

THRIPS MANAGEMENT IN ARKANSAS COTTON
John D. Hopkins, Jack D. Reaper, III, D.R. Johnson and G.M. Lorenz, III
University of Arkansas Cooperative Extension Service
Little Rock, AR

Abstract

Thrips is an early-season cotton pest that has the potential to cause delayed maturity and yield loss in Arkansas cotton, with the level of damage varying from year to year based on the severity of the thrips infestation. As the severity of thrips infestation cannot be predicted, cotton producers rely on in-furrow insecticides and insecticidal seed treatments as a prophylactic measure to reduce the risk of thrips damage. The objective of this experiment was to evaluate in-furrow (IFAP), seed treatment (ST), and combination ST + foliar insecticides (FS) for thrips management in cotton. Experiments were conducted in Mississippi Co. and Lee Co., AR, in 2001. The tobacco thrips was the predominant thrips species infesting both trials. Thrips counts and thrips damage ratings were taken beginning approximately 2 weeks after planting (WAP) and continued through mid-June. Stand was evaluated approximately one month after planting and yields were determined after harvest. Thrips numbers were low at both locations. In the Mississippi Co. location all treatments at all ratings reduced thrips numbers below that of the untreated check. Treatments numerically reduced the thrips count at the Lee Co. location through 22 days after planting (DAP). All chemical treatments significantly reduced thrips damage at the Mississippi Co. location, with the Temik treatments having the least damage at 33 DAP. At the Lee Co. location all chemical treatments reduced thrips damage with the reduction being significant ($P=0.05$) at the 36 DAP rating. Little difference was observed among chemical treatments for thrips damage at both locations. No chemical treatment at either location caused a statistically significant stand reduction or yield increase. However, on a numerical basis, Adage 5FS (300 gm/100Kg), Gaucho 480FS (8oz/cwt), L0263-A1 (250 floz/cwt), and Gaucho 480FS (8oz/cwt) + Orthene 97 (0.2 lbai/A) were the highest yielding treatments in both locations. The data presented from these trials indicate that the Adage and Gaucho seed treatments offer a level of thrips protection equal to Temik under light to moderate thrips pressure.

Introduction

Early season damage caused by thrips is an annual problem that occurs with varying degrees of severity in Arkansas cotton depending on the size of the thrips population in any given year. In 2000, approximately 36,563 bales were lost due to early season thrips damage (Williams, 2001). Prior to cotton emergence, thrips populations build up on wild or other alternate hosts. When these hosts begin to dry down, thrips move to emerging cotton seedlings and can cause terminal damage resulting in delayed maturity and yield loss (Micinski et al. 1990). When thrips population numbers are low, cotton plants can outgrow and compensate for some thrips injury, however, when thrips numbers reach high levels, yield reductions can occur if thrips are left unchecked (Herbert 1995, Roberts and Rechel 1996). In the mid-south production area, the tobacco thrips, *Frankliniella fusca* (Hinds) is the predominate species that occurs on cotton. However, the western flower thrips, *Frankliniella occidentalis* (Pergrande), was quite common in 1999 and caused a great deal of concern among Arkansas producers. Other species that have been reported in cotton include the flower thrips, *Frankliniella tritici* (Fitch), and the soybean thrips, *Neohydatothrips variables* (Beach) (Burriss et al 2000) and the onion thrips, *Thrips tabaci* (Lindeman) (Eddy and Livingstone 1931). The objective of this study was to evaluate the effectiveness of various in-furrow, seed treatment, and seed treatment + foliar spray combinations for thrips control in cotton.

Methods

These trials were conducted in locations that have been historically free of root-knot and reniform nematodes to eliminate confounding as Temik is nematicidal as well as insecticidal. Cotton was planted at the Northeast Research and Extension Center in Mississippi Co., on 10 May and at the Cotton Branch Station in Lee Co., AR, on 14 May. Plots were four (38") rows X 35 ft. in length, arranged in a RCBD with four replications. Granular insecticide treatments were applied at planting using granular applicator boxes mounted on a John Deere 7100 planter. Treated seed had been previously shipped to the appropriate chemical company (Syngenta / Gustafson) for seed treatment. The foliar application was made 29 DAP with a CO₂ backpack sprayer. The 2-row boom was equipped with conejet TXVS 6 nozzles on a 19" spacing. Operating pressure was 35 psi with a final spray volume of 12 GPA. In Mississippi Co., thrips counts were made on 29 May (19 DAP), 5 June (26 DAP), 12 June (33 DAP), and 19 June (40 DAP). In Lee Co., thrips counts were made on 29 May (15 DAP), 5 June (22 DAP), 12 June (29 DAP), and 19 June (36 DAP). Five plants were randomly selected from the middle two rows in each plot. Each plant was cut and immediately placed into a mason jar containing 70% ethyl alcohol. In the laboratory, thrips were rinsed from the plants with alcohol. To separate thrips from the alcohol, rinsate was poured onto a coffee filter lining the inside of a Buchner funnel. A vacuum pump was used to quickly evacuate the alcohol leaving the thrips on the coffee filter.

