BILLET PLANTING RESEARCH

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Research continued to develop methods to maximize the chances of success with billet (stalk section) planting. During 2011, results were obtained from two field experiments conducted at the Sugar Research Station at St. Gabriel comparing plant cane and first ratoon crop yields obtained from billet and whole stalk plantings of commercial and experimental varieties. In addition, the potential for Syngenta® seed-treatment chemicals to improve stand establishment and yield in billet plantings continued to be evaluated. Finally, an experiment was planted comparing billets cut with a harvester modified to minimize physical damage to billets or an un-modified harvester and whole stalks.

Plant cane yields obtained from billet and whole stalk plantings were compared for five varieties, L 99-233, HoCP 00-950, L 01-283, L 01-299, and L 03-371. First ratoon yields from billet and whole stalk plantings were compared for seven varieties, HoCP 96-540, L 99-226, L 99-233, HoCP 00-950, L 01-283, L 01-299, and L 03-371. Drought conditions after planting resulted in large differences between yields obtained from billet and whole stalk plantings in the plant cane experiment (Table 1). Stalk population, cane tonnage and sugar per acre were lower for billet plantings of all varieties except L 99-233. Sugar per ton of cane was lower for billet plantings of L 01-299. The yield reductions were large. Tonnage and sugar yields were reduced 37-39% for HoCP 00-950 and L 01-283. Tonnage also was reduced 39% for L 01-299, but the lower sugar per ton resulted in a 44% reduction in total sugar yield. L 03-371 which has shown poor tolerance to billet planting in a previous experience had a 54% reduction in both tonnage and total sugar yields in billet compared to whole stalk plantings.

In first ratoon, total sugar yield was lower in the billet compared to the whole stalk plantings of HoCP 96-540 and L 99-226 (Table 2). Lower sugar yields detected in billet plantings of L 99-233, HoCP 00-950, and L 03-371 in plant cane were no longer evident in first ratoon.

Chemical seed treatments from Syngenta® for use in a new single-bud planting system being developed for Brazil are still under evaluation to determine whether they can increase yields obtained from billet plantings in Louisiana. Experiment treatments include a combination of three fungicides, an insecticide and nematicide combination, all pesticides combined, non-treated billets, and whole stalks. Second ratoon yields were determined in an initial experiment with Ho 95-988 and HoCP 96-540 (Table 3). The combined chemical treatment increased tonnage and sugar per acre yields for HoCP 96-540 in both plant cane and first ratoon, but the differences were no longer significant in second ratoon. The total sugar yield was higher in the insecticide/nematicide treatment compared to non-treated billets for Ho 95-988.

First ratoon yields were compared in an experiment with HoCP 96-540, L 99-226, and L 99-233 (Table 4). Cane tonnage and sugar yield were still higher in the combined chemical treatment compared to non-treated billets.

In a plant cane experiment with HoCP 96-540, L 99-226, and L 99-233, initial shoot populations after planting were affected by the treatments only for HoCP 96-540 (Table 5). Shoot population was higher in the combined chemical treatment compared to non-treated billets and the insecticide/nematicide treatment. More differences were observed in the spring shoot population comparisons (Table 5). The spring shoot population was higher in the whole stalk planting compared to non-treated, fungicide treated, and insecticide treated billets for HoCP 96-540, whereas the combined chemical treatment was similar. Shoot population was higher in the whole stalk planting than non-treated and insecticide/nematicide treated billets of L 99-226, and the whole stalk planting had more shoots than the fungicide treated billets of L 99-233. The millable stalk population was higher for the whole stalk planting than non-treated and fungicide treated billets of L 99-233, but the whole stalk planting had the lowest shoot population for L 99-226 (Table 5). Stalk weight and sugar per ton of cane were mostly similar among treatments of the three varieties, except that stalk weight of the whole stalk planting was higher than for insecticide/nematicide and fungicide treated billets of L 99-226 (Table 6). Differences in plant cane tonnage yield were only detected for HoCP 96-540. The combined chemical treatment tonnage yield was higher than for non-treated and insecticide/nematicide treated billets and the whole stalk planting of HoCP 96-540. Differences among treatments for total sugar yield were detected for HoCP 96-540 and L 99-233. The combined chemical treatment yield was again higher than for non-treated and insecticide/nematicide treated billets of HoCP 96-540. The whole stalk planting yield was higher compared to fungicide treated billets for L 99-233.

The seed treatment chemicals continue to show the potential to increase initial stand establishment and spring shoot populations in billet plantings. Yield increases then come primarily from increased stalk population rather than increased stalk weight or sugar per ton. The results suggest that the maximum benefit comes from application of all of the pesticides combined. The results with the Syngenta® seed-treatment chemicals are promising, and the research will be continued.

An experiment was planted to determine whether modifications to a chopper harvester to minimize physical damage to billet cut for planting could improve stand establishment and yield. Two Deere 3520 mechanical sugarcane harvesters were used to cut billets. One contained a modification package that rubberized all surfaces/edges that come into contact with cane being cut, single-blade cutters for cutting long billets, and a solid elevator floor. Billets cut with both harvesters were planted with a Deere 7510 drum mechanical planter. Two varieties, L 99-226 and L 03-371, were included in the experiment.

