COMPARISON OF INSECTICIDES FOR CONTROL OF FLEAHOPPERS ON TEXAS COASTAL BEND COTTON

Roy D. Parker, Extension Entomologist
Texas Agricultural Extension Service
Corpus Christi, TX

Abstract

Provado (2 rates), Provado + Baythroid, Provado + Guthion, Bidrin, Orthene and Fulfil (Ciba CGA-215944, proposed common name pymetrozine) and an untreated check were compared for control of fleahoppers. Two applications were made at 6 day intervals. All insecticides significantly reduced fleahop-per numbers. Significant differences in aphid numbers were detected on only 1 of 4 inspection dates; Orthene treated cotton had more aphids than the other insecticide treatments. Fewer predators and parasites in various treatments generally reflected the presence of lower numbers of aphids in that cotton. Insecticide treated cotton produced an average of 200 lb/acre more lint than the untreated cotton.

Introduction

The cotton fleahopper is a primary pest of cotton in Texas. Both adults and nymphs suck sap from the tender portions of the plant, including small squares. Pinhead size and smaller squares are susceptible to damage. Plants are most susceptible to damage during the first 3 weeks of squaring. Increased damage is observed on smooth leaf varieties. Insecticidal control has not been difficult to achieve, but information on product longevity and effect on other insects such as aphids is needed to aid in control decisions.

The objectives of the experiment were to evaluate insecticides for effective-ness in controlling fleahoppers, to determine effects on cotton aphids and to measure the impact of these treatments on beneficial arthropod numbers.

Materials and Methods

DPL 50 cotton was divided into 4 row X 40 ft plots with 3 replications in a randomized complete block design. Treatments were made to the center 2 rows of each plot beginning at the matchhead square stage (5/17) and repeated 6 days later (5/23). Treatments were initiated later in the plant development stage than normal, since few fleahopper were present earlier in the season. Applications were made with a CO_2 backpack sprayer equipped with 2, 4X hollowcone nozzles per row calibrated to deliver 9.86 gpa total volume at 40 psi pressure. The adjuvant Silwet (16 oz/100 gallons) was added to all Provado treatments as requested by Bayer Company.

The entire test was oversprayed for boll weevils with encapsulated methyl parathion (Penncap M 2F at 1.0 qt/acre) on 26 and 30 Jun and 4 Jul, and with azinphosmethyl (Guthion 2L at 1 pt/acre) on 7 and 11 Jul. On 6 Jun the entire test was oversprayed with mepiquat chloride (Pix 0.35 lb AI/gal at 9 oz/ acre) + Bacillus thuringiensis (Dipel ES/NT at 1 qt/acre) + liquid nitrogen (Tricert at 1 qt/acre). Tebufenozide (Confirm 2L at 8 oz/acre) + an adjuvant (Latron CS-7 at 2 pt/100 gal of spray mix) was applied to the entire test on 4 Jul for beet and fall armyworms.

Treatments were evaluated by (1) counting the number of fleahoppers (nymphs and adults) and predators on 20 plant terminals on 4 dates after the initial application, (2) estimating the number of cotton aphids on 5 fully expanded terminal leaves, (3) calculating % parasitized aphids, (4) harvesting 13.75 ft row/plot on 29 Jul and 9 Aug, and (5) ginning seed cotton on 10-saw laboratory equipment.

Results and Discussion

All insecticide treatments significantly reduced fleahopper numbers (adults and nymphs) during the evaluation period (Tables 1-3). More consistent results were achieved with nymphs as compared to adults. There was a trend, and at times it was statistically significant, for less effect by Bidrin on fleahoppers, especially adults. This may have occurred due to (1) the relatively low rate applied and (2) poor location of two Bidrin plots which would favor more movement of adults into these plots (first plots downwind from weed hosts). The magnitude of the fleahopper infestation is reflected in the season avg fleahopper totals. The avg number of fleahoppers in insecticide treated cotton was 12.6 and 67.0 per 100 plants in insecticide treated and untreated cotton, respectively. Substantial damage on a smooth leaf cotton variety would be expected to occur at this level of infestation.

