EARLY-SEASON INSECT CONTROL: ADAGE™ VS RECOMMENDED STANDARDS

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Abstract

A new insecticide, Adage™ (thiamethoxam), was compared to recommended standards, Temik (aldicarb) and Gaucho (imidacloprid), for efficacy against early-season thrips on cotton and for its effect on plant growth, development, and yield. Three rates of Adage were evaluated. At all rates, Adage reduced thrips damage below that in the untreated check, and the two highest rates were comparable to Temik and superior to Gaucho. Leaf areas were significantly greater in all treatments (except the low rate of Adage) compared to the untreated. Bloom counts were higher in the highest rate Adage treatment compared to Temik, Gaucho, and the untreated. Thrips larval numbers were comparable in all insecticide treatments from 20 to 34 DAP. Lint yield at first harvest was higher in the highest rate Adage treatment compared to Temik and the untreated. Total lint yield did not differ among the insecticide treatments.

Introduction

Thrips are among the first insects to attack cotton in the early season and can cause significant damage (Burris et al. 1990). Roberts and Rechel (1996) showed that thrips and their feeding damage resulted in reduced plant root development, leaf area, plant dry matter, and yield. Micinski et al. (1990) reported that thrips can cause abortion of the terminal which results in excessive branching that delays crop maturity and reduces yield.

Thiamethoxam, sold as Adage™ in the U.S. and Cruiser® on the worldwide market, is one of the newest insecticides under development for control of thrips on seedling cotton (Hofer and Brandl 1999). The performance of Adage was reported to be comparable or superior to Temik and Gaucho (Zang et al. 1999, Van Tol and Lentz 1999).

Materials and Methods

Early-season thrips control was studied at the West Tennessee Experiment Station in Jackson, TN, in 1999. Plots were planted in conventionally-tilled soil on May 13 with a 2-row IH 900 cone planter. Treatments were arranged in a randomized complete block design with five replications. Plots were four 38-inch rows X 30 ft. 'DPL 5415' variety seed were supplied by Novartis Crop Protection. Treatments consisted of a no-treatment plot, Adage 5FS seed treatment (ST) at three rates (0.2, 0.25, and 0.3 lb ai/cwt), Gaucho 480F 0.25 lb ai/cwt, and Temik 15G at two rates (0.5 and 0.75 ai/A IFG). Ridomil Gold 10.5G in-furrow granules were applied at 8 lb formulation/A. A preemergence herbicide combination of Cotoran 1.2 qt/A + Prowl 1 pt/A + Dual 1.5 pt/A was applied following planting.

Efficacy of thrips control was determined by taking a 4-plant sample (two plants from each of the two center rows of each plot) on each sample date. Individual plants were selected at random and gently pulled from the soil and placed in pint fruit jars containing ca. 200 ml of 70% ethanol. A lid was placed on the jar which was gently inverted to wash the thrips from the plants. All samples were taken to the laboratory where the plants were rinsed over a standard US sieve No. 100. The alcohol remaining in the jar was also poured through the sieve. The sieve was back rinsed with alcohol through a funnel into a 20-ml scintillation vial. Samples were labeled with the plot number and date. Samples were later counted using a stereo microscope, and the number of thrips/4 plants was recorded. Thrips samples were collected June 2, 8, 11, and 16 (20, 26, 29, and 34 days after planting (DAP), respectively).

Plant stands were counted 15 DAP in a randomly selected 10 ft section of one of the two center plot rows. Four plants were randomly collected 42 DAP for measurement of leaf area (cm^2). The total leaf area/4 plants was recorded and used for data analysis. Plant heights were measured 35 DAP. Five plants/plot were measured from the soil to the terminal. The average height (inches) of the five plants was used for analysis. The node of first position square was determined 47 DAP by examining five plants/plot and recording the node of the first square. Blooms were counted to determine if treatments delayed fruit production. The number of blooms in 10 ft of row was counted 3 times over a 5-day period, and the number/10 ft was recorded for data analysis. Cotton was harvested with a 2-row spindle picker modified for plot harvesting. The amount of seed cotton picked from each plot was weighed. First harvest occurred September 20, and second harvest was September 30. Data were analyzed using Analysis of Variance, and means were separated using Duncan's Multiple Range Test ($P<0.05$).

