

**AT-PLANTING HERBICIDES FOR BERMUDAGRASS (*CYNODON DACTYLON*)
CONTROL IN SUGARCANE (*SACCHARUM* SPP. HYBRIDS)**

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ABSTRACT

Field experiments were conducted in Louisiana during the 1992/1993 and 1993/1994 growing seasons to evaluate the use of at-planting preemergence (PRE) applications of mixtures of clomazone with atrazine or sulfometuron or imazapyr with atrazine. Treatments were followed by metribuzin postemergence (POST) in the spring at the start of the sugarcane crop's initial (plant-cane) growing season. Bermudagrass was the only weed present in the control and covered 82% of the plant-cane crop's row top in late May each year. Standard at-planting treatments of metribuzin at 2.6 kg ai/ha and terbacil at 1.6 kg ai/ha or treatment with sulfentrazone at 0.6 kg ai/ha had little impact on bermudagrass cover when followed by a metribuzin application in the spring. Bermudagrass cover following at-planting applications of mixtures containing clomazone at 2.2 kg ai/ha with atrazine or sulfentrazone or imazapyr at 0.6 kg ai/ha with atrazine was reduced in May to at least 18% (1992/1993) and 58% (1993/1994). At-planting applications of imazapyr at 0.3 kg/ha controlled bermudagrass equivalent to clomazone at 1.1 kg/ha, while imazapyr at 0.6 kg/ha controlled bermudagrass at levels equivalent to the 2.2 kg/ha rate of clomazone each year. Crop injury from the various systems was minimal (<5%) both years. Gross cane and sugar yields were equal to the control where metribuzin, terbacil, or sulfentrazone were applied alone at-planting. At-planting applications of clomazone at 2.2 kg/ha in mixture with either atrazine or sulfentrazone or imazapyr at 0.6 kg/ha with atrazine were the only treatments evaluated that increased cane (7%) and sugar (9%) yields over the control.

Nomenclature: Atrazine, 6-chloro-*N*-ethyl-*N'*-(1-methylethyl)-1,3,5-triazine-2,4-diamine; clomazone, 2-[(2-chlorophenyl)methyl]methyl-4,4-dimethyl-3-isoxazolidinone; imazapyr, (±)-2-[4,5-dihydro-4-methyl-4-(1-methylethyl)-5-oxo-1*H*-imidazol-2-yl]3-pyridinecarboxylic acid; metribuzin, 4-amino-6-(1,1-dimethylethyl)-3-(methylthio)-1,2,4-triazin-5(4*H*)-one; sulfentrazone, *N*-[2,4-dichloro-5-[4-(difluoromethyl)-4,5-dihydro-3-methyl-5-oxo-1*H*-1,2,4-triazol-1-yl]-phenyl]methanesulfonamide; terbacil, 5-chloro-3-(1,1-dimethylethyl)-6-methyl-2,4-(1*H*,3*H*)-pyrimidinedione; bermudagrass, *Cynodon dactylon* (L) CYNDA; sugarcane, complex hybrid of *Saccharum* spp. cultivar 'CP 70-321'.

EVALUATION OF SUGARCANE MOSAIC INCIDENCE IN FLORIDA

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ABSTRACT

A survey of sugarcane mosaic was conducted in Florida to determine the extent of its spread from an outbreak that was first observed in 1996. Incidence of mosaic was determined based on serological detection in leaves collected randomly from plants in commercial sugarcane fields. Incidence of mosaic in sugarcane cv. CP 72-2086 ranged from 0 to 97% in growers' fields in Florida. The highest incidence of mosaic in grower fields was located 10-15 km east of Pahokee. Adjacent fields and fields in adjacent surveying sections had large differences in incidence of mosaic on CP 72-2086 with the source of seedcane as a probable reason for the range of infection. Multiple cultivars were susceptible to mosaic infection in a natural spread experiment. However, these cultivars had lower incidences of mosaic than CP 72-2086 in fields located in an area of high mosaic infection and were not infected in a second spread experiment planted the following year in the same general area. Although CP 72-2086 was susceptible to infection, no losses in biomass or sugar were observed in either the plant or first ratoon crops in a 2-year-yield test. Thus, the cultivar, CP 72-2086, is considered tolerant to mosaic. The results suggest that planting of mosaic-free seedcane will lower the incidence of mosaic in the area.

