AERIAL INSECTICIDE CONTROL OF THE SUGARCANE BORER

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Insecticidal control of the SCB was evaluated in a randomized complete block design with five replications using the variety LCP 85-384 (Rep 1-plant cane, Reps 2-5-first ratoon) at Armalise Plantation, Belle Rose, La. (Assumption Parish). Treatments were applied with water using a Recip/Grumman AgCat aircraft (28-foot spray width), calibrated to deliver 2 gpa. Treatments were randomly assigned to field plots ranging in size from 2.0 to 4.4 acres each (3-7 swaths/plot). All insecticide treatments were applied with the surfactant Latron CS-7 at the rate of 0.25% vol/vol. SCB infestations were monitored weekly by randomly examining 25 stalks in the center portion of each plot throughout the season for live SCB larvae in the leaf sheaths. Plots were treated when threshold levels were at 5% of the sugarcane stalks infested with larvae in the leaf sheaths. SCB monitoring continued weekly after the initial treatment (16 July), and on 15 August, plots were again treated. Weekly monitoring continued into September with the SCB population never again reaching the threshold. Relative soil–surface associated arthropod abundance was assessed using pitfall traps. Three pitfall traps were placed in the center row of each plot at intervals of 100-, 120-, and 140-foot spacings. Contents of the traps in ethylene glycol were collected on 8 August, 31 August, and 14 September, and specimens were sorted in the laboratory.

Confirm-, Karate-, and Fury-treated plots had significantly lower percent bored internodes and percent season infestation of SCB than the untreated check plots (Table 1). Additionally, both Karate and Fury exhibited a significantly shorter SCB length of control 29 days after treatment based on weekly infestation counts. Confirm did not significantly affect populations of ants or other non-target arthropods counted in pitfall traps (Table 2). Fury- and Karate-treated plots had significantly fewer ants than untreated check plots. Differences were not detected in spider populations among any of the insecticides compared to the untreated check plots. This research suggests that Confirm, Karate, and Fury effectively control SCB infestations and may be used in an effective integrated pest management program in Louisiana sugarcane. All three materials now have EPA Section 3 labels for sugarcane borer management.

Table 1. Aerial application insecticide study for control or the sugarcane borer, Armalise Plantation, Belle Rose, La., 2001.

Treatment/ formulation	Rate (amt/acre)	% SCB Live Laval Infestation 10 DAT	17 DAT	24 DAT	29 DAT	% SCB Season Infestation	% Bored Internodes	Moth Emergence
Untreated check	--	11.2a	8.8a	11.2a	26.4a	15.3a	9.7a	7,700.0a
Confirm 2F	8.0 oz	1.6b	4.0b	4.0b	9.6c	3.2b	2.1b	0.0a
Karate Z	2.0 oz	0.0b	1.6b	4.0b	16.0b	3.7b	1.5b	1167.0a
Fury 1.5EC	3.37 oz	0.8b	0.8b	6.4b	24.0b	6.0b	2.5b	933.0a

Means followed by the same letter within a column are not significantly different (P=0.05, LSD).
Insecticide treatments were applied on 16 July and 15 August.

Table 2. Arthropod abundance in a sugarcane field, Armalise Plantation, Belle Rose, La., 2001.

Treatment/ formulation	Rate amt/acre	Season Arthropod Abundance Ants	Crickets	Spiders
Untreated check	--	12.1a	4.6ab	2.2a
Confirm 2F	8.0 oz	6.7a	6.0bc	3.1a
Karate Z	2.0 oz	3.1b	3.7a	3.4a
Fury 1.5EC	3.37 oz	4.4b	6.8c	3.7a

Means followed by the same letter within a column are not significantly different (P=0.05, LSD).
Insecticide treatments were applied on 16 July and 15 August.

ASSESSMENT OF REGIONAL INSECT PEST MANAGEMENT IN LOUISIANA SUGARCANE, 2000 AND 2001

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An experimental assessment of insect pest management was conducted in Louisiana sugarcane over eight production regions which were selected for comparison of sugarcane borer (SCB), *Diatraea saccharalis*, spring dead hearts, SCB and other insect pest insecticidal controls, end-of-season bored internodes (and adult emergence), and yield. In each region, two management units were chosen to compare: two plant-cane and two stubble fields in SCB-susceptible varieties versus moderate or resistant varieties. A total of 117 fields were sampled across the primary Louisiana sugarcane production regions in 2000 and 98 fields in 2001. The varieties sampled were LCP85-384 or HoCP91-555 (both SCB susceptible) and HoCP85-845, CP70-321, LCP86-454, or LHo83-153 (all SCB resistant).

Regions included in this survey were as follows: Central (Rapides Parish), Southwest (Jefferson Davis Parish), Upper River (Pointe Coupee and Iberville parishes), Upper Lafourche (Assumption Parish), Lower Lafourche (Terrebonne and Lafourche parishes), Vermilion (Vermilion and Lafayette parishes), Teche (St. Martin and Iberia parishes), and Lower River (St. James Parish). With cooperation from the respective growers, licensed consultants, and county agents, spring dead heart sampling, stand counts, insecticide use, and end of season SCB bored internode frequency and adult emergence holes were compared with the yields of the sampled fields. During the dead heart survey, borer larvae were collected and reared out for parasite (parasitoid) determination.