Table 1. Comparison of yield components for billet and whole stalk plantings of five varieties in plant cane during 2012.

Variety	Treatment	Stalk popula (x1000)	Stalk weight (lbs.)	Sugar/ton cane (lbs.)	Tons cane per acre	Sugar/acre (lbs.)
L 99-233	Billet	36.0	2.0	187	26.8	5018
	Whole	33.9	1.7	188	29.8	5615
HoCP 00-950	Billet	25.2 b	1.8	203	16.8 b	3405 b
	Whole	39.0 a	2.1	207	26.8 a	5522 a
L 01-283	Billet	27.8 b	1.7	209	18.5 b	3882 b
	Whole	37.3 a	1.9	208	30.2 a	6324 a
L 01-299	Billet	21.8 b	2.0	186 b	17.0 b	3138 b
	Whole	33.2 a	2.0	202 a	27.8 a	5649 a
L 03-371	Billet	18.4 b	1.9	207	12.8 b	2609 b
	Whole	41.8 a	2.0	206	27.2 a	5632 a

[1]Values of different yield components for billet and whole stalk comparisons within a variety followed by different letters were significantly different (*P*=0.05).

Table 2. Comparison of cane tonnage and sugar yields for billet and whole stalk plantings of seven varieties in 2010 plant cane and 2011 first ratoon.

Variety	Treatment	Tons cane per acre Plant cane	Sugar/acre (lbs.) Plant cane	Tons cane per acre First stubble	Sugar/acre (lbs.) First stubble
HoCP 96-540	Billet	35.5	7767	26.0	5288 b
	Whole	38.0	8426	27.8	6261 a
L 99-226	Billet	34.5	7697	25.0 b	5227 b
	Whole	45.3	10350	28.8 a	6048 a
L 99-233	Billet	35.3	7656 b	23.0	5008
	Whole	39.0	8937 a	21.8	4582
HoCP 00-950	Billet	29.7 b	7128 b	23.2	5092
	Whole	34.7 a	8345 a	25.8	5848
L 01-283	Billet	36.0	8265	29.5	6453
	Whole	43.7	10369	30.5	6706
L 01-299	Billet	36.3	8429	29.5	6738
	Whole	37.0	9463	31.0	6709
L 03-371	Billet	23.3 b	5357 b	25.5	5698
	Whole	35.7 a	8447 a	24.2	5355

[1]Values of different yield components for billet and whole stalk comparisons within a variety followed by different letters were significantly different (*P*=0.05).

Table 3. Effect of Syngenta chemical treatments on yield components for two varieties, Ho 95-988 and HoCP 96-540, in 2009 plant cane, 2010 first ratoon, and 2011 second ratoon.

Variety and treatment	Plant cane		First ratoon		Second ratoon	
	Tons cane/A[y]	Sugar/A (lbs.)[y]	Tons cane/A[y]	Sugar/A (lbs.)[y]	Tons cane/A[y]	Sugar/A (lbs.)[y]
Ho 95-988						
Non-treated billets	48.2	9399	57.5	13113	26.8 b	5731 b
Insecticide + nematicide	54.2	10684	56.5	12715	31.7 a	7119 a
Fungicide combination	57.0	11459	59.7	13401	27.3 ab	6086 ab
All chemicals combined	54.2	10787	57.4	13120	26.2 b	5634 b
HoCP 96-540						
Non-treated billets	41.8 c	7877 c	43.3 b	9267 ab	29.2	6426
Insecticide + nematicide	51.8 b	9936 b	46.7 ab	10147 ab	32.4	7022
Fungicide combination	53.5 b	9564 bc	37.0 b	7970 b	28.7	6319
All chemicals combined	63.0 a	12205 a	60.9 a	12514 a	38.1	8246

[y]Values for comparisons within a variety and column followed by different letters were significantly different (*P*=0.05).

Table 4. Effects of Syngenta chemical treatments on yield components for three varieties, HoCP 96-540, L 99-226, and L 99-233, in 2010 plant cane and 2011 first ratoon.

Variety and treatment	Tons cane/acre[y] Plant cane	Sugar/acre (lbs.)[y] Plant cane	Tons cane/acre[y] First ratoon	Sugar/acre (lbs.)[y] First ratoon
HoCP 96-540				
Non-treated billets	39.3 b	8000 b	27.2 b	5496 b
Fungicide	38.3 b	7392 b	27.5 b	5709 ab
Insecticide/nematicide	45.0 ab	8783 ab	34.8 ab	7545 ab
All combined	52.3 a	10678 a	39.2 a	8213 a
L 99-226				
Non-treated	35.7 b	7528 b	29.2	5271
Fungicide	44.3 ab	9825 ab	32.5	6767
Insecticide/nematicide	41.3 b	8086 b	31.2	6166
All combined	53.3 a	11041 a	30.2	6327
L 99-233				
Non-treated	46.0 b	9732	30.0	6185
Fungicide	51.0 ab	10336	30.0	6210
Insecticide/nematicide	54.7 a	11234	31.0	5947
All combined	56.0 a	10862	28.8	5894

[y]Values for comparisons within a variety and column followed by different letters were significantly different (*P*=0.05).