FOURTEEN YEAR PERFORMANCE IN EARLY SELECTION STAGE OF THE CANAL POINT SUGARCANE CULTIVAR DEVELOPMENT PROGRAM

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ABSTRACT

The Canal Point (CP) sugarcane cultivar development program consists of five selection stages, which include Seedling, Stages I, II, III and IV. In Stage II, about 1,000 selections are evaluated yearly against one or more checks (i.e., commercial cultivars). Data of the CP 82 through the CP 95 series from Stage II testing were used to evaluate their performance over a period of 14 years. The characters studied included stalk number, stalk weight, Brix, apparent sucrose, sucrose content, cane yield, and sugar yield. Data were transformed by using annual performance of check cultivar CP 70-1133 as a baseline. Linear regression analysis of transformed data of the 14 CP series showed no significant trend for improvement for any trait. However, the transformed data of the CP 83 through the CP 91 series showed a significant trend for improvement in apparent sucrose and sucrose content. This study suggests that the use of transformed data from Stage II would allow us to evaluate the relative performance among the CP series and provide valuable information for planning future breeding and selection strategies.

IMPROVING WATER USE EFFICIENCY IN SUGARCANE UNDER UPPER EGYPT CONDITIONS

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ABSTRACT

Irrigating sugarcane (*Saccharum* spp.) in Egypt is a practice frequently criticized for its high water consumption. This study examines different irrigation methods to conserve water consumption of sugarcane and to improve its water use efficiency under Upper Egypt conditions. Improved surface irrigation, alternate furrow irrigation at 7 and 14-day intervals in laser-leveled fields, along with the traditional flood irrigation method were examined. In addition, two and three split applications of nitrogen (N) fertilizer were tested. The work was carried out at Assiut, Egypt during the 1996 to 1999 seasons using the commercial cane cultivar 'C9'. Significant responses were obtained in the plant-crop due to irrigation methods. Highest net cane and sugar yields were reported for improved surface irrigation followed by flood irrigation (126 and 115 mt/ha), and (16.7 and 14.7 mt/ha), respectively. Flood irrigation had the lowest water use efficiency value Water use efficiency (WUE) (3.94 kg cane/m³ water) whereas improved surface irrigation ranked second with a value of 5.50 kg cane/m³ water. A similar trend was observed in the first-ratoon crop with improved surface irrigation ranking first in net cane and sugar yield, but ranked second in WUE (55.81, 15.1 mt/ ha) and 5.74 kg cane/m³ water, respectively). Most juice quality parameters were not affected by irrigation treatments.

There were no significant effects of splitting N or its interaction with irrigation methods on most measured traits for both plant- and first-ratoon crops. This work suggests that improved surface irrigation with a maximum of 3700 m³ of water/ha would be the better choice for maximum production of net cane and sugar yields under Upper Egypt conditions. Splitting N applications into two doses for plant-crop or three for first-ratoon crops are advised under the improved surface irrigation system. Conserving water would allow Egypt to reclaim additional acreage for cultivation.

INTER-CROPPING OF FALL-PLANTED SUGARCANE WITH POTATOES AND GARLIC UNDER MIDDLE EGYPT CONDITIONS

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ABSTRACT

Inter-cropping of sugarcane with potatoes and garlic was examined as a means to increase land productivity in Egypt. In an experiment conducted at Mallawi, Egypt during the 1995 to 1998 seasons, we found that cane and sugar yields of inter-cropped cane treatments were not significantly different from monocultured cane ($P \neq 0.05$). However, contrast analysis indicated that cane and sugar yields of monocultured cane were significantly greater than the mean of all the inter-cropped treatments combined. Potato and garlic yields also were significantly reduced when inter-cropped with sugarcane. All yield attributes of potatoes, except for average tuber weight, were better for potatoes planted alone. However, garlic plants inter-cropped with sugarcane seemed to be protected by cane plants from winter conditions because some of the inter-cropped garlic yield attributes, such as head diameter and clove number per head, were greater than those of the crop alone. Results indicated that inter-cropping of two rows of garlic between sugarcane rows produced the maximum LER (Land equivalent ratio) and the lowest cane Aggressiveness value ($A_{\text{cane-crop}}$). This study suggests that the best cash return could be produced when a single row of potatoes, at 20 cm hill spacing, is inter-cropped with fall-planted sugarcane.

