‣ Progress Managing Stem Borers In Texas Rice

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Introduction

Texas rice is attacked by three species of stem borers—sugarcane borer (SCB), *Diatraea saccharalis*; Mexican rice borer (MRB), *Eoreuma loftini*; and rice stalk borer (RSB), *Chilo plejadellus*. The RSB is the least common and problematic of the above stem borers in the Texas Rice Belt (TRB), so our research has targeted the SCB and MRB. Some years the SCB is more abundant in the TRB than MRB; however, other years the MRB produces higher numbers. The SCB is native to the TRB whereas the MRB was introduced into Texas from Mexico in 1980. The MRB was first detected in the TRB in Calhoun Co. (the most southern county in the TRB) in 1988. The MRB has since moved north, east and west to infest all counties of the TRB except Orange Co. which borders Louisiana and the Gulf of Mexico. Pheromone trapping has revealed that the MRB is moving eastward towards Louisiana at the average rate of about 15 miles per year.

Both species lay eggs on rice foliage. Previous research suggests the majority of eggs are laid close to the time of panicle differentiation (PD), because visible symptoms of damage or signs of larvae are first observed after PD. Eggs hatch and most larvae crawl from the foliage to the junction of the leaf blade and sheath. At this point, the larvae enter the space between the sheath and culm. Here the early instars feed on the inside of the sheaths to cause orange-tan lesions on affected sheaths. These lesions are easily observed on the outside of sheaths; in fact, we are considering using these lesions as a base for future economic thresholds. In other words, a farmer/scout would examine a given number of culms for lesions. If these lesions were found on a given % of culms, then the farmer would spray a pesticide. Eventually, the larvae bore into the culms and feed within causing disruption of the flow of nutrients and water. This leads to deadhearts (dead foliage arising from the center of whorls), partially and completely unfilled grains and/or whiteheads (virtually all grains on panicles do not fill). Clearly, stem borers can cause significant yield losses. In fact, previous research at Ganado, TX showed that natural infestations of stem borers can reduce main crop yields by at least 50%. Also, preliminary evidence shows that stem borers can be very destructive to the ratoon crop. Conservation tillage can be employed to ensure early planting which increases the likelihood of a good ratoon crop. The ratoon crop is becoming increasingly economically important to Texas rice farmers, so improved management leading to better ratoon yields also is taking on added significance. Thus, improved management of the main crop to increase ratoon crop value includes expansion of conservation tillage and stem borer control.

OBJECTIVES AND MATERIALS AND METHODS

We conducted three experiments in 2006 involving stem borer management.

Experiment 1: Response of rice and stem borers to planting date

The experiment was conducted at Eagle Lake using Cocodrie planted on three dates – March 14, April 12 and May 15. Half of the plots were treated with Karate Z to control stem borers. Whiteheads were counted before harvest. After harvest, plots of the two earliest planting dates were ratoon cropped.

Experiment 2: Evaluate selected varieties for response to stem borer activity

The experiment was conducted at Ganado where half the plots were treated with Karate Z to control stem borers. Whiteheads were counted before harvest. After harvest, plots were ratoon cropped.

Experiment 3: Evaluate selected insecticides for control of stem borers

The experiment was conducted at Ganado using Cocodrie. Whiteheads were counted before harvest.

RESULTS

Experiment 1:

A combination of SCB and MRB infested the plots. Highest stem borer activity in the main crop occurred in the earliest planting date (Table 1). Across main plots, treated main crop plots outyielded untreated plots by about 900 lb/acre which shows the value of controlling stem borers.

Experiment 2:

A combination of SCB and MRB infested the plots. Priscilla produced the most whiteheads and the hybrids XL723, CLXL730 and CLXP729 produced the least (Table 2). Panicle density among varieties was not significantly different. Hybrid treated main crop plots outyielded untreated plots by almost 1000 lb/acre which shows that stem borer damage is not confined to whiteheads. Significantly more whiteheads were found in ratoon plots derived from untreated main crop plots compared to treated main crop plots. So, a carryover of stem borer damage from main to ratoon crop is possible. Research needs to be performed to evaluate response of ratoon rice to stem borer control in the main and/or ratoon crop.

