THRIPS MANAGEMENT IN MID-SOUTH COTTON

D. R. Cook
Mississippi State University
Stoneville, MS
S. D. Stewart
The University of Tennessee
Jackson, TN
W. D. Crow
J. Gore
Mississippi State University
Stoneville, MS
B. Thrash
G. M. Lorenz
University of Arkansas
Lonoke, AR
A. L. Catchot
Mississippi State University
Starkville, MS
D. L. Kerns
Texas A&M University
College Station, TX
S. Brown
LSU AgCenter
Alexandria, LA
G. Studebaker
University of Arkansas
Keiser, AR
T. Towles
LSU AgCenter
Winnsboro, LA
N. S. Little
USDA-ARS
Stoneville, MS
N. Bateman
University of Arkansas
Stuttgart, AR

Abstract

Studies were conducted across the Mid-South to evaluate selected at-planting and foliar insecticide treatments against thrips infesting cotton seedlings. At most locations, thrips densities were low to moderate in the at-planting treatment trials. With few exceptions, all of the at-planting treatments reduced thrips densities and damage ratings from the first to the fourth true leaf stage compared to the control (fungicide only). Also, all of the insecticide treatments resulted in higher yields compared to the control (fungicide only). In the foliar insecticide trials, with few exceptions all of the insecticide treatments, except the pyrethroid Karate, reduced thrips densities and damage from 3 DAT to 14 DAT. At 6-7 DAT and at 10-11 DAT, Acephate performed similar to Intrepid Edge and Radiant. There were no differences in yield in the foliar insecticide trials.

Introduction

There are several species of thrips that infest cotton seedlings including tobacco thrips, *Frankliniella fusca* (Hinds); western flower thrips, *Frankliniella occidentalis* (Pergande); flower thrips, *Frankliniella tritici* (Fitch); onion thrips, *Thrips tabaci* (Lindeman), and soybean thrips, *Neohydatothrips variabilis* (Beach). Tobacco thrips is the predominate species that infests cotton seedlings across much of the Mid-South (Cook et al. 2003, Stewart et al. 2013). Aldicarb (Temik 15G) was the standard at-planting management strategy prior to the introduction of the neonicotinoid seed treatments. Neonicotinoid seed treatments were quickly adopted following their introduction. Also aldicarb was

removed from the market. In recent years thrips have been managed almost exclusively with neonicotinoid seed treatments and supplemental foliar treatments. The two most widely used insecticide seed treatments for thrips management in cotton have been Gaucho (imidacloprid) and Cruiser (thiamethoxam), both are neonicotinoids. Widespread resistance to thiamethoxam has been observed in tobacco thrips populations across the Mid-South (Huseth et al. 2016, Darnell-Crumpton et al. 2018). Currently thiamethoxam is not offered as a commercial seed treatment for thrips control in the Mid-South. All of the commercial seed treatment packages include imidacloprid. Another aldicarb product (AgLogic 15G) was introduced into the market in recent years. Many growers are supplementing neonicotinoid seed treatments (imidacloprid) with Acephate either as an additional seed treatment or as an in-furrow spray, or have started using aldicarb again. One reason these are preferred over supplemental foliar applications for thrips management is that some of the newer transgenic herbicide technologies do not allow co-application of an insecticide with the herbicide. However, in some case supplemental foliar applications are needed. Acephate has been the standard foliar thrips treatment for decades, but less than satisfactory performance has been observed in some cases. In response, some growers are using spinetoram, either as Radiant or Intrepid Edge for supplemental foliar thrips management. During 2021 studies were conducted in Arkansas, Louisiana, Mississippi, Tennessee, and Texas to evaluate the performance of selected seed treatments containing imidacloprid (Gaucho, Aeris), AgLogic 15G, and Acephate as a seed treatment and as an in-furrow spray treatments (alone and in combination with Gaucho) against thrips infesting cotton seedlings in the Mid-South. Additionally the performance of selected foliar treatments was evaluated in Tennessee, Mississippi, and Texas. These included the representative products from the organophosphate, spinosyn, pyrethroid, and carbamate insecticide classes.

