BILLET PLANTING RESEARCH

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Research continued to develop methods to maximize the chances of success with billet (stalk section) planting. During 2012, results were obtained from field experiments conducted at the Sugar Research Station at St. Gabriel evaluating the potential for Syngenta seed-treatment chemicals to improve stand establishment and yield in billet plantings. In addition, an on-farm experiment was conducted comparing billets cut with a harvester modified to minimize physical damage to billets cut with an un-modified harvester and machine-cut whole stalks.

Chemical seed treatments from Syngenta for use in Plene®, 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. The pesticides were applied using different methods.

Second ratoon yields were obtained in an experiment with HoCP 96-540, L 99-226, and L 99-233 (Table 1). Cane tonnage and sugar yield were still higher in the total combination chemical treatment for HoCP 96-540. No differences were detected for the other varieties.

Table 1. Effect of Syngenta chemical treatments on yield components for three varieties, HoCP 96-540, L 99-226, and L 99-233, in 210 plant cane, 2011 first ratoon, and 2012 second ratoon.

	Plant cane		First ratoon		Second ratoon	
Variety and treatment	Tons cane/A[1]	Sugar/A (lbs.)[1]	Tons cane/A[1]	Sugar/A (lbs.)[1]	Tons cane/A[1]	Sugar/A (lbs.)[1]
HoCP 96-540						
Non-treated billets	39.3 b	8000 b	27.2 b	5496 b	44.5 ab	7217 ab
Insecticide + nematicide	38.3 b	7392 b	27.5 b	5709 ab	43.0 ab	7015 b
Fungicide combination	45.0 ab	8783 ab	34.8 ab	7545 ab	40.3 b	6487 b
All chemicals combined	52.3 a	10678 a	39.2 a	8213 a	55.3 a	9318 a
L 99-226						
Non-treated billets	35.7 b	7528 b	29.2	5271	38.5	6480
Insecticide + nematicide	44.3 ab	9825 ab	32.5	6767	39.5	6604
Fungicide combination	41.3 b	8086 b	31.2	6166	37.3	5767
All chemicals combined	53.3 a	11041 a	30.2	6327	38.3	6385
L 99-233						
Non-treated billets	46.0 b	9732	30.0	6185	37.7	5882
Insecticide + nematicide	51.0 ab	10336	30.0	6210	41.0	6613
Fungicide combination	54.7 a	11234	31.0	5947	41.0	6592
All chemicals combined	56.0 a	10862	28.8	5894	35.8	5454

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

First ratoon results were obtained in another experiment with HoCP 96-540, L 99-226, and L 99-233 (Table 2). There were large numerical differences with higher tonnage and sugar yields in the total chemical and insecticide/nematicide treatments fitting the trend seen in previous experiments, but the only significant differences were that whole stalk tonnage and sugar yields and the tonnage yield for the insecticide/nematicide treatment were higher than for the fungicide treatment.

Table 2. Effects of Syngenta chemical treatments on yield components for three varieties, HoCP 96-540, L 99-226, and L 99-233, in 2011 plant cane and 2012 first ratoon.

Variety and treatment	Tons cane/acre[1] Plant cane	Sugar/acre (lbs.)[1] Plant cane	Tons cane/acre[1] First ratoon	Sugar/acre (lbs.)[1] First ratoon
HoCP 96-540				
Non-treated billets	34.7 b	7,390 b	36.8	8,670
Fungicide	49.1 ab	9,949 ab	42.1	9,850
Insecticide/nematicide	41.9 b	8,638 b	41.5	9,780
All combined	59.3 a	12,579 a	44.7	10,433
Whole stalk	44.2 b	9,545 ab	44.0	10,066
L 99-226				
Non-treated	42.3	9,153	37.2	8,853
Fungicide	36.1	7,247	40.4	9,607
Insecticide/nematicide	49.7	10,351	35.7	8,693
All combined	41.7	9,120	41.7	9,939
Whole stalk	41.9	8,592	34.9	8,540
L 99-233				
Non-treated	29.8	6,282 ab	38.3 ab	8,192 ab
Fungicide	25.7	5,151 b	32.8 b	7,054 b
Insecticide/nematicide	28.5	5,854 ab	42.9 a	9,121 ab
All combined	33.8	7,170 ab	39.6 ab	8,573 ab
Whole stalk	38.7	7,957 a	42.3 a	9,635 a

