

COMPARISON OF INSECTICIDES FOR CONTROL OF COTTON FLEAHOPPER

Texas Agricultural Experiment Station, Corpus Christi, TX, 1999

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OBJECTIVES: The cotton fleahopper can cause extensive loss of yield by feeding on small squares. Plants are most susceptible during the first 3 weeks of squaring. Generally, varieties with smooth leaves are more susceptible compared with those with more hairy leaves and possibly could require protection from fleahopper for a longer period (into the first week of bloom). We had an opportunity to compare insecticides for control of fleahopper at the early bloom stage to determine insecticide impact on predators, and to evaluate treatment effects on production.

MATERIALS/METHODS: Insecticides were evaluated for effect on cotton fleahopper and beneficial arthropods in a field experiment at the Texas Agricultural Experiment Station, Corpus Christi, TX. Treatments were replicated 4 times in a RCB design with 4 row (38-inch centers) x 50 ft plots. DPL 20B variety cotton was planted at 56,000 seed/acre on 16 Mar 1999 in soil with excellent moisture. Fertilizer applied was 100 - 14 - 0 + 0.6 Zn/acre. Treflan 4HFP (1 qt/acre) was incorporated for weed control before planting and Pix plus (5.5 oz/acre) was applied on 14 May for plant growth control.

Insecticides were applied to the center two rows of each plot on 17 May (one day before first bloom) and again on 24 May. Insecticide treatments were made with a self propelled Lee Company Spider Spray Trac using TX-8 hollow cone nozzles (2/row) which delivered 10.9 gpa total spray volume at 40 psi and a speed of 3.75 mph.

Treatment effects were assessed by (1) counting the number of fleahoppers/20 plant terminals in each plot before treatment on 17 May, 3 DAT-1 (days after treatment-1), and 3 and 6 DAT -2, (2) recording the number of beneficial arthropod predators/20 plant terminals 3 and 7 DAT - 1, (3) harvesting cotton for yield analysis on 5 Aug from 13.75 ft row in each plot, and (4) evaluating lint samples for fiber characteristics (International Textile Center, Texas Tech University, Lubbock, TX).

RESULTS/DISCUSSION: Insecticide treatments significantly reduced fleahopper numbers (Table 1) compared with the untreated check on all inspection dates (3 DAT - 1 and 3, 6 DAT - 2). Except for the first count 3 DAT - 1 (rainfall 16 h after treatment may have affected results), insecticides maintained fleahopper numbers below 10 per 100 plant terminals (reported in the table as number/20 terminals). For the 3 inspection dates (season average) the fleahopper population was maintained at or below 10 per 100 terminals by all insecticide treatments. Effects on beneficial arthropods were assessed 3 and 7 DAT - 1 (Tables 2 and 3). No differences were found in ladybeetle numbers 3 DAT - 1 but, numerically, the untreated check had the greatest numbers. Minute pirate bugs and spiders were significantly reduced in all insecticide treatments, except for minute pirate bugs in the Steward treatment, 3 DAT - 1. Significantly fewer total predators were detected in all insecticide treatments 3 DAT - 1. By 7 DAT - 1 no differences were found in lady beetles, minute pirate bug, green lacewing or total predator numbers but there were unexplained differences in spider numbers (Table 3). Numbers of harvested bolls, number of bolls per lint lb and lint yield were not statistically different (Table 4).

There was, however, an obvious numerical yield increase trend since all 11 insecticide treatments produced more lint yield (36 - 124 lb/acre range) compared to the untreated check. Similar results were observed in a 1998 test. Although not shown statistically, we believe the average yield increase of 74.5 lb/acre resulted from control of cotton fleahopper. Current written recommendations do not generally consider fleahoppers as damaging to cotton as it reaches the early bloom stage; however, relatively smooth leaf cotton varieties, as planted in this test (DPL 20B), are known to be more susceptible and possibly should be protected into the early bloom stage. We believe that this study provides circumstantial evidence of that damage potential. Fiber characteristics were not found to be different (Table 5).

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Table 1. Total fleahoppers (nymphs and adults) in insecticide treated cotton, Texas Agricultural Experiment Station, Corpus Christi, TX, 1999.

