

Efficacy of Insecticides for Pink Bollworm and Cotton Leaf Perforator Control in Cotton Grown in the Low Desert Region of Arizona, 1997

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Abstract

Neither Tracer nor Proclaim appeared to be effective pink bollworm materials whether applied at day or night. However against cotton leafperforator, both Tracer and Proclaim provided sufficient control. Although all three formulations of Karate equally provided statistically significant pink bollworm control, it was not commercially acceptable. Shortening the spray interval from 7 to 4 days may have helped alleviate this problem. None of the Karate formulations evaluated appeared to offer outstanding cotton leafperforator control.

Introduction

Prior to the appearance of whiteflies in Arizona cotton, the pink bollworm, *Pectinophora gossypiella* (Saunders) was the most serious insect pest facing many Arizona cotton growers. Although transgenic cotton cultivars containing the Bollgard™ genes from *Bacillus thuringiensis* have proved extremely effective in controlling this pest, there is much interest in developing alternative control programs for resistance management purposes. In addition to the pink bollworm, the cotton leafperforator, *Bucculatrix thuriberiella* Busck is a lepidopterous pest of Arizona cotton. The cotton leafperforator is usually a late season foliage feeder, rarely causing direct economic damage. However, leaves damaged by cotton leafperforator are often much more difficult to defoliate than non-damaged leaves. Thus, control of this pest is an important consideration.

The goal of this study was evaluate experimental insecticides for pink bollworm and cotton leafperforator control in cotton grown in southwestern Arizona.

Materials and Methods

This trial was conducted at the Yuma Valley Agricultural Center. Cotton, 'DPL 5461', was planted on 40 in beds on March 19, 1996. The test was a randomized complete block design, with 4 replicates. Plots were 4 rows X 50 ft, bordered on each side by 2 blank rows and on each end by 10 ft alleys. Products evaluated included Proclaim 5SG (emamectin benzoate) at 0.0075, 0.01 and 0.0125 lbs-ai/A, Tracer (Spinosad) at 0.063 lbs-ai/A, and three formulations of the pyrethroid Karate (cyhalothrin) at 0.025 lbs-ai/A. All treatments included Kinetic spreader sticker at 0.1% v/v. Treatments were sprayed using a tractor mounted sprayer. The boom covered 4 rows, with 3 hollow-cone D-2 nozzles per row, one centered over each row and two on 18 in drops on each side. The sprayer was calibrated to deliver 20 gallons per acre at 40 psi. The tractor traveled at 3 mph.

Applications for pink bollworms were made on 30 July, 6, 12 and 19 August. Application on 30 July and 6 August were made early in the day, and those on 12 and 19 August were made just following sunset. Insecticide efficacy was evaluated by collecting 25 soft medium sized bolls per plot and evaluating the number infested and damaged by pink bollworm larvae. A pre-application evaluation was made on 28 July, and post-application evaluations were made 5

to 6 days after treatment (DAT) on 4, 11, 18 and 25 August.

On 2 August, 8 days following the last data collection date for pink bollworm and 14 days following the last insecticide application, a pre-application evaluation was made for cotton leafperforator. Insecticide applications were made on 3 and 10 September. Evaluations were made by taking 25 full sweeps using a 15 inch sweep net swung in a 180 degree arc, and counting the number of cotton leafperforator larvae. Evaluations were made at 2 DAT on 5 and 12 September, and 6 DAT on 9 and 16 September.

All data were analyzed using an analysis of variance, and an F protected ($P < 0.05$) LSD for means separation.

Results and Discussion

University of Arizona recommends treating pink bollworms in Western Arizona when populations reach 5% infested bolls. On 28 July pink bollworm infested bolls were averaging 4.4% across treatments triggering the first application on 30 July (Table 1). Following the first application, variability was high and none of the products evaluated differed from the untreated. However, differences among treatments were observed following applications 2, 3 and 4. Although slight efficacy was detected, neither Tracer nor Proclaim appeared to be viable pink bollworm control products. Proclaim at 0.0125 lbs-ai/A differed from the untreated on 18 August when it averaged 45% infested bolls relative to 64% in the untreated. Tracer differed from the untreated only on 25 August when it averaged 70% infested bolls, relative to 87% in the untreated. Spraying at night rather than day did not appear to enhance the pink bollworm control of Tracer or Proclaim.

Although all of the formulations of Karate tested performed better than Proclaim or Tracer, and contained significantly fewer infested bolls than the untreated following applications 2, 3 and 4, control was not commercially sufficient (Table 1). To achieve better control with Karate, we probably should have shortened our spray interval from 7 to 4 days.