Materials and Methods

Studies were conducted during 2021 in Arkansas, Louisiana, Mississippi, Tennessee, and Texas to evaluate the performance of selected insecticide at-planting treatments against thrips in cotton. Treatments were arranged in a randomized complete block design with four replications. Deltapine 2012 B3XF cotton seed was used in all trials. Cotton seed were treated by Drs. Gus Lorenz and Ben Thrash. All seed was treated with Trilex Advanced 300FS (1.6 oz/cwt) fungicide. Additionally, trials were conducted to evaluate the performance of selected foliar insecticides against thrips. These trials were conducted in Mississippi, Tennessee, and Texas. Cotton seed that did not have an insecticide seed treatment (DPL 1646 B2XF in Mississippi, Phytogen 400W3FE and DPL 2012B3XF in Tennessee, and Nexgen 4936B3XF in Texas, Phytogen 480W3FE in Louisiana, and DPL 2012B3XF in Arkansas) was used in the foliar insecticide trials. Foliar treatments were applied at 10 gpa and trials were initiated at the first to second true leaf stage, depending on location. AgLogic was included as an at-planting comparison. Planting dates ranged from 28 Apr to 27 May for the insecticide seed treatment trials and from 22 Apr to 27 May for the foliar trials.

Thrips densities in the insecticide seed treatment trials were determined by sampling 5 plants per plot at the 1, 2, 3, and 4 leaf stage using a modified whole plant washing procedure. Thrips densities in the foliar trials were determined using the same method at 3, 6-7, 10-11, and 14 days after treatment, DAT, (foliar application). Also, plant damage was estimated at these timings using a 1 – 5 scale, with a rating of 1 = no damage and 5 = severe damage. Plots were machine harvested at crop maturity. Seed cotton yields were converted to lint yield based on 40% gin turnout. Data were subjected to ANOVA procedures, with means separated according to Fisher's Protected LSD.

Results

At-Planting Treatment Trials

At the first true leaf stage all of the insecticides except Acephate seed treatment and Gaucho resulted in fewer thrips adults than the non-treated control (Table 1). All of the insecticide treatments resulted in lower densities of thrips immatures and total thrips compared to the non-treated. Plots treated with AgLogic had fewer thrips immature than plots treated with Acephate seed treatment, Gaucho, or Acephate in-furrow. Also AgLogic resulted in fewer total thrips compared to all of the other insecticides, except Acephate seed treatment and Acephate in-furrow. All of the insecticide resulted in less thrips damage compared to the non-treated. AgLogic resulted in less damage than any of the other insecticides. Also Acephate seed treatment plus Gaucho resulted in less damage than Acephate seed treatment, Acephate in-furrow spray, and Acephate in-furrow plus Gaucho.

At the second true leaf stage none of the insecticides reduced densities of thrips adults compared to the non-treated (Table 2). All of the insecticides reduced thrips immatures compared to the non-treated. Also Aeris, Admire Pro, Acephate in-furrow plus Gaucho, and AgLogic resulted in fewer immature thrips compared to Acephate applied as s

seed treatment or in-furrow spray. All of the insecticides reduced total thrips compared to the non-treated. Also, Acephate in-furrow plus Gaucho, Admire Pro, and AgLogic resulted in fewer total thrips than Acephate alone as a seed treatment or in-furrow spray or Gaucho. All of the insecticide resulted in less thrips damage compared to the non-treated. AgLogic resulted in less damage than all of the other insecticides.

At the third true leaf stage there were no differences among treatments for densities of thrips adults (Table 3). All of the insecticide treatments resulted in lower densities of thrips immatures and total thrips compared to the non-treated. AgLogic resulted in fewer immature thrips than the other insecticide treatments, except Acephate in-furrow plus Gaucho. AgLogic resulted in fewer total thrips than the other insecticide treatments. All of the insecticides resulted in less thrips damage compared to the non-treated. AgLogic resulted in less thrips damage than the other insecticide treatments.