Damaging numbers of cotton aphids did not occur in the test (Table 4) and only on one inspection date (5/29) were significant differences in aphid numbers detected. On that date more aphids were found in Orthene treated cotton than in all other insecticide treatments. However, this number was not significantly greater than that in the untreated cotton.

Generally more predators were found in plots with the greatest number of aphids (Table 5). For example, Provado treated cotton may have contained fewer predators because fewer aphids were available. Insect predators were estimated to consist of various species of lady beetles (60%), pirate bugs (20%), green lacewings (10%) and nabids (10%). Likewise, a high level of parasitized aphids were generally found in treatments containing the greatest

Reprinted from the *Proceedings of the Beltwide Cotton Conference*
Volume 2:769-771 (1996)
National Cotton Council, Memphis TN

number of aphids (Table 6 compared with Table 4). Note, for example, that Orthene treated cotton contained the greatest number of aphids and highest percentage of parasitized aphids on 5/29.

All insecticide treated cotton (fleahopper treatments) produced significantly more bolls and lint on the first harvest date compared to the untreated cotton (Table 7). Significant differences were not found in these 2 parameters on the 2nd harvest date. Total lint production remained significantly greater in cotton treated for fleahoppers. Bidrin treated cotton (possibly due to relatively low rate used and plot locations) produced significantly less total lint compared to that obtained from the Fulfil and Provado + Baythroid treatments. Overall, insecticide treated cotton produced an avg of 200 lb/acre more lint than cotton not treated for the fleahopper infestation.

Conclusions

The cotton fleahopper caused extensive damage and subsequent lint loss where cotton was not protected with insecticide during the critical early fruiting stage. All insecticides tested provided effective fleahopper control. Noteworthy in this evaluation was performance of the new insecticides Fulfil and Provado.

Acknowledgements

Thanks are extended to Dean Christie, Bayer Corporation and to Brad Minton, Ciba Plant Protection Company for their support of this study. The assistance of Texas Agricultural Experiment Station personnel Kenneth Schaefer and Gilbert Ayala is acknowledged.

Table 1. Comparison of insecticides on DPL 50 cotton for control of fleahopper adults, Texas Agricultural Experiment Station Farm, Corpus Christi, Texas 1995.[a]

		Avg. no. adult fleahoppers/20 plants					
	Rate	(pretreat.)					
Season Treatment	(oz/acre)	5/17[b]	5/20	5/23[b]	5/26	5/29	avg.[d]
Provado 1.6F[c]	3.750	7.0	2.3 b	5.3 abc	0.3 b	0.7 bc	2.2 c
Provado 1.6F[c]	1.875	8.3	2.0 bc	4.3 bc	1.0 b	1.0 bc	2.1 c
Provado 1.6F + Baythroid 2E[c]	1.875 + 1.92	6.0	0.0 c	2.0 c	0.0 b	1.7 bc	0.9 c
Provado 1.6F + Guthion 2L[c]	1.875 + 16.00	6.7	2.7 b	4.7 bc	1.7 b	1.7 bc	2.7 bc
Bidrin 8E	1.00	9.3	6.0 a	7.3 ab	1.0 b	3.0 b	4.3 b
Orthene 90S	3.34	5.7	2.0 bc	3.0 c	0.3 b	0.0 c	1.3 c
Fulfil	2.822	6.3	2.0 bc	2.7 c	0.3 b	0.3 bc	1.3 c
Untreated		5.7	6.0 a	8.7 a	5.3 a	7.3 a	6.8 a

[a] Means within a data column followed by the same letter are not significantly different at the 5% level by ANOVA and LSD. No differences were found in columns without letters.
[b] Treatments were applied 5/17 and 5/23.
[c] Silwet was added to spray mixture at 16 oz/100 gallons.
[d] Season average following pretreatment count on 5/17.