Results

Adult thrips numbers differed significantly among treatments 20 DAP (Table 1). Numbers among insecticide treatments were all lower than in the untreated check. Lowest numbers were found on the Temik-treated plants, but Adage did not differ from the best treatment. At 26 and 29 DAP, adult numbers did not differ among insecticide treatments, and all were different from the untreated. At 34 DAP, adult numbers

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were lowest in the Temik (0.75) treatment but did not differ from the two highest Adage treatments or the other Temik treatment. Numbers in insecticide-treated plots were lower than in the untreated.

Larval thrips numbers on all four sample dates did not differ among insecticide treatments, and all were significantly lower than the untreated (Table 2).

Thrips damage ratings 26 DAP were all significantly lower in insecticide treated plots compared to the untreated (Table 3). Adage-(highest rate only) and Temik-treated plots had significantly lower ratings than Gaucho and lowest rate Adage-treated plots. The median rate of Adage was significantly better than Gaucho. Total leaf area 42 DAP did not differ among insecticide treatments, but all were greater than the untreated (Table 3). Plant stand at 15 DAP, plant height at 35 DAP and the node of the first position fruit at 47 DAP did not differ among treatments (Table 4).

The number of blooms/10 row ft did not differ 62 and 67 DAP, but significant differences were noted among treatments 64 DAP (Table 5). Adage-treated plots, at the commercial rate of 0.3 lb ai/cwt, had more blooms than any other treatment, but did not differ from the two lower rates of Adage. No significant differences were observed among treatments when the first two dates or all three were added together (Table 6).

Lint yields were significantly different among treatments for both first and total harvest but not at second harvest (Table 7). At first harvest, Adage-treated plots (0.3 lb) produced significantly more cotton than all other treatments except Adage-(0.25 lb) and Gaucho-treated plots. Except for the top yield, the remaining insecticide treatments did not differ from each other. The lowest rate Adage treatment and the two Temik treatments did not differ from the untreated. For total yield, the insecticide-treated plots did not differ from each other, but only the two highest Adage rates, Gaucho, and the high rate of Temik differed from the untreated. Only percent first harvest values from Adage-treated plots differed from the untreated.

Summary

Adage performance, compared to Temik and Gaucho, was comparable or superior in many of the criteria evaluated. Due to ease of handling, cost, and effectiveness, producers may find this a viable alternative to consider in efforts to reduce inputs. Although this paper reports only the second year of evaluation of Adage, the results have been very promising.

References

Burris, E., A. M. Pavloff, B. R. Leonard, J. B. Graves, and G. Church. 1990. Evaluation of two procedures for monitoring populations of early season insect pests (Thysanoptera: Thripidae and Homoptera: Aphididae) in cotton under selected management strategies. J. Econ. Entomol. 83:1064-1068.

Hofer, D. and F. Brandl. 1999. Cruiser[R]/Adage[TM] performance features of thiamethoxam as a seed treatment in worldwide cotton. Proceedings Beltwide Cotton Conferences. 2:1101-1104.

Micinski, S., P. D. Colyer, K. T. Nguyen, and K. L. Koonce. 1990. Effects of planting date and early-season pest control on yield in cotton. J. Prod. Agric. 3:597-602.

Roberts, B. A. and E. A. Rechel. 1996. Effects of early season thrips feeding on root development, leaf area and yield. Proceedings Beltwide Cotton Conferences. 2:939-941.