Of the 5,350 stalks (65,081 total internodes) evaluated for the eight regions, 1,331 of the internodes were bored, for a total average of 2%, and SCB spring dead hearts averaged 277 per acre for the 2000 growing season. Results indicated a year of very light insect pressure, with most fields receiving only one or less application of insecticide because of the severity of the drought that farmers faced during this growing season. An exception to the drought occurred in the Central Louisiana region where early rains were received (Table 1 compares borer incidence and control in above normal rainfall versus drought conditions for each region), and some fields required three applications for SCB control, with infestations reaching as high as 20% live larvae in the leaf sheaths. One field surveyed required four applications of insecticide. Some of these same farmers also were faced with an outbreak of the recently discovered sugarcane aphid, *Melanaphis sacchari* (Zehntner), and the yellow sugarcane aphid, *Sipha flava* (Forbes), requiring additional insecticide treatments. Regardless of the traditional levels of SCB infestation in any particular sugarcane region, borer infestations and need for control were overwhelmingly decreased under reduced rainfall conditions.

In comparison, of the 3,100 stalks (39,807 total internodes) evaluated in 2001 in the eight regions, 1,470 of the internodes were bored, for a total average of 3.7%, with SCB spring dead hearts averaging 278 per acre. Tables 2 provides analyzed means from the dead heart assessment for each region during the 2000 and 2001 production seasons. Results indicated a year having closer to normal SCB pressure because of rainfall more evenly spread throughout the regions, with most fields receiving one or less application of insecticide. In a few fields throughout the sugarcane-growing regions, two applications of insecticide were required for SCB control.

Table 1. Rainfall and borer incidence and control comparison in the eight regions of the Louisiana sugarcane industry in 2000 and 2001.

Selected Regions	Inches of rainfall (± normal)[a]				# of Insecticide applications	% SCB bored internodes[b]
	FEB & MAR	APR & MAY	JUN & JUL	AUG & SEP		
2000						
Central	8.3 (-2.1)	12.3 (+3.0)	7.5 (-1.4)	3.1 (-5.5)	2.5	4.1a
Southwest	2.6 (-5.9)	9.7 (+0.1)	8.2 (-2.3)	6.5 (-4.1)	0.0	2.9ab
Upper River	2.8 (-8.2)	1.9 (-8.2)	8.6 (-1.3)	2.0 (-8.3)	0.1	2.8ab
Upper Lafourche	9.2 (-0.1)	1.0 (-8.6)	8.1 (-5.1)	11.5 (-2.3)	0.0	2.5abc
Lower Lafourche	5.7 (-5.1)	0.9 (-8.3)	13.0 (+0.6)	10.4 (-3.1)	0.2	2.0bc
Vermilion	3.1 (-5.0)	3.0 (-6.2)	8.1 (-4.9)	9.0 (-3.2)	0.0	1.3bc
Teche	2.5 (-5.7)	1.1 (-7.7)	12.0 (-1.3)	9.6 (-2.7)	0.0	1.3bc
Lower River	4.2 (-6.7)	1.2 (-7.9)	6.8 (-5.1)	8.9 (-2.8)	0.1	0.7c
2001						
Central	14.7 (+4.4)	4.0 (-5.2)	12.8 (+3.9)	11.0 (+2.4)	1.0	1.7b
Southwest	11.2 (+2.6)	1.8 (-7.8)	17.1 (+6.6)	21.8 (+11.2)	1.0	2.5ab
Upper River	14.0 (+3.0)	2.3 (-7.8)	25.7 (+15.8)	12.0 (+1.7)	0.8	6.3a
Upper Lafourche	9.4 (+0.1)	2.7 (-6.9)	28.9 (+15.7)	14.8 (+1.0)	0.5	2.3ab
Lower Lafourche	7.8 (-3.1)	0.2 (-8.9)	23.9 (+11.5)	14.9 (+2.3)	1.0	2.0b
Vermilion	11.8 (+3.6)	3.7 (-5.6)	26.5 (+13.5)	18.7 (+6.6)	0.5	5.4ab
Teche	12.7 (+4.4)	4.2 (-4.6)	17.6 (+4.3)	24.5 (+12.2)	0.8	1.8b
Lower River	9.7 (-1.3)	7.9 (-1.1)	24.6 (+12.6)	13.2 (+1.5)	0.5	3.8ab

[a]Values in parentheses represent the amount the measured rainfall total was above or below a normal average
[b]Sugarcane borer (SCB) bored internodes values represent a mean of 16 fields evaluated in each region each year except the Southwest region, which had eight fields evaluated each year, and means followed by the same letter in a column for the designated year are not significantly different ($P \leq 0.05$, LSD).

Table 2. SCB dead heart assessment in the Louisiana sugarcane industry in 2000 and 2001.

	SCB Dead Hearts Per Acre	
Selected Regions	2000	2001
Central	675a	130b
Southwest	167b	550ab
Upper River	150b	158ab
Upper Lafourche	406ab	158ab
Lower Lafourche	113b	625a
Vermilion	248b	300ab
Teche	219b	175ab
Lower River	238b	125b

Each value represents a mean of 16 fields evaluated in each region each year except the Southwest region, which had 8 fields evaluated each year, and means followed by the same letter in a column are not significantly different ($P \leq 0.05$, LSD).

SUGARCANE BORER MANAGEMENT THRESHOLD ASSESSMENT ON FOUR COMMERCIAL VARIETIES

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Four sugarcane borer (SCB) insecticide management regimes were studied in a four replication randomized complete block experiment on each of four varieties planted in the fall of 2000 at the Sugar Research Station, St. Gabriel, La. The study conducted during the 2001 season was designed to assess SCB injury, potential area-wide moth production, and yield loss of resistant and susceptible varieties under different intensity levels (different thresholds) of pest management. The variables were the four commercially grown sugarcane varieties in Louisiana, (1) SCB resistant (CP70-321, HoCP85-845) and susceptible varieties (LCP85-384, HoCP91-555) and (2) four regimes of SCB insecticidal control (based on 5% and/or 10% larval SCB infestation thresholds and a non treatment threshold).

