BILLET PLANTING RESEARCH

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Research continued to develop methods to maximize the chances of success with billet planting. During 2003, results were obtained from billet planting experiments conducted at the St. Gabriel Research Station at St. Gabriel, La. The experiments included LCP 85-384 plant cane, first and second stubble experiments comparing billet date and rate of planting and an experiment in first stubble comparing billet and whole stalk planting in HoCP 85-845 and HoCP 91-555.

Yield differences were detected in the plant cane date of planting test (Table 1). An early August planting date was not included in this experiment. Instead, a late planting date during mid-October was included. The mid-August planting date produced higher yields than the mid-September and October planting dates. The stalk population for the mid-August planting date was higher than for the late-August planting date, but the tonnage and sugar per acre yields were similar. Yield components for the October planting date were lower than yields obtained from the mid-September planting date. Sugar per ton was higher for the late-August planting date than for the September and October planting dates (data not shown). Yield differences were not detected in plant cane or first stubble of the date of planting test planted in 2001 (Table 2), except that sugar per ton was higher for the late-August planting date than for the mid-August and late-September dates (data not shown). The yield differences detected in plant cane for the experiment planted in 2000 were no longer evident in first stubble or second stubble (Table 3).

In the plant cane of the rate of billet planting experiment, the lowest stalk population was obtained from the one billet planting rate for both planting dates (Table 4). The maximum stalk population was achieved by the six billet planting rate for the August planting date and by the nine billet planting rate for the September planting date. Fewer treatment differences were detected for tonnage and sugar per acre (Table 4). More differences were detected for the September planting date than for the August date. Tonnage was higher for the six or more billet planting rates than for the one billet planting rate for the August date, whereas the highest sugar per acre yield was obtained from the 12 and nine billet planting rates for the September date. Stalk weight was highest for the one and three billet planting rates for the September date (data not shown). Yield differences detected in plant cane during 2002 were still evident for the August planting date in first stubble (Table 5). Tonnage and sugar per acre were higher for the six billet planting rate than for the three and one billet planting rates. The nine or 12 billet planting rates did not provide any additional yield. Stalk weight was higher for the one billet planting rate than for the 12 billet rate (data not shown). The one billet planting rate produced the lowest tonnage yield in the experiment planting during 2000, yields were similar for all planting rates in first stubble, and the nine billet planting rate treatment produced the highest tonnage in second stubble (Table 6). Sugar per acre yields were similar (data not shown).

HoCP 85-845 and HoCP 91-555 responded well to billet planting in plant cane and first stubble (Table 7). No differences were detected in tonnage or sugar per acre yield between billet and whole stalk plantings in first stubble.

The results obtained during 2003 were similar to those from experiments in previous years. A planting date outside the traditional planting period (in this case, an October planting date) produced lower yield. Stubble yields were similar for billet plantings made from mid-August to late-September. Low billet planting rates produced reduced stalk populations and lower yields, and the differences associated with planting rate were more pronounced with the September planting date. Lower yield associated with low planting rate persisted into first stubble in one case. As long as large gaps do not occur in the plant cane stand, the ratooning ability of LCP 85-384 provides some ability to recover during the subsequent stubble crops. It is not certain whether future varieties will respond the same way. Early results with HoCP 91-555 and HoCP 85-845 are promising. Experimental varieties being considered for release to the industry will need to be evaluated for billet planting tolerance.

It is very important to do a good job of planting billets. Billets are more sensitive than whole stalks to any planting problem. The research results from this and previous years suggests that practices to maximize the chance of success with billet planting include: providing a well-prepared seedbed, planting long (20-24 inch) billets with a low level of physical damage, planting at a high rate (approximately six running billets in the furrow), covering with a uniform layer of no more than 3 inches of packed soil, and providing good drainage and careful weed control.

Table 1. Effect of date of planting on 2003 plant cane yield of billet planted LCP 85-384.

Date of planting	Stalks/acre (x1000)	Tons cane per acre	Sugar per acre (lbs.)
August 18	49,268 a	36.9 a	7116 a
August 27	44,268 b	34.1 ab	6534 ab
September 13	43,946 b	32.3 b	6285 b
October 18	37,054 c	26.8 c	5072 c

Average values for the different yield components followed by the same letter were not significantly different (P = 0.05).

Table 2. Effect of date of planting on 2002 plant and 2003 first stubble yields of billet planted LCP 85-384 at the St. Gabriel Research Station.

