BILLET PLANTING RESEARCH

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Research continued to develop methods to maximize the chances of success with billet (stalk section) planting. During 2009, results were obtained from two field experiments conducted at the Sugar Research Station at St. Gabriel comparing stubble crop yields obtained from billet and whole stalk plantings of commercial and experimental varieties. In addition, the potential for Syngenta chemical treatments to improve stand establishment and yield in billet plantings was evaluated.

An experiment to compare yields obtained from billet and whole stalk plantings of commercial and experimental varieties was not planted in 2008 to be evaluated in plantcane during 2009 due to Hurricane Gustav damage to seedcane sources. Yields were determined and compared for first stubble and second stubble crops of experiments established in previous years. The yield differences detected in plantcane between billet and whole stalk plantings for four of eight varieties during 2008 (Table 1) were no longer significant in first stubble. Sizeable numerical differences were still found for some varieties, but variability in the data resulted in a failure to detect significant differences. The yields of billet and whole stalk plantings in the experiment in second stubble during 2009 were similar within all varieties (Table 2). Yields in plantcane for this experiment were lower in billet plantings for six of eight varieties. The significant differences decreased to one variety in first stubble and then none in second stubble. The pattern, in which the magnitude of differences between billet and whole stalk planting yields decreases in stubble crops, has been observed in previous field experiments. However, the difference between yields over the entire crop cycle can be substantial when the cycle starts with a significantly lower yield in the billet planting.

Chemical treatments being developed by Syngenta for a single-node planting system in Brazil were evaluated to determine whether they could improve billet planting stand establishment and plantcane yield in Louisiana. Billets of Ho 95-988 and HoCP 96-540 with 3-4 buds per billet were dipped in a combination of multiple fungicides, a combination of insecticide and nematicide, all chemicals combined, or left un-treated. Billets of each variety were planted in a randomized complete block design with four replications. Primary shoot populations were counted after emergence during the fall, and spring shoot populations were counted following winter. Millable stalk counts were determined during August, and the other yield components were determined at harvest.

The fungicide mixture increased primary shoot populations and spring shoot population for both varieties, and the combination of all chemicals further increase stand establishment in HoCP 96-540 (Table 3). Millable stalk population was only increased by the total combination treatment in HoCP 96-540. Yield increases in cane tonnage and sugar per acre resulting from chemical treatments were detected for HoCP 96-540 (Table 4) with the highest yields in the treatment with all chemicals combined.

Table 1. Comparison of yield components for billet and whole stalk plantings for eight varieties in 2008 plantcane and 2009 first stubble.

		Plantcane		First stubble	
Variety	Treatment	Tons cane per acre[y]	Sugar/acre (lbs.)[y]	Tons cane per acre[y]	Sugar/acre (lbs.)[y]
Ho 95-988	Billet	24.8 b	5624 b	32.0	5826
	Whole	33.5 a	7465 a	33.5	6196
HoCP 96-540	Billet	28.4	6460	31.2	5932
	Whole	38.3	8047	36.0	6523
L 97-128	Billet	25.2 b	5271 b	28.2	5421
	Whole	33.9 a	7482 a	33.5	6460
L 99-226	Billet	25.9 b	5376 b	31.8	5901
	Whole	41.0 a	8817 a	36.8	7040
L 99-233	Billet	24.3 b	5333 b	31.8	5914
	Whole	32.2 a	7192 a	31.0	6072
HoCP 00-950	Billet	27.6	6221	34.0	6481
	Whole	33.8	7719	39.0	7539
L 01-283	Billet	36.2	7816	41.5	7754
	Whole	36.2	7689	41.5	7893
L 01-299	Billet	36.7	7509	43.8	7880
	Whole	38.2	7706	49.2	9448

[y]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 plantcane yield components for billet and whole stalk plantings of four varieties in 2007 plantcane, 2008 first stubble, and 2009 second stubble.

Variety	Billet vs. whole	Plantcane Tons per acre[y]	Plantcane Sucrose (lbs/acre)[y]	First stubble Tons per acre[y]	First stubble Sucrose (lbs/acre)	Second stubble Tons per acre	Second stubble Sucrose (lbs/acre)
LCP85-384	Billet	29.0 b	5227	28.4	6030	29.5	5375
	Whole	37.5 a	6231	28.7	6025	31.5	5604
Ho95-988	Billet	32.7 b	6094 b	31.0	6584	28.0	5395
	Whole	46.7 a	8429 a	33.1	7274	32.5	6017
HoCP96-540	Billet	38.8 b	9259	38.1	8040	35.5	6441
	Whole	53.8 a	9880	43.4	9093	38.8	7118
L97-128	Billet	33.6 b	5941 b	29.8	6040	29.5	5361
	Whole	48.9 a	8573 a	34.6	7153	30.8	5440
L99-226	Billet	41.0 b	7918 b	33.1 b	7323	28.2	5207
	Whole	50.6 a	9650 a	36.6 a	7838	28.8	5234
L99-233	Billet	42.7	7657 b	27.6	5937	29.0	5409
	Whole	46.7	8729 a	29.1	6042	29.5	5384
L01-283	Billet	48.7	9241	35.1	7484	36.8	6623
	Whole	49.5	9608	36.2	7681	40.5	7752
L01-299	Billet	46.9	8576	41.2	8327	47.5	8559
	Whole	45.4	8599	42.1	8730	44.5	8201

