NEW INSECTICIDES FOR CONTROL OF COTTON FLEA HOPPER AND IMPACT OF DROUGHT ON PRODUCTION

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Abstract

Metasystox-R, Fulfill, Actara, Emamectin benzoate, Orthene (two formulations), Bidrin, Provado (two rates) and an untreated check were compared for control of fleahoppers and effect on beneficial arthropods. Two insecticide treatments were spaced 7 days apart. Insecticide treatments significantly reduced fleahopper numbers as measured 3 and 6 days after each treatment. Least disruption of predators (not significantly different from the untreated check) was found in Fulfill, Bidrin, Orthene (both formulations) and Metasystox-R treated cotton. Significant differences were not observed in lint yield; however, a numerical increase did occur in all but one of the insecticide treatments (average of 29.7 lb/acre). Important changes in fiber characteristics did not occur.

Introduction

The cotton fleahopper, *Pseudatomoscelis seriatus* (Reuter), can cause extensive loss of small squares during the early fruiting phase of plant development. The period of greatest susceptibility is from primordial square until bloom. Generally, cotton varieties with smooth leaves are more susceptible than those with hairy leaves. They damage cotton by sucking sap from tender portions of the plant including the pinhead and smaller sized squares. In a 1993 field experiment at Corpus Christi in which 8 insecticides were evaluated, the average yield increase was 80 lb lint/acre (Parker et al. 1993). In another experiment (Parker 1996) in which 7 insecticides were evaluated, the average increase was 200 lb lint/acre; a net return of $105.00/acre was achieved in the latter test. Fleahoppers numbered 44 and 67/100 plants respectively in the untreated cotton during the susceptible period in these two experiments.

The objectives of the experiment were to compare insecticides for effectiveness in controlling fleahoppers, to measure the impact of these treaments on beneficial arthropods and to determine dollar returns from treatments.

Materials and Methods

Treatments were replicated 4 times in a RCB design with each treatment 4 rows (38-inch centers) by 30 ft. The experiment was conducted on DPL 33B variety cotton planted on 31 Mar in soil a profile full of moisture, sandy clay loam texture (52% sand, 16% silt and 32% clay), pH of 8.1 and 1.1% organic matter. Fertilizer applied was 77+26+0+2% zinc; herbicides Treflan 4F (1 qt/acre) in Dec 1997 and Caparol 4L (3 oz/acre) applied at-planting were used for weed control.

Insecticides were applied to the center two rows of each plot. The first treatment was made on 19 May with a compressed air sprayer calibrated at 2 mph to deliver 8.2 gpa total volume through TX3 hollowcone nozzles at a pressure of 45 psi. The second treatment was made on 26 May with a CO_2 backpack sprayer calibrated to deliver 7.45 gpa total volume through TX3 hollowcone nozzles at a pressure of 40 psi. Two nozzles were used per row. No effective rain was received after planting (0.22 inches on 5 dates) through harvest.

Treatment effects were measured by (1) counting the number of fleahoppers/20 plant terminals in each plot 3 and 6 days after treatment (DAT) 1 and 2, (2) recording the number of beneficial arthropods/20 plant terminals on the same dates fleahopper counts were made, (3) harvesting cotton for yield analysis on 1 Aug from 13.75 ft row from both of the treated rows in each plot, and (4) evaluating lint samples for fiber characteristics (International Textile Center, Lubbock, TX). All data were analyzed by ANOVA and LSD.

Results and Discussion

All insecticide treatments significantly reduced fleahopper numbers compared to the untreated check on all inspection dates (3 and 6 DAT) after each treatment (Table 1). Fulfill, Actara (Novartis), Orthene 97Pel and Provado (high rate) were the only insecticides tested which maintained fleahopper numbers at or below 10% for the duration of the test period. Effects on predator numbers measured 3 DAT-2 demonstrated that most insecticides reduced their numbers (Table 2). Least disruption (total predators) occurred with Bidrin, both Orthene formulations, Fulfill and Metasystox-R. No differences were found in the number of harvested bolls but differences were found in the number of harvested bolls required to produce a lb of fiber (Table 3). Numerically, untreated check plots had the least fiber weight per boll and several insecticide treatments had significantly heavier bolls. No statistical differences were observed in lint production but all insecticide treatments, except one, produced numerically more lint than the untreated check. The only statistical difference found in fiber characteristics was fiber elongation; although statistically significant, the difference had no economic value (Table 4).