Date of planting	Tons cane per acre		Sugar per acre (lbs.)	
	Plant cane	First stubble	Plant cane	First stubble
August 23	44.0	30.5	8943	5192
August 28	42.1	29.3	8496	5259
September 17	46.0	31.2	9199	5323
September 28	45.4	31.5	8854	5351

Yield values within columns were not significantly different (P = 0.05).

Table 3. Effect of date of planting on 2001 plant, 2002 first stubble, and 2003 second stubble yields of billet planted LCP 85-384 at the St. Gabriel Research Station.

Date of planting	Tons cane per acre			Sugar per acre (lbs.)		
	Plant cane	First stubble	Second stubble	Plant cane	First stubble	Second stubble
August 3	43.3 b	43.4	27.8	8972 b	9006	4397
August 15	44.5 b	41.9	28.1	9296 b	8582	4231
August 31	49.8 a	42.6	25.6	10402 a	8675	4425
September 18	49.7 a	42.1	35.4	9607 ab	8203	5886
September 28	45.0 b	40.0	27.6	9200 b	8111	4439

Average values for the different yield components within a crop cycle year followed by the same letter were not significantly different (P = 0.05).

Table 4. Effect of rate of planting on 2003 plant cane yield of LCP 85-384 planted as billets on two dates at the St. Gabriel Research Station.

Rate	Stalks/acre		Tons cane per acre		Sugar per acre (lbs)	
	Aug 15	Sep 16	Aug 15	Sep 16	Aug 15	Sep 16
1 billet	36313 c	31938 d	36.6 b	33.8 c	7074 b	6421 c
3 billets	44896 b	42604 c	41.2 ab	45.1 ab	8034 ab	8508 b
6 billets	50271 a	47875 b	45.4 a	43.6 b	8811 ab	8616 b
9 billets	51146 a	54667 a	46.1 a	46.6 ab	9275 a	9133 ab
12 billets	49646 ab	58354 a	45.3 a	53.0 a	9172 ab	10854 a

Average values for different yield components within a date of planting followed by the same letter were not significantly different among the different planting rates (P = 0.05).

Table 5. Effect of rate of planting on 2002 plant cane and 2003 first stubble yields of LCP 85-384 planted as billets at five rates on two dates.

	Plant cane tons per acre		First stubble tons per acre		Plant cane sugar/acre		First stubble sugar/acre	
Rate	Aug 23	Sep 17	Aug 23	Sep 17	Aug 23	Sep 17	Aug 23	Sep 17
1 billet	34.8 b	34.3 c	31.6 c	33.4	6734 b	6442 c	5787 ab	6051
3 billets	40.0 ab	38.7 bc	30.4 c	35.8	8355 a	6913 bc	5489 b	6136
6 billets	42.0 ab	43.5 ab	35.4 a	35.4	8773 a	8747 a	6454 a	6027
9 billets	43.1 ab	47.1 a	34.7 ab	35.0	8656 a	8068 abc	6083 ab	6105
12 billets	46.2 a	45.8 ab	32.4 bc	33.2	9525 a	8383 ab	5895 ab	5682

Average values for tons of cane per acre within a column (crop cycle year and date) followed by the same letter were not significantly different (P = 0.05).

Table 6. Effect of rate of planting on 2001 plant cane, 2002 first stubble, and 2003 second stubble yields of LCP 85-384 planted as billets at five rates on two dates.

	Plant cane tons per acre		First stubble tons per acre		Second stubble tons per acre	
Rate	Aug 22	Sep 18	Aug 22	Sep 18	Aug 22	Sep 18
1 billet	56.1 b	46.9 b	48.5	38.8	5302 b	30.5 ab
3 billets	66.9 a	57.9 a	50.4	41.0	5130 b	28.9 b
6 billets	65.4 a	63.6 a	46.8	42.2	5243 b	28.1 b
9 billets	65.2 a	58.3 a	45.9	44.5	6431 a	33.2 a
12 billets	66.7 a	62.5 a	45.8	42.0	5188 b	27.7 b

Average values for tons of cane per acre within a column (crop cycle year and date) followed by the same letter were not significantly different (P = 0.05).

Table 7. Comparison of yields obtained from 2002 plant cane and 2003 first stubble for two varieties, HoCP 91-555 and HoCP 85-845, planted as billets and whole stalks at the St. Gabriel Research Station.

Variety	Treatment	Tons cane/acre		Sugar/acre (lbs.)	
		2002	2003	2002	2003
HoCP 91-555	Billet	49.4	34.4	8786	6923
	Whole stalk	43.5	33.8	7519	7003
HoCP 85-845	Billet	39.1	36.2	7901	6839
	Whole stalk	35.8	39.2	7037	7469

Yields were not significantly different (P = 0.05).

