AgriLIFE EXTENSION
Texas A&M System

Result Demonstration/Applied Research Report

Efficacy of Declare® and Cobalt® Insecticides for Control of Greenbugs in Winter Wheat - 2010

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SUMMARY

Eight insecticide treatments were applied on April 8, 2010 to wheat infested with greenbugs to determine the efficacy of Declare® and Cobalt® insecticides for aphid control. The plots were established on Robert Boozer's field which is located approximately 14 miles West of Dimmitt, TX and ½ mile south of Hwy 86 on CR 28.

In comparisons to the untreated check, applications of Declare® at 0.0125 lb ai/ac mixed with Nufos® at 0.75 lb ai/ac, Cobalt® at 13 fl. oz/ ac, and Nufos® at 0.5 lb ai/ac provided very effective control for 12 days after application. All rates of Declare® provided moderate to good control 4 days after application but continued to improve by the 12 day after application sample.

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 formulated as a capsulated suspension. The control efficacy of this particular pyrethroid and formulation for greenbug in winter wheat has not been documented. Cobalt® is a relatively new registered product that contains a mixture of both chlorpyrifos and *gamma*-cyhalothrin. If these products are effective in controlling greenbugs, then additional options for resistance management may be available. The objective of this experiment was to evaluate the insecticidal efficacy of Declare® at

different rates and Cobalt® for control of greenbugs and to compare these products to the standard application of chlorpyrifos (Nufos®).

MATERIALS & METHODS

Agronomic Practices

Location:	Ca. 14 miles West of Dimmitt, TX and ½ mile South of Hwy 86 on CR 28.
Drill Width:	8 inches
Previous crop:	Wheat – Summer Fallow
Tillage System:	Conventional
Soil Moisture at Planting:	Adequate moisture for germination
Irrigation:	None

Experimental Design

The experiment was arranged in a randomized complete block design having four (4) replications. Plots were 13 ft. wide by 30 ft. long

Weather

Climatic conditions were relatively mild throughout the testing period.

Daily Weather Conditions

Date	minT	maxT	Mean airT	precip
4/07/2010	19.9	55.7	39.6	0
4/08/2010	17.5	69.8	44.6	0
4/09/2010	27.8	81.5	57.5	0
4/10/2010	33.6	84.2	59.8	0
4/11/2010	30.5	84.7	60.4	0
4/12/2010	53.0	77.4	63.3	0
4/13/2010	56.0	68.7	60.1	0
4/14/2010	54.5	67.5	59.1	0
4/15/2010	51.2	60.2	54.8	0.55
4/16/2010	42.9	56.1	51.4	0.09
4/17/2010	34.8	52.3	45.2	0.02
4/18/2010	30.0	65.4	48.2	0
4/19/2010	45.4	61.4	49.9	0.01
4/20/2010	47.7	79.6	57.7	0

Insecticide Application

Applications of Declare®, *gama*-cyhalothrin ,at rates of 0.01, 0.0125, and 0.015; Declare® (0.01 lbs ai/ac) mixed with Nufos® (0.375 lbs ai/ac); Mustang Max® at 0.0125 lbs ai/ac; Nufos® at 0.5 lbs ai/ac, and Cobalt® at 13 fl. oz/ac were made

on April 8, 2010. Applications were made at 14.5 gpa with a CO_2 pressurized hand-carried boom held ca. 20 in. above the wheat. There were 5 (XR8002VS) nozzles on 20 inch centers across the boom which treated the middle 8 ft (100 inches) of each 13 ft. wide plot. On the morning of application the temperature was 33^{o}F and winds were from the W-SW direction at 2 mph.

Insect Samples and Data Analysis

The total number of greenbugs (nymphs and adults), predators (immature and adults), and aphid mummies were counted from each of three linear ft. drill row of wheat. Counts were taken one day before treatment and at 4, 6, and 12 days following application. Parasitic wasps became more noticeable after the insecticide applications and were sampled at the 6 and 12 day post treatment count dates. 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

At the time the experiment was initiated greenbug densities had become well established in all plots. There was some variability from plot to plot, but there were no statistical differences for greenbug densities across treatments (Table 1). Greenbug predators (predominately Lady beetle larvae) and parasitized greenbug mummies were present in very low numbers.