Treatment/ formulation	Rate form oz/acre	Fleahoppers/20 plants				
		Pretreatment	3 DAT-1 ^b	3 DAT-2	6 DAT-2	Season avg
Bidrin 8E	3.20	2.8 a	1.25 c	0.25 c	1.00 bc	(4) ^c 0.83 bc
Orthene 90SP	4.44	3.0 a	1.25 c	0.25 c	0.25 c	(3) 0.58 c
Orthene 97Pel	4.12	3.8 a	2.25 bc	0.25 c	0.25 c	(5) 0.92 bc
Provado 1.6 F ^a	3.75	2.0 a	3.75 b	0.50 bc	0.50 bc	(8) 1.58 bc
Provado 1.6 F ^a	2.00	5.0 a	2.50 bc	1.75 b	1.75 b	(10) 2.00 b
Vydate C-LV 3.77 SL	8.49	2.5 a	1.50 bc	0.25 c	0.75 bc	(4) 0.83 bc
Fulfill 50WG ^a	2.75	3.0 a	1.25 c	0.50 bc	0.25 c	(3) 0.67 c
Fulfill 50WG ^a	1.38	3.8 a	3.50 bc	0.50 bc	0.25 c	(7) 1.42 bc
Actara 25WG	3.03	2.8 a	1.25 c	0.25 c	0.00 c	(3) 0.50 c
Regent 4SC	0.80	3.0 a	3.00 bc	0.00 c	0.25 c	(5) 1.08 bc
Steward 1.25SC	9.22	5.0 a	2.75 bc	1.25 bc	0.50 bc	(8) 1.50 bc
Untreated		3.5 a	6.25 a	4.25 a	3.50 a	(23) 4.67 a
LSD (P=0.05)		NS	2.28	1.253	1.266	1.184
P > F		.1226	.0003	.0000	.0000	.0000

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

^a Silwet added to mixture at 8 oz/100 gallons.

^b 3 DAT-1 = 3 Days After Treatment.

^c Numbers in parentheses represent fleahoppers per 100 plants for easier comparison with standard treatment threshold language.

Table 2. Number of predators (3 DAT-1) for cotton fleahoppers, Texas Agricultural Experiment Station, Corpus Christi, TX 1999.

Treatment/formulation	Rate form oz /acre	Number per 20 terminals			Total predators ^c
		Lady beetles	Minute pirate bug	Spiders	
Bidrin 8E	3.20	1.75 a	0.25 bc	0.50 b	3.00 b
Orthene 90SP	4.44	2.75 a	0.00 c	0.25 b	3.00 b
Orthene 97Pel	4.12	2.00 a	0.75 bc	0.50 b	3.25 b
Provado 1.6 F ^a	3.75	2.75 a	1.00 bc	0.50 b	4.25 b
Provado 1.6 F ^a	2.00	1.75 a	0.25 bc	0.75 b	2.75 b
Vydate C-LV 3.77 SL	8.49	2.25 a	0.50 bc	0.75 b	3.50 b
Fulfill 50WG ^a	2.75	1.25 a	1.25 ab	0.50 b	3.25 b
Fulfill 50WG ^a	1.38	2.50 a	1.00 bc	0.50 b	4.00 b
Actara 25WG	3.03	1.00 a	0.25 bc	1.00 b	2.50 b
Regent 4SC	0.80	2.25 a	1.00 bc	0.75 b	4.00 b
Steward 1.25SC	9.22	2.75 a	1.50 ab	0.75 b	5.00 b
Untreated		4.50 a	2.25 a	2.25 a	9.00 a
LSD (P=0.05)		NS	<u>b</u>	1.037	3.085
P > F		.0626	.0075	.0081	.0021

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

^a Silwet added to mixture at 8 oz/100 gallons.

^b The P > F in this column is based on transformed $\sqrt{x + 1}$ data values. It is inappropriate to list LSD values based on transformed data.

^c In addition to lady beetles (57.9%), minute pirate bug (21.1%) and spiders (18.9%), the total predator column contains damsel bugs (0.5%), big-eyed bugs (0.5%) and assassin bugs (1.1%).

Table 3. Number of predators (7 DAT-1) for cotton fleahoppers, Texas Agricultural Experiment Station, Corpus Christi, TX 1999.

Treatment/formulation	Rate form oz/acre	Number per 20 terminals				
		Lady beetles	Minute pirate bug	Spiders	Green lacewing	Total predators ^c
Bidrin 8E	3.20	3.0 a	2.5 a	2.0 a	0.0 a	7.5 a
Orthene 90SP	4.44	2.0 a	1.5 a	0.0 b	0.0 a	3.5 a
Orthene 97Pel	4.12	2.0 a	1.5 a	0.0 b	0.0 a	4.0 a
Provado 1.6 F ^a	3.75	1.0 a	0.5 a	1.0 ab	0.5 a	3.0 a
Provado 1.6 F ^a	2.00	4.0 a	3.0 a	2.0 a	0.0 a	9.0 a
Vydate C-LV 3.77 SL	8.49	0.5 a	2.0 a	0.0 b	0.0 a	2.5 a
Fulfill 50WG ^a	2.75	2.0 a	1.5 a	0.5 ab	0.0 a	4.0 a
Fulfill 50WG ^a	1.38	1.5 a	3.5 a	1.0 ab	0.0 a	6.0 a
Actara 25WG	3.03	2.0 a	6.0 a	0.5 ab	0.0 a	9.0 a
Regent 4SC	0.80	3.0 a	2.0 a	0.5 ab	0.5 a	6.0 a
Steward 1.25SC	9.22	2.0 a	2.0 a	0.0 b	0.0 a	4.0 a
Untreated		0.5 a	6.5 a	0.0 b	0.0 a	8.0 a
LSD (P=0.05)		NS	NS	<u>b</u>	NS	NS
P > F		.1559	.0649	.0494	.1282	.0869