CULTURAL PRACTICES RESEARCH IN SUGARCANE IN 2003

Chuck Kennedy and Allen Arceneaux

in cooperation with
St. Gabriel Research Station, USDA, ARS, MSA Soil and Water Research, Baton Rouge, LA,
and USDA, ARS, MSA Sugarcane Research, Houma, LA

SUMMARY

Field experiments were conducted in 2003 to test the effects of management practices on yield and yield components of sugarcane.

The residual effect of harvesting a plant cane crop in early October vs early December resulted in 30-34% less cane for the subsequent ratoon crop when harvested in October, 20-30% when harvested in November, and 18-25% when harvested in December. The apparent quality of seed material (plant cane vs ratoon cane) of LCP85-384 and depth of soil cover over billets interacted for cane and sugar yield response. Yields were lower from the ratoon source and were exacerbated by a cover depth of 2 to 3 inches. Best yields across planting sources occurred at a cover depth of 4 to 5 inches. Cane and sugar yield of 2nd ratoon LCP85-384 following burning the previous harvest=s residue was not significantly different than any other residue management program, including leaving the residue undisturbed and untreated. Plant population, however, was lower for management programs that left the crop stubble covered.

OBJECTIVES

This research is designed to provide information on cultural practices in an effort to help cane growers produce maximum economic yields and thereby a more profitable production system. This annual progress report is presented to provide the latest available data on certain practices and not as a final recommendation for growers to use all of these practices. Recommendations are based on several years of research data.

RESULTS

Harvest Date on Subsequent Yields

It is well established that later harvest of sugarcane often results in higher natural sugar yield. Date of harvest for plant cane crops also can affect subsequent stubble yields. As expected, lowest tonnage stubble crops occurred with an October harvest, and this was exacerbated by an early harvest of the previous plant cane (Fig.1). LCP85-384 was slightly more responsive and outperformed HoCP -555 when plant cane was harvested later.

Residue Management/Stubble Protection

Soil temperature ~3.5 inches deep in the cane bed of second stubble LCP85-384 was only moderately affected by residue management. When average daily air temperature (ADAT) was below 50, leaving the residue mat resulted in slightly warmer average daily soil temperature (ADST). When ADAT was above 50, ADST became increasingly higher for treatments that removed the residue from the cane bed (Fig. 2). The differences in ADST between treatments during winter were relatively small, amounting to only 1-2 F on average.

With an average of 4 T of residue/acre remaining on the field into spring, we did not find a significant difference in residue from Jan. 2003 to March 2003 for residue plots amended with UAN, stabilized urea, or molasses compared to the untreated check(Fig. 3). Shoot population averaged about 40,000 millable stalks/acre by August. Plots where residue was removed had about 26% more stalks than plots where residue was treated or left undisturbed (Fig.4). Yield ranged from 25.5 to 28.2 T/acre, whole-stalk sample CRS ranged from 161.5 to 176.8 lbs/T and Lbs sugar/acre ranged from 4288 to 4764. Plots where residue was treated with N during the winter had lower to significantly lower cane yields than plots where residue was removed (Fig. 5), but there were no statistical differences among treatments for sugar yields (Fig.6).

Depth of Cover and Seed Source

Using a potentially weaker seed source (ratoon stock vs plant cane stock) resulted in lower sugar yields when less soil cover was employed at planting (Fig.7). This interaction occurred primarily through cane yield differences with a slight interaction in CRS (Fig. 8).