SCB larval infestations were monitored weekly with leaf sheath sampling. Plots (0.01 acre, three rows each) were treated when infestation levels reached the designated threshold levels set by the indicated treatment regimes. Confirm® (tebufenozide), with the surfactant Latron® CS-7, was tank mixed at the rate of 6 oz/acre and 0.25% vol/vol, respectively. All three rows in each plot were treated using a CO_2 sprayer mounted on an all-terrain vehicle. The spray boom covering two rows on one side and one row on the other contained one flat fan spray nozzle per 6 feet of row width at 10 GPA and 35 psi. Infestations were assessed on the two outside rows, and the integrity of the center row was preserved for yield evaluation. In addition, because of enhanced experimental variability caused by naturally occurring arthropod predation, especially from fire ants, two applications of the soil pesticide chlorpyrifos (Lorsban®) were broadcast for arthropod predator suppression at the soil level. Data collected included number of dead hearts per acre (sugarcane shoots killed by SCB larvae), percent SCB bored internodes, SCB adult moth emergence, and yield loss. Data were analyzed using PROC GLM with means separated by LSD.

As shown in Table 1 and Figures 1 and 2, when using the >5% SCB infestation threshold (5%) or the 5% early and 10% late threshold (5%/10%), differences were not detected in percent bored internodes or average percent infestation. There were different numbers of applications of insecticide required to control SCB infestations and reduced infestation levels below the designated thresholds in this study. The variety HoCP91-555 (highly susceptible) required three applications of insecticide during the growing season for 5% and 5%/10% management regimes. In comparison, LCP85-384 (susceptible) required three insecticide applications for the 5% management threshold, but only two insecticide applications for the 5%/10% management threshold. The resistant variety HoCP85-845 required two applications in the late part of the season for the 5% threshold and only one application in the late part of the growing season for the 5%/10% threshold. CP70-321 required only one application made in the late part of the growing season under the 5% and the 5%/10% management regimes. The average season percentage of SCB infestation was similar on the 5% and 5%/10% management thresholds for all varieties (Table 2). Moth emergence was significantly higher for variety HoCP91-555 at the 10% threshold than for all other varieties at the 5% and 5%/10% management thresholds.

Management Regimes

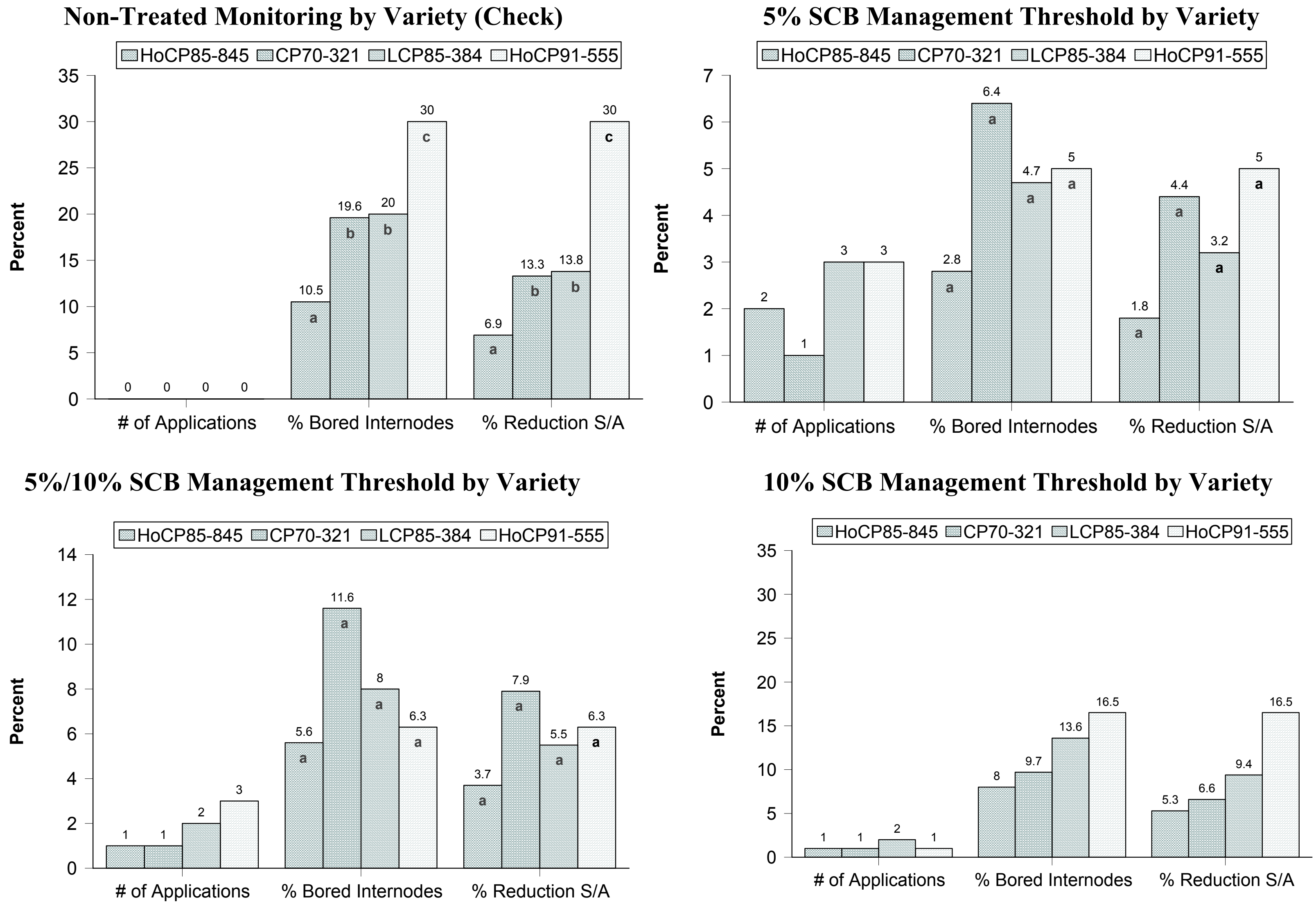
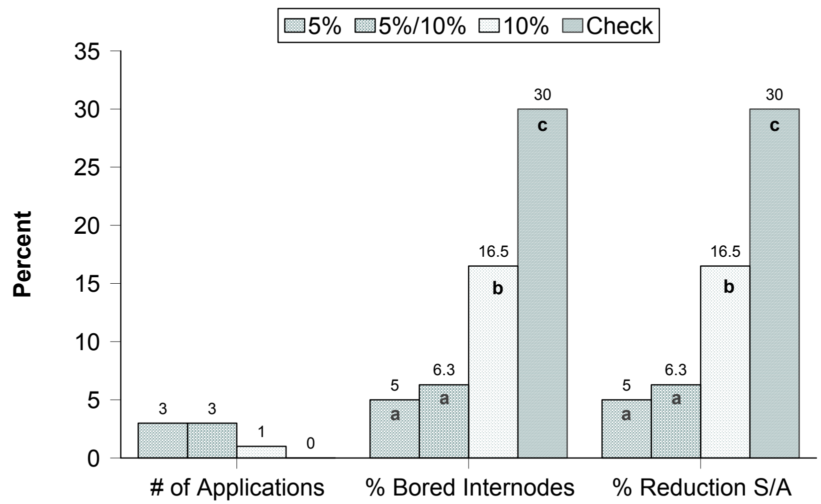