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

Earlier experiments all evaluated dip application of the chemical treatments to billets. Dip application provides complete coverage of the treated billets, but it may be difficult to achieve commercially. Therefore, different chemical application methods were compared in a plant cane experiment with L 99-226 and L 03-371. All chemical treatments contained the insecticide and three fungicides combined. Dip application, an in-furrow spray, and a planter mounted spray application were compared to non-treated billets and whole stalks for L 99-226. For L 03-371, the comparison was limited to non-treated billets, in-furrow spray, and planter spray. A dye was added to the chemical treatments to provide a visual assessment of coverage. The dip-application provided complete coverage as expected. The in-furrow spray was applied at a high, 50 gallon per acre broadcast application rate on a 36 inch band. It provided near total coverage of the upper surfaces of billets in the planting furrow, but there was little or no coverage of the undersides of billets. However, it provided some soil application of the chemicals. The planter spray was applied at a 15 gallon per acre broadcast rate from eight nozzles, four each on the upper and lower sides of both ends of the billet alignment panels below the drum. The dip and in-furrow spray treatments both increased initial stand establishment for L 99-226, and the in-furrow spray increased initial/fall shoot population for L 03-371 (Table 3). The in-furrow spray also resulted in higher millable stalk population for L 03-371 (Table 3). Stalk weight was greater for whole stalk compared to non-treated billet plantings (Table 4). Cane tonnage and total sugar yields were higher for the dip application compared to all other treatments, including whole stalk planting, for L 99-226, and the in-furrow spray increased yields for L 03-371 (Table 4).

Table 3. Comparison of spring stand establishment and millable stalks resulting from plantings of billets treated with Syngenta seed-treatment chemicals and whole stalks for two varieties, L 99-226 and L 03-371, during 2010/2011.

Variety	Treatment	Spring shoots/acre[1]	Millable stalks/acre[1]
L 99-226	Non-treated billets	47,548 b	30,752
	In-furrow spray	69,237 a	33,109
	Planter spray	66,458 ab	32,746
	Dip	71,654 a	33.894
	Whole stalks	64,163 ab	33,834
L 03-371	Non-treated	64,605 b	40,218 b
	In-furrow spray	99,386 a	44,044 a
	Planter spray	83,919 ab	36,975 b

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

Table 4. Comparison of plant cane yield components for two varieties, L 99-226 and L 03-371, in plantings of billets treated with Syngenta seed-treatment chemicals and whole stalks during 2012.

Variety and treatment	Stalk weight (lbs.)[1]	Sugar/ton cane (lbs.)	Tons cane/acre[1]	Sugar/acre (lbs.)[1]
L 99-226				
Non-treated billets	3.0 b	239	39.8 b	9,519 b
In-furrow spray	3.2 ab	239	40.6 b	9,693 b
Planter spray	3.2 ab	241	40.8 b	9,805 b
Dip	3.2 ab	247	49.3 a	12,187 a
Whole stalks	3.4 a	242	42.6 b	10,341 b
L 03-371				
Non-treated	2.2	242	34.5 b	8,347 b
In-furrow spray	2.3	240	46.7 a	11,170 a
Planter spray	2.3	234	39.9 ab	9,297 b

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

The seed treatment chemicals continue to show the potential to increase stand establishment and stalk populations in billet plantings. The results suggest that the most consistent 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 billets cut for planting would reduce damage to buds and the internode rind of billets and whether planting higher quality billets 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. Billet characteristics and damage were assessed for each harvester before and after mechanical planting. Two varieties, L 99-226 and L 03-371, were included in the experiment.

Billet lengths were similar for each variety when cut with each harvester, but the number of buds per billet was slightly lower for the modified harvester with L 99-226 and slightly higher for L 03-371 (Table 5). The number of buds per billet was lower for L 99-226 following mechanical planting. The number of damaged buds per billet was very low for the modified harvester/before planter treatment for L 99-226. Internode damage was lower for billets cut with the modified harvester for both varieties. The benefit of a low rate of bud damage resulting from the harvester modifications was lost because of damage caused by the mechanical planter. Billets cut by the modified harvester maintained a slightly lower amount of internode damage following mechanical planting.

Table 5. Comparison of characteristics and physical damage for billets cut by non-modified and modified chopper harvester before and after passing through a drum mechanical planter during September, 2012.