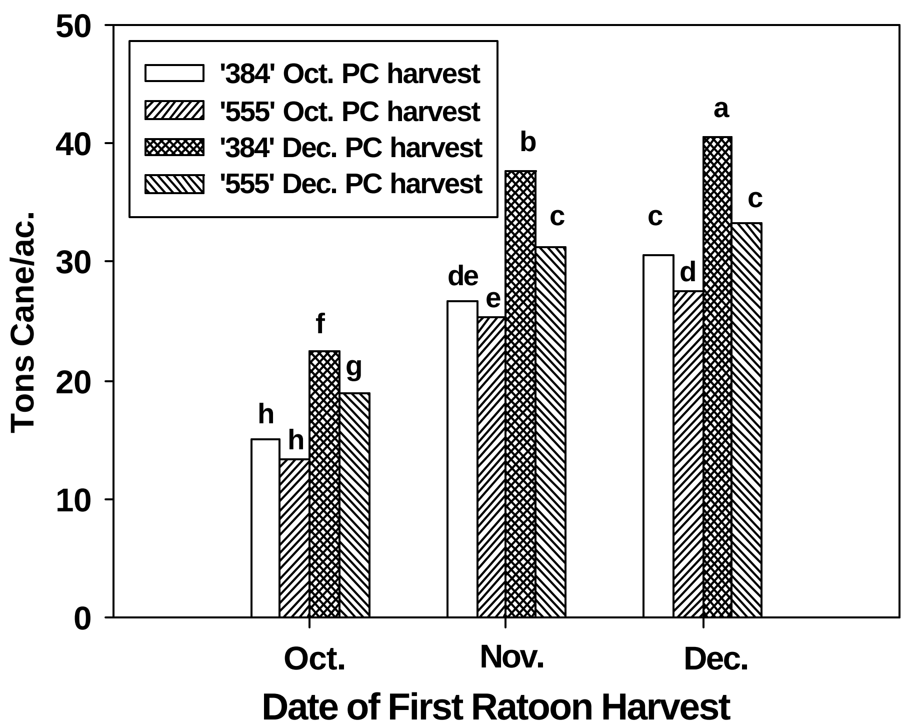

Fig. 1. The effect of harvest date and previous harvest date on first ratoon cane yield of two varieties. Bars with the same letter are NS at $P \leq 0.05$.

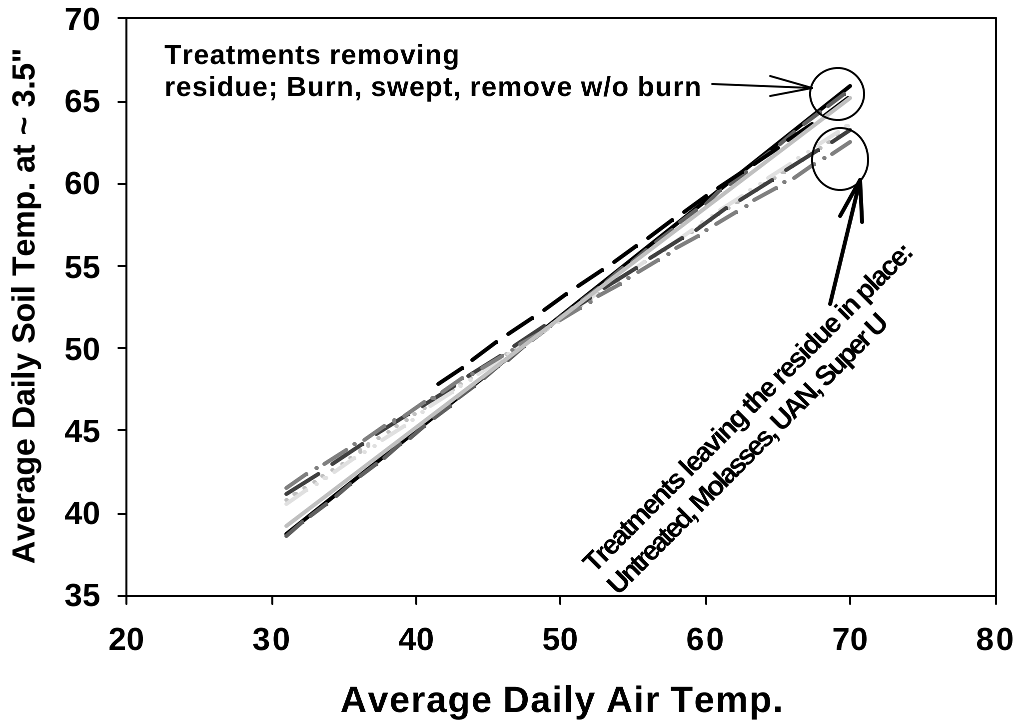

Fig.2. Relationship between air temp. and soil temp. changes with residue treatment.