At the fourth true leaf stage there were no differences among treatments for densities of thrips adults (Table 4). Only Acephate in-furrow and AgLogic reduce immature thrips and total thrips compared to the non-treated. All of the insecticide treatments resulted in lower damage ratings compared to the non-treated. Acephate seed treatment plus Gaucho, Gaucho, Aeris, AgLogic, and Acephate in-furrow plus Gaucho resulted in less damage than Acephate applied as a seed treatment or in-furrow spray. AgLogic resulted in less damage than any of the other insecticide treatments.

No differences among treatments were observed for lint yield (Table 5). Yields for treated plots ranged from 1,246 lb. to 1,359 lb. lint per acre.

Foliar Treatment Trials

Only Acephate (both rates) and Dimethoate reduced thrips adults compared to the non-treated at 2-3 DAT (Table 6). All of the insecticide treatments, except Warrior, reduced densities of immature thrips and total thrips compared to the non-treated control. Plots treated with Intrepid Edge had fewer immature thrips than plots treated with Acephate (0.21lb), Dimethoate, or Warrior. There were no differences among treatments for thrips damage ratings.

Only Intrepid Edge, Radiant, and Acephate (both rates) resulted in lower densities of thrips adults compared to the non-treated at 5-7 DAT (Table 7). All of the insecticide treatments, except Warrior, reduced densities of immature thrips and total thrips compared to the non-treated control. All of the insecticides resulted in lower damage ratings compared to the non-treated control.

There were no differences among treatments for densities of thrips adults at 12-15 DAT (Table 8). All of the insecticide treatments, except Warrior, reduced densities of immature and total thrips compared to the non-treated control. All of the insecticide treatments, except Warrior reduced thrips damage compared to the non-treated control.

There were no differences among treatments for yield (Table10). Lint yields ranged from 1,149 lb. to 1,227 lb. per acre.

Table 1. Impact of selected at-planting treatments on densities of thrips adults, immatures, and total thrips and thrips damage at the 1 leaf growth stage.

			Thrips / 5 Plants			
Treatment	Application Method	Rate	Adults	Immatures	Total	Damage Rating
Non-Treated	-	-	5.8a	29.8a	35.6a	2.51a
Acephate 97S	Seed Treatment	6.4[1]	6.5a	7.7b	14.2b	1.84bc
Acephate 97S + Gaucho 5FS	Seed Treatment	6.4[1]+0.375[2]	4.4b	3.4bc	7.8cd	1.51d
Gaucho 5FS	Seed Treatment	0.375[2]	5.0a	4.3bc	9.3bc	1.67bcd
Aeris[3]	Seed Treatment	0.75[2]	4.2b	4.4bc	8.5bc	1.59cd
AgLogic 15G	In-Furrow Granule	0.6[4]	1.6c	0.3c	1.9d	1.14e
Acephate 97S + Gaucho 5FS	In-Furrow Spray + Seed Treatment	1.0[5] +0.375[2]	4.5b	2.8bc	7.2cd	1.63bcd
Acephate 97S	In-Furrow Spray	1.0[5]	4.0b	5.2bc	9.3bc	1.85b
Admire Pro 4.6SC	In-Furrow Spray	0.33[5]	4.3b	7.4b	11.6bc	1.75bcd
P>F			<0.01	<0.01	<0.01	<0.01

Means within a column followed by a common letter are not significantly different (FPLSD $P = 0.05$).
[1]oz wt. product / cwt.
[2]mg AI / seed.
[3]mg AI / seed. Aeris applied at the listed rate contains 0.375 mg AI imidacloprid (Gaucho) and 0.375 mg AI thiodicarb.
[4]lb AI / per acre, in-furrow granule.
[5]lb AI / per acre, in-furrow spray.

Table 2. Impact of selected at-planting treatments on densities of thrips adults, immatures, and total thrips and thrips damage at the 2 leaf growth stage.