EXPERIMENT 3:

A combination of SCB and MRB infested the plots. In general, best control in terms of density of whiteheads was achieved by two applications of Karate Z at 0.03 lb (AI)/acre, two applications of Mustang Max at 0.018 lb (AI)/acre and one application of compound X at the high rate (Table 3). Although yields were not significantly different among treatments, the above treatments averaged 760 lb/acre more than the untreated.

CONCLUSIONS

These results show in the southern TRB where the experiments were conducted, stem borers are becoming serious constraints to yield. Early planting does not necessarily avoid significant stem borer damage. Hybrid varieties, which produce fewer whiteheads than conventional varieties, still can benefit from stem borer control. Farmers in the southern TRB should consider applying a pyrethroid to control stem borers.

Table 1. Effect of planting date on stem borer activity in rice. Eagle Lake, TX. 2006

Planting date	Treatment[a]	Panicles/ ft of row	No. whiteheads in 4 middle rows		Yield (lb/acre)		
			Main crop	Ratoon crop	Main	Ratoon	Total
Mar 14	T	37	8	40	8518	1799	10317
	U	37	53	39	7475	1902	9377
Apr 12	T	33	2	31	8430	1573	10003
	U	34	14	41	7721	1362	9083
May 15	T	25	4	na	3866	na	na
	U	25	30	na	3024	na	na
Statistical analysis for Table 1							
Main plot (planting date):							
Mar 14		37 a	31 a	40	7996 a	1851 a	9847 a
Apr 12		34 a	8 c	36	8075 a	1467 b	9543 b
May 15		25 b	17 b	na	3445 b	na	na
				NS			
Sub plot (treatment):							
T		32	5 b	36	6938 a	1686	10160 a
U		32	32 a	40	6073 b	1632	9230 b
		NS		NS		NS	
Interactions (planting date x treatment):							
		NS	SIG	NS	NS	NS	NS
			Pr <0.0857				

[a] Treatment: T = treated for stem borers with multiple applications of Karate Z @ 0.03 lb (AI)/acre, U = untreated

Means followed by the same or no letter are not significantly different (NS) at the 5% level (ANOVA and LSD). Main plot ratoon yield is significant at 10% level (*Pr <0.0622*).

Table 2. Host plant resistance to stem borers. Ganado, TX. 2006

Variety	Trt.[a]	Panicles/ ft of row	No. whiteheads/4 rows: Main	No. whiteheads/4 rows: Ratoon	Yield (lb/acre): Main crop	Yield (lb/acre): Main crop (T – U)	Yield (lb/acre): Ratoon crop	Yield (lb/acre): Total yield[b]
Priscilla	T	35	1	31	7544	1114	3796	11340
	U	32	25	33	6430		3615	10045
Trenasse	T	44	0	19	9347	414	3500	12847
	U	44	9	29	8933		3186	12119
XL723	T	38	0	9	10593	635	4240	14833
	U	39	6	11	9958		4152	14110
CL XL730	T	42	0	4	10102	1098	3855	13957
	U	41	1	6	9004		3992	12996
CL XP729	T	38	0	9	10696	1262	3940	14636
	U	42	5	10	9434		4596	14030

[a] Treatment: T = treated for stalk borers with 2 applications of Karate Z at 0.03 lb (AI)/acre, U = untreat
[b] Total yield = main + ratoon crops

Statistical analysis of stem borers for Table 2

	Panicles/ ft of row	No. whiteheads/4 rows: Main crop	No. whiteheads/4 rows: Ratoon crop	Yield (lb/acre): Main crop	Yield (lb/acre): Ratoon crop	Yield (lb/acre): Total yield
***Main plot (variety)*:**						
Priscilla	33	13 a	32 a	6987 d	3705 bc	10692 d
Trenasse	44	5 b	24 b	9140 c	3343 c	12483 c
XL723	38	3 bc	10 c	10275 a	4196 a	14471 a
CL XL730	41	1 c	5 d	9553 b	3923 ab	13476 b
CL XP729	40	3 bc	10 c	10065 a	4268 a	14333 a
	NS					
***Sub plot (treated or untreated for stalk borers)*:**						
Treated	39	0 b	14 b	9568 a	3866	13434 a
Untreated	40	9 a	18 a	8672 b	3908	12580 b
	NS				NS	
***Interaction*:**						
Main plot x sub plot	NS	SIG Pr <.0001	NS	NS	NS	NS

Means in a column followed by the same or no letter are not significantly different (NS) at the 5% level (ANOVA and LSD).