Table 2. Comparison of insecticides on DPL 50 cotton for control of fleahopper nymphs, Texas Agricultural Experiment Station Farm, Corpus Christi, Texas 1995.[a]

		Avg. no. nymph fleahoppers/20 plants					
	Rate	(pretreat.)					
Season Treatment	(oz/acre)	5/17[b]	5/20	5/23[b]	5/26	5/29	avg.[d]
Provado 1.6F[c]	3.750	4.7	0.3	0.3 b	0.0 b	0.0 b	0.2 b
Provado 1.6F[c]	1.875	4.7	1.0	0.3 b	0.0 b	0.0 b	0.3 b
Provado 1.6F + Baythroid 2E[c]	1.875+ 1.92	8.3	0.0	0.3 b	0.0 b	0.0 b	0.1 b
Provado 1.6F + Guthion 2L[c]	1.875+ 16.00	6.3	2.7	1.3 b	0.0 b	0.7 b	1.2 b
Bidrin 8E	1.00	6.0	2.0	0.3 b	0.3 b	0.0 b	0.7 b
Orthene 90S	3.34	9.3	0.3	0.7 b	0.0 b	0.0 b	0.3 b
Fulfil	2.822	4.7	0.0	0.7 b	0.0 b	0.0 b	0.2 b
Untreated		5.3	6.7	7.0 a	7.0 a	5.7 a	6.6 a

[a] Means within a data column followed by the same letter are not significantly different at the 5% level by ANOVA and LSD. No differences were found in columns without letters.
[b] Treatments were applied 5/17 and 5/23.
[c] Silwet was added to spray mixture at 16 oz/100 gallons.
[d] Season average following pretreatment count on 5/17.

Table 3. Comparison of insecticides on DPL 50 cotton for control of fleahopper (nymphs + adults), Texas Agricultural Experiment Station Farm, Corpus Christi, Texas 1995.[a]

		Avg. no. fleahoppers/20 plants					
	Rate	(pretreat.)					
Season Treatment	(oz/acre)	5/17[b]	5/20	5/23[b]	5/26	5/29	avg.[d]
Provado 1.6F[c]	3.750	11.7	2.7 bc	5.7 bc	0.3 b	0.7 cd	2.4 bc
Provado 1.6F[c]	1.875	13.0	3.0 bc	4.7 bc	1.0 b	1.0 bcd	2.4 bc
Provado 1.6F + Baythroid 2E[c]	1.875+ 1.92	14.3	0.0 c	2.3 c	0.0 b	1.7 bcd	1.0 c
Provado 1.6F + Guthion 2L[c]	1.875+ 16.00	13.0	5.3 bc	6.0 bc	1.7 b	2.3 bc	3.8 bc
Bidrin 8E	1.00	15.3	8.0 ab	7.7 b	1.3 b	3.0 b	5.0 b
Orthene 90S	3.34	15.0	2.3 c	3.7 bc	0.3 b	0.0 d	1.6 c
Fulfil	2.822	11.0	2.0 c	3.3 bc	0.3 b	0.3 d	1.5 c
Untreated		11.0	12.7 a	15.7 a	12.3 a	13.0 a	13.4 a

[a] Means within a data column followed by the same letter are not significantly different at the 5% level by ANOVA and LSD. No differences were found in columns without letters.
[b] Treatments were applied 5/17 and 5/23.
[c] Silwet was added to spray mixture at 16 oz/100 gallons.
[d] Season average following pretreatment count on 5/17.

Table 4. Effect of foliar insecticides on cotton aphid numbers on DPL 50 cotton, Texas Agricultural Experiment Station Farm, Corpus Christi, Texas, 1995.[a]

		Average no. aphids/5 leaves				
Treatment[b]	Rate (oz/acre)	5/20	5/23	5/26	5/29	Season average
Provado 1.6F[c]	3.75	5.33	19.67	3.00	0.00 b	7.00
Provado 1.6F[c]	1.875	6.67	14.33	3.67	0.67 b	6.34
Provado 1.6F + Baythroid 2E[c]	1.875+ 1.92	4.00	12.67	1.67	3.67 b	5.50
Provado 1.6F + Guthion 2L[c]	1.875+ 16.0	15.00	29.67	6.33	2.33 b	13.33
Bidrin 8E	1.0	6.00	30.67	10.67	2.33 b	12.42
Orthene 90S	3.34	35.00	47.67	14.67	11.33 a	27.17
Fulfil	2.822	9.00	26.00	9.50	1.00 b	11.38
Untreated		37.00	75.00	32.67	7.00 ab	37.92

[a] Means within a data column followed by the same letter are not significantly different at the 5% level by ANOVA and LSD. No differences were found in columns without letters.
[b] Treatments were applied 5/17 and 5/23.
[c] Silwet was added to spray mixture at 16 oz/100 gallons.