			Thrips / 5 Plants			
Treatment	Application Method	Rate	Adults	Immatures	Total	Damage Rating
Non-Treated	-	-	7.5abc	45.9a	53.3a	2.76a
Acephate 97S	Seed Treatment	6.4[1]	10.4ab	29.7b	40.1b	2.40b
Acephate 97S + Gaucho 5FS	Seed Treatment	6.4[1]+0.375[2]	10.4ab	14.0cde	24.4cd	1.97d
Gaucho 5FS	Seed Treatment	0.375[2]	11.0ab	17.4cd	28.4bcd	2.05cd
Aeris[3]	Seed Treatment	0.75[2]	10.5ab	10.8de	21.3cd	2.05cd
AgLogic 15G	In-Furrow Granule	0.6[4]	4.3c	4.9e	9.2e	1.55e
Acephate 97S + Gaucho 5FS	In-Furrow Spray + Seed Treatment	1.0[5] +0.375[2]	6.8bc	10.9de	17.7de	2.36bc
Acephate 97S	In-Furrow Spray	1.0[5]	9.0ab	22.6bc	32.2bc	2.36bc
Admire Pro 4.6SC	In-Furrow Spray	0.33[5]	12.1a	7.5de	19.6cde	2.16bcd
P>F			0.04	<0.01	<0.01	<0.01

Means within a column followed by a common letter are not significantly different (FPLSD $P = 0.05$).
[1]oz wt. product / cwt.
[2]mg AI / seed.
[3]mg AI / seed. Aeris applied at the listed rate contains 0.375 mg AI imidacloprid (Gaucho) and 0.375 mg AI thiodicarb.
[4]lb AI / per acre, in-furrow granule.
[5]lb AI / per acre, in-furrow spray.

Table 3. Impact of selected at-planting treatments on densities of thrips adults, immatures, and total thrips and thrips damage at the 3 leaf growth stage.

			Thrips / 5 Plants			
Treatment	Application Method	Rate	Adults	Immatures	Total	Damage Rating
Non-Treated	-	-	8.9	76.5a	85.4a	3.00a
Acephate 97S	Seed Treatment	6.4[1]	18.4	34.1b	52.5c	2.50ab
Acephate 97S + Gaucho 5FS	Seed Treatment	6.4[1]+0.375[2]	13.0	41.9b	54.9bc	1.81c
Gaucho 5FS	Seed Treatment	0.375[2]	9.5	70.3a	79.8ab	2.31bc
Aeris[3]	Seed Treatment	0.75[2]	13.3	43.3b	56.5bc	1.94bc
AgLogic 15G	In-Furrow Granule	0.6[4]	4.9	4.8c	9.8d	1.88c
Acephate 97S + Gaucho 5FS	In-Furrow Spray + Seed Treatment	1.0[5] +0.375[2]	9.1	28.3bc	37.4c	1.81c
Acephate 97S	In-Furrow Spray	1.0[5]	13.0	30.7b	43.7c	2.13bc
Admire Pro 4.6SC	In-Furrow Spray	0.33[5]	10.6	40.9b	51.5c	2.06bc
P>F			0.09	<0.01	<0.01	<0.01

Means within a column followed by a common letter are not significantly different (FPLSD $P = 0.05$).
[1]oz wt. product / cwt.
[2]mg AI / seed.
[3]mg AI / seed. Aeris applied at the listed rate contains 0.375 mg AI imidacloprid (Gaucho) and 0.375 mg AI thiodicarb.
[4]lb AI / per acre, in-furrow granule.
[5]lb AI / per acre, in-furrow spray.

Table 4. Impact of selected at-planting treatments on densities of thrips adults, immatures, and total thrips and thrips damage at the 4 leaf growth stage.