Cotton leafperforator numbers were high in this trial. Precounts taken on 2 September averaged 44 per 100 sweeps across treatments (Table 2). Although numerically there were great differences among treatments when precounts were taken, these differences were not statistically different. Two days following application 1, all of the insecticide treatments differed from the untreated, but not among each other. By 6 DAT, only the Karate formulations failed to contain statistically fewer perforators than the untreated. Tracer and Proclaim were both effective in controlling cotton leafperforator, providing 85-90% control. Following application 2, perforator populations had declined sharply across all treatments including the untreated. Tracer and Proclaim both appeared to provide superior control, but by 6 DAT did not differ from the Karate treatments.

Overall, neither Tracer nor Proclaim appeared to be effective pink bollworm materials. This finding was not unexpected, both Tracer and Proclaim are both most active if ingested, and have limited adjuvantic activity. However against cotton leafperforator, both Tracer and Proclaim provided sufficient control. Although all three formulations of Karate equally provided statistically significant pink bollworm control, it was not commercially acceptable. Shortening the spray interval from 7 to 4 days may have helped alleviate this problem. None of the Karate formulations evaluated appeared to offer outstanding perforator control.

Table 1. Mean percentage of pink bollworm damaged bolls^a.

Treatments	Rate (lbs-ai/A)	28 July (precount)	4 Aug (5 DAT) Day-App	11 Aug (5 DAT) Day-App	18 Aug (6 DAT) Night-App	25 Aug (6 DAT) Night-App
Untreated		5.00 ± 1.00 a	28.00 ± 4.00 a	33.00 ± 3.00 a	64.00 ± 4.90 a	87.00 ± 3.00 a
Proclaim 5SG	0.0075	3.00 ± 1.91 a	15.00 ± 3.79 a	28.00 ± 6.93 a	63.00 ± 11.12 ab	73.00 ± 6.19 ab
Proclaim 5SG	0.010	3.00 ± 1.00 a	19.00 ± 3.00 a	29.00 ± 6.61 a	62.00 ± 3.46 ab	79.00 ± 6.40 ab
Proclaim 5SG	0.0125	8.00 ± 3.27 a	21.00 ± 3.42 a	21.00 ± 5.74 ab	45.00 ± 10.12 bc	81.00 ± 5.74 ab
Tracer	0.063	6.00 ± 3.83 a	20.00 ± 6.53 a	33.00 ± 6.61 a	61.00 ± 7.72 ab	70.00 ± 5.29 b
Karate 1.0CS	0.025	3.00 ± 1.91 a	16.00 ± 2.83 a	6.00 ± 2.58 b	25.00 ± 9.43 d	44.00 ± 4.32 c
Karate 2.09CS	0.025	4.00 ± 1.63 a	15.00 ± 2.52 a	11.00 ± 1.91 b	29.00 ± 3.79 cd	36.00 ± 2.31 c
Karate 1EC	0.025	3.00 ± 1.91 a	11.00 ± 5.51 a	11.00 ± 5.00 b	33.00 ± 5.97 cd	36.00 ± 2.83 c

Means in a column followed by the same letter are not significantly different (F protected LSD, P < 0.05).

^aAll foliar treatments were applied with Kinetic non-ionic surfactant at 0.1% v/v.

Table 2. Mean number of cotton leafperforator larvae per 100 sweeps^a.

Treatment	Rate (lbs-ai/A)	2 September (precount)	5 September (2 DAT)	9 September (6 DAT)	12 September (2 DAT)	16 September (6 DAT)
Untreated		94.00 ± 21.32 a	119.00 ± 19.28 a	38.00 ± 5.03 a	26.00 ± 9.02 a	44.00 ± 7.30 a
Proclaim 5SG	0.0075	34.00 ± 1.15 a	11.00 ± 5.51 b	8.00 ± 1.63 b	1.00 ± 1.00 c	5.00 ± 3.79 b
Proclaim 5SG	0.010	44.00 ± 6.73 a	10.00 ± 2.58 b	5.00 ± 1.00 b	6.00 ± 4.76 bc	5.00 ± 1.91 b
Proclaim 5SG	0.0125	31.00 ± 5.26 a	15.00 ± 8.23 b	6.00 ± 2.58 b	1.00 ± 1.00 c	11.00 ± 8.39 b
Tracer	0.063	16.00 ± 6.73 a	7.00 ± 3.42 b	2.00 ± 1.15 b	0.00 ± 0.00 c	2.00 ± 1.15 b
Karate 1.0CS	0.025	51.00 ± 25.21 a	35.00 ± 5.74 b	17.00 ± 4.73 ab	20.00 ± 7.12 ab	14.00 ± 4.76 b
Karate 2.09CS	0.025	40.00 ± 18.76 a	21.00 ± 13.10 b	33.00 ± 12.49 a	14.00 ± 7.02 abc	16.00 ± 8.49 b
Karate 1EC	0.025	44.00 ± 17.05 a	38.00 ± 15.45 b	23.00 ± 15.26 ab	12.00 ± 5.89 abc	12.00 ± 1.63 b

Means in a column followed by the same letter are not significantly different (F protected LSD, P < 0.05).

^aAll foliar treatments were applied with Kinetic non-ionic surfactant at 0.1% v/v.