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

^a Silwet added to mixture at 8 oz/100 gallons.

^b The P > F in this column is based on transformed $\sqrt{x + 1}$ data values. It is inappropriate to list LSD values based on transformed data.

^c In addition to lady beetles (35.6%), minute pirate bug (49.2%) spiders (11.4%) and green lacewing (2.3%), the total predator column contains assassin bugs (1.5%).

Table 4. Plant population, number of bolls and lint production from cotton treated with insecticide for fleahoppers, Texas Agricultural Experiment Station, Corpus Christi, TX, 1999.

Treatment/formulation	Rate form oz/acre	Number (1000's/acre)		Bolls per lint lb	Yield (lb lint/acre)
		Plants	Harvested bolls		
Bidrin 8E	3.20	47.8 a	260 a	234 a	1119 a
Orthene 90SP	4.44	44.0 a	263 a	232 a	1130 a
Orthene 97Pel	4.12	48.0 a	271 a	234 a	1161 a
Provado 1.6 F ^a	3.75	46.3 a	254 a	235 a	1083 a
Provado 1.6 F ^a	2.00	45.0 a	253 a	231 a	1095 a
Vydate C-LV 3.77 SL	8.49	48.0 a	265 a	238 a	1118 a
Fulfill 50WG ^a	2.75	48.0 a	247 a	227 a	1085 a
Fulfill 50WG ^a	1.38	43.8 a	262 a	230 a	1140 a
Actara 25WG	3.03	49.3 a	257 a	239 a	1080 a
Regent 4SC	0.80	49.8 a	270 a	232 a	1168 a
Steward 1.25SC	9.22	50.3 a	262 a	234 a	1124 a
Untreated		46.5 a	250 a	239 a	1044 a
LSD (P=0.05)		NS	NS	NS	NS
P > F		.1010	.1519	.1620	.1288

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

^a Silwet added to mixture at 8 oz/100 gallons.

Table 5. Effect of foliar insecticides applied for fleahopper control on cotton fiber characteristics, Texas Agricultural Experiment Station, Corpus Christi, TX, 1999.

Treatment/formulation	Rate form oz/acre	Fiber characteristics ^b				
		Mic	Lgth	Ur	St	Elong
Bidrin 8E	3.20	5.0 a	1.04 a	82.6 a	24.6 a	6.7 a
Orthene 90SP	4.44	5.1 a	1.03 a	83.1 a	24.3 a	6.7 a
Orthene 97Pel	4.12	5.1 a	1.04 a	83.5 a	24.1 a	6.7 a
Provado 1.6 F ^a	3.75	5.0 a	1.03 a	84.0 a	24.3 a	6.9 a
Provado 1.6 F ^a	2.00	5.1 a	1.02 a	83.0 a	23.7 a	6.4 a
Vydate C-LV 3.77 SL	8.49	4.9 a	1.04 a	83.4 a	24.8 a	6.6 a
Fulfill 50WG ^a	2.75	5.1 a	1.03 a	83.9 a	24.0 a	6.6 a
Fulfill 50WG ^a	1.38	5.0 a	1.02 a	83.5 a	24.2 a	6.9 a
Actara 25WG	3.03	4.9 a	1.03 a	82.3 a	24.9 a	6.9 a
Regent 4SC	0.80	5.0 a	1.02 a	83.2 a	24.0 a	6.7 a
Steward 1.25SC	9.22	5.1 a	1.04 a	84.0 a	24.1 a	6.7 a
Untreated		4.8 a	1.03 a	83.8 a	24.1 a	6.7 a
LSD (P=0.05)		NS	NS	NS	NS	NS
P > F		.1155	.1720	.1092	.1337	.0578

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

^a Silwet added to mixture at 8 oz/100 gallons.

^b Mic = micronaire, Lgth = length, Ur = uniformity ratio, St = strength, Elong = % elongation