Result Demonstration/Applied Research Report

Efficacy of Declare® and Transform® Insecticides for Control of Greenbugs in Winter Wheat - 2011

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SUMMARY

Ten insecticide treatments were applied on April 11, 2011 to wheat infested with greenbugs to compare the efficacy of Declare® and Transform® insecticides to Warrior® and the standard chlorpyrifos for aphid control. The plots were established on Kevin Welch'sfield which is near Friona, TX located approximately 3 miles South of Hwy 60 and ½ mile East of FM 3140 on CR I. Statistically all of the insecticide treatments provided equally effective control of greenbugs at each of the three post treatment sample dates.

OBJECTIVE

There are few insecticides registered for use to control greenbug infestations in wheat. In general, producers rely on the insecticide chlorpyrifos for control of greenbug and other aphid pests. Reliance on a single insecticide for control often is responsible for insects developing insecticide resistance. When other products with different modes of action are registered and available, management strategies can be developed to reduce the likelihood of resistance. The insecticide, Declare® is a *gama*-cyhalothrin pyrethoid which is a relatively new pyrethroid formulated as a capsulated suspension. Transform® is a new class of insecticide, sufoxyflor, that may be efficacious against aphids. If these products are effective in controlling greenbugs in wheat, then additional options for resistance management may be available. The objective of this experiment was to evaluate the insecticidal efficacy of Declare® and Transform® at different rates for control of greenbugs and to compare these products to the standard application of chlorpyrifos (Lorsban Advance®) and Warrior II®.

MATERIALS &METHODS

Agronomic Practices

Location:	Near Friona, TX located approximately 3 miles South of Hwy 60 and ½ mile East of FM 3140 on CR I.
Drill Width:	8 inches
Previous crop:	Corn
Tillage System:	Reduced Tillage
Soil Moisture at Planting:	Adequate moisture for germination
Irrigation:	Center Pivot

Experimental Design

The experiment was arranged in a randomized complete block design having four(4) replications. Plots were 10 ft. wide by 35 ft. long

Weather

Climatic conditions were seasonably warm and uniform throughout the testing period. The wheat was under severe drought conditions. There had only been two dates (Feb. 1, 0.2 inch and Feb. 3, 0.05 inch) of measurable rainfall since January 1, 2011.

Date	Max Air Temp (^{o}F)	Min Air Temp (^{o}F)
4/7/11	69.9	37.2
4/8/11	70.6	37.8
4/9/11	71.3	38.2
4/10/11	71.7	38.8
4/11/11	72.1	39.5
4/12/11	72.4	40.0
4/13/11	72.6	40.4
4/14/11	73.1	40.8
4/15/11	73.7	41.2
4/16/11	73.8	41.7
4/17/11	73.9	41.8
4/18/11	74.0	42.1
4/19/11	74.3	42.1
4/20/11	74.3	42.0
4/21/11	74.5	42.2
4/22/11	74.7	42.4

Friona, Parmer Co.

Insecticide Application

Applications of Declare[®], *gama*-cyhalothrin, at rates of 0.0125, and 0.015; Declare[®] (0.01 lbs ai/ac) mixed with Nufos[®] (0.188 lbs ai/ac); Transform[®] at rates of 0.011, 0.016, 0.022, and 0.033 lbs ai/ac; Lorsban Advance[®] at 0.25lbsai/ac, and Warrior II[®] at 0.031 lbs ai/ac were made on April 11, 2011. Applications were made at 14.5 gpa with a CO_2 pressurized hand-carried boom held ca. 20 inches above the wheat. There were 5 (XR8002VS) nozzles on 20 inch centers across the boom which treated the middle 8.3 ft (100 inches) of each 11 ft. wide plot. On the morning of application the temperature was 45°F and winds were from the N-NW direction at 4-5 mph.

Insect Samples and Data Analysis

The total number of greenbugs (nymphs and adults), predators (immature and adults), aphid mummies, and parasitoid wasps were counted from each of two linear ft. drill row of wheat from the center of each plot. Counts were taken three days before treatment and at 3, 7, and 11 days following application (DAT). Data were analyzed using PROC GLM analysis of variance (SAS, 2009) and means were separated with Tukey's studentized range test (P=0.10).

RESULTS &DISCUSSION

The greenbug densities are reported as the mean number of aphids per linear foot of row. Counts of tillers per plant at the pre-treatment sample averaged 61.5 tillers. Greenbug numbers prior to treating were relatively low but they were statistically similar among the treatments (Table 1). Following the applications of Declare[®], Declare[®] plus Nufos[®], Transform[®], Lorsban Advance[®], and Warrior II[®], all treatments and rates reduced greenbug densities lower than the untreated check at each of the 3 DAT, 7 DAT, and 11 DAT samples. The primary difference was how quickly the level of control occurred with the treatments. At 3 DAT, the percentage of control for all of the Transform[®] rates was lower than the other treatments, but the control percentages continued to increase to levels ranging from 83% to 97% by 11 DAT. These control percentages were comparable to the standard application of Lorsban Advance[®]. There was very little difference in percentage of control between the applications of Declare[®] at the 0.015 rate and the mixture of Declare[®] 0.01 rate plus Nufos[®] 0.188 rate at each of the sample dates. Both of these treatments with Declare[®] provided slightly better level of control over time than the 0.0125 rate of Declare[®]. Applications of Lorsban Advance and Warrior II provided good knockdown (91% or better) by 3 DAT and maintained this level of control to 11 DAT.