The thrips on the coffee filter were rinsed with alcohol into a petri dish. Immature and adult thrips were then visually counted using a dissecting microscope. Thrips collected from the untreated control plots were identified to determine species distribution (Figures 1 and 2). Thrips damage was visually rated in the Mississippi Co. plots on 12 June (33 DAP) and 19 June (40 DAP). Damage was rated in the Lee Co. plots on 26 May (15 DAP), 12 June (29 DAP), and 19 June (36 DAP). Damage was evaluated using a 1 to 10 damage rating system with 1 equal to no damage, 5 equal to moderate damage, and 10 equal to plant death. 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 dead plants and plants having severe damage and leaves without form. A stand count was made on 19 June (40 DAP/ Mississippi Co. and 36 DAP/ Lee Co.). Plots were harvested in Mississippi Co. on 10 October (153 DAP) and in Lee Co. on 2 November (172 DAP). All four rows of each plot were harvested with a commercial cotton picker. The cotton was weighed and lint yield was determined based upon a 35% gin turnout. Data were processed using Agriculture Research Manager Ver. 6.0.1. Analysis of variance was run and Duncan's New Multiple Range Test ($P=0.05$) was used to separate means only when AOV Treatment P(F) was significant at the 5% level.

Results and Discussion

During 2001, thrips pressure was light and the tobacco thrips was the predominant species infesting cotton at both trial locations. At the Mississippi Co. location, all treatments provided a numerical reduction in total thrips count compared to the untreated control at 19 DAP. At 26 and 33 DAP all treatments significantly ($P=0.05$) reduced total thrips counts below that of the untreated control but failed to differ significantly among themselves. At 40 DAP, again, all treatments significantly ($P=0.05$) reduced total thrips counts below that of the untreated control, however, L0263-A1 (250 fl oz/cwt seed) was the least effective chemical treatment. When rated at 33 and 40 DAP all chemical treatments significantly ($P=0.05$) reduced the level of thrips damage compared to the untreated control (Table 1). Thrips damage ratings among chemical treatments failed to differ at 40 DAP, however, at 33 DAP (IFAP) and 11 DAT (FS), all Temik treatments and the Gaucho 480FS + Orthene 97 treatment had significantly less thrips damage than the seed treatments. No treatment differed significantly ($P=0.05$) from the untreated control with respect to stand count at 40DAP. No significant treatment differences were observed with respect to cotton lint yield. On a numerical basis only, Temik applied at a rate of 5 lbs./A was the lowest yielding treatment at 968 lbs. lint/A compared to 986 lbs. lint/A for the untreated check. Numerically, the highest yielding treatments in this trial were L0263-A1 followed by (fb) Adage 5FS fb Gaucho 480FS fb Gaucho 480FS + Orthene 97. Numerically, the Temik treatments had the lowest yields among the chemical treatments (Table 2). At the Lee Co. location, no treatment differed significantly ($P=0.05$) from the untreated control with respect to total thrips counts when rated at 15, 22, 29, and 36 DAP. On a numerical basis, all treatments reduced thrips numbers below the level found in the untreated control through 22 DAP. At 29 DAP, Temik (3.5, 4.0, and 5.0 lbs./A) and L0263-A1 had numerically higher thrips numbers than the untreated control. At 36 DAP, only Temik (5.0) and L0263-A1 had numerically higher thrips numbers than the untreated control (Table 3). When rated at 15 and 29 DAP all chemical treatments numerically reduced the level of thrips damage compared to the untreated control. At 36 DAP, all chemical treatments significantly ($P=0.05$) reduced the level of thrips damage compared to the untreated control. The treatments providing the lowest damage ratings 36 DAP were Gaucho 480FS + Orthene 97, Gaucho 480FS, Adage 5FS, and Temik 15G (5.0 and 7.0). When rated at 36 DAP, the only treatment to have a stand count significantly ($P=0.05$) higher than the untreated control was Gaucho 480FS + Orthene 97. On a numerical basis, the highest stand counts were obtained with Gaucho 480FS + Orthene 97, L0263-A1, Adage 5FS, and Gaucho 480FS. The plant stands in the Temik (5.0 and 7.0) treatments were numerically less than the plant stand in the untreated control by 23% and 20%, respectively. No significant treatment differences were observed with respect to cotton lint yield. On a numerical basis only, all Temik treatments failed to out yield the untreated control. Numerically, the highest yielding treatments in this trial were Adage 5FS followed by (fb) Gaucho 480FS fb L0263-A1 fb Gaucho 480FS + Orthene 97. These seed treatments out yielded the untreated control (987 lbs. Lint/A) by 5 to 8% (Table 4). Results from these trials indicate that the Adage, Gaucho, and L0263-A1 seed treatments offer a level of thrips protection equal to that provided by Temik under light to moderate thrips pressure.