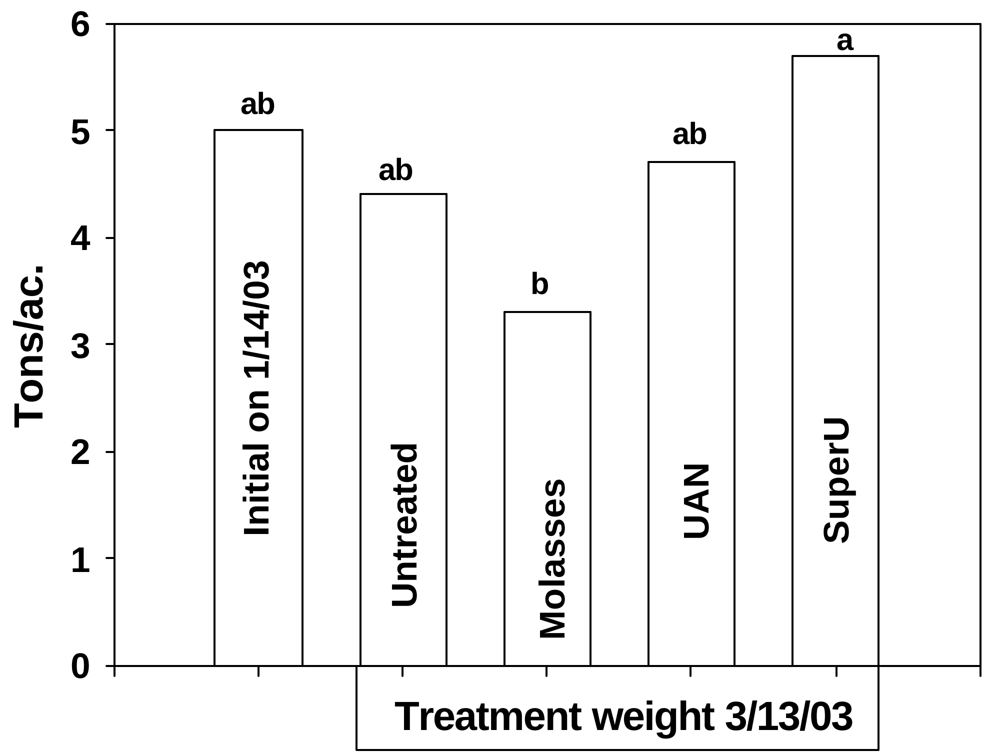

Fig.3. The effect of residue treatments applied in Winter on residue remaining in the Spring

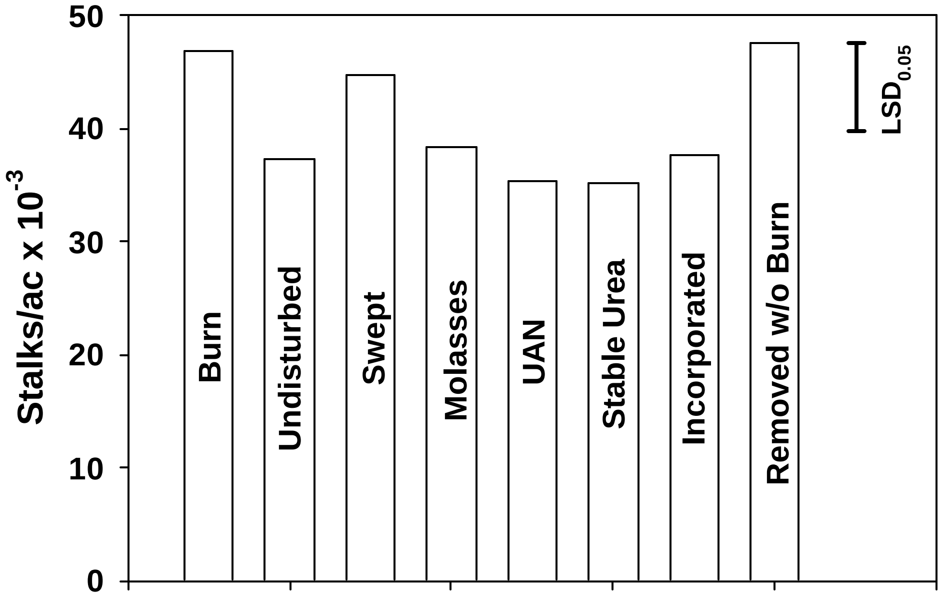

Fig. 4. The effect of harvest residue management on stalk population of 2nd ratoon LCP85-384.

