

**ACTIVITY OF STEWARD AGAINST PLANT BUGS,
BOLLWORMS AND PREDACIOUS ARTHROPODS
IN COTTON IN SOUTH CAROLINA**

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Abstract

In two small plot tests, populations of plant bugs and bollworms were too low to determine differences among treatments. However, in test 1 (12 rows X 30 ft.), after two applications, Steward at 0.09 or 0.11 lbs. a.i. caused ca. 6- and 25- fold reductions, respectively, in ant numbers and Karate Z at 0.03 lbs. caused a 12-fold reduction compared with the untreated plots. There were no significant differences between untreated plots and those treated with Tracer at 0.08 lbs. a.i. In a second test (plots 16 rows X 40 ft.) in which two applications of Steward at 0.09 and 0.18 lbs. a.i. were compared with an untreated check, ant populations were reduced significantly and substantially by both rates after one and two applications. Although differences in numbers of geocorids were not significant after the first application, the high rate of Steward had significantly lower numbers of adults than did untreated plots following a second application. Additional studies are needed to assess the impact of Steward on beneficials, particularly in areas where ants and geocorids are important predators.

Introduction

The oxidiazine, Steward®, from DuPont is being developed as a lepidopterous larvacide for cotton. Also, it reportedly has good activity against *Lygus* spp. without disturbing beneficial arthropods. Reported herein are results of two tests; one in which normal rates were compared against cotton bollworm, *Helicoverpa zea* (Boddie), *Lygus* spp. and predacious arthropods; a second in which a normal and a high rate were evaluated against predacious arthropods.

Materials and Methods

In the first test, two rates of Steward® and one rate of Tracer® and Karate Z® were applied on July 22 and July 27 to plots 12 rows wide by 30 ft. long replicated four times in a RCB design. Plots were sampled on 7/31 and 8/4 for pests and beneficials using a beat cloth (three per plot). In the second test, Steward at 0.09 and 0.18 lbs. a.i./A was applied on 8/6 and 8/11 to plots 16 rows wide by 40 ft. long replicated five times in a RCB design. Beat cloth samples

were taken on 8/9 and 8/18 and were supplemented with samples from pit-fall traps.

Results and Discussion

Data in Table 1 show information obtained on very low populations of plant bugs and cotton bollworm. There were little or no differences among treatments. However, Karate Z tended to give better control of both insects. In Table 2, ant numbers were significantly lower in plots treated twice with Steward at 0.09 or 0.11 lbs. a.i. or with Karate Z at 0.03 lbs. a.i. Applications of Karate Z resulted in significantly lower populations of spiders compared to untreated plots. Data on geocorid nymphs were inconclusive. Data assessing Steward activity on geocorids (primarily *Geocoris punctipes*) and ants (*Solenopsis invicta*) are shown in Tables 3 and 4. At three days after the first application (Table 3), there were no significant differences between Steward at either 0.09 or 0.18 lbs. a.i. compared with untreated plots. However, ant numbers were substantially and significantly lower in Steward plots. At seven days after a second application (Table 4), the 0.18 rate of Steward caused significant reductions in geocorid adults compared to untreated plots. Plots receiving the normal use rate of Steward (0.09 lbs. a.i.) were intermediate and not significantly different from either plots receiving the 0.18 rate or untreated plots. Both Steward rates caused substantial reductions in ants that were either foraging on plants (beat cloth samples) or moving across the soil surface (pitfall traps).

Normal use rates of Steward can be expected to adversely impact numbers of *S. invicta*, whereas only very high rates may impact *G. punctipes*. We suggest that additional studies be conducted to determine whether or not Steward applications may perturb predacious arthropods to the extent that later pressure from pest species is increased. This may be particularly important in areas where *S. invicta* is abundant in cotton.

Table 1. Efficacy of Steward®, Tracer® and Karate Z® against plant bugs and bollworms in cotton in South Carolina, Test 1, 1999.

Treatment ¹ and rate/A (lbs. a.i.)	Plant bugs at 4 days after 2 nd application	Mean ² no. in 9 row feet ³	
		Bollworms after 2 nd application	
		4 days	8 days
Steward 0.09	2.0abc	1.8a	2.8ab
Steward 0.11	1.0bc	1.3ab	4.5ab
Tracer 0.08	3.5a	0.0b	4.0ab
Karate Z 0.03	0.3c	0.3b	1.3b
Untreated	1.8abc	0.8ab	7.3a

¹ Treatments applied 7/22 and 7/27

² Means followed by the same letter are not significantly different (p=0.05)

³ From three beat samples using a 3' X 3' cloth.

Table 2. Activity of Steward®, Tracer® and Karate Z® on predacious arthropods in cotton in South Carolina. Test 1, 1999.

Treatment ¹ and rate/A (lbs. a.i.)	Mean ² no. in 9 row feet ³ 4 days after 2 nd application.		
	Geoc. Nymphs	Ants	Spiders
Steward 0.09	4.8b	10.8b	3.0bc
Steward 0.11	8.5ab	2.5b	8.5a
Tracer 0.08	12.0a	48.5a	4.0bc
Karate Z 0.03	7.0ab	5.0b	1.3c
Untreated	7.3ab	61.3a	6.0ab

¹ Treatments applied 7/22 and 7/27

² Means followed by the same letter are not significantly different (p=0.05)

³ From three beat samples using a 3' X 3' cloth.

Table 3. Activity of Steward® on predacious arthropods in cotton in South Carolina. Test 2, 1999.

Treatment ¹ and rate/A (lbs. a.i.)	Mean ² no. in 3 beat samples on 8/9 ³ .			
	Geocorids (<i>G. Punctipes</i>)			Ants (<i>Solenopsis invicta</i>)
	Nymphs	Adults	Total	
Steward 0.09	5.8a	0.8a	6.6a	3.6b
Steward 0.18	1.6a	0.2a	1.8a	7.2b
Untreated	5.2a	1.4a	6.6a	51.8a

¹ Treatments applied 8/6 and 8/11.

² Means followed by the same letter are not significantly different (p=0.05).

³ Three days after the first application.

Table 4. Activity of Steward® on predacious arthropods in cotton in South Carolina. Test 2, 1999.

Treatment ¹ and rate/A (lbs. a.i.)	Mean ² no. in 3 beat samples on 8/18 ³		Ants in 3 pitfall traps ⁴
	Geoc. adults	Ants	
Steward 0.09	7.0ab	7.2b	22.0b
Steward 0.18	2.6b	2.0b	11.4b
Untreated	9.8a	45.8a	250.2a

¹ Treatments applied 8/6 and 8/11.

² Means followed by the same letter are not significantly different (p=0.05).

³ Three days after the first application.

⁴ Four-day period (8/11 - 8/15).