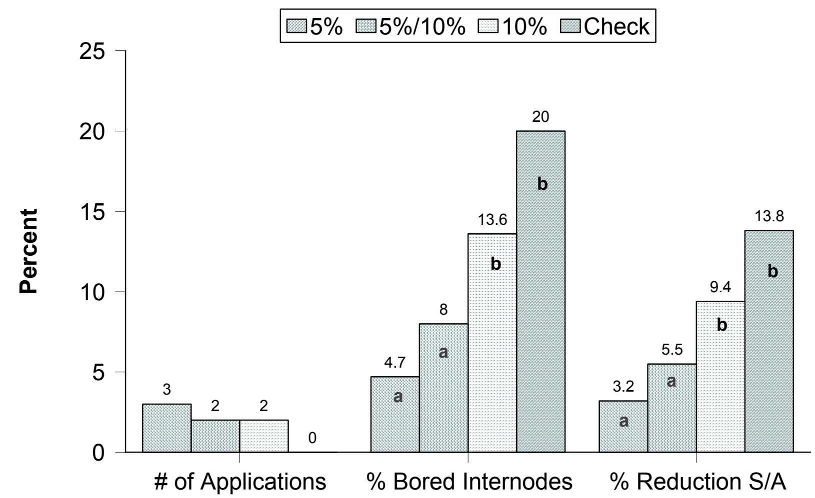
Figure 1. Management threshold by sugarcane variety showing the various parameters studied. % Reduction S/A= Percent reduction in sugar/acre. Means followed by the same letter within each group are not significantly different, ($P \leq 0.05$, LSD). Economic Injury Level for SCB on sugarcane has generally been considered around the 10% level of bored internodes.

Varieties

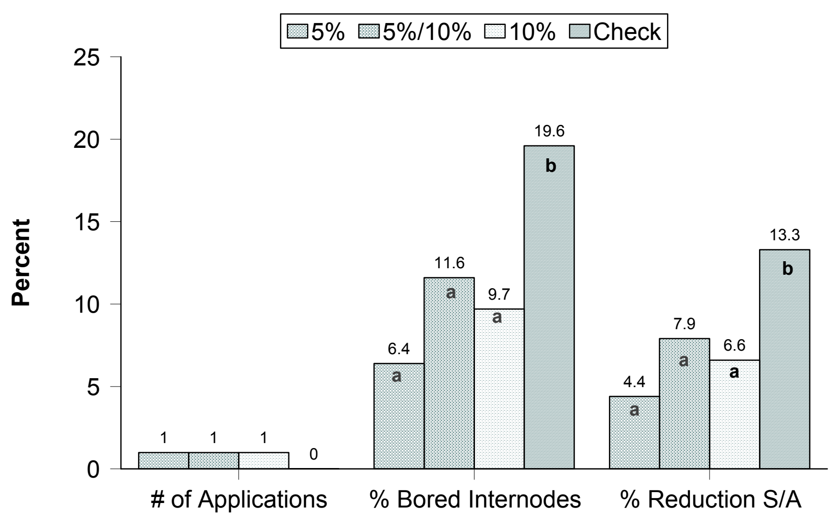
HoCP 91-555: SCB highly Susceptible



LCP 85-384: SCB Susceptible



CP 70-321: Moderately Resistant



HoCP 85-845: SCB Resistant

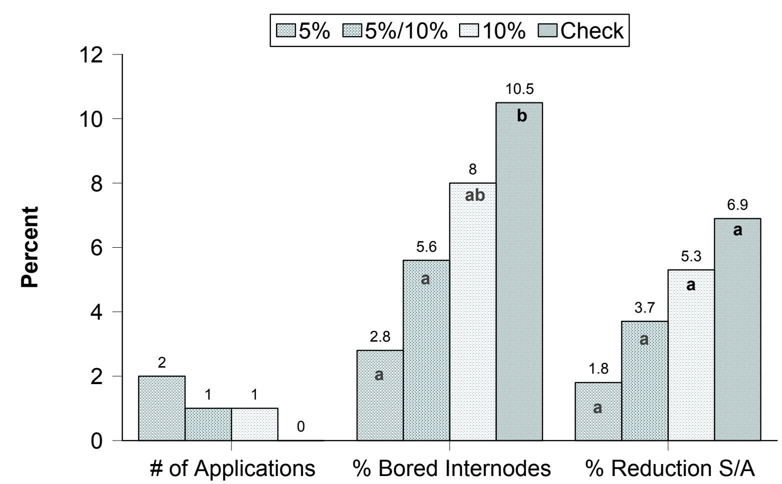


Figure 2. Represents sugarcane varieties under different SCB larval management thresholds. The above legend treatment thresholds in order are: greater than 5% season-long management threshold; greater than 5% early-season and greater than 10% late-season management threshold; greater than 10% season-long management threshold; non-treated monitoring by variety (Check). % Reduction S/A = Percent reduction in sugar/acre. Means followed by the same letter within each group are not significantly different, (P#0.05, LSD).

