BILLET PLANTING RESEARCH

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Research continued to develop methods to maximize the chances of success with billet planting. During 2002, results were only obtained from billet planting experiments conducted at the Sugar Research Station at St. Gabriel, LA. The experiments included one LCP 85-384 experiment in second stubble comparing billets planted at two rates and whole stalks with and without starter fertilizer, LCP 85-384 plant cane and first-stubble experiments comparing billet date and rate of planting, and a plant cane experiment comparing billet and whole-stalk planting in HoCP 85-845 and HoCP 91-555. Yield differences seen among treatments in plant cane were no longer evident in the second-stubble experiment. The sugar per acre (lbs.) yields for whole stalks, 1x billets, and 2x billets were 5856, 5743, and 5400, respectively, without starter fertilizer (45-45-45) and 5524, 5719, and 5158, respectively, with starter fertilizer. No yield differences were detected in the plant cane date of planting test (Table 1); however, an early August planting date was not included. Yield differences were no longer evident in first stubble of the date of planting test (Table 2). Yields were lower at the lowest planting rates for both planting dates in plant cane (Table 3). No significant differences were detected among the different planting rates in first stubble (Table 4). HoCP 85-845 and HoCP 91-555 responded well to billet planting in plant cane (Table 5). Stalk population was higher in billet planted HoCP85-845. Yields were not obtained from farm experiments because of adverse harvesting conditions.

The results obtained during 2002 were similar to those from experiments in previous years. Yield differences were detected among treatments in the plant cane crop, but differences in yield detected in a prior plant cane crop were no longer significant in the stubble crops. As long as large gaps do not occur in the plant cane stand, the ratooning ability of LCP 85-384 allows it 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. Heavy rains during the planting season created problems in billet plantings across the industry during 2002. Numerous freezes then occurred during the winter, but most stand problems appeared to be associated with planting problems. Most stand problems occurred when heavy rains occurred shortly after planting in sandy soils. The research results from this and previous years suggest that practices to maximize the chance of success with billet planting include: 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), providing a well-prepared seed-bed, 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 2002 plant cane yield of billet planted LCP 85-384.

Date of planting	Stalks/acre (x1000)	Tons cane per acre	Sugar per acre (lbs.)
August 23	48.7	44.0	8943
August 28	53.4	42.1	8496
September 17	55.1	46.0	9199
September 28	53.1	45.4	8854

Average values for the different yield components were not significantly different among dates.

Table 2. Effect of date of planting on 2001 plant and 2002 first-stubble yields of billet planted LCP 85-384 at the Sugar Research Station.

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

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 3. Effect of rate of planting on 2002 plant cane yield of LCP 85-384 planted as billets on two dates at the Sugar Research Station.

	Stalks/acre (x1000)		Tons cane per acre		Sugar per acre (lbs)	
Rate	Aug 23	Sep 17	Aug 23	Sep 17	Aug 23	Sep 17
1 billet	40.8 c	38.7 d	34.8 b	34.3 c	6734 b	6442 c
3 billets	47.8 bc	48.1 c	40.0 ab	38.7 bc	8355 a	6913 bc
6 billets	50.5 ab	54.3 b	42.0 ab	43.5 ab	8773 a	8747 a
9 billets	55.7 ab	59.2 a	43.1 ab	47.1 a	8656 a	8068 abc
12 billets	57.3 a	60.3 a	46.2 a	45.8 ab	9525 a	8383 ab

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

	Plant cane (2000) Tons per acre		First-stubble (2001) Tons per acre	
Rate	Aug 22	Sep 18	Aug 22	Sep 18
1 billet	56.1 b	46.9 b	48.5	38.8
3 billets	66.9 a	57.9 a	50.4	41.0
6 billets	65.4 a	63.6 a	46.8	42.2
9 billets	65.2 a	58.3 a	45.9	44.5
12 billets	66.7 a	62.5 a	45.8	42.0

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 5. Comparison of yields obtained in plant cane for two varieties, HoCP 91-555 and HoCP 85-845, planted as billets and whole stalks at the Sugar Research Station.

Variety	Treatment	Stalks/acre	Tons cane/acre	Sugar/acre (lbs.)
HoCP 91-555	Billet	54,640	49.4	8786
	Whole stalk	45,725	43.5	7519
HoCP 85-845	Billet	38,910 a	39.1	7901
	Whole stalk	31,380 b	35.8	7037

Average values for stalk population per acre followed by different letters were significantly different (P = 0.05).

CULTURAL PRACTICES RESEARCH IN SUGARCANE IN 2002

Chuck Kennedy , Allen Arceneaux and Ray Ricaud
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 2002 to test the effects of management practices on yield and yield components of sugarcane.

An early (October) first ratoon harvest of HoCP85-845 and HoCP91-555 resulted in lower second ratoon yield, significantly lower than second ratoon production following a late (December) first ratoon harvest when all were preceded by an October plant cane harvest. Therefore, the effect of first ratoon harvest date on subsequent ratoon yields was greater when plant cane was harvested in October instead of December. In a similar study initiated this year, plant cane yields of LCP85-384 and HoCP91-555 were higher in a December harvest than an October harvest. Yields were generally higher for LCP85-384 than HoCP91-555 at the December harvest. October yields were equivalent for the two varieties.