By 4 days after treatment (DAT) all insecticide treatments, with the exception of the Mustang Max treatment, significantly reduced greenbug numbers below that of the untreated check. The Declare® (0.01 lbs ai/ac) mixed with Nufos® (0.375 lbs ai/ac), Cobalt® at 13 fl. oz/ac, and Nufos® at 0.5 lbs ai/ac treatments suppressed greennbugs to very low levels and mortality exceeding 98% (Table 1). The applications of Declare® at the 0.01, 0.0125, and 0.015 lb ai/ac rates reduced greenbug numbers to 14, 9, and 12, respectively, compared to 92 greenbugs in the untreated check. This was a 74%, 86%, and 85% reduction in greenbugs for the three different Declare® rates.

Greenbug densities at the 6 DAT sample were very similar and consistent with the 4 DAT sample. Control with the mixture of Declare® plus Nufos®, and the Cobalt®, and Nufos® treatments was ≥ 99%. The level of control for the 0.015 lb ai/ac rate of Declare® increased to 95%, but control for the other rates of Declare® remained below 90%. Control with Mustang Max improved slightly to 19%.

By the 12 DAT sample greenbug densities in the untreated check and the Mustang Max treatment remained statistically similar. All other treatments were statistically similar and were significantly less than the untreated check and the Mustang Max treatments. The level of control for all insecticide treatments, except Mustang Max was ≥ 95%.

Predator densities and the number of parasitized greenbug mummies were relatively low throughout the testing period (Tables 2 and 3). By 12 DAT predator numbers were increasing in the untreated check plots, but not in the insecticide treated plots. This could be a result of predator mortality in the treated plots and/or immigration of predators into the untreated plots where greenbugs were still present. Significant numbers of parasitized mummies were never found on any sample date in any of the treatments, including the untreated check. Counts of parasitoid wasps at 6 and 12 DAT were 0.3 to 1.7 (avg. 1.1) and 0.5 to 2.4 (avg. 1.5), respectively. There was no detectable evidence of a particular insecticide treatment having a detrimental effect to the parasitoid wasps.

These results show that applications containing chlorpyrifos provided quick reductions of greenbug densities and remained effective throughout the sampling period(12 DAT). All rates tested for the *gamma*-cyhalothrin pyrethroid, Declare®, gave good greenbug control but maximum levels of control were slower compared to treatments which included chlorpyrifos. The highest rate of Declare® provided comparable levels of control achived with chlorpyrifos treatments by 6 DAT.

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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 1 day pre-treatment (Pre-trt) and at 4, 6, and 12 days after treatment (DAT). 2010.

			4 DAT		6 DAT		12 DAT	
Treatment	Rate / ac	Pre-trt[ab]	GB[ab]	% Control[c]	GB[ab]	% Control[c]	GB[ab]	% Control[c]
Check		148.83 a	91.67 a		103.42 a		94.00 a	
Mustang Max 0.8	0.0125 lb ai	124.33 a	98.42 a	0.0	69.58 b	19.5	73.00 a	7.0
Declare 1.25 CS	0.01 lb ai	88.58 a	14.08 b	74.2	10.83 b	82.4	3.08 b	94.5
Declare 1.25 CS	0.0125 lb ai	102.83 a	8.67 b	86.3	16.75 b	76.6	4.08 b	93.7
Declare 1.25 CS	0.015 lb ai	134.58 a	12.33 b	85.1	4.67 bc	95.0	1.83 b	97.8
Declare 1.25 CS + Nufos 4E	0.01 lb ai + 0.375 lb ai	98.67 a	0.50 c	99.2	0.50 cd	99.3	0.42 b	99.3
Cobalt[d]	13 fl oz	95.5 a	0.92 c	98.4	0.00 d	100.0	0.50 b	99.2
Nufos 4E	0.5 lb ai	125.5 a	0.92 c	98.8	0.33 cd	99.6	3.00 b	96.2
CV		18.5640	49.3181		55.3714		56.6755	
Rep(Prob F)		0.1661	0.0006		0.0085		0.0008	
Trt(Prob F)		0.6664	0.0001		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=0.10, SAS Institute 2009).
[b] Values were corrected using the formula Log(x + 1.0) prior to conducting ANOVA.
[c] Percent control determined from the formula by Henderson and Tilton (1955).
[d] Cobalt application rate was equivalent to 0.25 lb ai/ac of chlorpyrifos and 0.0046 lb ai/ac of gamma-cyhalothrin.