Table 5. Comparison of fall and spring stand establishment and millable stalks resulting from plantings of billets treated with Syngenta seed-treatment chemicals and whole stalks for three varieties, HoCP 96-540, L 99-226, and L 99-233, during 2010/2011.

Variety and treatment	Fall shoots/acre (x 1000) [y]	Spring shoots/acre (x 1000) [y]	Millable stalks/acre (x 1000) [y]
HoCP 96-540			
Non-treated billets	11.6 b	12.3 c	41.1
Fungicide	14.6 ab	15.4 bc	44.4
Insecticide/nematicide	12.0 b	12.8 bc	40.1
All combined	15.6 a	16.3 ab	43.7
Whole stalk	13.3 ab	19.6 a	40.1
L 99-226			
Non-treated	17.7	17.7 b	38.6 a
Fungicide	18.4	19.7 ab	41.5 a
Insecticide/nematicide	17.1	15.8 b	37.9 ab
All combined	20.4	21.0 ab	40.5 a
Whole stalk	15.7	25.1 a	34.3 b
L 99-233			
Non-treated	14.0	20.2 ab	52.0 bc
Fungicide	13.5	16.7 b	51.4 c
Insecticide/nematicide	14.5	21.0 ab	56.8 ab
All combined	14.2	19.3 ab	57.0 a
Whole stalk	17.3	27.0 a	57.4 a

[y]Values for comparisons within a variety and column followed by different letters were significantly different (*P*=0.05).

Table 6. Comparison of plant cane yield components for three varieties, HoCP 96-540, L 99-226 and L 99-233, in plantings of billets treated with Syngenta seed-treatment chemicals and whole stalks during 2011.

Variety and treatment	Stalk weight (lbs.)	Sugar/ton cane (lbs.)	Tons cane/acre[y]	Sugar/acre (lbs.)[y]
HoCP 96-540				
Non-treated billets	2.6	214	34.7 b	7390 b
Fungicide	2.5	202	49.1 ab	9949 ab
Insecticide/nematicide	2.6	206	41.9 b	8638 b
All combined	2.5	213	59.3 a	12579 a
Whole stalk	2.7	214	44.2 b	9545 ab
L 99-226				
Non-treated	3.0 abc	217	42.3	9153
Fungicide	2.7 c	200	36.1	7247
Insecticide/nematicide	2.8 bc	208	49.7	10351
All combined	3.3 ab	202	41.7	9120
Whole stalk	3.5 a	206	41.9	8592
L 99-233				
Non-treated	1.8	214	29.8	6282 ab
Fungicide	1.8	200	25.7	5151 b
Insecticide/nematicide	1.8	205	28.5	5854 ab
All combined	1.9	212	33.8	7170 ab
Whole stalk	2.0	205	38.7	7957 a

[y]Values for comparisons within a variety and column followed by different letters were significantly different (*P*=0.05).

LONG-TERM EFFECTS OF POST-HARVEST RESIDUE MANAGEMENT

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SUMMARY:

Residue retention in Louisiana's cool, wet climate, typically prevailing during crop emergence, causes damaging conditions that have potential to undermine crop establishment in the spring. This contrasts with tropical, arid sugarcane growing regions where yield benefits are observed from post-harvest residue retention. This study has confirmed what other investigations have found, that post-harvest residue generated from green cane harvesting under Louisiana conditions has a negative effect on the cane and sugar yield of ratoon crops within a production cycle, with burning producing higher cane yield than residue retention. Sweeping the residue to the furrow bottoms produced intermediate yields. A primary objective of the study was the concern that the retained residue would have a cumulative adverse effect across production cycles. Fortunately, this did not materialize, as yield recovery was evident in the plant-cane crops of cycles two and three. The fallow period, vigorous commercial varieties, and associated cultural practices appear to play a role in mitigating the harmful effects of the trash blanket and provides a restorative effect on plant-cane crops at the initiation of each production cycle. Production cycle no. 4 has been initiated with the planting of L99-226.

Influence of residue management on sugar yield in three consecutive production cycles

	Residue management treatments		
	Pre-harvest burned	Swept	Retained
Cycle 1	pounds of sugar per acre		
First stubble	8128	8431	7414
Second stubble	8592	7539	7593
Third stubble	7245	7860	6468
Cycle 2			
Plant-cane	7343	7013	6450
First stubble	6647	4952	4916
Second stubble	5790	4595	4800
Cycle 3			
Plant-cane	11688	11715	12187
First stubble	7486	6727	6941
Second stubble	7825	6718	6165
Third stubble	6923	6352	6103
Mean[1]	**7762 a**	**7191 b**	**6906 b**

[1]Means in the bottom row followed by the same letter are not significantly different ($\alpha = 0.05$)

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