



## THRIPS MANAGEMENT IN ARKANSAS COTTON

*John D. Hopkins, Jack D. Reaper, III, D.R. Johnson, and G.M. Lorenz, III<sup>1</sup>*

### RESEARCH PROBLEM

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. This project was designed to evaluate in-furrow (IFAP), seed treatment (ST), and combination ST + foliar insecticides (FS) for thrips management in cotton.

### BACKGROUND INFORMATION

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 predominant 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 mid-South cotton include the flower thrips, *Frankliniella tritici* (Fitch), and the soybean thrips, *Neohydatothrips vari-*

---

<sup>1</sup> Entomology associate specialist and entomology extension specialist, Cooperative Extension Service, Lonoke; extension entomologist-pest management section leader and extension entomologist-IPM coordinator, Cooperative Extension Service, Little Rock.

*ables* (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.

### RESEARCH DESCRIPTION

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 County on 10 May and at the Cotton Branch Station in Lee County, Arkansas, on 14 May. Plots were four 38-inch rows X 35 ft. in length, arranged in a randomized complete block design with four replications. Granular insecticide treatments were applied at planting using granular applicator boxes mounted on a John Deere 7100 planter. Cottonseed used in the test had previously been shipped to the appropriate chemical company (Syngenta or Gustafson) for seed treatment. The foliar application was made 29 days after planting (DAP) with a CO<sub>2</sub> backpack sprayer. The 2-row boom was equipped with conejet TXVS 6 nozzles on a 19-inch spacing. Operating pressure was 35 psi with a final spray volume of 12 gallons per acre.

In Mississippi County, thrips counts were made on 29 May (19 DAP), 5 June (26 DAP), 12 June (33 DAP), and 19 June (40 DAP). In Lee County, 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 counted using a dissecting microscope. Thrips collected from the untreated control plots were identified to determine species distribution (Fig. 1 and 2).

Thrips damage was visually rated in the Mississippi County plots on 12 June (33 DAP) and 19 June (40 DAP). Damage was rated in the Lee County 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 County and 36 DAP/ Lee County). Plots were harvested in Mississippi County on 10 October (153 DAP) and in Lee County 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 tobacco thrips was the predominant species infesting cotton at both trial locations (Figs. 1 and 2). At the Mississippi County 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 lb/acre was the lowest yielding treatment at 968 lb lint/acre compared to 986 lb lint/acre 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 County 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 lb/acre) 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 lb lint/acre) 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.

#### PRACTICAL APPLICATION

The data presented from these trials indicate that the Adage and Gaucho seed treatments offer a level of thrips protection similar to that provided by the standard in-furrow granular insecticide under light to moderate pressure from tobacco thrips. These seed treatments offer a more convenient and time efficient method of thrips control compared to in-furrow granular insecticide applications, which involve a separate set of activities at the planter (calibration and handling).

#### LITERATURE CITED

- 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 Conf., National Cotton Council, Memphis, TN.* pp. 939-941.

Williams, M.R. 2001. Cotton Insect Losses 2000. *Proc. Beltwide Cotton Conf., National Cotton Council, Memphis, TN.*

**Table 1. Total thrips counts: Insecticide screening for thrips control. Mississippi County, AR. 2001.**

Treatment /form	Rate	Applic. method <sup>z</sup> (lb/acre)	Total thrips (adults+larvae)			
			19DAP	26DAP	33DAP	40DAP
UTC			3.3 a <sup>y</sup>	4.0 a	12.5 a	23.8 a
Temik 15G	3.5	IFAP	2.4 a	0.3 b	5.0 b	8.0 c
Temik 15G	4.0	IFAP	0.3 a	0.5 b	3.5 b	7.8 c
Temik 15G	5.0	IFAP	1.0 a	0.5 b	3.0 b	16.5 abc
Temik 15G	7.0	IFAP	1.0 a	0.0 b	3.0 b	8.5 c
Gaucho 480FS	8.0 <sup>x</sup>	ST	1.3 a	0.0 b	5.8 b	10.5 bc
L0263-A1	250.0 <sup>w</sup>	ST	2.3 a	1.0 b	2.8 b	19.5 ab
Adage 5FS	300.0 <sup>y</sup>	ST	1.3 a	0.5 b	2.0 b	12.5 bc
Gaucho 480FS + Orthene 97	8.0 <sup>x</sup> + 0.206	ST + FS 29DAP	1.8 a	0.5 b	2.0 b	7.0 c

<sup>z</sup> IFAP = In-Furrow At Planting; ST = Seed Treatment, FS = Foliar Spray.

