INSECTICIDAL CONTROL OF TARNISHED PLANT BUG IN LATE SEASON COTTON

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Introduction

Cases of populations of tarnished plant bug (*Lygus lineolaris* (Palisot de Beauvois)) with decreased tolerance to insecticides and in some instances, insecticide resistance, have been reported in Arkansas and Mississippi (Hollingsworth et al 1997, and Snodgrass and Elzen 1996). Scott and Snodgrass (1996) reported a spring to fall increase of pyrethroid resistance from 57.7% to 84.7% of plant bug populations collected from the Mississippi delta region. Such variations in susceptibility make it appropriate to test new insecticides and re-evaluate standard products in late season cotton in addition to testing for early season control. Summaries of results from late season trials from 1996 and 1997 conducted at the University of Arkansas Cotton Branch Experiment Station in Marianna are presented here.

Materials and Methods

In 1996 trials, 'DPL 51' cotton was planted 9 May in 8 row (38 inch centers) wide plots 70 ft long with 10 ft alleys and separated by a 6.5 ft buffer planted in mustard which was blooming at the time of the study. Treatments were arranged in a RCBD with 3 replications. Insecticides were applied using a 8-row CO_2 charged hi-boy sprayer calibrated to deliver 8.5 GPA at 30 psi with TJ-60 8002 VS nozzles on 19 inch spacing. For trials in 1997, 'Sure-Grow 125' was planted 12 May in similar plot configuration except there was no mustard; plots were separated by a 6.5 ft non-planted buffer. There were 4 replications in 1997, and spray volume was 9.5 GPA.

1996 Evaluations

Trial 1 - Fipronil and 2 different formulations of Karate were evaluated using a cage bioassay. Treatments were applied 25 July. Prior to application, plant bugs were collected using sweep nets in blooming mustard then placed in 15 ml plastic vials (5 insects per vial) on ice. Three organdy sleeve cages, 6 inches diameter by 18 inches long, were secured to randomly selected individual plants in the center 2 rows of each plot by tying the lower end of each cage around the plant ca 1 ft from the terminal with twist ties. The cages were rolled down to the tie and covered with aluminum foil leaving plant terminals exposed. Following insecticide application, the foil was removed, the cage pulled up, and 5 plant bug nymphs (3 to 5th instar) were placed into each cage. Cage tops were secured with twist ties. After 96 hrs following insecticide application, plants were cut below the cage and taken to the laboratory where plant bug mortality was determined. All data were analyzed with AOV, and means separated with LSD.

Trial 2 - Additional cage tests in 1996 included evaluation of 2 rates of Curacron and Orthene. Applications were made 26 July.

Trial 3 - A group of synthetic pyrethroids, Tracer and Orthene were evaluated in an open plot test. Applications were made 26 July and evaluated 4 DAT using 25 sweeps of an 18" net and 6 drop cloth samples on 9 ft of row (1.5 ft drops). Effects on beneficial natural enemies also were measured. Predaceous insects were counted in drop cloth samples. The predators were separated into groups - total predators and Hemipterian predators. The latter group consisted of *Geocoris* spp., *Nabis* spp., and *Orius* spp. Total predators included the Hemipterian predators plus Coccinellids (including a *Scymnus* spp.), Chrysopids and spiders.

1997 Evaluations

Trial 4 - Insecticides fipronil, Karate, Baythroid and Bidrin, were applied 14 August in an open plot test. Plants were too tall to use drop cloth sampling, so only sweep nets were used for evaluations. Treatments were evaluated 4 DAT using 25 sweeps of an 18" net.

Trial 5 - Applications of Orthene, Curacron and the experimental material MP062 (DuPont) were made 18 Aug. The number of plant bugs per plot were estimated at 4 DAT using sweep net samples.

Results

Trial 1 - Highest mortality was recorded in treatment plots receiving applications of fipronil (Table 1). No differences in mortality were observed between the different formulations of Karate.

Trial 2 - Plant bug mortality was greatest in treatment plots receiving applications of Orthene (Table 2). Mortality was determined to be 90% compared to 60% and 68% mortality at the high and low rates of Curacron.