Table 3. Evaluation of stem borer insecticides. Ganado, TX. 2006

Trt. #	Description	Rate [lb (AI)/acre]	Timing	[a] WHs/4 rows	Yield (lb/acre)
1	Untreated	—	—	26 a	6927
2	X	low rate	LB/H [b]	6 de	7393
3	X	high rate	LB/H	2 g	7774
4	Orthene 90S	0.5	1-2" P[c]	21 ab	6947
5	Orthene 90S	0.5	1-2" P + LB/H	15 bc	7229
6	Y (Seed treatment)	—	—	29 a	6803
7	Mustang Max	0.018	1-2" P	5 ef	7354
8	Mustang Max	0.025	1-2" P	13 bc	7172
9	Mustang Max	0.018 + 0.018	1-2" P+LB/H	2 fg	7670
10	Mustang Max	0.025 + 0.025	1-2" P+LB/H	1 g	7482
11	Karate Z	0.03	1-2" P	11 cd	7215
12	Karate Z	0.03 + 0.03	1-2" P+LB/H	1 g	7616
					NS

[a] WHs = whiteheads.
[b] LB/H = late boot/early heading.
[c] 1-2"P = 1 - 2 inch panicle.
Means in a column followed by the same or no letter are not significantly different (NS) at the 5% level (ANOVA and LSD).

Impact Of Herbicide Drift On Rice

Presented by Dr. Eric P. Webster
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Four studies were conducted at the LSU AgCenter Rice Research Station near Crowley, Louisiana in 2005 and 2006 to evaluate the effects of simulated herbicide drift on ‘Cocodrie’ rice. The experimental design for each study was an augmented two-factor factorial with a non-treated added for comparison. Factor A consisted of herbicide rate. The herbicides were applied at drift rates of 12.5 and 6.3% of the labeled usage rate of glyphosate as 22 oz/A of Roundup WeatherMax (2.8 and 1.4 oz/A, respectively), glufosinate as 24 oz/A of Ignite (3 and 1.5 oz/A, respectively), imazamox as 5 oz/A of Beyond (0.63 and 0.31 oz/A, respectively), and imazethapyr as 4 oz/A of Newpath (0.5 and 0.25 oz/A, respectively). Each application was made with the carrier volume varying proportionally to herbicide dosage based on a carrier volume rate of 25 GPA. The 12.5% herbicide rate was applied with a carrier volume of 3.1 GPA and the 6.3% herbicide rate was applied with a carrier volume of 1.6 GPA. Each application was made with a CO2 pressurized sprayer calibrated to deliver a constant carrier volume and speed was adjusted to vary application rate. Each herbicide was evaluated in a separate study. Factor B consisted of application timings at different growth stages: 1-tiller (TR) only in 2006, panicle differentiation (PD), boot (BT), and physiological maturity (PM). Rice plant height at 21 days after treatment (DAT) and rough rice yield for the primary crop in both years and ratoon crop in 2005 was obtained. Primary and ratoon crop yield in 2005 were combined as total rice yield. All data are presented as percent of the nontreated.

At 21 DAT, rice plant height was 70 to 89% of the nontreated regardless of Roundup application rate at PD and BT in 2005 and 2006. Rice treated with Roundup at 2.8 oz/A applied at PD and BT had a primary crop yield of 32 to 39% of the nontreated in 2005. A similar yield reduction was observed with the 1.4 oz/A applied at BT. However, the reduced rate applied at PD in 2005 resulted in a primary crop yield of 62% of the nontreated. In 2006, rice treated with Roundup at 2.8 oz/A at TR, PD, and BT had primary crop yields of 66, 65, and 54% of the non-treated, respectively. The reduced rate applied to rice at PD and BT in 2006 resulted in a primary crop yield of 75 to 81% of the nontreated. In 2005, rice treated with Roundup applied at