Table 5. Effect of foliar insecticides on arthropod predator[a] numbers on DPL 50 cotton, Texas Agricultural Experiment Station Farm, Corpus Christi, Texas, 1995.[b]

Treatment[c]	Rate (oz/acre)	Average no. predators/20 plant terminals 5/20	5/23	5/26	5/29	Season avg.
Provado 1.6F[d]	3.75	0.67 c	0.67 bc	0.5 cd	0.33 d	0.54 c
Provado 1.6F[d]	1.875	3.33 ab	0.00 c	0.0 d	2.67 bcd	1.50 bc
Provado 1.6F + Baythroid 2E[d]	1.875+ 1.92	0.33 c	0.33 bc	0.0 d	1.00 cd	0.42 c
Provado 1.6F + Guthion 2L[d]	1.875+ 16.0	0.67 c	4.00 abc	1.0 bcd	0.33 d	1.50 bc
Bidrin 8E	1.0	3.67 ab	6.00 a	5.0 a	3.67 abc	4.59 a
Orthene 90S	3.34	2.00 bc	5.67 a	2.5 abc	6.33 a	4.13 a
Fulfil	2.822	2.67 bc	3.33 abc	4.5 ab	1.00 cd	2.88 ab
Untreated		5.67 a	4.67 ab	4.0 a	5.33 ab	4.92 a

[a] Predators consisted of lady beetles (60%), pirate bugs (20%), lacewings (10%), nabids (10%).
[b] Means within a data column followed by the same letter are not significantly different at the 5% level by ANOVA and LSD.
[c] Treatments were applied 5/17 and 5/23.
[d] Silwet was added to spray mixture at 16 oz/100 gallons.

Table 6. Effect of foliar insecticides on percentage of parasitized aphids on DPL 50 cotton, Texas Agricultural Experiment Station Farm, Corpus Christi, Texas, 1995.[a]

Treatment[b]	Rate (oz/acre)	% parasitized aphids 5/26	5/29
Provado 1.6F[c]	3.75	25.0 b	0.0 b
Provado 1.6F[c]	1.875	25.0 b	0.0 b
Provado 1.6F + Baythroid 2E[c]	1.875+ 1.92	0.0 b	13.3 b
Provado 1.6F + Guthion 2L[c]	1.875+ 16.0	10.0 b	0.0 b
Bidrin 8E	1.0	42.5 ab	1.7 b
Orthene 90S	3.34	90.5 a	46.7 a
Fulfil	2.822	0.0 b	0.0 b
Untreated		47.5 ab	17.3 ab

[a] Means within a data column followed by the same letter are not significantly different at the 5% level by ANOVA and LSD.
[b] Treatments were applied 5/17 and 5/23.
[c] Silwet was added to spray mixture at 16 oz/100 gallons.

Table 7. Cotton production as effected by foliar insecticides applied for fleahopper control, Texas Agricultural Experiment Station Farm, Corpus Christi, Texas, 1995.[a]

Treatment[b]	Rate (oz/a)	Bolls Plants (1000's/a)	1000's/acre H_1	H_2	Yield (lb lint/acre) H_1	H_2	Total
Provado 1.6F[c] ab	3.75	57.3	174 a	94	523 a	257	780
Provado 1.6F[c] ab	1.875	49.7	183 a	71	524 a	201	725
Provado 1.6F + Baythroid 2E[c] a	1.875+ 1.92	51.7	185 a	80	561 a	228	789
Provado 1.6F + Guthion 2L[c] ab	1.875+ 16.0	52.3	172 a	97	512 a	268	780
Bidrin 8E b	1.0	46.7	167 a	66	505 a	184	689
Orthene 90S ab	3.34	50.3	169 a	87	510 a	248	758
Fulfil a	2.822	54.3	182 a	79	570 a	224	794
Untreated c		53.3	119 b	76	344 b	215	559

[a] Means within a data column followed by the same letter are not significantly different at the 5% level by ANOVA and LSD. No differences were found in columns without letters.
[b] Treatments were applied 5/17 and 5/23.
[c] Silwet was added to spray mixture at 16 oz/100 gallons.