References

Burris, E., C. Allen, R. Bagwell, D. Cook, B. Freeman, G. Herzog, G. Lentz, R. Leonard, and J. Reed. 2000. Thrips (Thysanoptera: Thripidae) A multi-state survey: Summary of observations for Arkansas, Alabama, Georgia, Louisiana, Mississippi, and Tennessee. Research Information Sheet 103. 6 pp. Louisiana State University.

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.

Eddy, C. O. and E. M. Livingstone. 1931. *Frankliniella fusca* (Hinds) thrips on seedling cotton. S. C. Agric. Exp. Stn Bull. B-113.

Herbert, D. A. 1995. Insect pest management in Virginia peanuts, soybeans, and cotton. Virginia Tech, Tidewater Agricultural Research and Extension Center Info Ser. No. 372, pp. 97-110.

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. Proc. Beltwide Cotton Conferences. pp. 939-941.

Williams, M.R. 2001. Cotton Insect Losses 2000. Proceedings Beltwide Cotton Conferences.

Table 1. Total Thrips Counts: Insecticide Screening for Thrips Control. Mississippi Co., AR. 2001.

Treatment /form	Rate lbs. /acre	Applic. Method ¹	Total thrips (adults+larvae) / 5 plants			
			19DAP	26DAP	33DAP	40DAP
UTC			3.3 a	4 a	12.5 a	23.8 a
Temik 15G	3.5	IFAP	2.4 a	0.3 b	5 b	8 c
Temik 15G	4	IFAP	0.3 a	0.5 b	3.5 b	7.8 c
Temik 15G	5	IFAP	1 a	0.5 b	3 b	16.5 abc
Temik 15G	7	IFAP	1 a	0 b	3 b	8.5 c
Gaucho 480FS	8.0 ²	ST	1.3 a	0 b	5.8 b	10.5 bc
L0263-A1	250 ³	ST	2.3 a	1 b	2.8 b	19.5 ab
Adage 5FS	300 ⁴	ST	1.3 a	0.5 b	2 b	12.5 bc
Gaucho 480FS + Orthene 97	8.0 ² + 0.206	ST + FS 29DAP	1.8 a	0.5 b	2 b	7 c

Means followed by same letter do not significantly differ (P=0.05, Duncan's New MRT).

Mean comparisons performed only when AOV Trt. P(F) is sign. at mean comparison OSL.

¹IFAP = In-Furrow At Planting; ST = Seed Treatment, FS = Foliar Spray.

²oz / cwt seed.

³fl oz / cwt seed.

⁴gm / 100Kg seed.

Table 2. Thrips Damage, Stand Count, & Yield: Insecticide Screening for Thrips Control. Mississippi Co., AR. 2001.

Treatment /form	Rate lbs. /acre	Applic. Method ¹	Thrips Damage Rating ²		Stand Count	Cotton Lint
			33DAP	40DAP	Plants / 3rwft	Yield Lbs./A
UTC			6.8 a	5.3 a	74.3 abc	986 a
Temik 15G	3.5	IFAP	2.8 c	2 b	62 c	1016 a
Temik 15G	4	IFAP	2.3 cd	1.3 b	68 bc	1005 a
Temik 15G	5	IFAP	2.3 cd	2 b	68.5 bc	968 a
Temik 15G	7	IFAP	1.3 d	2.5 b	70.8 abc	1022 a
Gaucho 480FS	8.0 ³	ST	4.5 b	2.5 b	66.8 bc	1051 a
L0263-A1	250 ⁴	ST	4.3 b	2.3 b	81.3 ab	1072 a
Adage 5FS	300 ⁵	ST	4.5 b	2.8 b	85 a	1053 a
Gaucho 480FS + Orthene 97	8.0 ³ + 0.206	ST + FS 29DAP	3.3 c	1.5 b	76.8 abc	1045 a

Means followed by same letter do not significantly differ (P=0.05, Duncan's New MRT).