Acknowledgments

References

Parker, Roy D. 1996. Comparison of insecticides for control of fleahoppers on Texas Coastal Bend cotton. pp. 769-771. *in* Proc. Beltwide Cotton Prod. Res. Conference, National Cotton Council, Memphis, TN.

Parker, Roy D., Stephen D. Livingston and Raymond L. Huffman. 1993. Evaluation of insecticides for control of fleahopper on cotton. pp. 57-64. *in* Results of Insect Control Evaluations on Corn, Sorghum, Cotton and Pecans in Texas Coastal Bend Counties, Texas Agricultural Extension Service, Corpus Christi, TX.

Table 1. Total fleahoppers (nymphs and adults) in insecticide treated cotton, Texas Agricultural Experiment Station Farm, Corpus Christi, TX, 1998.

Treatment/ formulation	Rate form/ acre	Fleahoppers / 20 plants				Season Avg
		3 DAT-1	6 DAT-1	3 DAT-2	6 DAT-2	
Metasystox-R 2EC	0.5 pt	5.5 b	10.3 b	1.67 b	4.0 b	5.4 b
Fulfill 50WG	2.75 oz	0.8 c	1.8 d	.67 bc	2.0 bc	1.3 de
Actara 25WG	4.29 oz	0.3 c	1.8 d	0.0 c	.33 c	0.6 e
Emamectin benzoate .16 EC	0.5 pt	1.8 c	4.8 cd	.67 bc	2.0 bc	2.3 cde
Orthene 90SP	4.44 oz	2.8 bc	5.5 cd	.33 bc	1.33 bc	2.5 cd
Orthene 97Pel	4.12 oz	0.8 c	4.3 cd	0.0 c	0.67 c	1.4 cde
Bidrin 8EC	3.2 oz	3.0 bc	7.3 bc	1.0 bc	2.67 bc	3.5 bc
Provado 1.6 F	3.75 oz	1.5 c	3.8 cd	.33 bc	2.00 bc	1.9 cde
Provado 1.6 F	1.875 oz	3.0 bc	5.5 cd	1.0 bc	1.67 bc	2.8 cd
Untreated		13.0 a	21.3 a	8.0 a	8.7 a	12.8 a
LSD (P=0.05)		3.21	4.37	0.518	2.958	2.028
P > F		.0000	.0000	.0000	.0008	.0000

Means in a column followed by the same letter are not significantly different by ANOVA (P=0.05; LSD).

Table 2. Number of predators three days after treatment with insecticides for cotton fleahopper, Texas Agricultural Experiment Station, Corpus Christi, TX, 1998.

Treatment/ formulation	Rate form / acre	Number per 20 terminals[a]					Total predators
		LB	GLW	PB	Spiders	Nabids	
Metasystox-R 2EC	0.5 pt	4.7 bc	0.0 b	1.3 a	0.3 a	0.3 a	6.7 abc
Fulfill 50WG	2.75 oz	9.7 a	0.0 b	0.0 c	0.7 a	0.3 a	10.7 a
Actara 25WG	4.29 oz	0.7 d	0.0 b	0.3 bc	0.0 a	0.0 a	1.0 d
Emamectin benzoate .16 EC	0.5 pt	4.0 bc	0.0 b	0.0 c	0.7 a	0.0 a	4.7 bcd
Orthene 90SP	4.44 oz	4.0 bc	0.7 ab	0.7 abc	0.7 a	0.7 a	7.0 abc
Orthene 97Pel	4.12 oz	6.0 ab	0.0 b	0.0 c	0.0 a	0.0 a	6.0 abcd
Bidrin 8EC	3.2 oz	7.7 ab	0.7 ab	0.0 c	0.3 a	0.7 a	9.4 ab
Provado 1.6 F	3.75 oz	1.7 cd	0.7 ab	0.0 c	0.3 a	0.3 a	3.0 cd
Provado 1.6 F	1.875 oz	1.3 cd	0.7 ab	0.7 abc	0.3 a	0.0 a	3.0 cd
Untreated		6.7 ab	1.3 a	1.0 ab	1.0 a	0.3 a	10.3 a
LSD (P=0.05)		[b]	[b]	[b]	NS	NS	5.175
P > F		.0020	.0075	.0075	.8378	.8120	.0113

