation to animal feed as a contaminating source. Samples consisted of animal feeds (19 samples of fodder and 6 samples of feed), 31 samples of sera and 25 samples of brain tissues of dairy cattle collected from Lembang, West Java. Feeds and fodder were collected from dairy farms located in Lembang. Sera were directly collected from 31 heads of Frisien Holstein (FH) cattle from the same location, while brain tissues of FH cattle were collected from a local animal slaughtering house. Pesticide residues were analysed using gas chromatography (GC). Both residues of organochlorines and organophosphates were detected from brain tissues with average residue concentration OP was 22.7 ppb and OC 5.1 ppb and a total residue was 27.8 ppb. The pesticide residues in brain tissues were new information that should be taken into consideration since the Indonesian consumed this tissues as an offal. Although pesticides residue concentration was low, pathological changes were noted microscopically from the brain tissues including extracellular vacuolisation, focal necrosis, haemorrhages, dilatation of basement membrane without cellular infiltration. Both pesticide recidues were also detected in sera, where OP (9.0 ppb) was higher than OC (4.9 ppb). These pesticides were also detected in animal feeds consisting fodders and feeds. Residues of OP (12.0 ppb) were higher than OC (1.8 ppb) in feeds, but residues of OP (16.8 ppb) were lower than OC (18.7 ppb) in fodders. Although, pesticide residues in sera and brain tissues were below the maximum residue limits (MRL) of fat, the presence of pesticides in brain tissues should be taken into consideration as their effects in brain lesion. There was a correlation between contaminant found in animal feeds and pesticide residues in sera of dairy cattle.

Q60 PROCESSING OF NON-FOOD OR NON-FEED AGRICULTURAL PRODUCTS

300 SUHENDRY, I.

Analysis ot total solid content using mini oven KTigaSP to measure dry rubber content of latex at yield collection place. II. type 2. ***Analisis kadar padatan total dengan oven mini KTigaSP untuk menetapkan KKK lateks di tempat pengumpulan hasil. II. tipe 2***/ Suhendry, I.; Ompusunggu, M. *Jurnal Penelitian Karet* (Indonesia). ISSN 0852-808X (2006) v. 24(1) p. 81-90, 5 tables; 4 ref

RUBBER; LATEX; OVENS; PERFORMANCE TESTING; TOTAL SOLID CONTENT.

Method to measure dry rubber content (DRC) at the field has been introduced by some researchers. One of them was through total solid content (TSC) value analyzed with mini oven KTigaSP. Although this method has showed a good result, it still needs to upgrade, especially in the oven which needs some modifications. It is expected that this improvement could give the uniformity of TSC value and analyze more latex samples. The modification product was mini oven KTigaSP type-2. By using the same procedure with mini oven KTigaSP type-1, some serial trials were continued to find out the variability of TSC among samples, the formula calibration to estimate latex DRC, and the accuracy of estimation result compared with metrolax method and standard ASTM D-1076 in laboratory. The result showed that mini oven KTigaSP type-2 could reduce the high variability of TSC value among samples of constant viscosity (CV) from around 2.5-3.0% to average CV = 1.7%. The variability was similar to ASTM D-1076 laboratory method. Analysis of statistics revealed that the linier model of regression Y = a + b X had highly significant response, but from t-test, it was noted that the intercept coefficient (a) was not significant. Therefore, the model was simplified into Y = b X and the practice formula was % DRC = 0.9263 x % TSC. The

measurement of latex DRC by metrolax showed standard deviation of around 2.8% less than by laboratory procedure. Meanwhile, latex DRC measured by mini oven KTigaSP Type-2 had average standard deviation around 0.48% above the laboratory method with deviation ranged from -1.08 to 1.70%.

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