Mean comparisons performed only when AOV Trt. P(F) is sign. at mean comparison OSL.

¹IFAP = In-Furrow At Planting; ST = Seed Treatment.

²1 = none, 10 = severe.

³oz / cwt seed.

⁴fl oz / cwt seed.

⁵gm / 100Kg seed.

Table 3. Total Thrips Counts: Insecticide Screening for Thrips Control. Lee Co., AR. 2001.

Treatment /form	Rate lbs. /acre	Applic. Method ¹	Total thrips (adults+larvae) / 5 plants			
			15DAP	22DAP	29DAP	36DAP
UTC			2.5 a	4.3 a	11.5 a	55.8 a
Temik 15G	3.5	IFAP	1.3 a	3.3 a	18.3 a	51 a
Temik 15G	4	IFAP	1.3 a	3 a	24.8 a	30.3 a
Temik 15G	5	IFAP	1.5 a	3 a	17.8 a	59.8 a
Temik 15G	7	IFAP	0.8 a	1.5 a	9.8 a	31.5 a
Gaucho 480FS	8.0 ²	ST	1.8 a	1.5 a	4.5 a	35.3 a
L0263-A1	250 ³	ST	0.5 a	5 a	15.8 a	60.5 a
Adage 5FS	300 ⁴	ST	1 a	0.8 a	10 a	20.8 a
Gaucho 480FS + Orthene 97	8.0 ² + 0.206	ST + FS 25DAP	0 a	1.3 a	4 a	16.3 a

Means followed by same letter do not significantly differ (P=0.05, Duncan's New MRT).

Mean comparisons performed only when AOV Trt. P(F) is sign. at mean comparison OSL.

¹IFAP = In-Furrow At Planting; ST = Seed Treatment, FS = Foliar Spray.

²oz / cwt seed.

³fl oz / cwt seed.

⁴gm / 100Kg seed.

Table 4. Thrips Damage, Stand Count, & Yield: Insecticide Screening for Thrips Control. Lee. Co., AR. 2001.

Treatment /form	Rate lbs. /acre	Applic. Method ¹	Thrips Damage Rating ²			Stand Count Plants / 3rwt	Cotton Lint Yield Lbs./A
			15 DAP	29 DAP	36 DAP	36 DAP	172 DAP
UTC			2.8 a	5.3 a	5.8 a	64.3 bc	987 abc
Temik 15G	3.5	IFAP	1.5 a	4 a	2.3 bc	66 bc	956 bc
Temik 15G	4	IFAP	1.5 a	3.5 a	2.5 b	66.3 bc	907 c
Temik 15G	5	IFAP	1.5 a	3 a	1.8 bcd	49.3 c	926 c
Temik 15G	7	IFAP	2.8 a	3.3 a	1.8 bcd	51.5 c	900 c
Gaucho 480FS	8.0 ³	ST	2.3 a	4.5 a	1.5 cd	79.8 ab	1056 a
L0263-A1	250 ⁴	ST	2 a	3.8 a	2 bcd	82.5 ab	1045 ab
Adage 5FS	300 ⁵	ST	1.5 a	3.8 a	1.8 bcd	82.3 ab	1062 a
Gaucho 480FS + Orthene 97	8.0 ³ + 0.206	ST + FS 25DAP	2.3 a	4.5 a	1.3 d	89 a	1035 ab

Means followed by same letter do not significantly differ (P=0.05, Duncan's New MRT).

Mean comparisons performed only when AOV Trt. P(F) is sign. at mean comparison OSL.

¹IFAP = In-Furrow At Planting; ST = Seed Treatment.

²1 = none, 10 = severe.

³oz / cwt seed.

⁴fl oz / cwt seed.

⁵gm / 100Kg seed.