Table 2. Mean number of predators at 1-day pre-treatment (Pre-trt) and at 4, 6, and 12 days after treatment (DAT). 2010.

Treatment	Rate / ac	Pre-trt[ab]	4 DAT[ab]	6 DAT[ab]	12 DAT
Check		0.00 a	0.50 a	0.67 a	2.25 a
Mustang Max 0.8	0.0125 lb ai	0.25 a	0.00 a	0.08 b	0.50 b
Declare 1.25 CS	0.01 lb ai	0.08 a	0.08 a	0.25 ab	0.00 b
Declare 1.25 CS	0.0125 lb ai	0.00 a	0.00 a	0.08 b	0.50 b
Declare 1.25 CS	0.015 lb ai	0.25 a	0.00 a	0.00 b	0.58 ab
Declare 1.25 CS + Nufos 4E	0.01 lb ai + 0.375 lb ai	0.17 a	0.08 a	0.08 b	0.17 b
Cobalt[c]	13 fl oz	0.25 a	0.25 a	0.00 b	0.08 b
Nufos 4E	0.5 lb ai	0.08 a	0.33 a	0.25 ab	0.33 b
CV		265.0714	283.7515	261.7705	158.4967
Rep(Prob F)		0.1343	0.6494	0.5386	0.0490
Trt(Prob F)		0.3878	0.0689	0.0117	0.0003

[a] Means in a column followed by the same letter are not significantly different according to Tukey's studentized range test (P=0.10, SAS Institute 2009).
[b] Values were corrected using the formula Log(x + 1.0) prior to conducting ANOVA
[c] Cobalt application rate was equivalent to 0.25 lb ai/ac of chlorpyrifos and 0.0046 lb ai/ac of gamma-cyhalothrin.

Table 3. Mean number of parasitized greenbug mummies at 1-day pre-treatment (Pre-trt) and at 4, 6, and 12 days after treatment (DAT). 2010.

Treatment	Rate / ac	Pre-trt[ab]	4 DAT[ab]	6 DAT[ab]	12 DAT[ab]
Check		0.08 a	1.08 a	1.08 a	1.25 a
Mustang Max 0.8	0.0125 lb ai	0.42 a	1.83 a	0.50 a	1.17 a
Declare 1.25 CS	0.01 lb ai	0.83 a	0.33 a	0.25 a	0.83 a
Declare 1.25 CS	0.0125 lb ai	0.83 a	0.83 a	0.33 a	0.50 a
Declare 1.25 CS	0.015 lb ai	0.92 a	1.08 a	0.25 a	1.33 a
Declare 1.25 CS + Nufos 4E	0.01 lb ai + 0.375 lb ai	0.92 a	0.50 a	0.08 a	0.75 a
Cobalt[c]	13 fl oz	1.08 a	1.58 a	0.42 a	0.33 a
Nufos 4E	0.5 lb ai	1.42 a	2.17 a	0.25 a	0.50 a
CV		115.7566	107.0187	150.94.02	121.6957
Rep(Prob F)		0.4109	0.1852	0.0271	0.2254
Trt(Prob F)		0.0553	0.0473	0.0514	0.2439

[a] Means in a column followed by the same letter are not significantly different according to Tukey's studentized range test (P=0.10, SAS Institute 2009).
[b] Values were corrected using the formula Log(x + 1.0) prior to conducting ANOVA
[c] Cobalt application rate was equivalent to 0.25 lb ai/ac of chlorpyrifos and 0.0046 lb ai/ac of gamma-cyhalothrin.