<sup>y</sup> 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.

<sup>x</sup> oz/cwt seed.

<sup>w</sup> fl oz/cwt seed.

<sup>v</sup> gm/100Kg seed.

Summaries of Arkansas Cotton Research, 2001

**Table 2. Thrips damage, stand count, and yield:  
Insecticide screening for thrips control. Mississippi County, AR. 2001.**

Treatment/ form	Rate (lb/acre)	Applic. method <sup>z</sup>	Thrips damage rating <sup>y</sup>		Stand count	Cotton lint yield
			33DAP	40DAP	40DAP (#/3 row ft)	153DAP (lb/acre)
UTC			6.8 a <sup>x</sup>	5.3 a	74.3 abc	986 a
Temik 15G	3.5	IFAP	2.8 c	2.0 b	62.0 c	1016 a
Temik 15G	4.0	IFAP	2.3 cd	1.3 b	68.0 bc	1005 a
Temik 15G	5.0	IFAP	2.3 cd	2.0 b	68.5 bc	968 a
Temik 15G	7.0	IFAP	1.3 d	2.5 b	70.8 abc	1022 a
Gaucho 480FS	8.0 <sup>w</sup>	ST	4.5 b	2.5 b	66.8 bc	1051 a
L0263-A1	250.0 <sup>v</sup>	ST	4.3 b	2.3 b	81.3 ab	1072 a
Adage 5FS	300.0 <sup>u</sup>	ST	4.5 b	2.8 b	85.0 a	1053 a
Gaucho 480FS + Orthene 97	8.0 <sup>w</sup> + 0.206	ST + FS 29DAP	3.3 c	1.5 b	76.8 abc	1045 a

<sup>z</sup> IFAP = in-furrow at planting; ST = seed treatment.

<sup>y</sup> 1 = none, 10 = severe.

<sup>x</sup> 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 significant at mean comparison OSL.

<sup>w</sup> oz/cwt seed.

<sup>v</sup> fl oz/cwt seed.

<sup>u</sup> gm/100Kg seed.

**Table 3. Total thrips counts: Insecticide screening  
for thrips control. Lee County, AR. 2001.**

Treatment /form (lb/acre)	Rate	Applic. method <sup>z</sup>	Total thrips (adults+larvae)/5 plants			
			15DAP	22DAP	29DAP	36DAP
UTC			2.5 a <sup>y</sup>	4.3 a	11.5 a	55.8 a
Temik 15G	3.5	IFAP	1.3 a	3.3 a	18.3 a	51.0 a
Temik 15G	4.0	IFAP	1.3 a	3.0 a	24.8 a	30.3 a
Temik 15G	5.0	IFAP	1.5 a	3.0 a	17.8 a	59.8 a
Temik 15G	7.0	IFAP	0.8 a	1.5 a	9.8 a	31.5 a
Gaucho 480FS	8.0 <sup>x</sup>	ST	1.8 a	1.5 a	4.5 a	35.3 a
L0263-A1	250.0 <sup>w</sup>	ST	0.5 a	5.0 a	15.8 a	60.5 a
Adage 5FS	300.0 <sup>v</sup>	ST	1.0 a	0.8 a	10.0 a	20.8 a
Gaucho 480FS + Orthene 97	8.0 <sup>x</sup> + 0.206	ST + FS 25DAP	0.0 a	1.3 a	4.0 a	16.3 a

<sup>z</sup> IFAP = In-Furrow At Planting; ST = Seed Treatment, FS = Foliar Spray.

<sup>y</sup> 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 significant at mean comparison OSL.

<sup>x</sup> oz/cwt seed.

<sup>w</sup> fl oz/cwt seed.

<sup>v</sup> gm/100Kg seed.