Incorporating harvest residue of first ratoon HoCP85-845 resulted in cane and sugar yields of the second ratoon crop similar to that of burning the residue. Other treatments were generally lower to significantly lower than these treatments. Individual residue management treatments on first ratoon LCP85-384 did not produce significantly different yield or yield parameters. Orthogonal contrasts indicated treatments that removed or incorporated residue on the cane bed produced only 4% more millable stalks than when residue was treated with additives (66 kg/ha N as UAN or stabilized urea or 3.78 l/ha molasses) or left undisturbed. Sweeping residue to row middles produced significantly higher cane and sugar yields than other treatments that removed or incorporate residue on the cane bed.

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 AND DISCUSSION:

Harvest Date on Subsequent Yields

It is well established that later harvest of sugarcane often results in higher sugar yield. Date of harvest for earlier crops also can affect subsequent stubble yields. An early (October) first ratoon harvest of HoCP85-845 and HoCP91-555 resulted in lower second ratoon yield, significantly lower than second ratoon production following a late (December) first ratoon harvest when all were preceded by an October plant cane harvest. Therefore, the effect of first ratoon harvest date on subsequent ratoon yields was greater when plant cane was harvested in October instead of December (Table 1). In a similar study initiated this year, plant cane yields of LCP85-384 and HoCP91-555 were higher in a December harvest than an October harvest. Yields were generally higher for LCP85-384 than HoCP91-555 at the December harvest. October yields were equivalent for the two varieties (Table 2).

Residue Management/Stubble Protection

Soil temperature 4 inches deep in the cane bed of second stubble HoCP 85-845 was only moderately affected by residue management. When harvest residue was burned, average daily soil temperature was usually a few degrees higher than temperatures occurring under the residue mat. Incorporating the residue and sweeping it to the row middle resulted in temperatures that were intermediate and higher, respectively, compared to burning and leaving the residue (Fig. 1). When average daily air temperature (ADAT) was below 43 , incorporating or leaving the residue mat resulted in slightly warmer average daily soil temperature (ADST). When ADAT was between 43 and 50 F , ADST for all treatments were comparable. When ADAT was above 50 , ADST became increasingly higher for the burn and sweep treatments compared to incorporation and leaving the residue (Fig. 2). The differences in ADST between treatments during winter were relatively small, amounting to only 1-2 F on average. Using a cultivator to slightly incorporate harvest residue and provide some soil cover over the stubble of HoCP 85-845 resulted in a 5% (not statistically significant) increase in second stubble yield over the residue-burned check (Table 3) and a significant 22% average increase above other treatments. Sugar yield was 12% more in tillage vs. burn and 25% more in tillage vs others (Table 3).

In a more comprehensive study with first stubble LCP85-384 , about 3 T of residue per acre remained on the field over the winter and into spring. We did not find a significant loss of residue from Nov. 2001 to March 2002 for residue plots amended with UAN, stabilized urea, or molasses (Fig. 4). Shoot emergence rate was very similar for all treatments. In late March, the average shoot population was about 57,000 / acre, with the lowest population in the undisturbed residue check (about 51,000) and the highest population in the residue-incorporated treatment (about 63,000). Shoot population increased through spring to populations averaging about 90,000 /ac, but declined to about 60,000 millable stalks/acre by August. Plots where residue was removed or incorporated had only about 4% more stalks than plots where residue was treated or left undisturbed (Table 4). Crop growth was variable, but tended to be the highest for treatments where residue was removed or incorporated vs. residue treated or left undisturbed.

Yield ranged from 27.8 to 34 T/acre, whole-stalk sample CRS ranged from 171.7 to 191.9 lbs/T and Lbs sugar/acre ranged from 4,856 to 6,250. There were no significant differences in cane yield among treatments although the burn treatment had the lowest average and the swept treatment had the highest average yield (Fig. 5). The molasses treatment produced the lowest CRS and was significantly lower than the highest CRS obtained in residue-incorporated plots (Fig.6). The molasses-treated plots also produced the lowest sugar/acre and were significantly lower than the residue swept treatment, which produced the highest sugar/acre (Fig.7). Orthogonal contrasts indicated sweeping residue from the top of the bed produced better cane and sugar yield than other forms of removal or incorporating (Figs. 5, 7). Nutrient uptake rate and concentrations in the shoot from samples taken during the season will be determined as processing and analysis occur this winter.

Table 1. Effect of date of harvest in plant cane and first stubble on the second stubble yield of two varieties on the St. Gabriel Research Station, 2002.

