

**SUGARCANE YIELD AS AFFECTED BY
ANNUAL GLYPHOSATE RIPENER TREATMENTS**

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ABSTRACT

The sugarcane ripener glyphosate (POLADO L) is labelled for use only in ratoon crops in Louisiana, Florida, and Texas. This study determined the effect of annual glyphosate applications on growth and yield of several cultivars (*Saccharum* interspecific hybrids) during a 3-yr crop cycle in Louisiana, beginning in the plant-cane crop and continuing into the first- and second-ratoon crops. Annual applications of glyphosate at 0.23 kg acid equivalent (ae)/ha and a treatment-harvest interval (THI) of 27 to 42 days consistently increased the sucrose concentration of juice and theoretical recoverable sugar per kg cane (TRS) in the plant cane and ratoon crops of cultivars, as compared to untreated controls. However, whereas mean annual TRS was increased 14% and 15% at a THI of 42 and 30 days, respectively, mean annual sugar yield, the product of TRS and cane yield, was increased only 6% and 7%, respectively, because of the generally adverse effect of treatments on cane yield. Glyphosate treatments decreased cane yield by slowing cane growth immediately after treatment, thus reducing stalk weight, and by occasionally retarding or reducing regrowth (ratooning) of some cultivars in the following crop (first-ratoon crop in one experiment and second-ratoon crop in another). This study indicates that annual glyphosate ripener treatments will usually increase mean annual sugar yield, but the magnitude of the increase will depend on cultivar tolerance to the treatments. Cultivar CP 70-321 appeared to have adequate tolerance to annual treatments, whereas CP 65-357 was too sensitive.

**SUBSURFACE DRAINING JEANERETTE SOIL TO INCREASE
CANE AND SUGAR YIELDS**

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ABSTRACT

An experiment was conducted in Iberia Parish, Louisiana during 1980-1990 to determine soil and crop response to subsurface drainage. Three subsurface drain spacings, 45-ft, 90-ft, and 135-ft, were tested on Jeanerette silty clay loam soil. The soil responded favorably to subsurface drainage. In the subsurface drained areas, the average SEW_{12} values, which is a measure of the magnitude and duration of the water table within 12 inches of the soil surface, were from 63 to 89 percent less than the average SEW_{12} values from the non-drained area. Cane and sugar yield also improved with subsurface drainage. Average cane yields from the subsurface drained treatments were from 2.0 T/A to 4.2 T/A greater (up to 16 percent greater) than yield from the non-drained check and the differences were significant. Average sugar yields from the subsurface drained treatments were from 711 lbs/A to 937 lbs/A greater (up to 21 percent greater) than yield from the non-drained area and the differences were highly significant. The recommended drain spacing for Jeanerette silty clay loam soil for increasing cane and sugar yields is 135 feet. Using 1994 drain installation costs and sugar prices, installing subsurface drainage systems with drains spaced 135-ft was justified because the value of the increase in sugar yields exceeded the cost of installing subsurface drainage at that spacing.

FIELD TEST FOR LEAF COLD TOLERANCE IN SUGARCANE

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ABSTRACT

Improvement of cold tolerance in sugarcane (a complex hybrid of *Saccharum* spp.) would ensure stable productivity of this crop in cooler regions and prevent yield loss in subtropical regions following serious freezes. Fifteen clones selected from backcross progeny of hybrids derived from commercial cane x *Saccharum spontaneum* plus two check cultivars were used to evaluate the stability of leaf cold tolerance of sugarcane genotypes at freezing temperatures under field conditions and to classify genotypes based on both genotypic values and stability statistics. Plants were rated for cold tolerance based on the percent green leaf tissue following exposure to freezing temperatures. Two plant cane and two first ratoon crops were evaluated. Parametric and nonparametric approaches were used to classify genotypes by integrating cold tolerance mean and stability. Considerable differences in parametric and nonparametric stability statistics for cold tolerance existed among genotypes. Cluster analyses grouped the genotypes that were differentiable in terms of mean and stability. Integration of mean and stability of cold tolerance by using parametric and nonparametric approaches should improve the effectiveness of selecting cold tolerance in sugarcane.