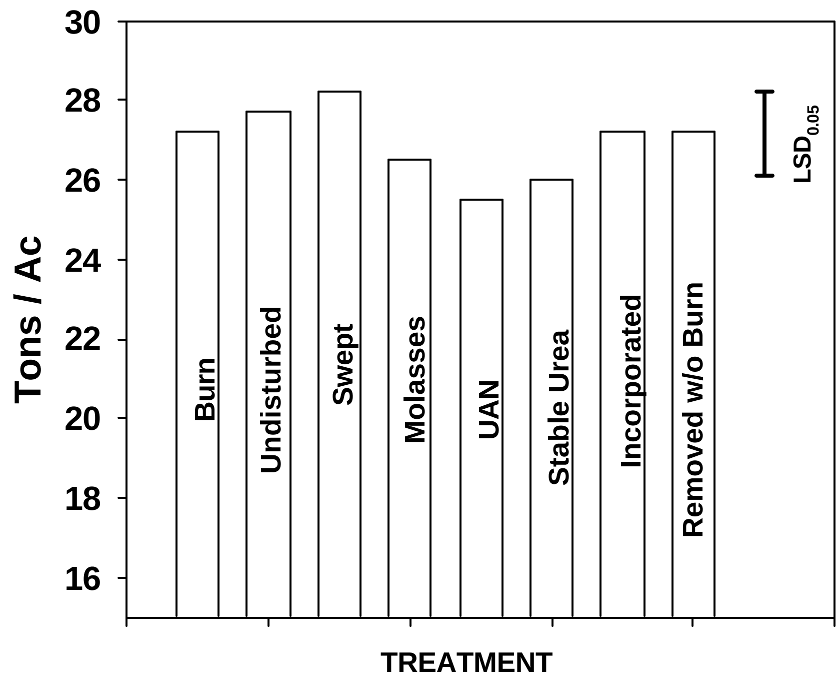

Fig. 5. The effect of residue management treatment on cane yield of 2nd stubble LCP85-384.

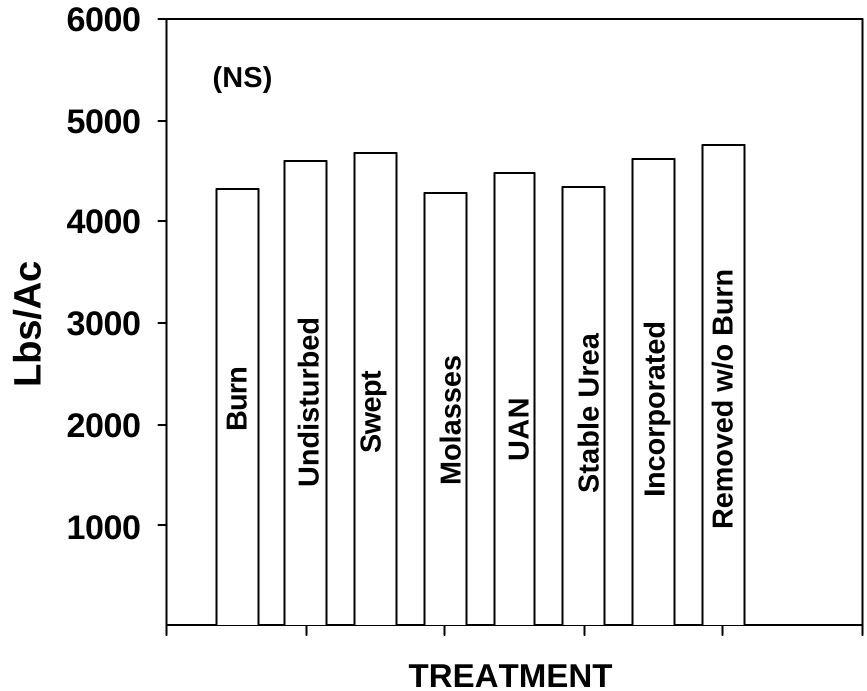

Fig.6. The effect of residue management of 2nd ratoon LCP85-384 on sugar yield.