Plant Cane 2000	1ST Stubble 2001	Cane Yield T/A	Stalk No. 1000/A	Stalk Wt. lbs.	Normal Sucrose %	Sugar Yield lbs/A
				HoCP 85-845		
Oct. 1	Oct. 9	25.0	34.8	1.65	14.1	5030
	Nov. 1	29.7	37.0	1.61	13.8	5796
	Dec. 3	34.7	37.0	1.71	13.4	6541
Dec. 1	Oct. 9	27.9	38.0	1.96	13.5	5322
	Nov. 1	30.9	38.7	1.54	13.8	6055
	Dec. 3	30.9	38.8	1.96	13.2	5717
				HoCP 91-555		
Oct. 1	Oct. 9	23.1	42.3	1.62	14.2	4668
	Nov. 1	28.4	43.2	2.01	13.0	5168
	Dec. 3	31.1	44.8	1.50	13.6	5997
Dec. 1	Oct. 9	27.8	46.1	1.75	13.9	5525
	Nov. 1	28.9	44.9	1.76	12.9	5203
	Dec. 3	31.0	44.2	1.66	13.6	5990
LSD .05 Treat.		4.7	1.6	0.35	1.3	1049
				Mean Effect		
Oct. 1		28.7	39.8	1.69	13.5	5483
Dec. 1		29.6	41.8	1.77	13.5	5635
	Oct. 9	26.0	40.2	1.76	13.7	5061
	Nov. 1	29.5	41.0	1.73	13.4	5555
	Dec. 3	31.9	41.2	1.71	13.4	6061
LSD .05 Plant cane		NS	0.6	NS	NS	NS
LSD .05 1st Stubble		2.4	0.8	NS	NS	524

Plant cane was harvested in October and December in 2000. First stubble cane was harvested in October, November, and December in 2001. Second stubble cane was harvested on one date in October 2002.

Table 2. Effect of date of harvest on plant cane yield of two cane varieties on the St. Gabriel Research Station, 2002.

Harvest Date		Plant Cane - 2002					
Plant cane	1st Stubble	Cane Yield	Stalk No.	Stalk Wt.	Normal Juice Brix	Normal Juice Sucrose	Sugar Yield
2002	2003	T/A	1000/A	lbs.	%	%	lbs/A
				LCP 85-384			
Oct. 8	Oct.	29.0	35.9	1.68	13.9	11.0	4319
	Nov.	31.6	37.8	1.59	13.4	10.4	4371
	Dec.	30.5	36.5	1.71	13.4	10.3	4160
Dec. 4	Oct.	39.3	38.5	1.90	16.9	14.6	8266
	Nov.	37.0	37.4	2.12	15.9	13.6	7140
	Dec.	36.7	38.3	1.93	15.9	13.5	7022
				HoCP 91-555			
Oct. 8	Oct.	27.7	36.1	1.76	14.8	11.9	4538
	Nov.	28.9	38.8	1.50	14.2	11.2	4362
	Dec.	28.6	37.5	1.62	14.0	10.7	4105
Dec. 4	Oct.	32.8	35.1	2.19	16.8	14.3	6725
	Nov.	33.4	36.3	2.23	16.3	13.8	6534
	Dec.	32.2	37.5	1.76	16.3	13.7	6271
LSD .05		3.5	3.0	0.30	1.1	1.3	1032
					Mean Effect		
Oct. 8		29.4	37.1	1.64	14.0	10.9	4309
Dec. 4		35.2	37.2	2.02	16.3	13.9	6993
LSD .05 Plant		1.4	NS	0.14	0.5	0.6	426

Plant cane was harvested in October and December in 2002. The cane was mechanically planted with combine-harvested billets.