			Thrips / 5 Plants			
Treatment	Application Method	Rate	Adults	Immatures	Total	Damage Rating
Non-Treated	-	-	9.0	83.0a	92.0a	3.25a
Acephate 97S	Seed Treatment	6.4[1]	8.3	68.0a	76.2ab	2.72b
Acephate 97S + Gaucho 5FS	Seed Treatment	6.4[1]+0.375[2]	6.8	70.4a	77.2a	2.02d
Gaucho 5FS	Seed Treatment	0.375[2]	7.9	80.5a	88.4a	2.20d
Aeris[3]	Seed Treatment	0.75[2]	8.2	66.8a	75.0ab	2.14d
AgLogic 15G	In-Furrow Granule	0.6[4]	6.5	37.0b	43.5c	1.47e
Acephate 97S + Gaucho 5FS	In-Furrow Spray + Seed Treatment	1.0[5] +0.375[2]	11.0	39.9b	50.9bc	2.08d
Acephate 97S	In-Furrow Spray	1.0[5]	6.9	80.2a	87.1a	2.61bc
Admire Pro 4.6SC	In-Furrow Spray	0.33[5]	7.1	72.5a	79.7a	2.26cd
P>F			0.47	<0.01	<0.01	<0.01

Means within a column followed by a common letter are not significantly different (FPLSD $P = 0.05$).
[1]oz wt. product / cwt.
[2]mg AI / seed.
[3]mg AI / seed. Aeris applied at the listed rate contains 0.375 mg AI imidacloprid (Gaucho) and 0.375 mg AI thiodicarb.
[4]lb AI / per acre, in-furrow granule.
[5]lb AI / per acre, in-furrow spray.

Table 5. Impact of selected at-planting treatments on cotton yield.

Treatment	Application Method	Rate	Lint Yield (lb. / Acre)
Non-Treated	-	-	1,246
Acephate 97S	Seed Treatment	6.4[1]	1,269
Acephate 97S + Gaucho 5FS	Seed Treatment	6.4[1]+0.375[2]	1,331
Gaucho 5FS	Seed Treatment	0.375[2]	1,329
Aeris[3]	Seed Treatment	0.75[2]	1,349
AgLogic 15G	In-Furrow Granule	0.6[4]	1,358
Acephate 97S + Gaucho 5FS	In-Furrow Spray + Seed Treatment	1.0[5] +0.375[2]	1,359
Acephate 97S	In-Furrow Spray	1.0[5]	1,309
Admire Pro 4.6SC	In-Furrow Spray	0.33[5]	1,327
P>F			0.08

Means within a column followed by a common letter are not significantly different (FPLSD *P* = 0.05).
[1]oz wt. product / cwt.
[2]mg AI / seed.
[3]mg AI / seed. Aeris applied at the listed rate contains 0.375 mg AI imidacloprid (Gaucho) and 0.375 mg AI thiodicarb.
[4]lb AI / per acre, in-furrow granule.
[5]lb AI / per acre, in-furrow spray.

Table 6. Impact of selected foliar treatments on densities of thrips adults, immatures, and total thrips and thrips damage at the 2-3 DAT.

			Thrips / 5 Plants			
Treatment	Insecticide Class	Rate	Adults	Immatures	Total	Damage Rating
Non-Treated	-	-	8.3abc	70.2a	78.5a	2.51
Intrepid Edge	Spinosyn + IGR	3.0[2]	8.9ab	22.5c	31.4b	2.28
Radiant 1SC[1]	Spinosyn	1.5[2]	5.7bcd	24.8bc	30.5b	2.28
Acephate 97S	Organophosphate	0.21[3]	3.6d	38.4b	42.1b	2.32
Acephate 97S	Organophosphate	0.52[3]	3.5d	29.5bc	33.0b	2.42
Bidrin 8E	Organophosphate	3.2[2]	5.0cd	27.8bc	32.8b	2.37
Dimethoate 4EC	Organophosphate	6.4[2]	4.2d	33.3b	37.5b	2.44
Warrior 2.08CS	Pyrethroid	1.28[2]	11.9d	65.9a	77.8a	2.53
P>F			<0.01	<0.01	<0.01	0.85

Means within a column followed by a common letter are not significantly different (FPLSD *P* = 0.05).
[1]Adjuvant included with Radiant, Crop Oil Concentrate at 1%v/v, Nonionic surfactant at 0.25% v/v, Dyne-Amic at 0.5% v/v or Dyne-Amic at 0.25% v/v.
[2]fl oz product / acre.
[3]lb product / acre.

Table 7. Impact of selected foliar treatments on densities of thrips adults, immatures, and total thrips and thrips damage at the 5-7 DAT.