[y]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 Fall and Spring stand establishment and millable stalks produced in plantcane by two varieties, Ho 95-988 and HoCP 96-540 during 2009.

Variety and treatment	Fall shoots/acre (x 1000)[y]	Spring shoots/acre (x 1000)[y]	Millable stalks/acre (x 1000)[y]
Ho 95-988			
Non-treated	24.7 b	33.6 b	42.2
Fungicide	34.5 a	44.4 a	44.3
Insecticide/nematicide	28.5 b	40.7 ab	42.7
Combination	29.8 ab	38.2 ab	43.2
HoCP 96-540			
Non-treated	13.9 c	22.4 c	30.0 b
Fungicide	21.8 b	32.2 b	34.3 ab
Insecticide/nematicide	16.5 c	25.5 c	33.6 b
Combination	25.8 a	46.7 a	38.5 a

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

Table 4. Effect of Syngenta chemical treatments on yield components for two varieties, Ho 95-988 and HoCP 96-540, in plantcane during 2009.

Variety and treatment	Stalk weight (lbs.)	Sugar/ton cane (lbs.)	Tons cane/acre[y]	Sugar/acre (lbs.)[y]
Ho 95-988				
Non-treated	2.5	193	48.2	9399
Fungicide	2.5	196	54.2	10684
Insecticide/nematicide	2.4	200	57.0	11459
Combination	2.4	198	54.2	10787
HoCP 96-540				
Non-treated	3.1	187	41.8 c	7877 c
Fungicide	2.7	185	51.8 b	9936 b
Insecticide/nematicide	2.9	186	53.5 b	9564 bc
Combination	2.9	194	63.0 a	12205 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:

Pre-harvest burning resulted in significantly higher sugar per acre yield than the full-retention and raked-to-the-middle residue management treatments. Over three production cycles, the advantage to pre-harvest burning of the residue totaled over 8,000 lb of sugar per acre, which is tantamount to an extra crop. Plantcane crops of cycle's no. two and three were high yielding, indicating that the debilitating effects of residue retention did not carry over to subsequent production cycles.

Objectives and Methods:

A study was initiated in 1997 to evaluate the long-term effects of harvest residue management on sugarcane. Objectives were to measure the benefits and consequences of combine-generated residue retention on subsequent crops in the production cycle. Residue management treatments included 1) pre-harvest burning, 2) post-harvest raking residue to the middles and 3) full retention of the residue. Treatments were established in the first stubble crop of production cycle number one in 1998 and maintained in place for the duration of three production cycles. When the study began many fields were burned prior to combining, a practice that is less frequently used today.

Results:

Trash blanket observations: The amount of trash blanket remaining after harvest averaged 2.63 and 4.50 tons of dry matter/acre, respectively, for the pre-harvest burned and non-burned treatments. Even though the trash blanket after burning was only approximately half of that of the non-burned plots, sufficient trash may have remained to adversely affect subsequent crops to some extent. Although the higher yielding plantcane and first stubble crops tended to generate the greatest amount of residue, exceptions occurred and trash amount was not predictable. Retention of the trash blanket, especially for the plots with residue raked to the furrow bottoms, resulted in difficulties for tillage operations and fertilizer applications in years when the residue was either or both wet and plentiful. Immobilization of plant nutrients by the trash blanket can occur but plant tissue samples revealed comparable levels of N and P among the three treatments, which indicated that nutrient uptake did not appear to be compromised by the presence of the trash blanket. Additional analyses to detect nutrient recycling are scheduled to be conducted this year to determine changes in soil organic matter and nutrient content of the soil and plant.