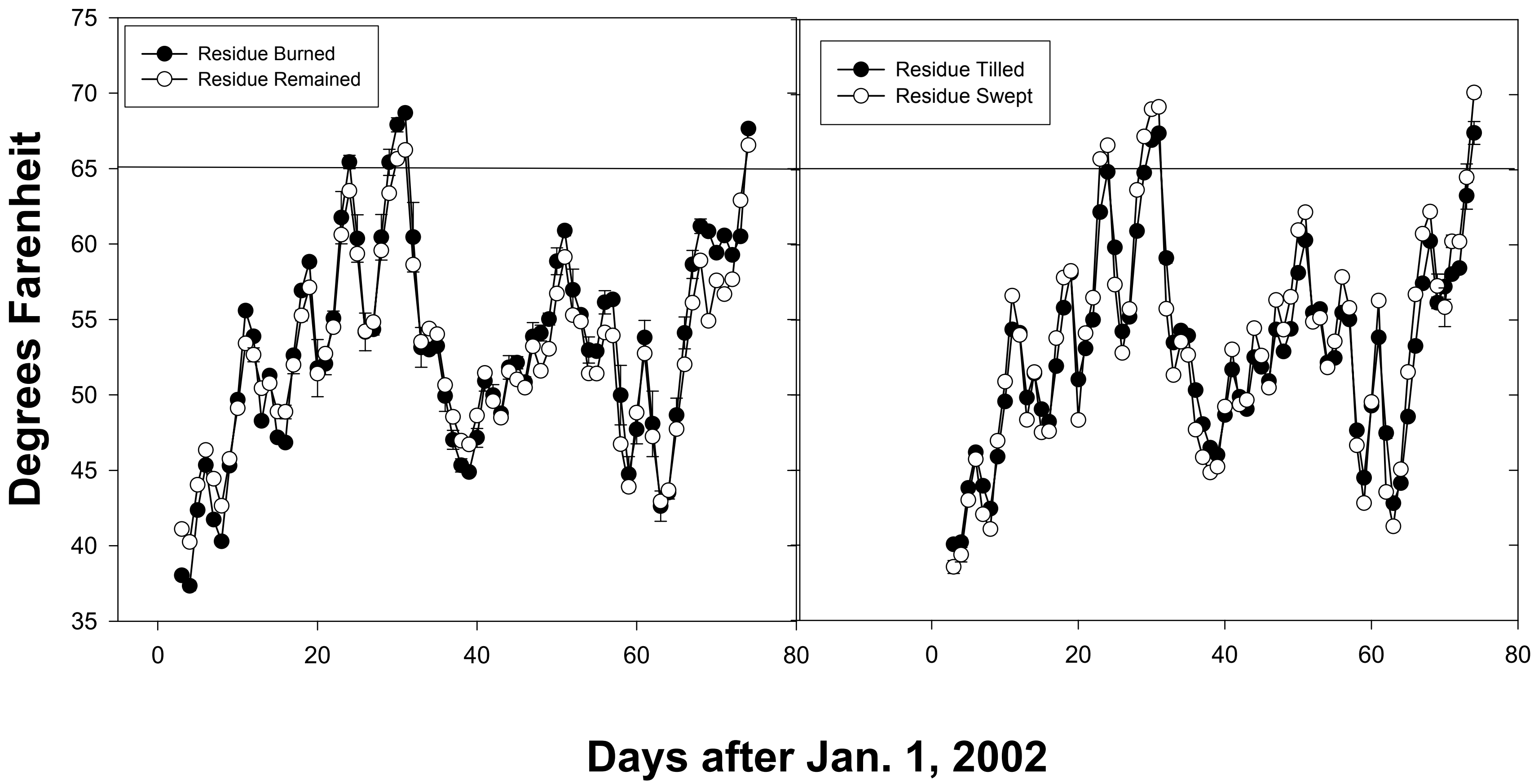

Fig. 1. Average daily soil temperature at 4" depth for different harvest residue management practices of HoCP85-845.