Table 1. Season-long sugarcane borer injury assessment, St. Gabriel Sugar Research Station, St. Gabriel, La., 2001.

Treatment		Number of Insecticide Applications	% Bored Internodes[c,d]	Estimated % Yield Loss[e]/Acre	Moth Emergence[f]/Acre	Deadhearts[g]/Acre
Variety[a]	Management[b]					
HoCP85-845	5%	2	2.8f	1.8g	1000b	50ab
LCP85-384	5%	3	4.7ef	3.2fg	2500b	0b
HoCP91-555	5%	3	5.0ef	5.0efg	0b	0b
HoCP85-845	5%/10%	1	5.6ef	3.7efg	2500b	50ab
HoCP91-555	5%/10%	3	6.3def	6.3efg	1500b	0b
CP70-321	5%	1	6.4def	4.4efg	1500b	75a
HoCP85-845	10%	1	8.0def	5.3efg	1000b	50ab
LCP85-384	5%/10%	2	8.0def	5.5efg	5500b	0b
CP70-321	10%	1	9.7cdef	6.6efg	6000b	75a
HoCP85-845	Non-treated	--	10.5cde	6.9efg	4000b	50ab
CP70-321	5%/10%	1	11.6cde	7.9def	4000b	75a
LCP85-384	10%	2	13.6bcd	9.4cde	2500b	0b
HoCP91-555	10%	1	16.5bc	16.5bc	14500a	0b
CP70-321	Non-treated	--	19.6b	13.3bcd	16500a	75a
LCP85-384	Non-treated	--	20.0b	13.8bc	5000b	0b
HoCP91-555	Non-treated	--	30.0a	30.0a	15000a	0b

[a]Susceptible varieties include HoCP91-555 and LCP85-384; resistant varieties include HoCP85-845 and CP70-321; [b]Managements are as follows: 5%: Greater than 5% SCB management threshold over entire season; 5%/10%: Greater than 5% SCB management threshold early season and greater than 10% SCB management threshold late season; Non-treated: Never treated; 10%: Greater than 10% SCB management threshold over entire season; [c]25 stalks per plot were evaluated for bored internodes; [d]Means within a column followed by the same letter are not significantly different (P#0.05, LSD); [e]Moth emergence reflects number of moths per acre; [f]Sugarcane shoots killed by SCB; [g]Estimated percent yield loss was calculated using conversion factors from White 2000, based on a per internode basis.

Table 2. Season-long sugarcane borer infestation with respect to different economic threshold levels and sugarcane varieties, St. Gabriel Sugar Research Station, St. Gabriel, La., 2001.

Treatment		Insecticide Application Date	Percent SCB Larval Infestation[a] Sample Dates					
Variety	Management[b]		6 Jul	16 Jul	26 Jul	9 Aug	20 Aug	3 Sept
HoCP91-555	5%	Jul 6, Aug 24, Sep 5	7.5ab	2.5b	0.0b	12.5ab	12.5ab	12.5cd
LCP85-384	5%	Jul 17, Aug 24, Sep 5	0.0b	17.5a	12.5a	7.5ab	7.5ab	7.5d
HoCP85-845	5%	Aug 24, Sep 5	5.0ab	5.0b	5.0ab	7.5ab	7.5ab	12.5cd
CP70-321	5%	Aug 24	0.0b	0.0b	2.5b	0.0b	10.0ab	2.5d
HoCP91-555	5%/10%	Jul 6, Aug 24, Sep 5	12.5a	5.0b	2.5b	15.0a	15.0a	15.0cd
LCP85-384	5%/10%	Jul 17, Sep 5	0.0b	7.5b	5.0ab	2.5ab	7.5ab	12.5cd
HoCP85-845	5%/10%	Sep 5	5.0ab	0.0b	0.0b	5.0ab	5.0ab	15.0cd
CP70-321	5%/10%	Sep5	0.0b	2.5b	5.0ab	5.0ab	5.0ab	12.5cd
HoCP91-555	Non-treated	--	0.0b	2.5b	0.0b	10.0ab	10.0ab	22.5bc
LCP85-384	Non-treated	--	0.0b	2.5b	2.5b	0.0b	0.0b	30.0ab
HoCP85-845	Non-treated	--	0.0b	2.5b	2.5b	10.0ab	2.5ab	15.0cd
CP70-321	Non-treated	--	7.5ab	0.0b	2.5b	2.5ab	10.0ab	30.0ab
HoCP91-555	10%	Sep 5	10.0a	5.0b	2.5b	10.0ab	10.0ab	37.5a
LCP85-384	10%	Aug 24, Sep 5	5.0ab	5.0b	2.5b	7.5ab	12.5ab	15.0cd
HoCP85-845	10%	Aug 24	0.0b	0.0b	2.5b	7.5b	12.5ab	5.0d
CP70-321	10%	Sep 5	0.0b	0.0b	5.0ab	10.0ab	7.5ab	12.5cd

[a]Percent live larvae based on 40 stalks/treatment.
[b]Managements are as follows: 5%: Greater than 5% SCB management threshold over entire season; 5%/10%: Greater than 5% SCB management threshold early season and greater than 10% SCB management threshold late season; Non-treated: Never treated; 10%: Greater than 10% SCB management threshold over entire season.
[c]Susceptible varieties include HoCP91-555 and LCP85-384; resistant varieties include HoCP85-845 and CP70-321.
[d]Means within a column followed by the same letter are not significantly different by LSD (P#0.05).