JALISCO FLY FOR BIOLOGICAL CONTROL OF MEXICAN RICE BORER IN SUGARCANE AND OTHER GRAMINACEOUS CROPS

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ABSTRACT

The Mexican rice borer, *Eoreuma loftini* (Dyar) (Lepidoptera: Pyralidae) is the key pest of sugarcane in south Texas. Growers have abandoned insecticides as an economically viable control method. To mitigate economic losses, the USDA ARS Beneficial Insects Research Unit and the Texas Agricultural Experiment Station, both in Weslaco, initiated a collaborative research project to import and evaluate the Jalisco fly, *Lydella jalisco* Woodley (Diptera: Tachinidae), as a biological control agent. Collections of *E. loftini* were made at Los Lirios (Ejido Caimanero) in the Ameca Valley of Mexico. The highest numbers of parasitized *E. loftini* borers were collected from mid-August to mid-October, when parasitism was often between 20 to 30%. A greenhouse experiment was performed to evaluate *L. jalisco* on different graminaceous host plants (sugarcane, sorghum, rice, corn, and johnsongrass) which *E. loftini* may infest. In the experiment, *L. jalisco* parasitized *E. loftini* on all host plants, but parasitism levels were highest on sugarcane (81.4%) and lowest on rice (14.9%) and johnsongrass (10%). Parasitism of *E. loftini* on corn (54.6%) and sorghum (22.0%) was intermediate and not significantly different from the other host plants. We found no other studies indicating that *L. jalisco* could parasitize *E. loftini* on host plants other than sugarcane, either through surveys of endemic populations in Mexico or under experimental conditions. Our results indicate that *L. jalisco* has the potential to act as a biological control agent against *E. loftini* on corn, sorghum, and rice as well as on sugarcane. Currently, field experiments are underway to evaluate the fly using these host plants under more field-realistic conditions.

OPTIMAL USE OF NITROGEN STABILIZATION PACKAGE IN SUGARCANE PRODUCTION TO INCREASE PRODUCER ECONOMIC RETURNS¹

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ABSTRACT

An economic analysis was conducted to determine the level of a nitrogen stabilization package (N-hib Ca, composed of calcium chloride, magnesium chloride, and a urease inhibitor) and liquid urea that would provide the nitrogen fertilizer requirements of sugarcane and optimize yield and economic returns. Urea and the nitrogen stabilization package were applied in a 4x3 factorial study design (N rates were 0, 67, 134, and 201 kg N/ha; and calcium rates from the N stabilization package were 0, 22, and 44 kg Ca/ha) to the variety CP 65-357 on a Baldwin silty clay soil for four years. The optimal fertilization level was evaluated at alternative raw sugar prices and fertilizer costs and appeared more sensitive to changes in fertilizer material costs than with changes in possible raw sugar prices.

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**PHENOTYPIC VARIATION OF BIOMASS YIELD COMPONENTS
IN F₁ HYBRIDS OF ELITE SUGARCANE CROSSED WITH
SACCHARUM OFFICINARUM AND *S. SPONTANEUM***

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ABSTRACT

Of the numerous members in the sugarcane complex, *Saccharum officinarum* and *S. spontaneum* are significant sources of germplasm for nobilization and vigor, respectively. Two types of F₁ sugarcane hybrids, *S. officinarum* clone Oi Dang x elite sugarcane (two crosses) and elite sugarcane x *S. spontaneum* (16 crosses), were studied for two years to determine the relative variation for 10 yield components. Means of the two groups differed significantly ($P \leq 0.01$) for all ten traits. As expected, the *S. officinarum* type had better juice quality (Brix, fiber, sucrose, and TRS) and stalk traits (diameter and weight), while the *S. spontaneum* type had better biomass yield components (stalk length, stalk and stool number, stalk biomass yield). Repeatability estimates for the *S. officinarum* hybrids were less than those for the *S. spontaneum* hybrids; however, different sample sizes for the two types of hybrids might have confounded repeatability estimates and their standard errors. The magnitude of repeatability estimates indicate that *S. spontaneum* hybrids are an excellent reservoir of high yielding, low sucrose, and high fiber germplasm for biomass production.

**YIELD LOSSES CAUSED BY LEAF SCALD IN A COMMERCIAL FIELD OF
SUGARCANE CULTIVAR CP 80-1743**

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ABSTRACT

Leaf scald has been observed in commercial fields of sugarcane in Florida since 1989. In response, the plant breeding programs have been selecting for resistance to the disease, and some commercial varieties have been withdrawn. However, measurements of yield loss have been difficult to obtain because of the inconsistent expression of the disease. In this study the frequency of infected stalks and the losses caused by leaf scald were estimated over two crops in a commercial field of cultivar CP 80-1743 which had a naturally occurring epidemic of the disease. In the plant crop, 53% of the surviving stalks were symptomatic at harvest. In the first-ratoon crop, 18% of the plants failed to regenerate shoots and 34% of the surviving stalks were symptomatic at harvest. In the plant crop, losses caused by the disease were estimated as 16% and 22% for cane tonnage and sugar production, respectively. In the first-ratoon crop, the losses were estimated as 25% and 33% for cane tonnage and sugar production, respectively. Three crops would normally have been harvested, but it was necessary to take the field out after two crops because of the high level of disease and the resulting decline in production.