Variety and treatment	Billet length	Bud number[1]	Damaged bud number[1]	Damaged internode number[1]
L 99-226				
Non-modified harvester Before planter	19.6	3.9 a	0.7 a	1.5 a
Non-modified harvester After planter	19.3	2.7 c	0.4 b	1.1 a
Modified harvester Before planter	21.1	3.6 b	0.1 c	0.6 b
Modified harvester After planter	18.9	2.7 c	0.3 bc	0.6 b
L 03-371				
Non-modified harvester Before planter	21.1	3.6 b	0.5 b	1.5 a
Non-modified harvester After planter	20.0	3.8 ab	0.9 a	1.4 a
Modified harvester Before planter	20.4	4.1 a	0.6 ab	0.5 b
Modified harvester After planter	--	--	--	--

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

Billet plantings suffer more compared to whole stalk plantings from any problem associated with planting. Good conditions for planting and rainfall after planting resulted in little environmental stress on this experiment during initial stand establishment. Periodic rainfall and no severe freezes resulted in no severe environmental stress during overwintering for the experiment. Two planting rates were compared for billets. A "heavy" planting rate similar to what would be used commercially to compensate for problems was compared to a "light" planting rate that would be more likely to show any treatment effects. These were compared to the commercial three and a lap whole stalk planting rate. Billet planting rates were assessed as the number of billets running in the planting furrow. Similar planting rates were obtained for the heavy and light rates from each harvester and variety (Table 6). As expected, the initial, fall shoot population was higher for the heavy, commercial planting rate compared to the light planting rate for both varieties and harvester types (Table 6). The whole stalk treatment population was higher than the light billet planting rate for L 99-226 but lower than the high billet planting rate for L 03-371. Following the mild winter, the spring shoot population for the light planting rate was lower for L 99-226 for the modified harvester and both harvesters for L 03-371. The modified harvester cut billets had a higher spring shoot population than the non-modified harvester cut billets for the heavy planting rate of L 03-371.

Table 6. Comparison of fall and spring stand establishment resulting from two varieties, L 99-226 and L 03-371, mechanically planted with billets cut with and without chopper harvester modifications to minimize physical damage (at two planting rates) and whole stalks during 2011/2012.

Variety	Treatment	Billet planting rate	Fall shoots/acre [1]	Spring shoots/acre[1]
L 99-226	Non-modified harvester Light planting rate	4.2	42,395 bc	45,875 bc
	Non-modified harvester Heavy planting rate	7.1	58,326 a	53,197 abc
	Modified harvester Light planting rate	3.7	38,008 c	42,539 c
	Modified harvester Heavy planting rate	6.9	51,294 ab	57,873 ab
	Whole stalk planting	3.0	50,496 ab	65,160 a
L 03-371	Non-modified harvester Light planting rate	3.6	45,965 b	49,844 d
	Non-modified harvester Heavy planting rate	7.3	62,495 a	58,236 bc
	Modified harvester Light planting rate	3.1	44,696 bc	52,454 cd
	Modified harvester Heavy planting rate	7.2	61,788 a	75,636 a
	Whole stalk planting	3.0	39,041 c	61,117 ab

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

Cane tonnage was lower for all billet treatments compared to whole stalk planting for L 99-226 (Table 7). The sugar per acre yield was lower for the non-modified harvester heavy billet planting rate and modified harvester light planting rate compared to the whole stalk planting treatment of L 99-226. The higher spring shoot population detected for the modified harvester high planting rate treatment of L 03-371 did not carry through to a significant increase in yield. Because of the damage caused by the drum planter and lack of environmental stress following planting, the higher quality of the billets cut by the modified harvester did not result in any increase in stand establishment or yield.

Table 7. Comparison of plant cane yield components for two varieties, L 99-226 and L 03-371, planted with billets cut with and without chopper harvester modifications to minimize physical damage (at two planting rates) and whole stalks during 2012.

Variety and treatment	Sugar/ton cane (lbs.)	Tons cane/acre[1]	Sugar/acre (lbs.) [1]
L 99-226			
Non-modified harvester Light planting rate	256	36.5 b	9,400 ab
Non-modified harvester Heavy planting rate	250	35.5 b	8,900 b
Modified harvester Light planting rate	250	35.5 b	8,900 b
Modified harvester Heavy planting rate	256	37.3 b	9,500 ab
Whole stalk planting	250	41.1 a	10,300 a
L 03-371			
Non-modified harvester Light planting rate	227	39.6	9,000
Non-modified harvester Heavy planting rate	232	38.3	8,900
Modified harvester Light planting rate	219	38.8	8,500
Modified harvester Heavy planting rate	227	34.4	8,700
Whole stalk planting	224	39.0	8,700

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