SMALL PLOT ASSESSMENT OF INSECTICIDES AGAINST THE SUGARCANE BORER

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Nine insecticide treatments were evaluated for control of SCB in a randomized complete block design with six replications in a field of first ratoon LCP85-384 sugarcane at the LSU AgCenter Sugar Research Station, St. Gabriel, La. (Iberville Parish). Insecticide treatments were applied to 3-row plots (6 ft x 40 ft) using a CO_2 sprayer mounted on an all-terrain vehicle with an 8005 flat fan nozzle (one nozzle per row) delivering 20 gpa at 35 psi. Prior to test initiation, Lorsban 15G (15 lb/acre) was applied on 10 July to suppress fire ant predation on SCB larvae. Initial insecticide treatments were made on 17 July when SCB infestations reached the Louisiana Cooperative Extension Service recommended threshold (5% of the stalks infested with SCB larvae in the leaf sheaths). Second applications were made on 21 August when re-infestation reached 5% in the Confirm 2F treated plots. SCB damage was assessed by counting bored internodes, moth emergence holes, and total number of internodes per stalk from 90 randomly selected stalks (15 stalks/plot) in each treatment (8 November). The study site received 6.54 and 6.35 inches of rainfall during the evaluation period of July and August respectively. Following ANOVA, means were separated with LSD.

All insecticide treatments significantly reduced % bored internodes compared to the check, but the Dimilin-treated plots displayed a higher percentage of bored internodes than the other treatments. Plots treated with Karate demonstrated significantly lower % bored internodes than plots treated with Intrepid at 4.0 oz/A and Dimilin. All insecticide treatments had significantly fewer moth emergence holes/acre than the untreated check. As a result of this research, both Dimilin and Intrepid have been discontinued from further consideration for SCB control in Louisiana management programs. Fury received a permanent Section 3 label in the fall of 2001.

Table 1. Effect of small plot insecticidal test on (SCB) *Diatraea saccharalis* (F.), St. Gabriel Research Station, 2001.

Treatment[a]/formulation	Rate (ai/acre)	% Bored internodes	No. of exit holes/acre[b]
Karate Z	1.92 oz	6.2d	556b
Baythroid 2E	2.1 oz	6.7cd	2,777b
Fury 1.5EC	3.2 oz	6.7cd	556b
Isomer 0.8EC	1.6 oz	10.4cd	5,556b
Intrepid 2F	6.0 oz	11.7cd	5,556b
Confirm 2F	8.0 oz	12.4cd	2,778b
Intrepid 2F	4.0 oz	12.7c	2,222b
Dimilin 2L	8.0 oz	23.4b	8,333b
Untreated Check	–	36.6a	65,000a

Means within a column followed by the same letter are not significantly different (P<0.05, LSD).
[a]All treatments were applied with Latron CS-7 at 0.25% vol/vol.
[b]Number of exit holes reflects moth emergence.

VARIETAL RESISTANCE RESEARCH WITH THE SUGARCANE BORER

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Sugarcane resistance to the sugarcane borer (SCB), *Diatraea saccharalis*, is categorized as a combination of physical characteristics that hinders boring (rind hardness, leaf-sheath appression), variety specific tolerance to boring, and antibiosis mechanisms that contribute to differences in survival of bored in larvae. The extent of this resistance also is influenced by the severity of infestations. Heavy borer pressure results in more bored internodes, even in varieties considered highly resistant. Several factors contributing to seasonal area-wide SCB infestation levels include weather conditions, predator and parasite numbers, and indigenous borer populations. Expansive acreage of cultivars with elevated moth production increases endemic SCB populations and imposes additional pressure on the remaining acreage of resistant varieties. This is of particular significance in major periods of late summer and fall SCB buildup, such as was experienced in most of the industry during 2001. For this reason, we also report moth production for each cultivar in these tests.

Test plots for assessing SCB varietal resistance in the 1998 HoCP and 1999 L series experimental varieties cultivars, and four commercial varieties, were planted September 22, 2000, at Glendale Plantation, Killona, La. A randomized block design replicated four times was used with each block containing two plots of the commercial varieties CP70-321, LHo83-153, HoCP91-555, and LCP85-384, and one plot for each block of the HoCP-98 and L-99 cultivars. No chemical controls for SCB were applied in the test, and natural control from fire ants was suppressed by applying granular Lorsban in late June. A 15-stalk sample was cut from each plot on October 25, 2001, (four replications = 60 stalks each of HoCP-98 and L-99 varieties and 120 stalks per commercial cultivar). Sample stalks were examined to determine the number of bored internodes, moth emergence holes, and the total number of internodes.

Experimental variety L99-231 had the most bored internodes (28.9%) and the highest moth production, with 17,347 moths per acre produced. Commercial variety HoCP91-555 also had a higher level of bored internodes at 18.4%. LHo83-153 had the lowest bored internodes (8.2%), followed by CP70-321, and LCP85-384 at 9.9% and 12.1%, respectively.

Because of low SCB populations caused by drought conditions in 2000, the test plot for assessing SCB varietal resistance in the 1997 HoCP and 1998 L series varieties, and three commercial varieties planted September 22, 1999, at Glendale Plantation, Killona, La., was reassessed in the first stubble stage in 2001. A randomized block design replicated four times was used with each block containing two plots of the commercial varieties CP70-321, HoCP85-845, and LCP85-384 and one plot for each block of the HoCP-97 and L-98 varieties. No chemical controls for SCB were applied in the test, and natural control from fire ants was also suppressed by applying granular Lorsban in late June. A 15-stalk sample was cut from each plot on October 12, 2001, (four replications = 60 stalks per each of HoCP-97 and L-98 cultivar and 120 stalks per commercial cultivar). Sample stalks were examined to determine the number of bored internodes, moth emergence holes, and the total number of internodes.