Trial 3 - Significantly lower numbers of tarnished plant bug were observed in drop cloth samples for all pesticides tested compared to the untreated control (Table 3). Best control was observed in plots receiving Capture at 0.06 lbs AI/ac

Reprinted from the *Proceedings of the Beltwide Cotton Conference*
Volume 2:1260-1261 (1998)
National Cotton Council, Memphis TN

and in Orthene treated plots. The drop cloth sample method was superior in allowing separation of treatment effectiveness compared to the sweep net. All treatments significantly lowered numbers of Hemipterian predators compared to the untreated control.

Trial 4 - Numbers of tarnished plant bug 4 DAT were significantly reduced in all plots sprayed with insecticides compared to the untreated control (Table 4). Control with the CS formulation of Karate was reduced compared to the EC formulation.

Trial 5 - Application of Orthene significantly lowered the number of tarnished plant bug in comparison to other treatments (Table 5). Reductions in tarnished plant bug numbers also were noted with other insecticide treatments compared to the untreated plots; however, control was below acceptable levels.

It is notable that the fields where these trials were conducted in 1996 and 1997 had not been sprayed previously that season with insecticides. The relative susceptibility of the tarnished plant bug populations to synthetic pyrethroids and other compounds probably was related to this lack of selection pressure. Crop protection decision makers in the Midsouth should strictly adhere to their state's recommended Insecticide Resistance Management Policies in order to avoid (or delay) selection for resistant populations of tarnished plant bug. In Arkansas, these are outlined in the Cooperative Extension recommendations MP 144.

References

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Table 1. Mortality of tarnished plant bugs (TPB) after exposure to fipronil and Karate in cages for 3 days-1996.

Treatment	Rate lbs (AI)/ac	% TPB mortality
fipronil 2.5 EC	0.1	100.0
Karate 1 EC	0.030	68.5
Karate 2.09 CS	0.030	85.0
Untreated		0.0
P > *F* (AOV)		0.05
LSD (0.05)		18.1

Table 2. Tarnished plant bug % mortality following applications of Curacron and Orthene-1996.

Treatment	Rate lbs (AI)/acre	% TPB mortality
Curacron 8E	0.25	68
Curacron 8E	0.50	60
Orthene 90S	0.50	90
Untreated		0
P > *F* (AOV)		0.05
LSD (0.05)		32.1

Table 3. Numbers of tarnished plant bugs and beneficial natural enemies present following applications of synthetic pyrethroids, Tracer and Orthene- 1996.

	Mean no. TPB			
Treatment & rate [lbs(AI)/ac]	per 25 sweeps	per 9 ft row (drop cloth)	Total predators /9 ft row (drop cloth)	Hemipterian predators /9 ft row (drop cloth)
Capture 2EC 0.04	5.25	9.75	20.75	6.50
Capture 2EC 0.06	3.00	6.00	23.50	5.00
Karate 1EC 0.028	5.50	7.50	24.75	4.75
Baythroid 2EC 0.03	7.25	8.50	27.50	9.75
Decis 1.5EC 0.023	5.00	9.75	25.75	7.75
Orthene 90S 0.5	5.75	6.00	19.00	5.75
Tracer 4CS 0.062	8.25	12.25	19.25	2.75
Untreated	7.75	18.50	27.75	16.75
P > *F* (AOV)	N.S.	0.05	N.S.	0.05
LSD (0.05)		4.98		5.91

Table 4. Numbers of tarnished plant bugs present following applications of synthetic pyrethroids, fipronil and Bidrin - 1997.

Treatment	Rate lbs (AI)/ac	TPB nymphs & adults/24 sweeps (4 DAT)
fipronil 2.5 EC	0.033	3.8
Karate 1 EC	0.03	5.5
Karate 2.09 CS	0.03	10.0
Baythroid 2 EC	0.03	6.0
Bidrin 8 EC	0.50	3.0
Untreated		18.8
P > *F* (AOV)		0.05
LSD (0.05)		18.1

Table 5. Numbers of tarnished plant bugs present following applications of Curacron, MP062, and Orthene- 1997.

Treatment	Rate lbs (AI)/ac	TPB nymphs & adults/24 sweeps (4 DAT)
Orthene 90S	0.50	7.5
Curacron 8E	0.50	30.8
MP062 1.25 CS	0.06	25.8
MP062 1.25 CS	0.11	21.0
Untreated		39.5
P > *F* (AOV)		0.01
LSD (0.05)		6.8