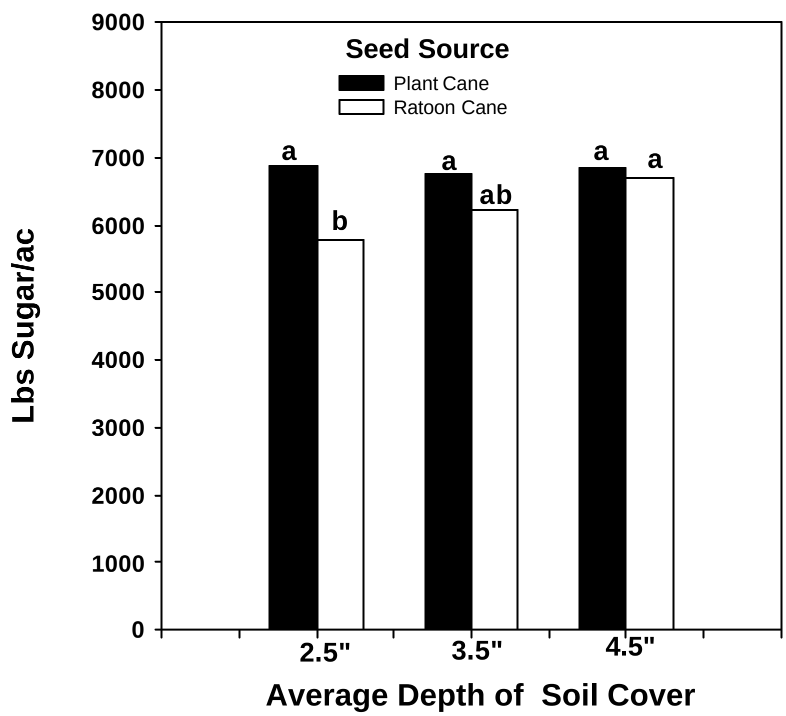

Fig. 7. The effect of seed source and depth of soil cover on yield of LCP85-384. Bars with the same letter are NS at *P≤0.05.*

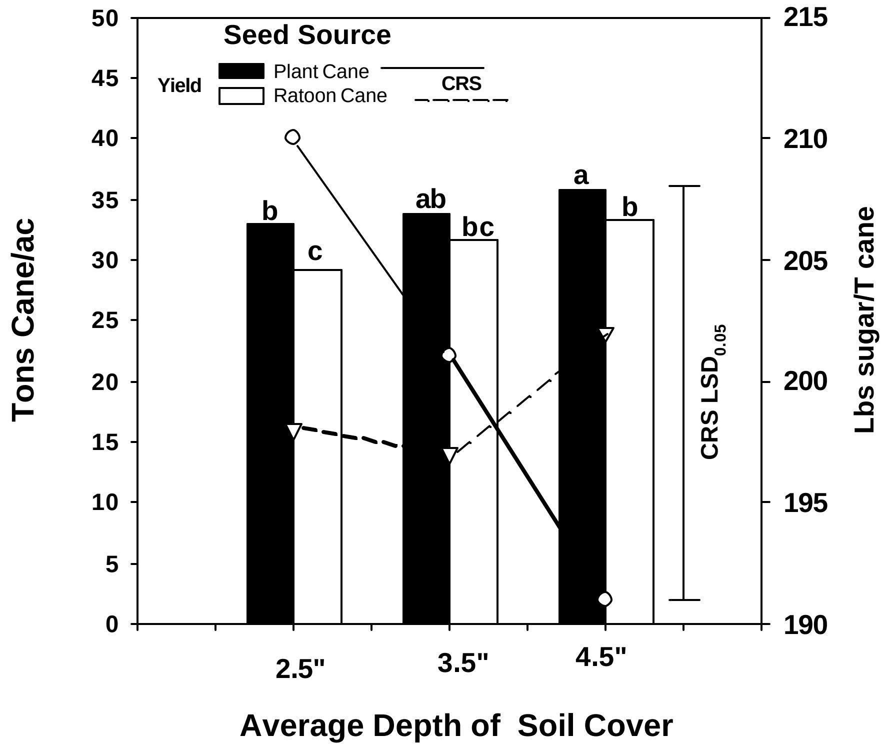

Fig. 8. The effect of seed source and depth of soil cover on yield and CRS of LCP85-384. Bars with the same letter are NS at *P≤0.05.*

ACKNOWLEDGMENTS

The authors wish to express appreciation for the financial support by the American Sugar Cane League.

LONG-TERM EVALUATION OF THE EFFECTS OF COMBINE TRASH BLANKET ON SUGARCANE YIELDS
(Cycle No. Two – First Stubble Results)

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SUMMARY

A study designed to evaluate the long-term consequences and benefits of the trash blanket generated by combine harvesting was initiated using LCP 85-384 plant cane in 1997. Each cane cycle, beginning with the plant cane harvest, three treatments are established for all ratoon crops in the cycle: ratoon cane grown on rows with the trash blanket (GCTB); ratoon cane grown on rows from which the trash blanket will be repositioned in the furrow in the fall (TBR); and ratoon cane grown on rows with residue from the combining of cane burned standing (BSTB). First stubble of cycle no. two was harvested in the fall of 2003. Sugar/acre yields for GCTB, TBR and BSTB were 4,920, 4,958 and 6,649 pounds/acre (P=.10), respectively. When comparing treatment means as an average of the five crops to date (three in cycle one and two in cycle two) , cane plots on which residue was retained averaged over 500 pounds of sugar per acre (P=.005) less than the other residue management treatments.