Means in a column followed by the same letter are not significantly different by ANOVA (P=0.05; LSD).

[a]LB = lady beetles, GLW = green lacewing, PB = pirate bug

[b]The P > F are based on transformed $\sqrt{X+1}$ data values except for total predators. It is inappropriate to list LSD values based on transformed data.

Table 3. Plants, bolls and lint from cotton treated with foliar insecticide for fleahoppers, Texas Agricultural Experiment Station Farm, Corpus Christi, TX, 1998.

Treatment / formulation	Rate form / acre	Number per 1000's / acre			Yield (lb lint / acre)
		Plants	Harvested bolls	Bolls per lint lb	
Metasystox-R 2EC	0.5 pt	38.3 a	153 a	422 abc	343 a
Fulfill 50WG	2.75 oz	36.5 a	172 a	415 abc	354 a
Actara 25WG	4.29 oz	37.8 a	166 a	422 abc	335 a
Emamectin benzoate .16 EC	0.5 pt	37.9 a	159 a	421 abc	357 a
Orthene 90SP	4.44 oz	38.4 a	147 a	433 ab	315 a
Orthene 97Pel	4.12 oz	38.1 a	171 a	409 c	352 a
Bidrin 8EC	3.2 oz	34.1 a	143 a	418 abc	336 a
Provado 1.6 F	3.75 oz	39.9 a	142 a	413 bc	355 a
Provado 1.6 F	1.875 oz	34.8 a	170 a	412 c	373 a
Untreated		37.8 a	149 a	435 a	317 a
LSD (P=0.05)		NS	NS	20.0	50.2
P > F		.1031	.1206	.0297	.0643

Means in a column followed by the same letter are not significantly different by ANOVA (P=0.05; LSD).

Table 4. Fiber characteristics from cotton treated with foliar insecticide for fleahoppers, Texas Agricultural Experiment Station Farm, Corpus Christi, TX, 1998.

Treatment / formulation	Rate form/ acre	Fiber Characteristics[a]				
		Mic	Lgn	Ur	St	Elong
Metasystox-R 2EC	0.5 pt	4.3 a	0.96 a	81.1 a	25.4 a	5.83 ab
Fulfill 50WG	2.75 oz	4.3 a	0.96 a	81.2 a	26.2 a	5.75 b
Actara 25WG	4.29 oz	4.2 a	0.94 a	80.2 a	25.2 a	5.85 a
Emamectin benzoate .16 EC	0.5 pt	4.2 a	0.97 a	80.9 a	25.6 a	5.98 a
Orthene 90SP	4.44 oz	4.4 a	0.97 a	80.6 a	26.2 a	5.83 ab
Orthene 97Pel	4.12 oz	4.3 a	0.96 a	80.5 a	26.2 a	5.90 a
Bidrin 8EC	3.2 oz	4.3 a	0.97 a	80.4 a	26.0 a	5.93 a
Provado 1.6 F	3.75 oz	4.3 a	0.95 a	80.6 a	26.3 a	5.93 a
Provado 1.6 F	1.875 oz	4.3 a	0.97 a	80.6 a	26.1 a	5.93 a
Untreated		4.4 a	0.97 a	80.5 a	25.6 a	5.93 a
LSD (P=0.05)		NS	NS	NS	NS	.171
P > F		.1287	.1040	.1787	.0637	.0433

Means in a column followed by the same letter are not significantly different by ANOVA (P=0.05; LSD).

[a]Mic = micronaire, Lgn = fiber length, Ur = uniformity ratio, St = strength, Elong = fiber elongation.