The predator densities averaged 0.94, 1.4, 1.0, and 0.54 per linear row foot at the pre-trt, 3 DAT, 7 DAT, and 11DAT samples, respectively (Table 2). The densities never differed statistically among the treatments at any of the sample dates. This is an

indication that none of the treatments had a detrimental effect on the predators. The predator most commonly found were the lady beetle larvae and lady beetle adults. Other predators that were occasionally found were big-eyed bugs, minute pirate bugs, lacewing larvae, and spiders.

Parasitoid wasps were present in low numbers at the pre-treatment, 3 DAT, and 7 DAT sample dates (Table 3). Their presence was much greater by the 11 DAT sample date. As with the predator densities, none of the insecticide treatments had a negative effect on the presence of parasitoid wasps.

ACKNOWLEDGEMENTS

Trade names of commercial products used in this report are included only for better understanding and clarity. Reference to commercial products or trade names is made with the understanding that no discrimination is intended and no endorsement by the Texas A&M University System is implied. Readers should realize that results from one experiment do not represent conclusive evidence that the same response would occur where conditions vary.

Table 1. Mean number of greenbugs at 3 days pre-treatment (Pre-trt) and at 3, 7, and 11days after treatment (DAT). 2011.

Treatment	Rate lbai/ ac	Pre-trt	3 DAT GB	3 DAT % Control	7 DAT GB	7 DAT % Control	11 DAT GB	11 DAT % Control
Declare	0.0125	32.0 a	1.0 b	93.5	7.8 ab	56.9	5.13 b	63.2
Declare	0.015	50.9 a	4.3 ab	82.4	7.5 ab	73.9	0.75 b	96.6
Declare + Nufos	0.01 + 0.188	36.5 a	2.3 b	86.9	5.0 b	75.8	0.5 b	96.9
Transform	0.011	41.3 a	10.2 ab	48.5	6.5 b	72.1	1.5 b	91.6
Transform	0. 016	36.3 a	9.8 ab	43.7	6.1 b	70.2	2.75 b	82.6
Transform	0.022	34.9 a	3.67 b	78.1	4.1 b	79.2	0.63 b	95.9
Transform	0.033	42.6 a	6.3 ab	69.2	3.6 b	85.1	0.5 b	97.3
Lorsban Advance	0.25	32.0 a	1.0 b	93.5	0.8 b	95.6	1.13 b	91.9
Warrior II	0. 031	63.0 a	2.8 b	90.7	0.4 b	98.9	2.5 b	90.9
Untreated		28.1 a	13.5 a		15.9 a		12.25 a	
CV		62.0734	88.3204		101.6040		124.4492	
Rep(Prob F)		0.4023	0.0167		0.2484		0.2456	
Trt(Prob F)		0.1949	0.0002		<0.0001		<0.0001	

[a]Means in a column followed by the same letter are not significantly different according to Tukey's studentized range test (P=0.05, SAS Institute 2009).

Table 2. Mean number of predators at 3-day pre-treatment (Pre-trt) and at 3, 7, and 11days after treatment (DAT). 2011.[a]

Treatment	Rate lbai/ac	Pre-trt	3 DAT	7 DAT	11 DAT
Declare	0.0125	1.3 a	2.0 a	1.3 a	0.6 a
Declare	0.015	0.8 a	2.0 a	1.0 a	1.1 a
Declare + Nufos	0.01 + 0.188	1.3 a	0.8 a	1.4 a	0.6 a
Transform	0.011	0.4 a	2.3 a	0.8 a	0.0 a
Transform	0. 016	1.1 a	2.0 a	0.8 a	0.6 a
Transform	0.022	0.9 a	0.8 a	1.0 a	0.5 a
Transform	0.033	0.9 a	0.7 a	0.3 a	0.1 a
Lorsban Advance	0.25	0.6 a	1.2 a	0.9 a	0.1 a
Warrior II	0. 031	1.0 a	1.2 a	0.6 a	0.9 a
Untreated		1.4 a	1.0 a	1.9 a	0.9 a
CV		118.0386	84.5153	115.5567	156.2797
Rep(Prob F)		0.5779	0.3754	0.1767	0.3441
Trt(Prob F)		0.7734	0.1367	0.2724	0.1758

[a] Means in a column followed by the same letter are not significantly different according to Tukey's studentized range test (P=0.05, SAS Institute 2009).

Table 3. Mean number of parasitoid wasps at 3-day pre-treatment (Pre-trt) and at 3, 7, and 11days after treatment (DAT). 2011.

Treatment	Rate lbai/ac	Pre-trt	3 DAT	7 DAT	11 DAT
Declare	0.0125	0.0 a	0.0 a	0.00 b	2.25 a
Declare	0.015	0.1 a	0.2 a	0.13 ab	1.75 a
Declare + Nufos	0.01 + 0.188	0.0 a	0.2 a	0.00 b	1.75 a
Transform	0.011	0.0 a	0.2 a	0.63 a	1.13 a
Transform	0. 016	0.0 a	0.3 a	0.00 b	1.13 a
Transform	0.022	0.3 a	0.0 a	0.00 b	1.88 a
Transform	0.033	0.4 a	0.0 a	0.50 ab	1.25 a
Lorsban Advance	0.25	0.0 a	0.3 a	0.13 ab	1.00 a
Warrior II	0. 031	0.0 a	0.2 a	0.25 ab	2.63 a
Untreated		0.0 a	0.0 a	0.00 b	1.88 a
CV		313.3302	243.6699	224.1295	114.017
Rep(Prob F)		0.0249	0.0173	0.0017	0.4044
Trt(Prob F)		0.0118	0.4665	0.0032	0.7638

[a] Means in a column followed by the same letter are not significantly different according to Tukey's studentized range test (P=0.05, SAS Institute 2009).