INTRODUCTION

Research under Louisiana conditions has consistently shown a two to four tons of cane per acre decrease in yield when combine residue is not removed from the field before springtime. Waiting to remove trash in February or March by either burning, raking or shaving has not produced consistent positive results relative to fall removal. The trash blanket influences ratoon yields negatively by trapping soil moisture, lowering soil temperature and possibly liberating allelopathic chemicals. The positive effects of the green cane trash blanket include moisture conservation, reduction in soil erosion, cold protection and the suppression of weeds. A longer-term effect may be the enhancement of soil organic matter. South African research under tropical conditions has shown that long-term trash retention (green-cane harvesting) allowed for lower N and K fertilizer rates after a number of years. The primary objective of this research effort is to evaluate the impact of residue management on cane yield and soil organic properties on a long-term basis.

PROCEDURES

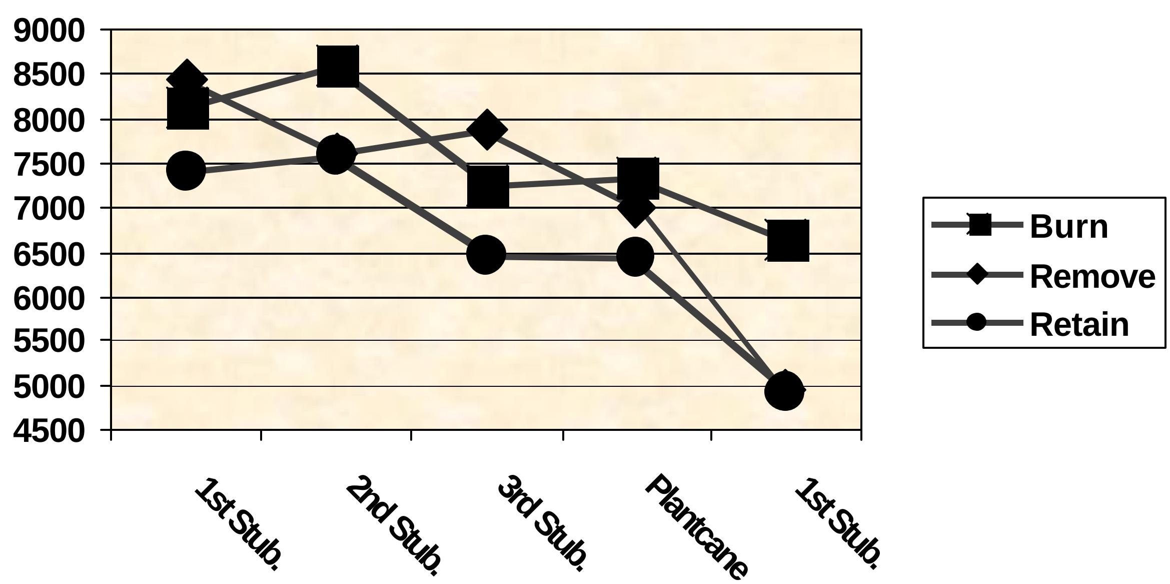
In November 1997, a field of LCP 85-384 plant cane was divided in two and the cane on a third of the rows in each half was burned standing prior to combining. The rows of cane in the remaining two-thirds of each half were green chopped and the leafy trash residue was broadcast evenly over the field by the combine. Shortly after harvest, the trash blanket was removed from the tops of half of the rows receiving the combine residue in each half of the field. The resultant three treatments are: 1) ratoon cane grown on rows with residue from the combining of cane burned standing; 2) ratoon cane grown on rows with residue from the combining of green cane; and 3) ratoon cane grown on rows from which combine residue was removed. These same treatments will be initiated with plant cane and imposed for each ratoon crop of at least two cropping cycles (three ratoon crops per cycle). Standard herbicide and cultural practices will be employed for all treatments.

Treatment plots are three rows wide and 365 feet in length, arranged in a randomized block design and replicated twice. Long-term effects of residue management will be ascertained by measuring the direct effects on cane and sugar yield over time. Additionally, changes in organic matter content and fertility status of the soil will be monitored. An appropriate analysis of variance will be used to determine significant differences among the treatment means.

RESULTS

The graph below shows sugar per acre yields for the three residue management treatments for all five crops across two cycles. A clear trend has emerged, with the standing burn treatment consistently yielding the best and the retained residue treatment the worst. While all yields appear to be lower with each successive harvest, it is believed to be a year effect and not a carryover effect of the imposed treatments.

Research is partially supported by a financial grant from the American Sugar Cane League.



Sugar/acre yields for five stubble crops harvested across two cycles.