**TOPPING HEIGHT AND SUGAR YIELD: EFFECTS OF CULTIVAR,
CROP YEAR, AND USE OF THE CHEMICAL RIPENER GLYPHOSATE**

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ABSTRACT

A 3-year field study (1991-1993) with seven experiments was conducted in the plant- and first-ratoon crops of three sugarcane cultivars, CP 65-357, CP 70-321, and CP 72-370, to examine the effects of the severity of topping (from no topping to topping 5 cm above the apical meristem or bud to 41 cm below the bud in 15-cm increments) on sugar yield (kg ha^{-1} of theoretical recoverable sugar per hectare) and its components, cane yield (Mg ha^{-1}) and yield of theoretical recoverable sugar (TRS) per ton of cane (kg/Mg), as influenced by cultivar, crop year, or the use of the chemical ripener glyphosate [isopropylamine salt of N-(phosphonomethyl)glycine]. Sugar yield response to topping severity was similar for all cultivars regardless of crop year or the use of glyphosate. The highest sugar yield was obtained with no topping and, although differences were not always significant, the greater the severity of topping, the greater the loss in sugar yield. Although there was generally an increase in TRS (approximately 2.5%) with each incremental reduction in the topping height, any increase in sugar yield (kg ha^{-1}) was more than offset by a decrease in the cane yield (approximately 6%), regardless of cultivar, crop age, or use of glyphosate. However, the practice of no topping has potential adverse effects on processing which can ultimately contribute to sugar losses in the factory and lower sugar quality.

**JOHNSONGRASS (*Sorghum halepense*) AND SUGARCANE
RESPONSE TO ASULAM APPLICATION¹**

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ABSTRACT

In field studies conducted over 2 yr, johnsongrass arising from seed (1992) or rhizomes (1993) and three sugarcane cultivars, 'CP 70-321', 'CP 72-370', and 'LCP 82-89', were treated during the plant-cane growing season with asulam at 3.7 kg ai/ha on April 15, May 1, May 15, or June 15. In the first year, late season johnsongrass panicle counts in sugarcane plots averaged across asulam application dates were comparable for cultivars LCP 82-89 and CP 72-370 and 44 and 33% lower, respectively, than for CP 70-321. In the second year, johnsongrass panicle counts were highest in plots planted to LCP 82-89. Regardless of johnsongrass source or cultivar, johnsongrass panicle counts were reduced by at least 50% when asulam was applied compared with a nontreated check. Even though visual injury was greatest for CP 72-370 both years, late-season johnsongrass control, sugarcane stalk populations and heights, and cane yields were not affected. Averaged across cultivars, yields of plant-cane were equivalent when asulam was applied in April or May and greater than when applied in June both years. For the May 15 asulam application, plant-cane yields were 17% (1992) and 14% (1993) greater than for the June 15 application. Plant-cane yields for the June 15 application were higher than the nontreated check only in 1992. **Nomenclature:** Asulam, methyl[(4-aminophenyl)sulfonyl]carbamate; sugarcane, *Saccharum* interspecific hybrids 'CP 70-321', 'CP 72-370', and 'LCP 82-89'; johnsongrass, *Sorghum halepense* (L.) Pers.

EVALUATION OF PARENTAL CLONES IN BREEDING FOR RESISTANCE TO RATOON STUNTING DISEASE

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ABSTRACT

Clones selected for advancement in the Canal Point Cooperative Sugarcane Breeding Program were inoculated with *Clavibacter xyli* subsp. *xyli*, the causal agent of ratoon stunting disease (RSD) in separate tests over a four-year period. The purpose of this study was to evaluate our first attempts to screen for RSD resistance in the Canal Point breeding program. Plot size and number of replications varied according to selection stage (amount of seedcane available). The number of stalks sampled per clone ranged from 3 to 20. Since these were preliminary RSD ratings, only the susceptible clones, which showed >10 colonized vascular bundles (CVB) per standardized core (1 cm diameter) of stalk tissue were discarded. Seven female parents (CP 70-1133, CP 89-2149, CP 84-1322, CP 85-1025, CP 89-2319, US 90-1025 and Co 285) in the CP 92 & 93 series produced at least 10 progeny and had no progeny discarded. Six female parents (CP 76-1306, CP 86-1427, CP 86-1670, CP 87-1733, CP 85-1758, and US 88-1014) had >20% of their progeny discarded, and two female parents (CP 76-1306 and CP 87-1733) had >40% of their progeny discarded because of RSD susceptibility. All male parents with >10 progeny had at least one clone discarded based on RSD susceptibility. Among the 25 parents used as males and the four polycrosses, six clones (CP 80-1743, SP 70-1143, Akoki 22, CP 85-1491, CP 88-2045 and CP 89-2178) had >20% of their progeny discarded due to RSD susceptibility. The average number of CVB for male parents with >10 progeny ranged from 1.81 for CP 81-1238 to 6.31 for CP 88-2045. For the female parents, the average number of CVB ranged from 1.05 for US 90-1025 to 7.84 for US 88-1014. These preliminary data provide evidence that breeding for effective resistance to RSD by selection of resistant parents may be possible. Use of RSD-resistant clones as parents should increase the frequency of RSD resistance in the progeny, even if selection pressure in the routine breeding and selection program is absent.

