EVALUATION OF VARIETAL RESISTANCE TO THE MEXICAN RICE BORER

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The Mexican rice borer (MRB), *Eoreuma loftini*, is an invasive stem borer which has become the primary pest of sugarcane in Texas. The pest has recently begun infesting sugarcane in Louisiana where it has potential to cause millions of dollars in annual economic losses. Chemical control of MRB infestations in Texas has had limited success and most growers have abandoned the use of insecticides altogether. Resistant sugarcane cultivars have the potential to reduce MRB infestations without the added input costs associated with insecticide applications. The use of host plant resistance is also compatible with all other control strategies and fits well within integrated pest management programs. While stem borer-resistant cultivars including HoCP 85-845 have been identified, the level of resistance in many of the commercial cultivars which currently dominate the acreage in Louisiana remains unknown.

Twelve sugarcane cultivars were evaluated for stem borer resistance in a small plot field study at the Texas A&M AgriLife Research Station at Beaumont. Both MRB and the sugarcane borer (*Diatraea* saccharalis) are present at the Beaumont station, but borer populations are typically predominately MRB. Cultivars were planted 1 September 2015 to 1-row (12 ft) plots with 6-ft alleys between plots. A randomized complete block design with five replications was used. Plots were maintained according to recommended agronomic practices until harvest on 18 October 2016. At harvest, 15 randomly-selected stalks were taken from each plot for collection of borer injury data. The number of internodes, number of bored internodes, and number of emergence holes per stalk were recorded and summed for each 15 stalk sample. Data were analyzed with generalized linear mixed models (SAS, PROC Glimmix) with a binomial (percentage bored internodes) and Poisson (emergence per stalk) distributions.

Significant differences were detected between cultivars in the percentage bored internodes, but not in emergence per stalk (Table 1). Resistant standard, HoCP 85-845, had the lowest level of injury among the cultivars evaluated. The most widely planted cultivar in Louisiana, L 01-299, and the recently released, L 09-804, were also among the most resistant cultivars. South African cultivar, N-21, which is resistant to African stem borers, also appears to be resistant to MRB. Experimental cultivar, L 09-840, which was not selected for commercial release, was the most susceptible cultivar evaluated. Commercial cultivars HoCP 00-950 and HoCP 04-838 were also susceptible to MRB injury.

Continued evaluation of stem borer resistance among commercial and experimental sugarcane cultivars is critical to mitigation of losses from these damaging pests. Resistant cultivar L 01-299 has potential to reduce the amount of sugarcane which is treated with insecticides as this cultivar is being planted on increasing acreage in Louisiana. While the MRB continues to pose a significant threat to Louisiana sugarcane, increased planting of L 01-299 may significantly reduce the pest's impact on the industry.

Table 1. MRB injury to commercial sugarcane cultivars, Beaumont TX, 2016.

Variety	Percentage Bored Internodes	Emergence/stalk
L 09-840	5.7 a	0.09
HoCP 00-950	3.8 b	0.28
HoCP 04-838	3.5 b	0.16
HoCP 91-555	3.4 bc	0.12
L 01-226	3.2 bcd	0.08
Ho 95-988	3.2 bcd	0.07
Ho 96-540	2.7 bcd	0.13
Ho 07-613	2.4 cde	0.25
N-21	2.4 de	0.03
L 09-804	1.8 e	0.15
L 01-299	1.0 f	0.04
HoCP 85-845	0.8 f	0.03
F =	8.28	0.89
df =	11, 48	11, 44
P =	< 0.001	0.554

INSECTICIDAL CONTROL OF THE WEST INDIAN CANEFLY

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The West Indian canefly (WIC), *Saccharosydne saccharivora,* has been a sporadic pest of sugarcane in Louisiana since the 1940s. The pest is known to be a major sugarcane pest in many regions of the Caribbean, but has rarely been an issue in U.S. sugarcane. Outbreaks of WIC in Louisiana occurred in 1969, 1997, 2012, and 2016. Because the WIC has been an infrequent pest, little is known about effective controls and the pest's ability to reduce sugar yields.

Research conducted during the 2012 outbreak identified effective pyrethroid and neonicotinoid insecticides. These studies also provided evidence that substantial yield losses can occur from WIC infestations. In 2016, reports from consultants indicated early in the season that WIC infestations would likely be a problem. In response to the impending outbreak, two insecticide trials were initiated.