Van Tol, N. B. and G. L. Lentz. 1999. Evaluation of Adage 5FS[TM] for early-season insect control. Proceedings Beltwide Cotton Conferences. 2:1098-1101.

Zang, L., N. Ngo and B. Minto. 1999. Adage[TM] (thiamethoxam) seed treatment for cotton. Proceedings Beltwide Cotton Conferences. 2:1104-1106.

Table 1. Effect of at-planting insecticide treatments on numbers of adult thrips. 1999.

			Mean Number / 4 Plants			
Treatment	**Rate**	**Appl.**	**20 DAP**	**26 DAP**	**29 DAP**	**34 DAP**
Untreated			2.8 a[a]	2.0 a	4.4 a	14.4 a
Adage 5FS	0.2 lb ai/cwt	ST	0.2 bc	0.0 b	0.4 b	6.8 b
Adage 5FS	0.25 lb ai/cwt	ST	1.0 bc	0.6 b	0.8 b	4.0 bc
Adage 5FS	0.3 lb ai/cwt	ST	0.4 bc	0.6 b	1.0 b	3.2 bc
Gaucho 480F	0.25 lb ai/cwt	ST	1.2 b	0.4 b	1.2 b	6.2 b
Temik 15G	0.5 lb ai/acre	IFG	0.0 c	0.0 b	0.6 b	3.6 bc
Temik 15G	0.75 lb ai/acre	IFG	0.2 bc	0.2 b	0.0 b	1.4 c
P > F			0.0001	0.0461	0.0004	0.0001

[a]Means within a column followed by the same letter are not significantly different ($P<0.05$, Duncan's Multiple Range Test).

Table 2. Effect of at-planting insecticide treatments on numbers of larval thrips. 1999.

			Mean Number / 4 Plants			
Treatment	**Rate**	**Appl.**	**20 DAP**	**26 DAP**	**29 DAP**	**34 DAP**
Untreated			118.0 a	106.8 a	18.2 a	11.6 a
Adage 5FS	0.2 lb ai/cwt	ST	1.0 b	3.2 b	1.4 b	1.0 b
Adage 5FS	0.25 lb ai/cwt	ST	0.6 b	1.2 b	0.8 b	2.0 b
Adage 5FS	0.3 lb ai/cwt	ST	0.8 b	2.4 b	2.0 b	1.8 b
Gaucho 480F	0.25 lb ai/cwt	ST	2.4 b	3.8 b	2.4 b	2.2 b
Temik 15G	0.5 lb ai/acre	IFG	0.2 b	0.8 b	0.2 b	0.6 b
Temik 15G	0.75 lb ai/acre	IFG	1.2 b	0.8 b	0.0 b	0.4 b
P > F			0.0001	0.0001	0.0001	0.0018

[a]Means within a column followed by the same letter are not significantly different (P<0.05, Duncan's Multiple Range Test).

Table 3. Effect of at-planting insecticide treatments on thrips damage ratings and leaf area. 1999.

			Damage Rating (0-5)	Total Leaf Area (cm^2) 4 plants/plot
Treatment	**Rate**	**Appl.**	**26 DAP**	**42 DAP**
Untreated			4.1 a	609 b
Adage 5FS	0.2 lb ai/cwt	ST	2.9 b	858 a
Adage 5FS	0.25 lb ai/cwt	ST	2.6 c	1001 a
Adage 5FS	0.3 lb ai/cwt	ST	2.3 d	924 a
Gaucho 480F	0.25 lb ai/cwt	ST	3.0 b	907 a
Temik 15G	0.5 lb ai/acre	IFG	2.3 d	922 a
Temik 15G	0.75 lb ai/acre	IFG	2.3 d	831 a
P > F			0.0001	0.0020

[a]Means within a column followed by the same letter are not significantly different (P<0.05, Duncan's Multiple Range Test).

Table 4. Effect of at-planting insecticide treatments on stand, plant height, and node of 1st position square. 1999.

