EVALUATION OF THRIPS MANAGEMENT OPTIONS IN COTTON

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Abstract

Thrips are early-season pests that have the potential of causing 50-60% yield reduction in Arkansas cotton with the level of damage varying from year to year. The objective of this experiment was to evaluate seed treatment, in-furrow, and foliar insecticides for thrips management in cotton. Experiments were conducted in Lonoke Co. and Lee Co., AR, in 1999 and 2000, respectively. Thrips samples and ratings were taken at weekly intervals four times each year early in the growing season. In both years, all treatments significantly improved thrips control above that of the untreated check. In 1999, the Temik treatments outperformed the others with respect to thrips suppression, visual damage rating, and cotton yield. While thrips suppression was not significant among treatments in 2000, the Temik treatments achieved higher yields. The data presented from these growing seasons indicate Temik to be one of the best treatments for thrips control in Arkansas cotton.

Introduction

Thrips are an annual problem in cotton production, however, the thrips population varies in severity from year to year. The problem with controlling thrips is that you never know when they are going to be severe. As a result, most growers apply insecticides in-furrow or as seed treatments. Thrips build up in the spring on early wild host plants and most likely wheat. These hosts of thrips start to dry up from early May until mid June. As these hosts begin to dry, thrips start to migrate to more favorable food sources. Unfortunately, this about the same time that cotton is starting to grow. The large host acreage for thrips and their reproductive capability create a situation, in most years, where young cotton sustains some level of damage from large thrips populations. In the mid-south production area, the tobacco thrips, *Frankliniella fusca* is the predominate species that occurs on cotton. However, the western flower thrips, *Frankliniella occidentalis*, was quite common last year and caused a great deal of concern among Arkansas producers. Other species that have been reported in cotton include the flower thrip, *Frankliniella tritici*, and the soybean thrips, *Neohydatothrips variables,* (Burris et al 2000) and the onion thrips, *Thrips tabaci* (Eddy and Livingstone 1931).

Thrips injure cotton by feeding in the terminal area of the plant. This terminal feeding disrupts normal growth of the plant leaf structure. The result is usually severely deformed leaves, aborted terminals and greatly reduced leaf area. This general injury of the plant structure greatly reduces the photosynthetic capacity of the plant. As a result, the general vigor of the plant is low causing stunting, increased susceptibility to plant diseases, and, in the end, lower yields. If not controlled, thrips injury can reduce stands severely. In addition, yields can be reduced by up to 50 or 60 percent in a year when thrips are numerous and not controlled by insecticides either in-furrow, as seed treatments, or as foliar treatments.

Methods

The test for 2000 was planted at the Cotton Branch Experiment Station at Marianna, Arkansas and in Lonoke County in 1999. The test was arranged in a randomized complete block design with 4 replicates. Plots were 4 (38") rows wide and 50 feet long. The variety was Paymaster 1218 BG/RR in 2000 and Paymaster 1560 BG in 1999. Thrips samples and ratings were taken on May 23, May 31, June 6 and June 13 in 2000. During 1999, samples were taken on May 28, June 3, 24, and 28. Five plants were randomly sampled per plot to determine the level of thrips infestation. Plants were processed using the wash procedure described by Burris (1990). Samples were taken from the outside 2 rows of each plot to avoid influence on yield. Each plant was cut and immediately placed into a mason jar containing 70% ethyl alcohol. In the laboratory, plants were rinsed with alcohol to wash off thrips. To separate the thrips from alcohol, the solution was poured through coffee filters lining the inside of a buchner funnel. A vacuum pump was used to quickly evacuate the alcohol through the coffee filter. The thrips on the coffee filter were rinsed into a petri dish. Thrips were visually counted on the petri dish using a dissecting microscope.