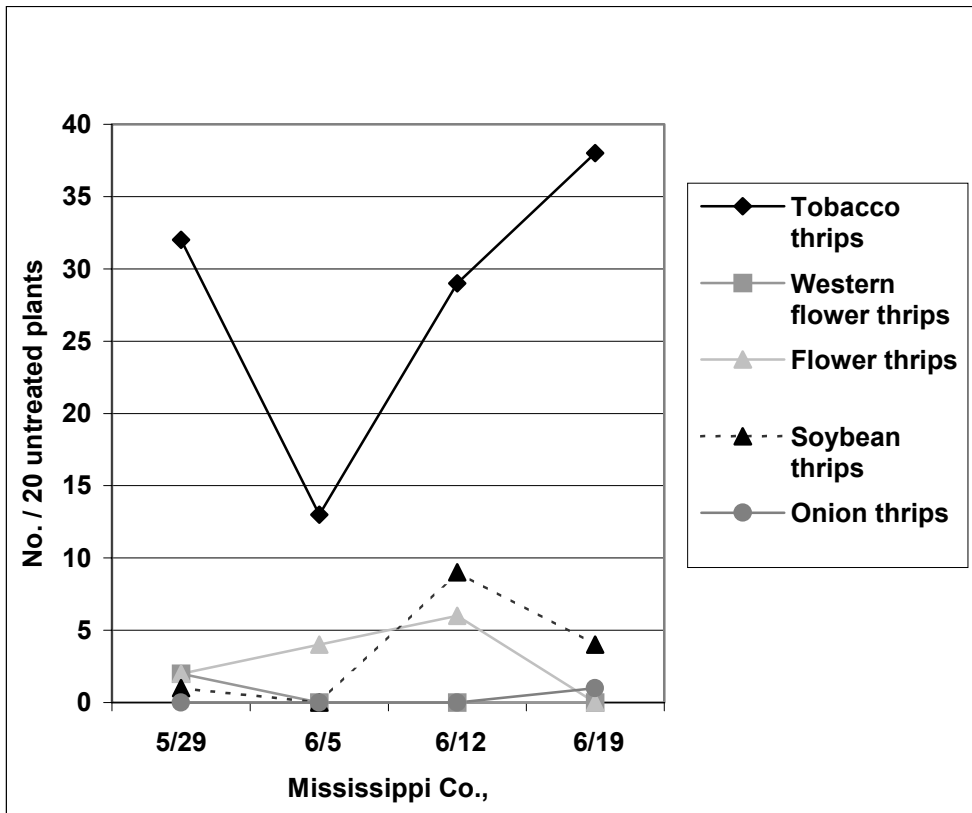


Figure 1. Thrips species distribution from thrips control trial in cotton. Mississippi Co., AR. 2001.

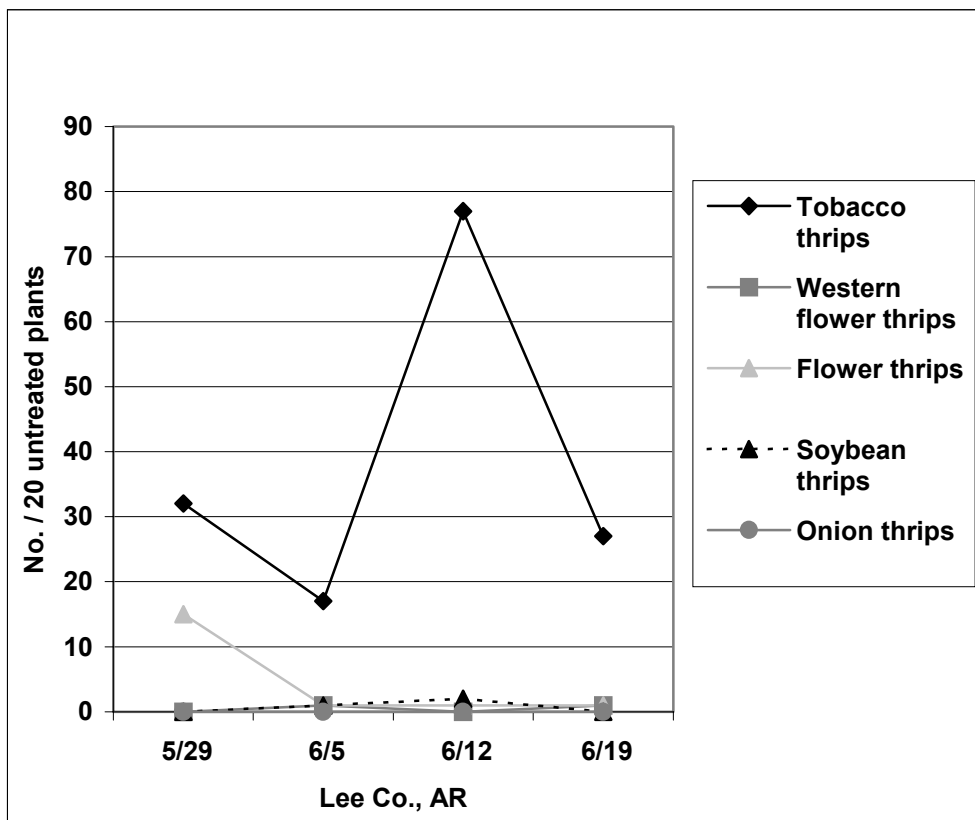


Figure 2. Thrips species distribution from thrips control trial in cotton. Lee Co., AR. 2001.