**Table 4. Thrips damage, stand count, and yield: Insecticide screening for thrips control. Lee County, AR. 2001.**

Treatment/ form	Rate (lb/acre)	Applic. method <sup>z</sup>	Thrips damage rating <sup>y</sup>			Stand count	Cotton lint yield
			15DAP	29DAP	36DAP	36DAP (#/3rwft)	172DAP (lb/acre)
UTC			2.8 a <sup>x</sup>	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	4.0	IFAP	1.5 a	3.5 a	2.5 b	66.3 bc	907 c
Temik 15G	5.0	IFAP	1.5 a	3 a	1.8 bcd	49.3 c	926 c
Temik 15G	7.0	IFAP	2.8 a	3.3 a	1.8 bcd	51.5 c	900 c
Gaucho 480FS	8.0 <sup>w</sup>	ST	2.3 a	4.5 a	1.5 cd	79.8 ab	1056 a
L0263-A1	250.0 <sup>v</sup>	ST	2 a	3.8 a	2 bcd	82.5 ab	1045 ab
Adage 5FS	300.0 <sup>u</sup>	ST	1.5 a	3.8 a	1.8 bcd	82.3 ab	1062 a
Gaucho 480FS + Orthene 97	8.0 <sup>w</sup> + 0.206	ST + FS 25DAP	2.3 a	4.5 a	1.3 d	89 a	1035 ab

<sup>z</sup> IFAP = In-Furrow At Planting; ST = Seed Treatment.

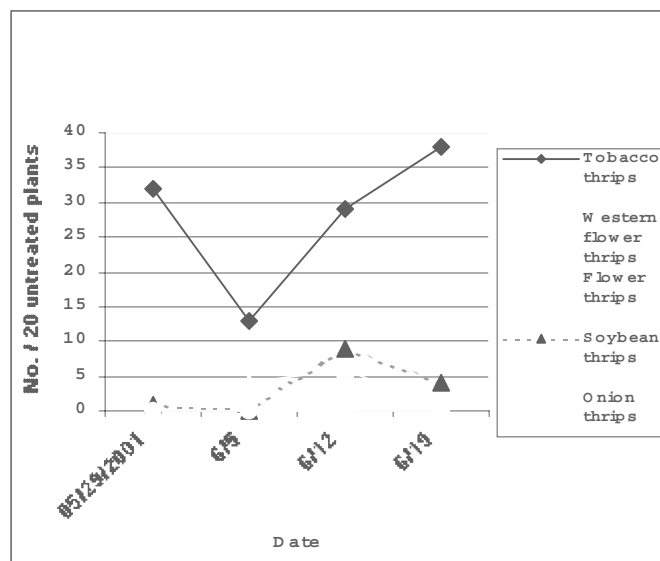
<sup>y</sup> 1 = none, 10 = severe.

<sup>x</sup> 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 significant at mean comparison OSL.

<sup>w</sup> oz/cwt seed.

<sup>v</sup> fl oz/cwt seed.

<sup>u</sup> gm/100Kg seed.



**Fig. 1. Thrips species distribution from thrips control trial in cotton. Mississippi County, AR. 2001.**

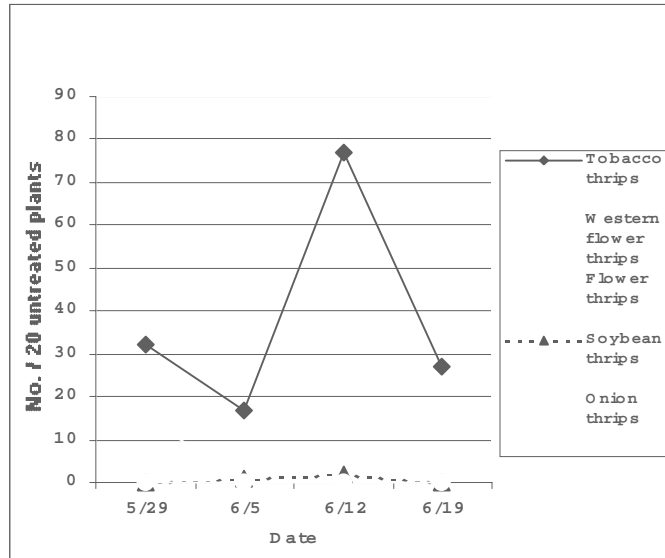


Fig. 2. Thrips species distribution from thrips control trial in cotton. Lee County, AR. 2001.