Damage was also evaluated on each rating date using a 1 to 10 damage rating system with 1 equal to no damage, 5 equal to moderate damage, and 10 equal to extreme damage. Damage ratings were a composite of the overall appearance of the plots based on individual plant appearance. Plants with entire leaves without thrips damage in the terminal area were described as no damage and given a rating of 1. Plants with all leaves damaged and having damage along all leaf margins but still maintaining leaf form were described as moderate damage and given a rating of 5. The most severe damage rating of 10 was given to plots with plants having severe damage and leaves without form. Many times the severely damaged plots would have severe stand reduction. Plots were planted using a John Deere 7100 planter and maintained using standard agronomic practices. Yields were determined by harvesting the middle 2 rows of each plot.

Results and Discussion

During 1999, the thrips pressure was higher than usual. All treatments in the test significantly improved thrips control compared to the untreated check (Table 1 and 2). The untreated check had significantly more thrips than all other treatments averaging 58.8 thrips on the first evaluation compared to the lowest number of 0.8 in the Temik at 0.75 lb that was the best treatment on the 17 days after treatment (DAT) observation. The counts on the other treatments on the 17 DAT observations ranged from 1.5 to 10.5 thrips per 5 plants. On the 23 DAT observations the trend on the thrips numbers was for the Temik treatments to have a few less thrips in the count. The Temik treatments averaged 3.0 to 4.5 total thrips compared to 6.8 to 8.5 thrips per sample in the Adage, Admire and Gaucho treatments. In the next set of observations, the trend was significantly different. The Temik treatments averaged 20.8 to 36.0 significantly lower than the Adage, Admire and Gaucho which averaged 93.8, 49.5 and 86.8 respectively and 80.8 for the untreated check. The trend continued into the 34 DAT observations but the numbers had declined significantly by this time. This information indicates that Temik will give longer residual control of thrips and may reduce the need of additional control measures in years where thrips infestations are high. The lowest damage ratings were also observed in the Temik treatments. The separation of thrips damage ratings were first observed 27 days after planting where the Temik had significantly lower damage ratings compared to other treatments. The damage rating for the untreated check was 8.3 or severely damaged. Temik treatments averaged 2.8 for the Temik 0.5 treatment, 2.5 for the Temik 0.75 rate and 2.8 for the highest rate of 1.05 pounds. Admire had a 5.5 damage rating, Adage a 5.3 rating and Gaucho a 5.8 damage rating. The highest yield was also observed in the Temik treatment with 1036 pounds of lint per acre. All treatments were significantly higher in yield compared to the untreated check but treatments were not significant different. The average yield did tend to be higher in the Temik treatments with an overall yield of 938 pounds lint per acre compared with an average of 869 pounds for non Temik treatments and 604 pounds for the untreated check.

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The thrips pressure in 2000 was more intense in Arkansas in some locations but the pressure in the test location was lighter that 1999. The control of thrips obtained was similar for all products. Significant differences were found primarily on the first observation with Gaucho, Temik and Adage providing control better than the untreated. Temik treatments averaged 4 to 11thrips per sample on the first observation with Adage and Gaucho 480 averaging 4.8 and 9 thrips respectively. Gaucho 600FS and DiSyston were not significantly different from the untreated check, averaging 23 and 25 thrips per sample. The untreated check averaged 29 per sample. The overall difference among treatments for yield was not significant. However, the trends were similar to 1999 with the Temik treatment having the highest yield at 1471 pounds lint per acre compared to the untreated control which had the lowest yield at 1216 pounds lint per acre. Similarly, Temik treatments overall averaged 1405 pounds per acre compared to an average yield of 1321 for all other treatments (Table 3 and 4). In Arkansas tests, Temik historically has been one of the best treatments for thrips control and the trend is similar for the trials reported here.

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Table 1. Evaluation of insecticide treatment options on thrips population levels in cotton. Arkansas, 1999.