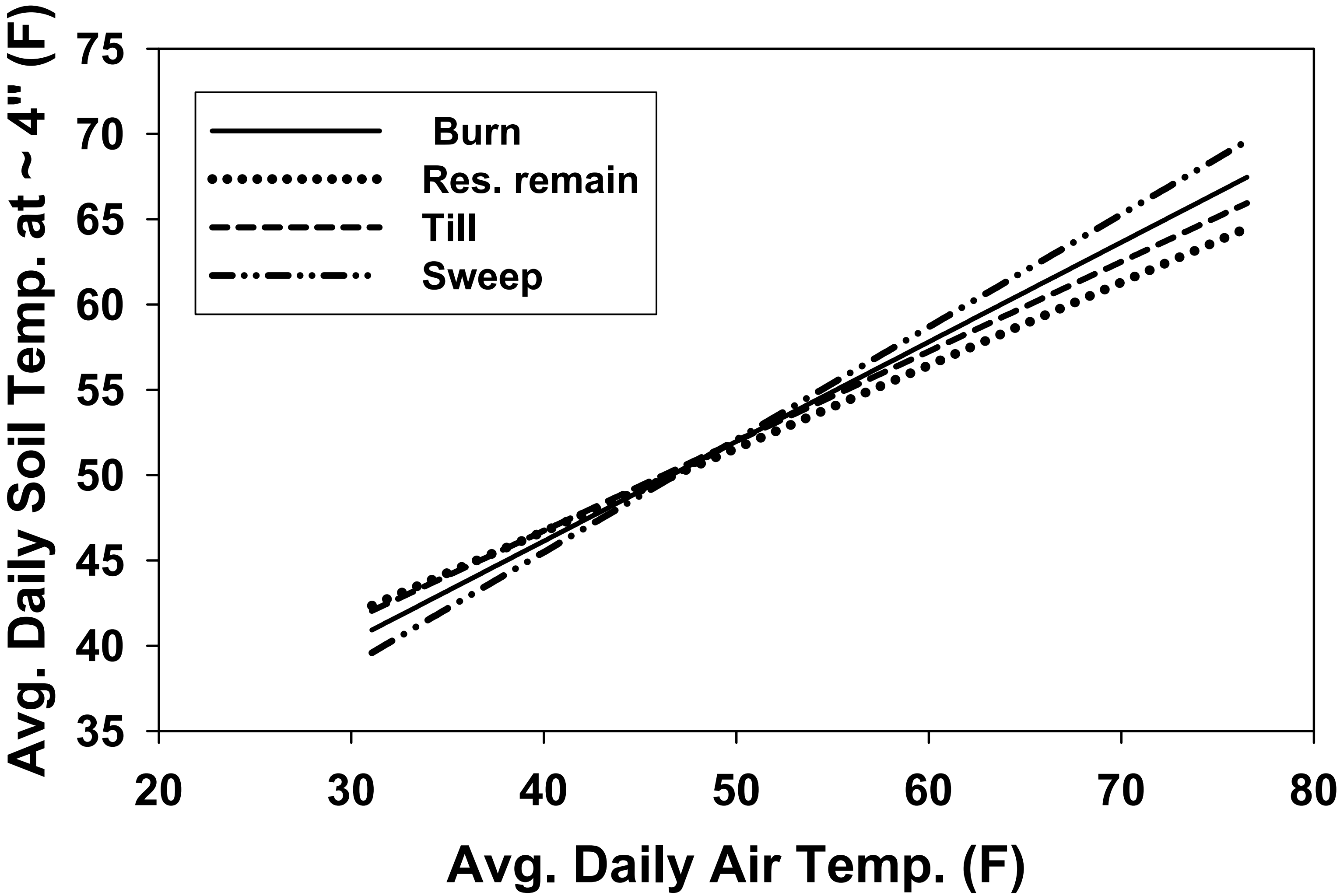

Fig. 2. Relationship between soil and air temperatures for different harvest residue management treatments of HoCP85-845.

Table 3. Effect of residue management on the second stubble yield of HoCP 85-845 variety on the St. Gabriel Research Station, 2002.

Residue Management Treatment	Cane Yield	Second Stubble Cane - 2002: Stalk No.	Stalk Wt.	Normal Juice Brix	Normal Juice Sucrose	Sugar Yield
2001	T/A	1000/A	lbs.	%	%	lbs/A
Residue	27.7	23.2	2.44	16.1	13.6	5191
Burn	32.1	21.9	2.60	15.8	13.3	5992
Sweep	27.9	22.3	2.66	16.5	14.0	5564
Surfactant	27.5	20.5	2.44	16.1	13.6	5297
Till	33.8	21.7	2.38	16.4	14.0	6724
LSD .05	3.1	2.0	NS	NS	NS	795

The burn plots were harvested and the trash was removed by burning. The soil cover was applied over the cane stubbles immediately after harvesting plant cane in 2000 and first stubble in 2001.

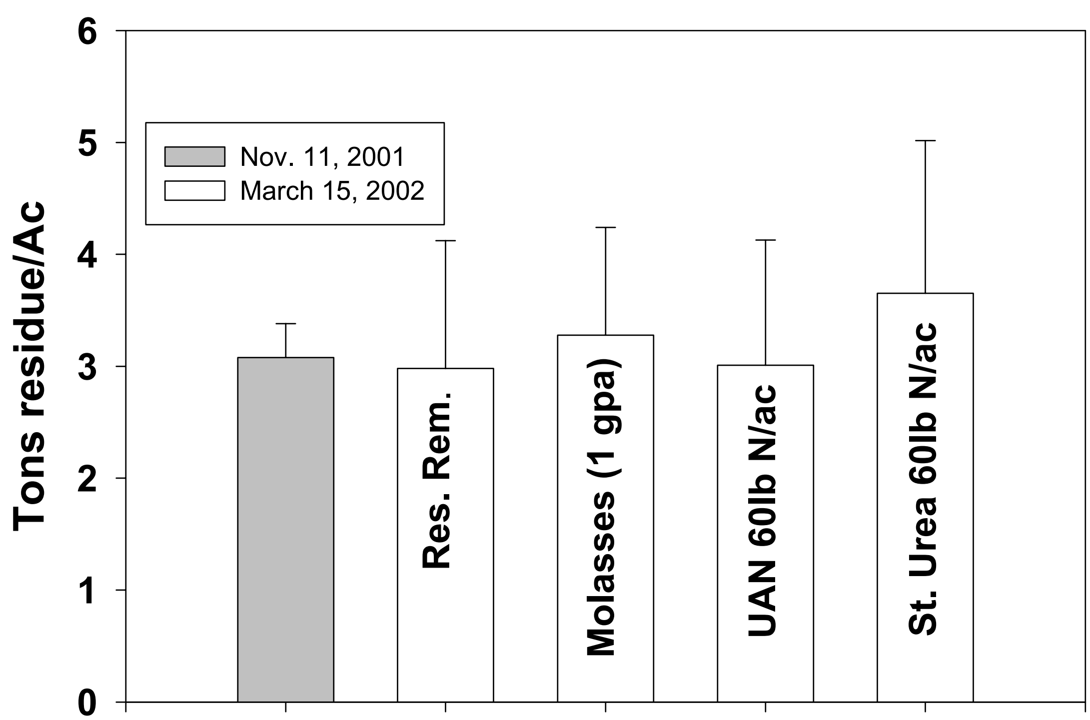

Fig. 3. Spray-on adjuvants did not reduce residue over winter on 1st Stubble LCP85-384.

