BILLET PLANTING RESEARCH

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Research continued to develop methods to maximize the chances of success with billet (stalk section) planting. During 2022, results were obtained from a field experiment conducted at the Sugar Research Station at St. Gabriel evaluating the potential for seed-treatment pesticides to improve stand establishment and yield in billet plantings. In addition, results were obtained from an experiment to compare gene expression in sugarcane plants inoculated with the red rot pathogen, *Colletotrichum falcatum*, to plants treated with the insecticide, thiamethoxam with and without inoculation.

Seed-Treatment Pesticide Experiments at the Sugar Research Station

Billet pesticide treatments continued to be evaluated in small field experiments to determine whether they can increase yields obtained from billet plantings in Louisiana. In all experiments, billets 20-22 inches in length have been cut with a mechanical harvester and run through a mechanical drum planter to provide planting material similar to what would be planted on commercial farms.

A plant cane experiment was conducted comparing HoCP 96-540 non-treated billets and whole stalks to billets dip-treated with the following treatments: Priaxor Xemium fungicide (fluxapyroxad 14.33%, pyraclostrobin 28.58%, BASF) 7.5 oz/acre, Revytek fungicide (mefentrifluconazole 11.61%, pyraclostrobin 15.49%, fluxapyroxad 7.74%, BASF) 12 oz/acre, Quilt Xcel fungicide (azoxystrobin 13.6% and propiconazole 11.7%, Syngenta) at 20 oz/acre, Quilt Xcel fungicide (azoxystrobin 13.6% and propiconazole 11.7%, Syngenta) at 20 oz/acre + Platinum insecticide (thiamethoxam 75% granular, Syngenta) at 5.7 oz/acre, Xyway fungicide (flutriafol 20.9%, FMC) at 15 oz/acre, Xyway fungicide at 15 oz/acre + zironar biological fungicide/nematicide (*Bacillus licheniformis* 3.5%, *Bacillus subtilis* 4.0%) at 12 oz/acre, Xyway fungicide at 15 oz/acre + Vantacor insecticide (chlorantraniliprole 47.85%) at 2 oz/acre, and Xyway fungicide at 15 oz/acre + Platinum insecticide at 7.5 oz/acre. The experiment was planted 9/28/2021 and harvested 11/10/2022.

Stand establishment following planting was improved by three treatments compared to non-treated billets as indicated by higher primary shoot counts for Xyway, Xyway + Platinum, and Quilt Xcel + Platinum, and the two fungicide + insecticide treatments had a higher population than whole stalks (Table 1). The spring shoot population was higher compared to non-treated billets for whole stalks, Xyway, Xyway + Vantacor, Xyway + Platinum, and Quilt Xcel + Platinum (Table 1). The millable stalk population was higher for all treatments, except Revytek (Table 1).

Effects of treatments were variable among the different plant cane yield components. There were no treatment effects on stalk weight and sugar per ton of cane (Table 2). There were large differences in tons of cane per acre and total sugar per acre yields, but due to variability among plots within treatments, only the whole stalk, Xyway + Platinum, and Quilt Xcel + Platinum treatments had higher cane tonnage yields than non-treated billets and only the whole stalk and Quilt Xcel + Platinum treatments had higher total sugar per acre yields than non-treated billets (Table 2). The results were similar to previous experiments in which beneficial effects

from fungicide and insecticide treatments alone have been erratic with the most consistent benefits being obtained from fungicide + Platinum treatments.

Table 1. Primary shoot, spring shoot, and millable stalk populations in plant cane for non-treated billets and whole stalks compared to billets dip-treated with seed-treatment pesticides in a field experiment conducted at the Sugar Research Station during 2022.

Treatment	Primary shoots per acre (x1,000)[1]	Spring shoots per acre (x1,000) [1]	Millable stalks per acre (x1,000)[1]
Non-treated billets	4.53 c	13.80 e	29.24 c
Whole stalks	5.50 bc	25.54 a	37.66 a
Priaxor 9 oz	5.54 bc	16.58 cde	36.15 ab
Quilt Xcel 21 oz	5.67 bc	18.60 bcde	36.12 ab
Revytek 12 oz	4.90 bc	14.87 de	32.31 bc
Xyway 15 oz	6.11 ab	22.39 abc	37.06 a
Xyway 15 oz + Zironan 12 oz	5.47 bc	17.49 cde	34.84 ab
Xyway 15 oz + Vantacour 2 oz	6.44 ab	21.28 abcd	36.02 ab
Xyway 15 oz + Platinum 7.5 oz	7.59 a	24.77 ab	34.47 ab
Quilt Xcel 21 oz + Platinum 5.7 oz	7.59 a	27.05 a	37.63 a

[1]Mean values within a column followed by the same letter were not significantly different (P>0.05).

Table 2. Plant cane yield components for HoCP 96-540 billets planted non-treated or treated with different combinations of seed-treatment pesticides applied as a dip and non-treated whole stalks in a field experiment at the Sugar Research Station during 2022.

Treatment	Stalk weight (lbs) [1]	CRS (lbs) [1]	Tons cane per acre[1]	Sugar per acre (lbs) [1]
Non-treated billets	2.4	193	39.5 c	6,930 cd
Whole stalks	2.4	189	48.1 a	9,069 a
Priaxor 9 oz	2.5	185	40.9 bc	7,576 bcd
Quilt Xcel 21 oz	2.4	183	36.4 c	6,667 d
Revytek 12 oz	2.1	185	36.4 c	6,729 d
Xyway 15 oz	2.3	191	41.0 bc	7,883 abcd
Xyway 15 oz + Zironan 12 oz	2.5	186	35.7 c	6,595 d
Xyway 15 oz + Vantacour 2 oz	2.3	190	41.8 abc	7,949 abcd
Xyway 15 oz + Platinum 7.5 oz	2.3	185	44.5 ab	8,203 abc
Quilt Xcel 21 oz + Platinum 5.7 oz	2.3	190	44.3 ab	8,415 ab

[1]Mean values within a column followed by the same letter were not significantly different (P>0.05).

Results from seed-treatment pesticide field experiments with billets continue to be promising. New chemicals, such as Xyway fungicide, continue to be evaluated. The results continue to suggest that applications of single pesticides have erratic effects on billet planting performance, whereas a combination of any one of multiple fungicides and insecticide have the most beneficial effect.

Experiment to Evaluate Thiamethoxam Treatment Effects on Plant Gene Expression

An experiment was conducted to evaluate the effects of *Colletotrichum falcatum* infection and treatment with the systemic insecticide, thiamethoxam (Platinum), on gene expression in plants of a red rot susceptible variety, HoCP 96-540, to determine if this insecticide induces systemic resistance and affects the plant response to infection. The experiment compared the responses of sugarcane plants to three treatments: response to infection of the stalk tissues by the pathogen and response to treatment with the systemic insecticide with and without inoculation with the pathogen. All plants (freshly cut, two-node stalk cuttings) had a hole drilled into the internode, and some were inoculated by placing conidia of the pathogen inside. Plant tissue samples, consisting of internode tissue and bud/shoot and root tissue once developed, were collected from non-inoculated, non-treated plants; inoculated, non-treated plants; and inoculated, treated plants. Samples were collected before planting, 1 week after planting, and 4 weeks after planting. Total RNA was extracted, and RNA sequence analysis was performed, and sequence data was obtained. The sequence data was analyzed to determine and compare gene expression in the different treatments to determine if thiamethoxam induces systemic resistance responses. This research was conducted in cooperation with Dr. Jon Richards.