Treatment	Rate lb (AI)/acre	Thrips totals per 5 plants 17DAT	23DAT	27DAT	34DAT
UTC		58.8 a	11.8 a	80.8 a	7.5 a
Temik 15G IF	0.53	2.3 b	4.5 b	36.0 c	2.3 c
Temik 15G IF	0.75	0.8 b	4.0 b	34.1 c	1.5 c
Temik 15G IF	1.05	1.5 b	3.0 b	20.8 c	1.8 c
Admire	0.05	10.5 b	7.5 ab	93.8 b	5.8 b
Adage 200 ST	3.2*	6.5 b	8.5 ab	49.5 b	6.0 b
Gaucho 480 ST	8.0*	7.5 b	6.8 ab	86.8 b	5.0 b

Means followed by same letter do not significantly differ (P=.05, Duncan's New MRT)
Mean comparisons performed only when AOV Treatment P(F) is significant at mean comparison OSL.
*oz / cwt seed

Table 2. Effect of different thrips control options in cotton on damage and yields in Arkansas, 1999.

Treatment	Rate lb (AI)/acre	Thrips Damage Ratings 17DAT	23DAT	27DAT	Yield Lint/A
UTC		6.5 a	7.3 a	8.3 a	604 b
Temik 15G IF	0.53	4.8 a	1.3 b	2.8 c	1036 a
Temik 15G IF	0.75	5.3 a	1.5 b	2.5 c	904 ab
Temik 15G IF	1.05	4.8 a	1.5 b	2.8 c	875 ab
Admire	0.05	5.8 a	3.5 b	5.5 b	861 ab
Adage 200 ST	3.2*	5.5 a	2.8 b	5.3 b	824 ab
Gaucho 480 ST	8.0*	6.8 a	2.8 b	5.8 b	922 ab

Means followed by same letter do not significantly differ (P=.05, Duncan's New MRT)
Mean comparisons performed only when AOV Treatment P(F) is significant at mean comparison OSL.
*oz / cwt seed

Table 3. Evaluation of different control options effects on thrips on cotton in Arkansas, 2000.

Treatment	Rate lb AI/acre	Thrips totals per 5 plants 13DAT	21DAT	28DATz	34DAT
UTC		29a	142a	101a	135a
Gaucho 600FS (ST)	6.4**	23a	84a	104a	161a
Gaucho 480 (ST)	8.0*	9b	75a	88a	136a
Temik 15G (IF)	0.50	4b	44a	94a	127a
Temik 15G (IF)	0.60	6b	55a	97a	141a
Temik 15G (IF)	0.75	11b	57a	124a	154a
Adage 300 (ST)	4.8*	6b	75a	149a	146a
Di-Syston 15G (IF)	1.00	25a	54a	104a	165a

Means followed by same letter do not significantly differ (P=.05, Duncan's New MRT)
Mean comparisons performed only when AOV Treatment P(F) is significant at mean comparison OSL.
*oz / cwt seed
**fl oz / cwt seed

Table 4. Evaluation of thrips control options on cotton damage rating and yields in Arkansas, 2000.

Treatment	Rate lb AI/acre	Thrips Damage Ratings 13DAT	21DAT	28DAT	34DAT	Yield Lint/A
UTC		4.0a	5.3a	7.8a	9.0a	1215.92a
Gaucho 600FS (ST)	6.4**	3.8a	3.5a	3.3b	5.0b	1348.14a
Gaucho 480 (ST)	8.0*	1.8b	3.8a	3.5b	3.8b	1283.01a
Temik 15G (IF)	0.50	1.3b	2.5a	4.0b	5.5b	1360.48a
Temik 15G (IF)	0.60	1.8b	3.8a	3.8b	5.3b	1384.32a
Temik 15G (IF)	0.75	2.5ab	4.5a	6.5ab	5.0b	1471.59a
Adage 300 (ST)	4.8*	1.8b	3.5a	3.8b	4.8b	1390.14a
Di-Syston 15G	1.00	2.5ab	4.3a	4.3b	5.3b	1264.56a

Means followed by same letter do not significantly differ (P=.05, Duncan's New MRT)
Mean comparisons performed only when AOV Treatment P(F) is significant at mean comparison OSL.
*oz / cwt seed
**fl oz / cwt seed