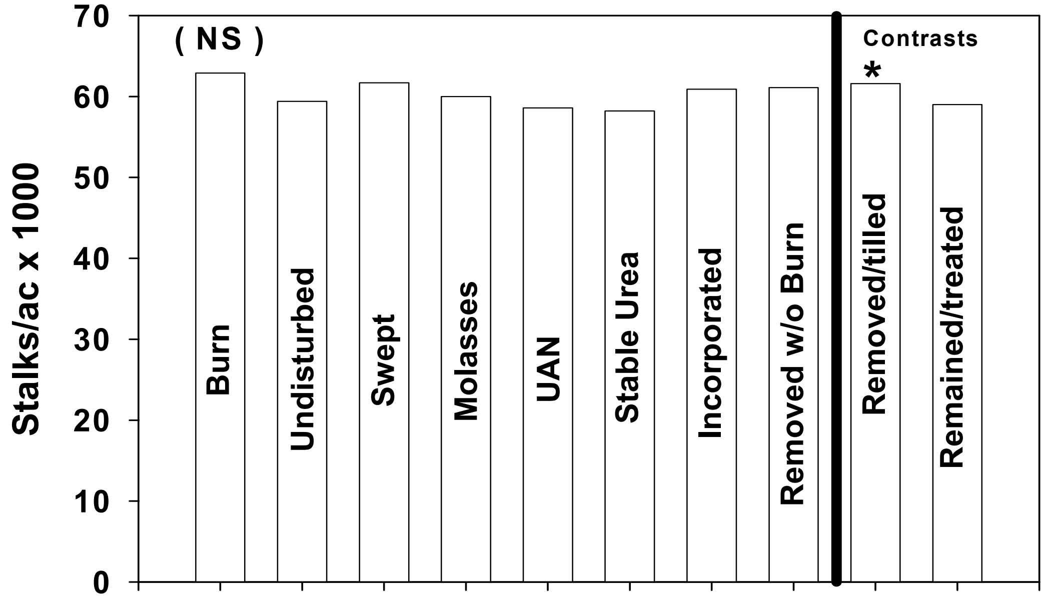

Fig. 4. The effect of harvest residue management treatments on millable stalk population of 1st stubble LCP85-384

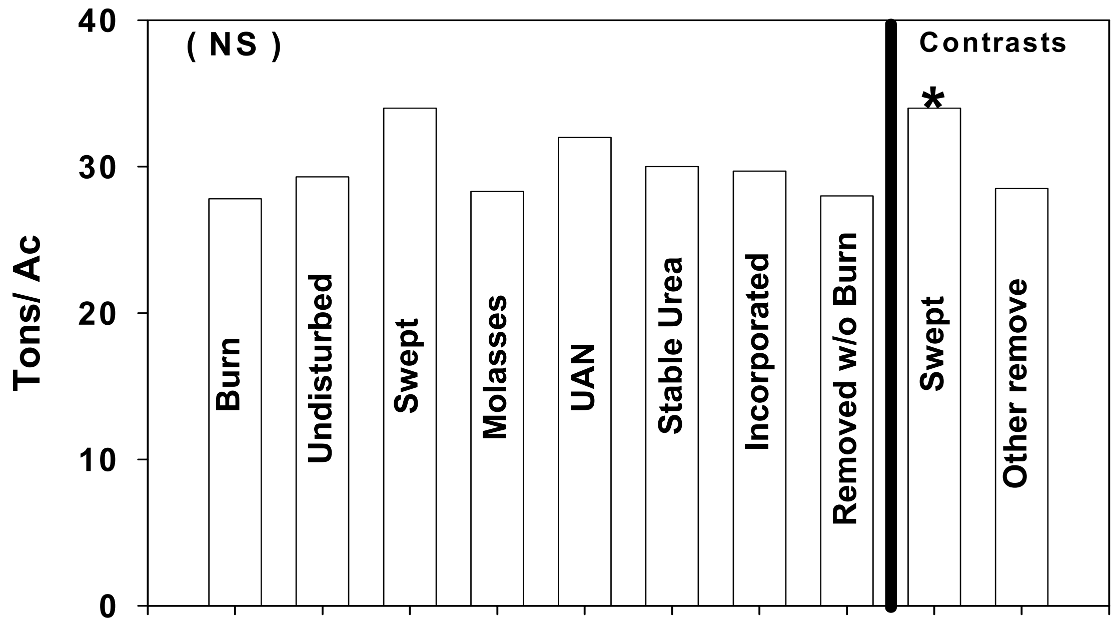

Fig. 5. The effect of different residue managements on cane yield of 1st stubble LCP85-384.

