

KOMODITAS:TEBU

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PLANT GENETICS AND BREEDING (2 JDL)

Monitoring genetic fidelity in plants derived through direct somatic embryogenesis in sugarcane by RAPD analysis

Source: *Journal of New Seeds*. 2006. 8 (3). 1-9

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Abstract:

Sugarcane (*Saccharum officinarum* L.) plantlets derived through direct somatic embryogenesis were evaluated using random amplified polymorphic DNA (RAPD) markers to assess genetic fidelity. Thirty-five arbitrary 10-mer oligonucleotide primers produced amplification products and seventeen were used to screen for variation among 100 regenerants. In general, 4384 bands were scored of which only 125 bands were polymorphic. With all the primers used, extent of polymorphism ranged from 0.86 to 8.45%. All the RAPD profiles were monomorphic and similar with very low variation among the plantlets. The results suggest that direct somatic embryogenesis as a method can generate plants with maximum uniformity and that RAPD can be useful as a tool to check genetic variation among sugarcane regenerants

Selection of sugarcane genotypes using callus culture traits

Source: *Agrociencia*. 2006. 40 (5). 605-611

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Abstract:

Programs that seek to obtain new sugar cane genotypes (*Saccharum officinarum*) last 10 to 15 years and the selection stage is that which consumes more time. Therefore, a study was conducted to determine the relationship between the characteristics of callus culture and agronomic variables of the plants derived from calluses of four genotypes of sugar cane cultivated in Mexico. It was found that fresh weight of the calluses correlated (0.464; p less than or equal to 0.0001) with industrializable stems, with internodes number (0.420; p less than or equal to 0.0001) and the number of stems (0.441; p less than or equal to 0.001). The sucrose content in the calluses correlated with length of industrializable stem (0.653; p less than or equal to 0.001) and the diameter of the internodes (0.479; p less than or equal to 0.001). Fresh

weight and sucrose content in the calluses are two characteristics of in vitro cultures that should be studied with more genotypes before using them to select sugar cane genotypes in breeding programs

PLANT PHYSIOLOGY-GROWTH AND DEVELOPMENT (3 JDL)

Allelopathic, autotoxic, and hormetic effects of postharvest sugarcane residue

Source: *Agronomy Journal*. 2006. 98 (6). 1526-1531

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Abstract:

With green sugarcane (interspecific hybrids of *Saccharum* spp.) harvesting, 6 to 24 Mg ha⁻¹ of postharvest residue is deposited on the field surface covering the sugarcane stubble that must reemerge for several ratoon crops. The objectives of this research were to: (i) determine if postharvest residue possesses allelopathic, autotoxic, and hormetic properties; (ii) determine the interaction of soil type with possible autotoxic effects; and (iii) identify a reliable indicator species. Extract concentrations consisted of 0, 0.1, 10, 25, and 100% of the original solution of a 1:28 tissue to water extract. The higher concentrations of residue extracts exhibited autotoxicity by delaying early leaf development. The lower extract concentration of 10% increased sugarcane bud germination by 45% compared with the control, indicating hormetic effects. Allelopathic activity on tall morninglory (*Ipomoea hederacea* Jacq.) was more pronounced on a light soil; germination and radical length were reduced by all concentrations by an average of 42% and 8 mm, respectively, compared with the control. Seedling dry weights were reduced by an average of 10 mg by the 10, 25, and 100% extract concentrations relative to the control. On the heavy soil, only the 100% concentration reduced radical length and weight by 5 mm and 4 mg, respectively, relative to the control. Extract effects on oat (*Avena nuda* L.), rye (*Secale cereale* L.), and tomato (*Lycopersicon esculentum* Mill.) showed poor correlation with effects on sugarcane. Chemical analysis by gas chromatography/mass spectrometry indicated the extract contained benzoic acid. Further studies are needed to establish the impact of benzoic acid in natural settings

Sugarcane morphological, photosynthetic, and growth responses to water-table depth

Source: *Journal of Sustainable Agriculture*. 2006. 28 (3). 77-97

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Abstract:

High water tables threaten the sustainability of sugarcane (*Saccharum* spp.), the primary crop of Florida's Everglades Agricultural Area (EAA). The purpose of this study

was to evaluate the effects of water-table depth on morphological characters, single-leaf net photosynthetic rate (Ps), and growth of sugarcane. In pot studies, single stools of sugarcane cultivar CP 80-1743 were grown at eight equally spaced water-table depths from 5 to 33 cm (2 to 13 in). Large-tiller number of CP 80-1743 increased by 0.2 for each cm (0.4 in) increase of water-table depth, and stalk diameter increased as water-table depth increased from 5 through 23 cm (2 through 9 in). In lysimeter studies, responses of two genotypes to periodic floods and several water-table depths were compared. Yields of genotype CP 95-1429 were not affected by water-table depth and CP 95-1429 had similar stalk numbers and diameters across water-depth treatments. Yields of genotype CP 95-1376 increased as water-table depth increased, and stalk numbers and diameters of CP 95-1376 also increased as water-table depth increased. Quantifying large tiller number and stalk diameter in sugarcane should facilitate identification of genotypes and agronomic practices with improved tolerance to shallow water-tables

Oilseed crops initial development as influenced by sugarcane vinasse soil application

Source: ***Bragantia***. 2008. 67 (3). 685-692

Author(s): Ramos-N-P. Novo-M-do-C-de-S-S. Ungaro-M-R-G. Lago-A-A-do. Marin-G-C

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Abstract:

