Conservation Tillage Impacts On Rice Pest Management

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Introduction

Recent trends in southern U.S. rice production are more conservation tillage associated with earlier planting dates, lower seeding rates and more hybrid rice acreage. In addition, in SE Texas and SW Louisiana, more farmers are expanding ratoon rice acreage and adopting higher levels of management on this second crop. Obviously, conservation tillage allows for earlier planting which increases the likelihood of producing a high yielding ratoon crop. The trend towards lower seeding rates is a result of improved planting equipment, more precision leveling, increased cost of seed (particularly hybrid seed) and more drill versus aerial planting. Thus, the combination of lower seeding rate, earlier planting in cooler weather and increased cost of seed means farmers should consider investing in seed protectant technology.

For the past 3 years, my project has evaluated Dermacor X-100 (active ingredient rynaxypyr) rice seed treatment to control rice water weevil (RWW), Lissorhoptrus oryzophilus. In 2007, we also evaluated control of stem borers---Mexican rice borer, Eoreuma loftini and sugarcane borer, Diatraea saccharalis---and South American rice miner (SARM), Hydrellia wirthi. In addition, we quantified the impact of stem borers on main and ratoon crop rice. For brevity, this paper only reports results from 2007.

Materials and Methods

In 2007, RWW and SARM experiments were conducted at the Beaumont Center using Cocodrie and XL723. The stem borer experiments were conducted at Ganado, TX where stem borers are especially problematic. The stem borer ratoon experiment used Cocodrie and XL723 and the stem borer insecticide evaluation experiment used Cocodrie. All experiments were drill-seeded during the optimal planting season in Texas followed by a delayed flood and managed according to recommended practices. The experiments at the Beaumont Center had plots surrounded by metal barriers to minimize movement of fertilizer and pesticides into and out of the plots. The experiments at Ganado lacked metal barriers. All experiments were designed as a randomized complete block with four replications. Treatments are listed in the accompanying tables.

Results and Discussion

Dermacor X-100 seed treatment provided excellent control of RWW and good control of SARM at the rates investigated for both experiments involving XL723 and Cocodrie (Tables 1 and 2). Also, surprisingly, Dermacor X-100 seed treatment at 0.1 mg active ingredient per seed gave excellent control of stem borers as measured by number of whiteheads per plot (Table 3). These results show Dermacor X-100 has excellent potential as a seed treatment to protect rice from an array of early and late season insect pests. This new technology has the potential of immensely benefitting those farmers who practice conservation tillage, utilize low seeding rates and plant expensive seed. Presently, all southern rice-producing states are submitting Section 18s in a regional effort to have Dermacor X-100 available for use in 2008.

Data show stem borers were very damaging to main crop rice, regardless of variety---XL723 or Cocodrie (Tables 4 and 5). For instance, control of stem borers on the main crop of XL723 produced a yield advantage of 1881lb/acre compared to no control on the main crop. Due to relatively low populations of stem borers on the ratoon crop, no significant differences in yield among treatments were detected. However, for XL723, control of stem borers on the ratoon crop produced a yield advantage of 695lb/acre compared to no control on the ratoon crop. Thus, data show stem borer control for main and ratoon crop production is critical in certain areas of Texas. Δ

Table 1. Rice water weevil (RWW), South American rice miner (SARM) and stem borer control. XL723. Beaumont, TX. 2007.

Description[a]	Rate mg (AI)/seed / lb (AI)/A[b]	No. SARM damaged leaves	No. immature RWW/5 cores Jun 14	No. immature RWW/5 cores Jun 26	No. WHs[c]	Yield[d] lb/A
Dermacor X-100	0.025 / 0.039	4 bc	2 b	1 b	0	11157 a
Dermacor X-100	0.05 / 0.078	3 bc	1 b	1 b	0	10575 a
Dermacor X-100	0.10 / 0.156	1 c	1 b	0 b	0	10465 ab
Karate Z	0.04 lb (AI)/A	8 b	5 b	9 a	0	10426 ab
Untreated	---	18 a	73 a	17 a	0	9602 b
					NS	

[a]Dermacor X-100 = seed treatment, Karate Z = foliar spray applied 3 days after flood.
[b]lb (AI)/A based on 18,800 Cocodrie seeds/lb and 90 lb/A seeding rate.
[c]Based on no. whiteheads (WHs) in middle 4 rows/plot.
[d]Based on reps I-III; rep IV data deleted due to drift of urea from adjacent Foundation Seed field.
Means in a column followed by the same or no letter are not significantly different (NS, $P > 0.05$, ANOVA, LSD).