**MECHANICAL HARVESTING EFFECTS ON SUGARCANE
CULTIVARS GROWN ON ORGANIC SOILS**

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ABSTRACT

For much of the Florida sugarcane industry's history, manual laborers harvested about 75% of the crop. Now, a rapid change is complete and 100% of Florida's milled sugarcane (a complex hybrid of *Saccharum* spp.) is harvested by machines. The sugarcane cultivar development program at Canal Point (CP) now routinely subjects promising experimental clones to commercial mechanical harvesters. However, more information was needed on responses to mechanical harvesting of many already released sugarcane cultivars as 75% of Florida's harvest rapidly changed from manual to mechanized harvesting. The purpose of this study was to compare, when subjected to mechanized harvesting, the plant-cane through second-ratoon yields of established and promising sugarcane cultivars in Florida. Three experiments were planted in the fall of 1991, one on land previously subjected to a summer flooded fallow period, and two on land subjected to a successive sugarcane rotation. A major concern in Florida is that root damage during a mechanical harvest will reduce yields of subsequent ratoons. Therefore, cultivars whose cane-tonnage yields were highest relative to other cultivars in the ratoon crops were categorized as well adapted to mechanical harvesting. Significant crop (plant-cane, first-ratoon, and second-ratoon crops) x cultivar interactions in two experiments suggested that mechanical harvesters did not affect all cultivars similarly. Among nine cultivars that were planted in all three experiments, CP 80-1827 had the highest yields. Four cultivars that yielded similarly to each other, but lower than CP 80-1827, were CP 70-1133, CP 72-2086, CP 85-1308, and CP 85-1382. CP 80-1743 and CP 84-1198 were not planted in each of the three experiments but yielded well where planted. Except for an extreme negative case with CP 82-1172, cultivar characteristics such as ability to remain upright or to maintain straight stalks after lodging were not good predictors of which cultivars would produce high ratoon yields following mechanical harvests.

PROCESSING OF SUGARCANE RIND INTO NON-WOVEN FIBERS

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ABSTRACT

This process was developed for conversion of sugarcane rind to non-woven fibers. It includes partial, directional delignification, and optional agitation and/or tumbling preceding washing and subsequent steam explosion steps. The ultimate fibers in sugarcane rind are similar to those of hard wood, 2 to 5 mm long. Therefore, for these non-woven fibers to be useful raw material for applications such as yarn spinning and geotextile mats, they should be at least 2.5 cm long. A typical sugarcane crushing process causes the length of bagasse segments to be too short; hence not suitable for this study. Instead, a cane separation process similar to that referred to as the "Tilby Process," was used to prepare the sugarcane rind. In this separation process, the cane is split longitudinally in two halves, the high sucrose content pith routed out, and the resulting rind used for this process. The typical treatment in this process is to react 0.1 N NaOH at 166°C (steam pressure 620 kPa) with the rind segments in a reactor designed to specific chemical and mechanical actions. The wet and partially delignified fiber bundles can be damaged by complete rotatory action of an impeller in the reactor; therefore either an oscillating agitation and/or tumbling of the reactor around its horizontal axis was employed. In this paper all runs included tumbling and also some feature agitation. Since the rind is encouraged to split longitudinally rather than transversely by the mechanical action, lignin is removed preferentially in the longitudinal direction. As a result bundles of fibers from the rind are successively reduced in cross section with slight reduction in length, thereby yielding fibers with the necessary length and desired cross section for conversion to other useful products.

Keywords: Fiber, Lignin, Non-woven, Rind, Steam Explosion, Sugarcane.