Experimental variety L98-207 and commercial variety LCP85-384 had the most bored internodes (17.8% and 15.2%, respectively). L98-209 and HoCP85-845 had the highest moth production at 10,652 and 10,010 moths per acre produced, respectively. HoCP97-609 had the lowest bored internodes (12.1%), followed by L98-209 and HoCP85-845 at 12.3% and 13.1%, respectively.

Host plant resistance to target pest insects remains an important component of the sugarcane IPM system providing growers with a proven methodology for minimizing the economic impact of the sugarcane borer. Resistant varieties reduce pest damage at little or no cost to the grower. Our research now provides additional assessment criteria for selecting resistant cultivars. Incorporating the cultivar's pest survival rating better allows us to flag varieties that will enhance SCB populations in an area. Quantifying the impact of adult SCB emergence involves little additional data collection and enhances the efficiency and value of the entomological component in sugarcane breeding and varietal development at the LSU Agricultural Center.

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Table 1. Sugarcane borer damage and moth production on 1998 HoCP series, 1999 L series varieties, and four commercial varieties during 2001, Glendale Plantation, Killona, La. Test was planted September 22, 2000, and samples cut October 25, 2001.

Variety	% Bored internodes	Stalks/acre	Moths/acre production
L99-231	28.9a	35,891	17,347a
HoCP98-741	25.3ab	36,386	12,735abc
L99-233	25.0ab	48,889	15,482ab
TUCCP77-042	24.0ab	44,214	11,054abcd
L99-226	21.0abc	40,296	11,417abcd
HoCP91-555	18.4abcd	31,429	6,024bcd
L99-213	17.6bcd	48,096	10,421abcd
LCP85-384	12.1cd	43,523	3,627cd
CP70-321	9.9d	33,214	3,045d
LHo83-153	8.2d	34,326	2,288d

Means followed by the same letter are not significantly different ($P \leq 0.05$, LSD).
Stand counts provided by Dr. Kenneth Gravois, Sugar Research Station.

Table 2. Sugarcane borer damage and moth production in first stubble 1997 HoCP series, 1998 L series varieties, and three commercial varieties during 2001, Glendale Plantation, Killona, La. Test was planted September 22, 1999; first stubble samples harvested October 25, 2001.

Variety	% Bored internodes	Stalks/acre*	Moths/acre production
L98-207	17.8a	57,934	9,656a
LCP85-384	15.2a	46,851	7,809a
CP70-321	13.3a	33,493	8,373a
HoCP85-845	13.1a	30,799	10,010a
L98-209	12.3a	49,163	10,652a
HoCP97-609	12.1a	40,561	6,760a

Means followed by the same letter are not significantly different ($P \leq 0.05$, LSD).
Stand counts provided by Dr. Kenneth Gravois, Sugar Research Station.

EVALUATION OF LOUISIANA SUGARCANE VARIETIES AGAINST TWO EXOTIC INSECT PESTS CAUSING ECONOMIC DAMAGE IN TEXAS.

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The **Mexican rice borer (MRB)**, *Eoreuma loftini* (Dyar), is a potentially serious threat to rice and sugarcane in Texas and Louisiana. In 1980, MRB was discovered from Mexico in the Lower Rio Grande Valley (LRGV) of Texas, and it immediately became a serious pest of sugarcane, causing a complete crop failure in some fields. Since invading the Texas rice belt (TRB) in the late 1980s, the MRB has become an increasingly severe problem. A recently completed insecticide experiment in rice sustained a 50% yield loss in untreated plots. Sugarcane yield loss studies at Weslaco have shown that 25% MRB bored internodes causes as much as a $250 economic loss in sugar per acre. Without adequate controls, the MRB is on the verge of becoming a major problem to these multi-state agricultural systems.

In view of the poor history of research success on biological control and insecticides to control MRB, proactive efforts were undertaken to plant and assess the relative resistance to MRB exhibited by four Louisiana recommended commercial varieties (LCP 85-384, HoCP 85-845, CP 70-321, and HoCP 91-555) and a fifth former Louisiana variety (NCo 310) that was planted as a susceptible check. Both NCo 310 and CP 70-321 are currently grown in LRGV as commercial varieties. There were six replications of each variety (each plot one row by 20 foot long) in this experiment conducted at the Weslaco Station Annex. The varieties LCP 85-384, HoCP 85-845, and HoCP 91-555 were transported disease- and insect-free from Louisiana. No insecticide was used during the growing season. However, there was irrigation at regular intervals, which tended to cause the experiment to be less attractive to MRB.

The percent MRB bored internode assessment of varieties in this experiment (planted 10/2/00) evaluated on 11/1/01 using a Tilby stalk-splitting machine is shown in Table 1. It is noted that the relative adult (moth) emergence values (distinguished by an oval-shaped exit hole on the stalk) also are presented for this MRB assessment.

Table 1. Susceptibility of Louisiana commercial varieties to the Mexican rice borer, Weslaco, TX, 2001.

Variety	% Bored internodes	Moth emergence/acre
HoCP 91-555	13.8a	7040ab
LCP 85-384	13.2a	11280a
NCo 310	8.7ab	1920bc
CP 70-321	7.7ab	2380bc
HoCP 85-845	5.8b	1550c
Least Significant Difference	*6.25*	*5454*

Means within a column followed by the same letter are not significantly different, LSD $P \leq 0.05$. A randomized complete block design with five replications, and 20 stalks/plot was used.