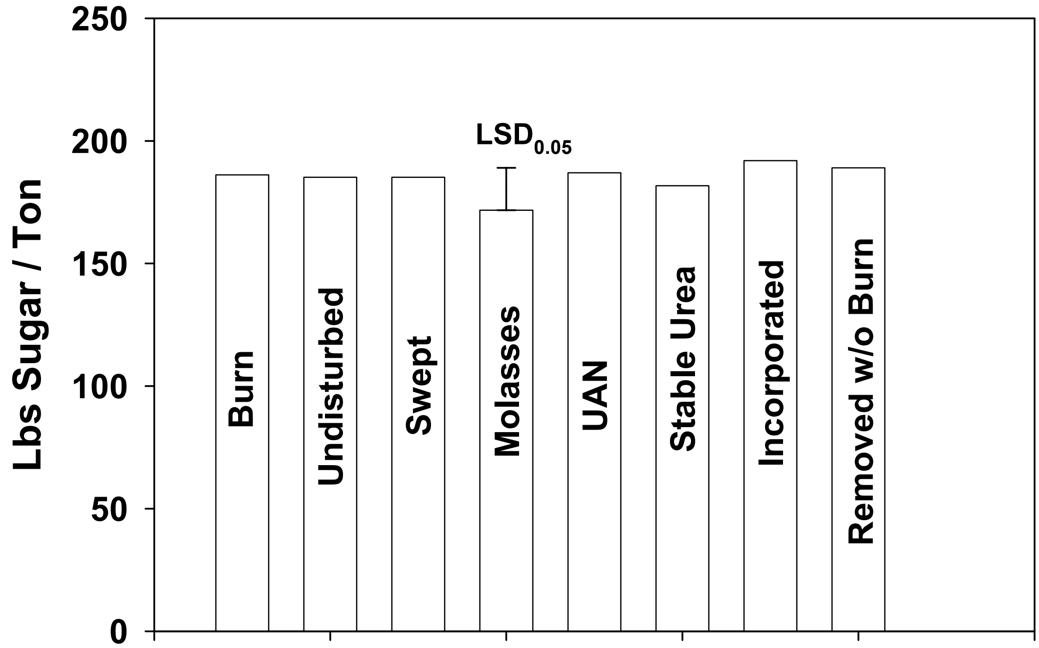

Fig. 6. The effect of different residue managements on CRS of 1st stubble LCP85-384.

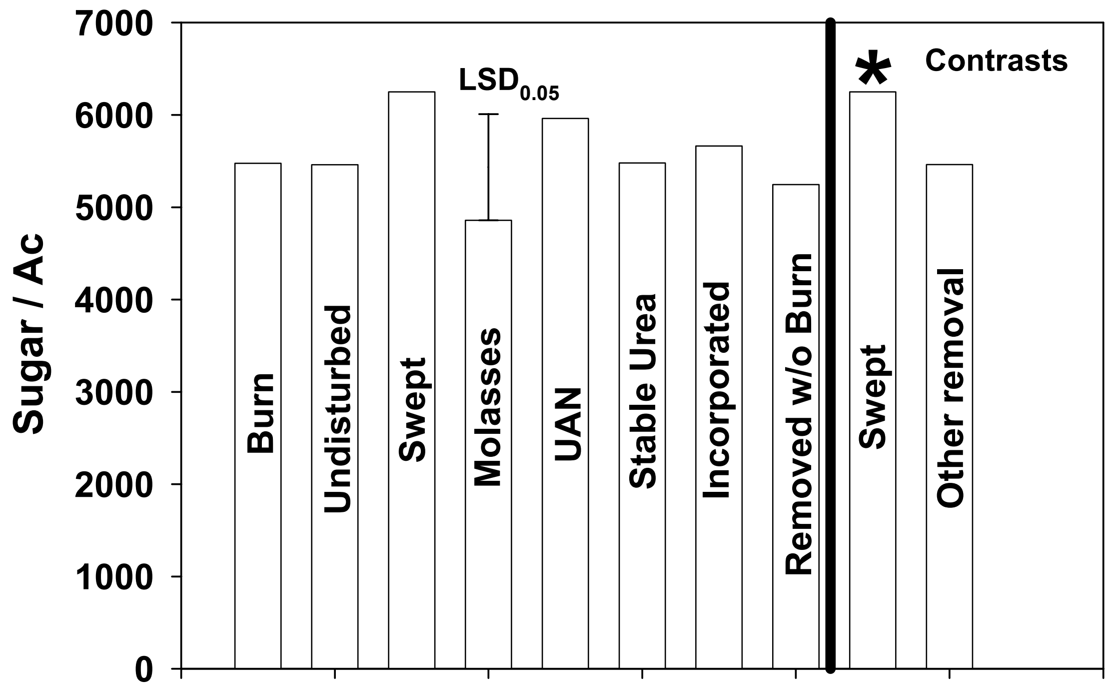

Fig. 7. The effect of different residue managements on Sugar/Ac of 1st stubble LCP85-384, St. Gabriel, 2002.

LONG-TERM EVALUATION OF THE EFFECTS OF COMBINE TRASH BLANKET ON SUGARCANE YIELDS
(Cycle No. Two - Plant Cane 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 will be 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). Plant cane of cycle no. two was harvested in the fall of 2002. Sugar/acre yields for GCTB, TBR, and BSTB were 5,033, 5,493, and 5,743 pounds/acre (plant cane yields were not significantly different), respectively. When comparing treatment means as an average of the four crops to date (three in cycle one and plant cane in cycle two), cane plots on which residue was retained averaged at least 750 pounds of sugar/acre (P=.02) less than the other residue management approaches. While it is premature to tell, it appears that the adverse influence of retained residue may carry over to the next production cycle, in spite of an intervening fallow period.

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 negatively influences ratoon yields 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.

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

PROCEDURES

In November 1997 a field of LCP 85-384 plant cane was divided and the cane on one-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 physically 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. Cane yield and juice quality will be determined at a commercial sugar mill.

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 of the soil will be monitored. An appropriate analysis of variance will be used to determine significant differences among the treatment means.