The first trial was conducted near Lottie, LA in Pointe Coupee Parish in a field of second stubble HoCP 96-540. Pest levels were assessed by counting the no. WIC nymphs and adults on the 3rd or 4th leaf down from the whorl on 5 randomly selected plants on each of the 2 center rows of each plot. Pre-treatment data collection on 25 May 2016 revealed infestations were below treatable levels. Infestations had increased by 31 May and were above the recommended treatment threshold of 30 WIC/leaf. Insecticides were applied using a CO_2-pressurized backpack sprayer calibrated to deliver 10 gpa at 30 psi. A 2-row boom equipped with 8 TeeJet TP11001VS nozzles spaced 18 inches was used to spray insecticides approximately 2 ft above the canopy. Insecticide efficacy was evaluated at 3, 7, 14, and 21 days after treatment (DAT). Data from each date were analyzed separately using linear mixed models (Proc GLIMMIX, SAS Institute) with treatment as a fixed effect and replication, replication × treatment, and row (replication × treatment) as random effects. Tukey's honestly significant difference test ($\alpha = 0.05$) was used for mean separations and the Kenward-Rogers method was used for calculation of error degrees of freedom.

A second test was conducted near Alma Plantation in West Baton Rouge Parish in a field of second stubble L 01-299. Pretreatment data collection on 21 June 2016 revealed severe infestations were present and the application was made the following day. Plot size, experimental design, application methods, and statistical analysis were the same as in the Lottie trial.

Differences were detected in the number of nymphs per leaf at 3, 7, 14, and 21 DAT in the Lottie test (Table 1). Infestations recovered by 14 DAT in plots treated with low rates of Intruder and in plots treated with Admire Pro. Sivanto and Karate Z provided excellent control through three weeks. Populations in all plots had crashed or were potentially over sprayed by 44 DAT (data not shown). All of the products evaluated in the Alma test provided good control through 28 DAT (Table 2). Populations in non-treated controls began to decline by 14 DAT, and were near 0 in all plots by 50 DAT (data not shown).

This work identified effective insecticides for WIC control. More investigation into the relationship between WIC infestations and yield loss is needed. Future research will aim to determine yield loss in large plot trials.

Table 1. Mean no. WIC nymphs per leaf as affected by insecticide applications, Lottie, LA, 2016.

Treatment/ Formulation	Rate amt/ acre	WIC no. per leaf (LS Means)				
		Pre-treament	3 DAT	7 DAT	14 DAT	21 DAT
		Nymphs (±5.9 [SE])	Nymphs(± 3.9 [SE])	Nymphs (± 5.7 [SE])	Nymphs (± 6.4 [SE])	Nymphs (± 5.7 [SE])
Nontreated check	--	35.0	47.6a	58.7a	70.3a	80.0a
Karate Z	1.9 fl oz	27.3	1.8b	2.1b	7.1c	3.9c
Intruder 70 WSP	1.1 oz	37.4	12.8b	17.2b	51.2ab	57.9ab
Intruder 70 WSP	2.3 oz	35.1	7.8b	9.6b	51.4ab	44.6b
Admire Pro	1.3 fl oz	32.2	15.5b	9.0b	39.6b	48.3ab
Sivanto	6.0 fl oz	24.4	4.6b	2.8b	7.5c	0.6c
	F =	0.92	24.00	15.08	16.10	16.59
	df =	5, 15	5, 15	5, 15	5, 234	5, 39
	P =	0.496	<0.001	<0.001	<0.001	<0.001

Table 2. Mean no. WIC nymphs per leaf as affected by insecticide applications, Alma Plantation, West Baton Rouge Parish, LA, 2016.