Table 2. Rice water weevil (RWW), South American rice miner (SARM) and stem borer control. Cocodrie. Beaumont, TX. 2007

Description[a]	Rate mg (AI)/seed / lb (AI)/A[b]	No. SARM damaged leaves	No. immature RWW/5 cores Jun 14	No. immature RWW/5 cores Jun 26	No. WHs[c]	Yield[d] lb/A
Dermacor X-100	0.0125 / 0.047	1 b	2 c	1 b	2	10349
Dermacor X-100	0.025 / 0.039	0 b	1 c	1 b	1	9956
Dermacor X-100	0.05 / 0.078	0 b	1 c	0 b	1	10168
Dermacor X-100	0.10 / 0.156	1 b	0 c	0 b	0	10331
Karate Z	0.04 lb (AI)/A	1 b	7 b	1 b	1	10215
Untreated	---	3 a	53 a	12 a	2	9841
					NS	NS

[a]Dermacor X-100 = seed treatment, Karate Z = foliar spray applied 3 days after flood.
[b]lb (AI)/A based on 18,800 Cocodrie seeds/lb and 90 lb/A seeding rate.
[c]Based on no. whiteheads (WHs) in middle 4 rows/plot.
[d]Based on reps I-III; rep IV data deleted due to drift of urea from adjacent Foundation Seed field.
Means in a column followed by the same or no letter are not significantly different (NS, $P > 0.05$, ANOVA, LSD).

Table 3. Evaluation of seed and foliar treatments for stem borer control in rice, Ganado, TX. 2007.

Description	Rate lb AI/A / mg AI/seed[a]	Timing[b]	No. panicles /ft of row	No. WHs/plot[c]	Yield lb/A
Untreated	---	---	27	69 ab	6660 bc
Cruiser 5FS	0.064	ST	26	90 b	6140 c
V-10170	0.20	ST	28	60 b	6432 c
Dermacor X-100	0.331 / 0.10	ST	28	2 d	7388 a
Rynaxypyr	0.026	LB	25	12 c	7439 a
Rynaxypyr	0.026	H	30	4 d	7053 ab
Rynaxypyr	0.046	LB	26	4 d	7407 a
Rynaxypyr	0.046	H	26	5 cd	7418 a
			NS		

[a]mg AI/seed given 18,800 Cocodrie seeds/lb and 80 lb/A seeding rate.
[b]ST = seed treatment; LB = late boot; H = heading.
[c]No. whiteheads (WHs) per 4 middle rows.
Means in a column followed by the same or no letter are not significantly different (NS, $P > 0.05$, ANOVA, LSD).

Table 4. Stem borer research on main and ratoon crop rice. Cocodrie. Ganado, TX. 2007.

Main Crop[a]	Ratoon Crop[a]	No. WHs[b]/4 middle rows Main	No. WHs[b]/4 middle rows Ratoon	Yield (lb/A) Main	Yield (lb/A) Ratoon	Yield (lb/A) Total
T	T	7 b	1 b	7502 a	2648	9970 a
T	U	7 b	10 a	7377 a	2106	9484 a
U	T	55 a	2 b	6477 b	2318	8795 b
U	U	61 a	16 a	6404 b	1975	8379 b
					NS	

[a]T = treated for stem borers; U = untreated.
[b]WHs = whiteheads.
Means in a column followed by the same or no letter are not significantly different (NS, $P > 0.05$, ANOVA, LSD).

Table 5. Stem borer research on main and ratoon crop rice. XL723. Ganado, TX. 2007.

Main Crop[a]	Ratoon Crop[a]	No. WHs[b]/4 middle rows Main	No. WHs[b]/4 middle rows Ratoon	Yield (lb/A) Main	Yield (lb/A) Ratoon	Yield (lb/A) Total
T	T	1 b	0 c	8377 a	2423	10800 a
T	U	0 b	2 b	8675 a	1902	10577 a
U	T	67 a	1 bc	6715 b	2602	9317 b
U	U	66 a	4 a	6794 b	1907	8700 b
					NS	

[a]T = treated for stem borers; U = untreated.
[b]WHs = whiteheads.
Means in a column followed by the same or no letter are not significantly different (NS, $P > 0.05$, ANOVA, LSD).