Both sugarcane borer (SCB) susceptible varieties (HoCP 91-555 and LCP 85-384) are also susceptible to MRB, with LCP 85-384 significantly more susceptible than the previously known MRB highly susceptible NCo 310 (when moth emergence is considered). HoCP 85-845 is significantly more MRB resistant than either LCP 85-384 or HoCP 91-555.

The **sugarcane lace bug**, *Leptodictya tabida* (Herrich-Schaeffer) (Hemiptera: Tingidae), is present on sugarcane in Florida, Texas, and Hawaii, as well as in numerous countries throughout the Caribbean area. It is often considered a relatively minor insect pest. However, at times, numbers of this leaf-feeding, sap-sucking insect can become high enough to cause entire fields in a region to appear pale green, with an obvious impact on photosynthesis. These conditions, sometimes averaging over 1000 lace bugs per plant, were present in several areas of LRGV of Texas in late July and early August of 2001.

Assessment of lace bug infestations (both immature nymphs and adults) on the test of Louisiana sugarcane varieties was initiated in the last week of July, with data summarized as shown in Table 2.

Table 2. Louisiana sugarcane varietal susceptibility to the sugarcane lace bug (Tingidae) in studies at the Weslaco Texas A&M Research Station Annex, July, 2001[1].

Variety	% Plants Infested	Total adults and nymph[2]	% Nymphs[3] (immatures)
NCo 310	97.3c	1151.6a	68.6c
CP 70-321	57.3b	216.4b	43.7b
LCP 85-384	84.0bc	604.6ab	64.7c
HoCP 85-845	61.3b	155.8b	40.3b
HoCP 91-555	36.0a	19.8b	34.6a

[1]15 plants sampled (all leaves) in each plot. Six-replication experiment with 20 ft. one-row plots. Means within each column followed by the same letter are not significantly different, ($P<0.05$, LSD).
[2]Adult and nymph forms per 15 plants sampled in each plot.
[3] % in nymphal stage of total number of lace bugs counted.

Varietal differences were observed showing that substantially fewer lace bugs occurred in HoCP 91-555, which was more resistant than variety NCo 310 and LCP 85-384. Data included both plant and leaf infestation levels, lace bug densities per plant, and the proportion of immature (nymphal stage) to total lace bug infestation numbers. The substantially reduced proportion of immatures in HoCP 91-555 was an indication of plant resistance. The sugarcane lace bug has not been observed in Louisiana sugarcane or in the 1,000-acre production near Beaumont, Texas.

MONITORING MOVEMENT OF THE MEXICAN RICE BORER TOWARD SUGARCANE AND RICE IN THE UPPER TEXAS RICE BELT AND WESTERN LOUISIANA, AND EVALUATION OF INSECTICIDE MANAGEMENT OPTIONS

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As a follow-up to pheromone trap sampling for the Mexican rice borer (MRB), *Eoreuma loftini* (Dyar) (Lepidoptera: Crambidae), adjacent to sugarcane fields in Southeast Texas and Southwest Louisiana in 2000, cooperative studies between Texas A&M and the LSU AgCenter were undertaken in the summer and fall of 2001 to define the insect's present range. Using twice weekly monitoring of pheromone traps in nine Texas counties and seven Louisiana parishes, new MRB locations were found in Austin and Harris counties in Texas. (See Figure 1 for relative locations). The insect still is not known to occur in Louisiana, but it now appears in relatively high populations within 50 - 60 miles of the new sugarcane production area near Beaumont, Texas, (Austin, Harris Calhoun, Colorado, Jackson, Matagorda, and Wharton counties), and within 120 miles of sugarcane in Southwest Louisiana (See Table 1). In addition to pheromone trap assessment, larval infestations in rice and other grasses have been discovered in many of the newly invaded areas. In addition to extensive participation by Texas rice belt county agents, western Louisiana sugarcane parish agents, personnel from both the Texas Department of Agriculture (S.S. Nilakhe) and the Louisiana Department of Agriculture and Forestry (Tad Hardy) supervised collection efforts.

Management studies involving varietal resistance and insecticide control also were assessed with cooperators in the USDA, LSU AgCenter, and Texas A&M Systems, as well as with chemical industry colleagues and the Rio Grande Valley Sugar Growers Association. The most promising MRB pesticidal controls in sugarcane, though inadequate compared to the sugarcane borer standards, were cyfluthrin (Baythroid®) and the ecdysone agonist tebufenozide (Confirm®). Replicated variety assessment to determine relative MRB resistance of rice and sugarcane has shown at least 4.5-fold differences in susceptibility among selected commercially available varieties. MRB has proven to be a very severe pest of sugarcane in South Texas and Mexico, and it would be an especially serious problem to Louisiana growers under drought conditions similar to those experienced in recent years (particularly because most of the Louisiana growers have no facility to irrigate).

Table 1. Pheromone trap collections of Mexican rice borer (*Eoreuma loftini*) moths in Southeast Texas during 2001[1.]

Texas Counties	May	June	July	August	September	October	November
New Discovery							
Austin	45	146	190	114	--	--	--
Harris	23	289	330	176	143	358	330
Previously Known Counties							
Calhoun	--	477	326	225	--	--	--
Colorado	96	159	65	116	57	240	140
Jackson	128	155	44	85	24	84	74
Matagorda	--	445	134	293	185	588	--
Wharton	102	398	223	241	53	461	242
No MRB Collected							
Liberty	--	0	0	0	--	--	--
Orange	--	0	0	0	0	0	--

[1]Number of moths per two traps per month. Moths were removed from traps twice weekly; pheromone lures and insecticide strips were replaced monthly.

Figure 1. Map of Mexican Rice Borer Pheromone Trapping in the Main Texas Rice Area (Southeast Texas), 2001.