Treatment/ Formulation	Rate (fl oz/ acre)	WIC no. per leaf (LS Means)					
		Pre-treatment	3 DAT	7 DAT	14 DAT	21 DAT	28 DAT
		Nymphs (±18.8 [SE])	Nymphs(± 10.1 [SE])	Nymphs (± 8.6 [SE])	Nymphs (± 5.2 [SE])	Nymphs (± 5.7 [SE])	Nymphs (± 3.8 [SE])
Nontreated check	--	116.4	106.9a	120.2a	108.7a	64.4a	44.1a
Karate	1.9	82.5	2.6b	2.3b	6.3b	0.3b	0.7b
Intruder	3.0 oz	114.8	1.5b	4.2b	6.3b	2.6b	2.6b
Intruder	3.5 oz	109.8	1.7b	3.1b	3.5b	1.2b	1.1b
Sivanto	4.0	104.7	0.7b	0.7b	3.0b	0.2b	0.5b
Sivanto	6.0	125.8	1.6b	1.1b	1.7b	0.5b	0.3b
	F =	0.62	18.29	33.23	67.16	20.43	21.87
	df =	5, 42	5, 15	5, 15	5, 42	5, 18	5, 15
	P =	0.689	<0.001	<0.001	<0.001	<0.001	<0.001

MEXICAN RICE BORER EXPANSION IN LOUISIANA

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The Mexican rice borer (MRB) (*Eoreuma loftini*) is an invasive insect which originated in Mexico and is a pest of sugarcane and other grass crops. The MRB has been the dominate pest of sugarcane in Texas since the 1980s, and was first detected in Louisiana in 2008. MRB populations can be monitored with pheromone traps. These bucket traps are baited with a female sex pheromone which can detect adult male moths even at low population densities.

As of December of 2016, the MRB has been detected in 11 Louisiana Parishes: Calcasieu, Cameron, Beauregard, Allen, Jefferson Davis, Acadia, Vermilion, Evangeline, St. Landry, Lafayette, and West Baton Rouge (Figure 1). High populations are present in rice producing areas of Calcasieu, Cameron, and Jefferson Davis Parishes. Populations near the eastern and northern edges of MRB range remain relatively low. The detection in West Baton Rouge Parish in October of 2016 represents the first rapid unpredicted range expansion observed in Louisiana. Prior to this detection, the population had been expanding gradually at a rate of less than 10 miles/year.

Infestations in sugarcane have been confirmed in Calcasieu, Jefferson Davis, Vermilion, and West Baton Rouge Parishes. MRB infestations in sugarcane do not appear to be severe in these regions, although damaging populations could develop in coming years. Ongoing studies include trapping for MRB in Iberville, Pointe Coupee, St. Martin, and St. Mary Parishes as well as monitoring MRB larval infestations in sugarcane in western production regions.

The cooperative MRB monitoring program between the LSU AgCenter and the Louisiana Department of Agriculture and Forestry (LDAF) will continue to document range expansion and distribution. At its current rate of spread, the MRB is predicted to be present throughout most of southern Louisiana within the next 15 years.

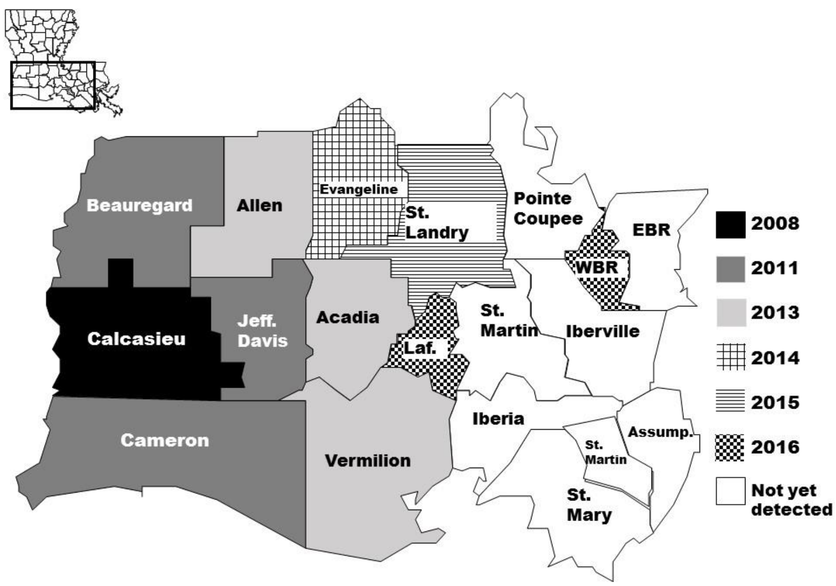

Figure 1. Mexican rice borer range expansion in Louisiana, 2008–2016.