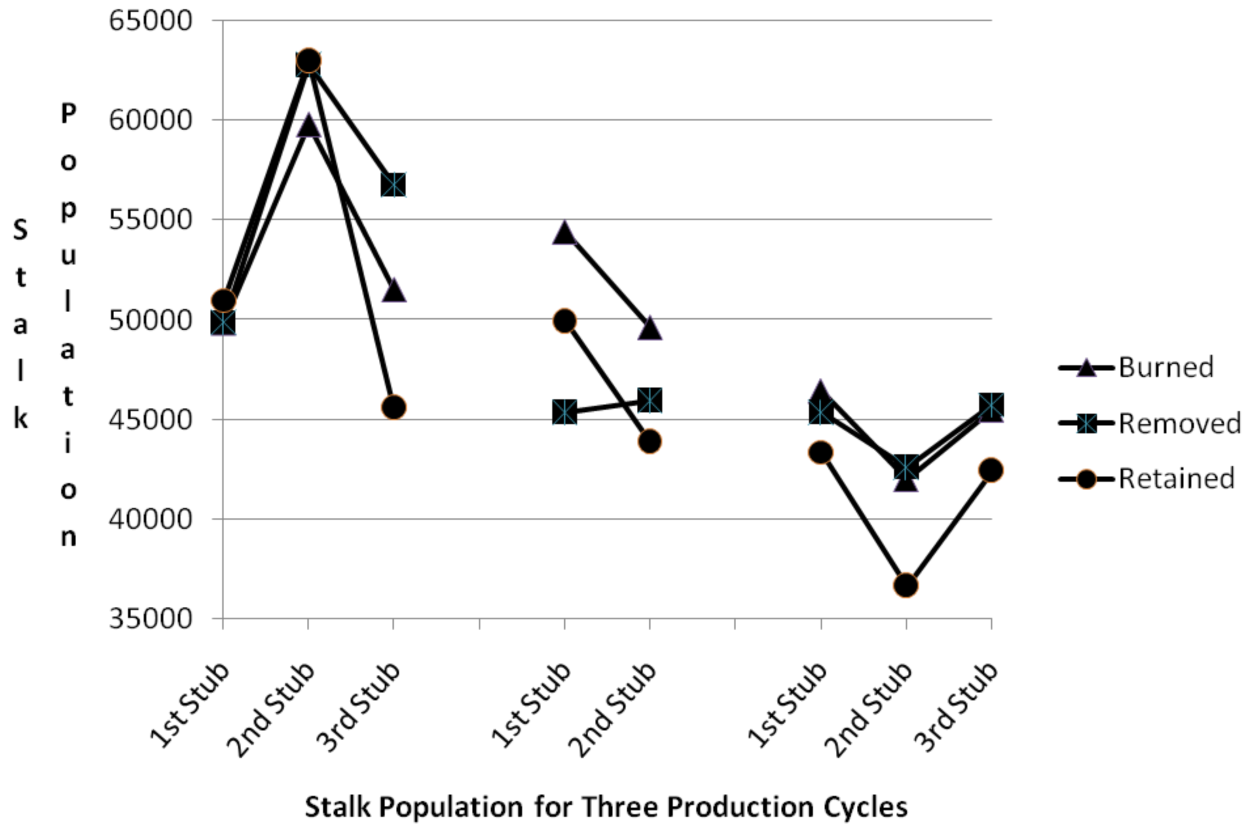
Effects of trash blanket retention on growth and yield: While retention of the trash blanket did not diminish yield in all seasons, averaged over all the stubble crops in the three cycles pre-harvest burning resulted in higher sugar yields than both the raked-residue and the retained- residue management approaches (**table 1**). Difference in sugar yield for the other

treatment comparison was not significant. It must be acknowledged, however, that differences in measured yield between the burned and non-burned treatments must factor in the direct effects of burning prior to harvesting as well as the effects of the retained residue.

Table 1. Influence of Retained Residue on the Sugar Yields (lb/ac) for Three Consecutive Production Cycles			
	Residue Management Treatments		
Cycle No. 1	***Pre-harvest Burned***	***Raked to Middles***	***Retained***
First Stubble	8138	8439	7421
Second Stubble	8596	7623	7599
Third Stubble	7247	7865	6469
Cycle No. 2			
Plantcane	7347	7018	6451
First Stubble	6649	4958	4921
Second Stubble	5791	4595	4807
Cycle No. 3			
Plantcane	11695	11722	12200
First Stubble	7493	6734	6944
Second Stubble	7826	6725	6172
Third Stubble	6925	6354	6107
Average with Plant Cane	7771 a[1]	7203 b	6908 b
Average without Plant Cane	7333 a[1]	6662 b	6305 b

1 = means in rows sharing a common letter are not significantly different (P = 0.10)

The adverse effects of residue retention appeared to be cumulative within cycles, with the most debilitating effects occurring in the older stubble crops. The chart below graphically shows that, by the last stubble crop in each of the three cycles, the stalk population for the cane with the retained trash blanket possessed the lowest number of stalks.



The magnitude of the yield advantage of burning over retaining the residue is noteworthy because the cumulative total is tantamount to getting an extra crop (***over 8,000 pounds of sugar per acre when totaled over the three production cycles***). The good news about the trash blanket is that the negative effects of retaining it did not carryover through the fallow period to subsequent production cycles, as indicated by the relatively high yields of the plantcane crops (note the high cycle 3 plantcane yield for the retained residue in **table 1**).

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