RESULTS

The debilitating effects of trash blanket retention on subsequent ratoon crops may carry over from one production cycle to the next, even though a fallow period intervenes. Plant cane plots in the second production cycle that were positioned as plots with full trash coverage in production cycle no. one produced only 88% of the yield of plots on which cane was burned standing and 91% of the yield of plots on which the residue was repositioned into the furrows. The table below shows treatments yields as an average of the four crops harvested thus far in the study.

Influence of Combine-residue Management on the Yield and Quality of LCP 85-384 as an Average of the Four Harvests (three ratoons in cycle one and plant cane in cycle two)			
Residue management	Pounds of sugar/acre	Tons of cane/acre	CRS
Cane burned standing prior to harvest	7,184	41.1	177
Cane grown on rows from which residue was removed	7,050	41.0	173
Cane grown on rows with residue retained	6,301	37.9	168
P =	.02	.13	.004

THE EVALUATION OF SOIL ELECTRICAL CONDUCTIVITY AS A SURROGATE FOR SOIL ANALYSIS IN SUGARCANE
(Observations are preliminary and investigations are ongoing)

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SUMMARY

An investigation of precision farming technologies was initiated in 2000. Three separate sugarcane fields are being used to evaluate the relationship between soil electron conductivity (EC), soil attributes, and sugarcane yield. The principal objective is to ascertain if soil EC can be used as a surrogate for conventional soil sampling and analysis. A secondary objective is to determine if zones of similar EC can be useful in managing fertilizer nitrogen. In 2002 nitrogen rates, 0, 80, 120 and 180 lb/acre, were applied at random across a plant cane field. Preliminary analysis suggests a relationship between EC and yield and EC and other soil characteristics. There was a trend (P=.20) for the highest N application rate to give the highest yield. The 2003 growing season will be used to determine the appropriateness of using zones of similar EC for fertilizer N management.

INTRODUCTION

Precision farming is defined as using information technologies to tailor soil and crop management to fit the specific conditions found within a field. Precision farming involves technologies that depend on global positioning systems (GPS) to collect information for site-specific management plans. Geo-referenced maps of the field can be produced to identify areas within individual fields to be uniquely managed. With sugarcane growers spending from 35 to 45% of direct expenses ($115 to $140/acre) for fertilizer and herbicides, it is easy to see the potential for significant savings with variable rate technology. Use of precision farming technologies may also have important environmental and health benefits. Prescription fertilizer and herbicide programs have the potential for minimizing ground and surface water contamination, which qualifies these practices as Best Management Practices useful for meeting water quality standards. The profitable use of these precision farming technologies in sugarcane production have not been investigated for the conditions that prevail in Louisiana.

PROCEDURES

Three fields were mapped using a Veris 3100 Soil Electrical Conductivity mapping ystem equipped with DGPS mapping capability. The Veris was operated on approximately 36 ft transects at 5-6 mph and measured EC at two depths in the soil (0-1 ft and 0-3 ft)

Research is partially supported by a financial grant from the American Sugar Cane League and nitrogen fertilizer was donated by Ouachita Fertilizer.

simultaneously. Over 4,500 data points were acquired for each field, yielding a density from 145 to 150 data points per acre. The Veris data were imported into SSToolbox, an ArcView-based agricultural Geographical Information System (GIS). The data for the shallow EC readings was classified into five classes using the quantile method, which grouped the data with equal numbers of data points. A referenced grid consisting of 1-acre cells was used as a pattern for sampling soil. The randomly selected sampling points within the cells were moved to the nearest corresponding Veris point to assure that five sample points fell within each of five zones of similar electrical conductivity. Samples were collected at each point and submitted to the LSU AgCenter Soil Testing Laboratory for analysis. The EC value for each sample location was added as an attribute of the soil test data.

A nitrogen fertilizer rate study was imposed on one of the fields mapped for EC in the spring of 2002. Four N rates, 0, 80, 120 and 180 lb N/acre, were randomly applied, with each rate replicated 21 times.

PRELIMINARY RESULTS

It appears that field patterns articulated by variation in EC reflect differences in soil texture, organic matter content, and inherent fertility - attributes which should be suitable candidates for variable input rates such as nitrogen fertilizer and/or herbicides. Plant cane did not differentially respond to applied fertilizer N (P=.20), but there was a trend for the 180 lb N/acre rate to produce the highest yield. Plant cane often is not the most sensitive crop in the production cycle to variable nitrogen application rates. As clearly indicted in the table below and by preliminary analysis of the data, a relationship between soil electrical conductivity and yield appears to exist. Ongoing spatial analysis has revealed spatial variability in EC but areas of homogeniety will be used this season for an additional evaluation of nitrogen rate comparisons. Ultimately, a nitrogen fertilizer prescription will be written based on EC and, perhaps, other variables.

Table 1. Apparent Influence of Soil Electrical Conductivity on the Yield of LCP 85-384

Range in Electrical Conductivity in mS/m	Yield in Tons of Cane/Acre
10 to 20	31.9
21 to 30	32.3
31 to 40	34.6
41 to 50	40.0