			Thrips / 5 Plants			
Treatment	Insecticide Class	Rate	Adults	Immatures	Total	Damage Rating
Non-Treated	-	-	4.8a	47.3a	52.0a	2.81a
Intrepid Edge	Spinosyn + IGR	3.0[2]	2.6bc	25.7b	28.3b	1.85b
Radiant 1SC[1]	Spinosyn	1.5[2]	2.8bc	19.9b	22.7b	1.91b
Acephate 97S	Organophosphate	0.21[3]	2.4c	30.1b	32.5b	1.98b
Acephate 97S	Organophosphate	0.52[3]	2.0c	20.0b	22.0b	2.02b
Bidrin 8E	Organophosphate	3.2[2]	4.0ab	27.2b	31.2b	1.79b
Dimethoate 4EC	Organophosphate	6.4[2]	4.0ab	29.1b	33.0b	2.04b
Warrior 2.08CS	Pyrethroid	1.28[2]	5.0a	51.4a	56.4a	2.02b
P>F			<0.01	<0.01	<0.01	<0.01

Means within a column followed by a common letter are not significantly different (FPLSD $P = 0.05$).
[1]Adjuvant included with Radiant, Crop Oil Concentrate at 1%v/v, Nonionic surfactant at 0.25% v/v, Dyne-Amic at 0.5% v/v or Dyne-Amic at 0.25% v/v.
[2]fl oz product / acre.
[3]lb product / acre.

Table 8. Impact of selected foliar treatments on densities of thrips adults, immatures, and total thrips and thrips damage at the 12-15 DAT.

			Thrips / 5 Plants			
Treatment	Insecticide Class	Rate	Adults	Immatures	Total	Damage Rating
Non-Treated	-	-	2.1	39.1a	41.2a	3.13a
Intrepid Edge	Spinosyn + IGR	3.0[2]	2.3	16.3b	18.5b	2.46c
Radiant 1SC[1]	Spinosyn	1.5[2]	3.3	15.0b	18.3b	2.42c
Acephate 97S	Organophosphate	0.21[3]	2.8	15.9b	18.8b	2.46c
Acephate 97S	Organophosphate	0.52[3]	2.7	12.4b	15.1b	2.50c
Bidrin 8E	Organophosphate	3.2[2]	3.8	16.8b	20.5b	2.46c
Dimethoate 4EC	Organophosphate	6.4[2]	2.8	14.8b	17.5b	2.71bc
Warrior 2.08CS	Pyrethroid	1.28[2]	3.4	30.8a	34.3a	3.00ab
P>F			0.46	<0.01	<0.01	<0.01

Means within a column followed by a common letter are not significantly different (FPLSD $P = 0.05$).
[1]Adjuvant included with Radiant, Crop Oil Concentrate at 1%v/v, Nonionic surfactant at 0.25% v/v, Dyne-Amic at 0.5% v/v or Dyne-Amic at 0.25% v/v.
[2]fl oz product / acre.
[3]lb product / acre.

Table 9. Impact of selected foliar treatments on cotton yield.

Treatment	Insecticide Class	Rate	Lint Yield (lb. / Acre)
Non-Treated	-	-	1,152
Intrepid Edge	Spinosyn + IGR	3.0[2]	1,177
Radiant 1SC[1]	Spinosyn	1.5[2]	1,220
Acephate 97S	Organophosphate	0.21[3]	1,197
Acephate 97S	Organophosphate	0.52[3]	1,162
Bidrin 8E	Organophosphate	3.2[2]	1,131
Dimethoate 4EC	Organophosphate	6.4[2]	1,227
Warrior 2.08CS	Pyrethroid	1.28[2]	1,149
P>F			0.44

Means within a column followed by a common letter are not significantly different (FPLSD $P = 0.05$).

[1]Adjuvant included with Radiant, Crop Oil Concentrate at 1%v/v, Nonionic surfactant at 0.25% v/v, Dyne-Amic at 0.5% v/v or Dyne-Amic at 0.25% v/v.

[2]fl oz product / acre.

[3]lb product / acre.

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