Treatment	**Rate**	**Appl.**	**Mean Stand # plants/10 ft 15 DAP**	**Mean Plant Height (inches) 35 DAP**	**Node of 1st Pos. Sq. 47 DAP**
Untreated			42.3	4.9	5.6
Adage 5FS	0.2 lb ai/cwt	ST	39.2	5.6	6.1
Adage 5FS	0.25 lb ai/cwt	ST	40.2	6.0	6.2
Adage 5FS	0.3 lb ai/cwt	ST	42.4	6.1	6.1
Gaucho 480F	0.25 lb ai/cwt	ST	42.3	6.2	6.4
Temik 15G	0.5 lb ai/acre	IFG	41.5	6.1	6.0
Temik 15G	0.75 lb ai/acre	IFG	37.3	5.9	5.8
P > F			0.6438	0.0741	0.0724

[a]Means within a column followed by the same letter are not significantly different (P<0.05, Duncan's Multiple Range Test).

Table 5. Effect of at-planting insecticide treatments on early bloom production. 1999.

			Mean number of blooms / 10 ft		
Treatment	**Rate**	**Appl.**	**62 DAP**	**64 DAP**	**67 DAP**
Untreated			6.6	4.0 bc	8.4
Adage 5FS	0.2 lb ai/cwt	ST	5.8	6.4 abc	16.6
Adage 5FS	0.25 lb ai/cwt	ST	5.6	7.6 ab	16.4
Adage 5FS	0.3 lb ai/cwt	ST	4.8	9.2 a	16.0
Gaucho 480F	0.25 lb ai/cwt	ST	6.0	2.6 c	10.8
Temik 15G	0.5 lb ai/acre	IFG	4.2	3.6 bc	16.6
Temik 15G	0.75lb ai/acre	IFG	3.0	3.6 bc	9.8
P > F			0.7113	0.0118	0.1232

[a]Means within a column followed by the same letter are not significantly different (P<0.05, Duncan's Multiple Range Test).

Table 6. Effect of at-planting insecticide treatments on early bloom production. 1999.

			Mean number of blooms / 10 ft	
Treatment	**Rate**	**Appl.**	**Total of counts 1 + 2**	**Total of 3 counts**
Untreated			10.6	19.0
Adage 5FS	0.2 lb ai/cwt	ST	12.2	28.8
Adage 5FS	0.25 lb ai/cwt	ST	13.2	29.6
Adage 5FS	0.3 lb ai/cwt	ST	14.0	30.0
Gaucho 480F	0.25 lb ai/cwt	ST	8.6	19.4
Temik 15G	0.5 lb ai/acre	IFG	7.8	24.4
Temik 15G	0.75 lb ai/acre	IFG	6.6	16.4
P > F			0.1836	0.1933

[a]Means within a column followed by the same letter are not significantly different (P<0.05, Duncan's Multiple Range Test).

Table 7. Effect of at-planting insecticide treatments on lint yield. 1999.

			Lint Yield (lb / A)		
Treatment	**Rate**	**Appl.**	**1st Harvest**	**Total Harvest**	**% 1st Harvest**
Untreated			446 c	561 b	79.5 c
Adage 5FS	0.2 lb ai/cwt	ST	514 bc	613 ab	83.8 ab
Adage 5FS	0.25 lb ai/cwt	ST	562 ab	666 a	84.1 ab
Adage 5FS	0.3 lb ai/cwt	ST	589 a	684 a	86.2 a
Gaucho 480F	0.25 lb ai/cwt	ST	547 ab	657 a	83.1 abc
Temik 15G	0.5 lb ai/acre	IFG	506 bc	622 ab	81.4 bc
Temik 15G	0.75 lb ai/acre	IFG	515 bc	636 a	80.6 bc
P > F			0.0057	0.0167	0.0179

[a]Means within a column followed by the same letter are not significantly different (P<0.05, Duncan's Multiple Range Test).