This research aimed to verify the effect of addition to soil of vinasse, a sugarcane industry residue, on the emergence and initial development of sunflower, castor bean and groundnut, which are crops with great potential of taking part of a sugarcane rotation system. The treatments consisted of application or not of 150 m³/ha of vinasse on soil sown with sunflower (IAC-Iarama, Catisol and Helio 358), castor bean (Guarani, Iris and IAC-2028) and groundnut (IAC Caiapo, Runner IAC 886 and Tatu) cultivars. The variables evaluated were emergence speed, first count emergence, final emergence, plant height, and dry plant biomass, measured 30 days after sowing. The results show that germination and initial development of groundnuts and, in a lesser degree of sunflower, were negatively influenced by the addition of vinasse to the soil, under greenhouse condition. On the other hand, the effect on castor bean was positive, mainly in relation to the vigour variables, the better performance being showed by 'IAC 2028' and 'Iris'

PLANT DISEASES (1 JDL)

Variation in infection capacity and in virulence exists between genotypes of Sugarcane yellow leaf virus

Source: ***Plant Disease***. 2007. 91 (3). 253-259

Author(s): Ahmad-Y-A. Costet-L. Daugrois-J-H. Nibouche-S. Letourmy-P. Girard-J-C. Rott-P

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Abstract:

Two experiments, one in Guadeloupe and one in Reunion Island, were performed to transmit different genotypes of Sugarcane yellow leaf virus (SCYLV) to eight sugarcane cultivars differing in resistance to infection by the virus and to yellow leaf. Transmission was attempted from SCYLV-infected sugarcane plants or leaves to healthy tissue-cultured plantlets grown in vitro and with the aphid vector *Melanaphis sacchari*. After inoculation and elimination of insects with an insecticide, plantlets were transferred to Montpellier, France and grown in a greenhouse. Plants were tested for presence of SCYLV by tissue-blot immunoassay and reverse-transcription polymerase chain reaction after 5 to 6 months of growth. SCYLV genotypes BRA-PER, CUB, and REU were detected in 47, 62, and 39% of plants inoculated with these genotypes in Guadeloupe, respectively. SCYLV genotypes BRA-PER and REU and a mixed infection of genotypes BRA-PER and REU were detected in 56, 33, and 42% of plants inoculated with these genotypes in Reunion Island, respectively. Genotypes BRA-PER and CUB could be transmitted to all eight sugarcane cultivars, but genotype REU could never be transmitted to resistant sugarcane cvs. H78-4153 and H78-3567. SCYLV genotype REU was transmitted successfully to sugarcane cv. R570 in Guadeloupe, but not in Reunion Island. Genotypes BRA-PER and CUB induced yellow leaf symptoms in susceptible or highly susceptible sugarcane cultivars, whereas genotype REU induced very few symptoms. SCYLV was not found in several symptomatic plants, suggesting an association of disease with undetectable populations of the virus or a nonviral cause. This is the first report of variation in infection capacity and in virulence of SCYLV

WEEDS AND WEED CONTROL (1 JDL)

Influence of planting date and microsite on weed dynamics in sugarcane in Sri Lanka

Source: **Weed Science**. 2007. 55 (1). 23-29

Author(s): Witharama-W-R-G. Naylor-R-E-L. Whytock-G-P

Abstract:

Experiments were conducted in Sri Lanka to compare weed seedling emergence in three sugarcane plots of 0.1 ha planted in October 1995, January 1996, and April 1996. In each plot, weed *seedling* emergence was monitored for 20 weeks in five permanent quadrats on each of three microsites: on ridges, in furrows, and on adjacent fallow land. Soil moisture (0 to 5 cm) and soil temperature (at 2.5 cm) were also recorded. Only crowfootgrass, swamp millet, and guineagrass (all grasses) occurred in all nine planting time-by-microsite combinations. Approximately half of all *seedlings* emerging over the three planting times were swamp millet, and the next most frequent species was tropic ageratum. The composition of the emerged flora was similar on ridges and in furrows, but more seedlings emerged in the furrows than on the ridges. The highest number of emerged seedlings and of species occurred on adjacent fallow land. The major factor influencing seedling emergence appeared to be soil moisture

SOIL BIOLOGY (1 JDL)

Soil organic matter and microbial biomass as influenced by sugar cane (*Saccharum* hybrid sp.) production practices in Mauritius

Source: ***South African Journal of Plant and Soil***. 2008. 25 (2). 111-118

Author(s): Cheong-L-R-N. Kwong-K-F-N-K. Preez-C-C-du

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Abstract:

Sugar cane has been grown in Mauritius for over 350 years in a monocropping system. As a result, soil quality could have declined since productivity has been stagnating over the last twenty years in spite of improved agronomic practices and higher-yielding varieties. A study was therefore initiated to determine the effects of sugar cane production practices on the biological quality of the major soil groups of Mauritius. Organic matter (OM) and microbial biomass contents were determined for soils with different cropping histories, namely native vegetation, cropping with sugar cane under manual conditions, and cropping with sugar cane under mechanized conditions. When virgin soil was compared to manually-cropped soil, OM content was found to decrease with cropping in the topsoil, but to increase in the subsoil as a result of soil mixing through tillage. Microbial biomass also decreased in the topsoil as the microbial population had less OM to feed on. When manually-cropped soil was compared to mechanically-cropped soil, both OM and microbial biomass tended to decrease with mechanization as the soil was highly disrupted following land preparation. This decline in soil biological quality will continue if remedial measures are not taken, the latter being trash blanketing, addition of substantial amounts of organic wastes, and the incorporation of leguminous green manures within the cropping cycle, among others