AT-PLANTING MANAGEMENT OF THRIPS IN MID-SOUTH COTTON

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Abstract

Thrips are one of the first insect pests to infest cotton following seedling emergence, with tobacco thrips, *Frankliniella fusca* Hinds, being the predominate species in the Mid-South. Following the introduction of the neonicotinoid seed treatments, thrips management has been almost exclusively accomplished with seed treatments and supplemental foliar treatments. Currently there are two seed treatment insecticides commonly used for thrips management in cotton and include Gaucho (imidacloprid) and Cruiser (thiamethoxam). Generally, the seed treatments have provided satisfactory control. However, recently less than satisfactory control of tobacco thrips has been observed with Cruiser (thiamethoxam). During 2015 studies were conducted in Arkansas, Louisiana, Mississippi, and Tennessee to evaluate the performance of Cruiser and Gaucho seed treatments alone and in combination with their respective companion nematicide products (Aeris and Avicta), as well as, acephate seed treatment at several rates. Thrips populations were low compared to studies conducted during 2014. Acephate provided thrips control that was similar to or better than Cruiser depending on rate and growth stage. On some sample dates the performance of Gaucho was similar to that of Cruiser. No differences among treatments were observed for yield. However, yields from the Gaucho treated plots were among the highest, while yields from Cruiser treated plots were among the lowest in the studies.

Introduction

Thrips are one of the first insect pests to infest cotton following seedling emergence. There are several species of thrips that infest cotton seedlings. These include 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 typically the predominate species that infests cotton seedlings in the Mid-South (Stewart et al. 2013). Prior to the introduction of neonicotinoid seed treatments, thrips infestations were managed with at-planting insecticides, either as in-furrow applications or seed treatments. Granular aldicarb (Temik 15G) was the standard at-planting treatment to manage thrips and other early-season insect pests for many years. Following the removal of Temik from the market, growers have managed thrips almost exclusively with neonicotinoid seed treatments and supplemental foliar treatments. Currently the two most widely used insecticide seed treatments for thrips management in cotton are Gaucho (imidacloprid) and Cruiser

(thiamethoxam), both are neonicotinoids. Historically, the neonicotinoid seed treatments have provided satisfactory control. Recently less than satisfactory control of tobacco thrips has been observed with Cruiser (thiamethoxam) and elevated LC_{50} values (thiamethoxam) have been reported for tobacco thrips collections from the Mississippi Delta (Darnell et al. 2015). Also, there were reports of issues with imidacloprid during 2015. Aside from foliar applications, growers have very few alternatives to neonicotinoid seed treatments if the performance of these tools continues to decline. During 2015 studies were conducted in Arkansas, Louisiana, Mississippi, and Tennessee to evaluate the performance of Cruiser and Gaucho seed treatments alone and in combination with their respective companion nematicide products (Aeris and Avicta), as well as, acephate seed treatment applied at several rates.

Materials and Methods

Studies were conducted during 2015 in Arkansas, Louisiana, Mississippi, and Tennessee to evaluate the performance of selected insecticide seed treatments against thrips in cotton. Treatments were arranged in a randomized complete block design with four replications. Phytogen 333 WRF cotton seed was used in all trials. Cotton seed were treated by Dr. Gus Lorenz and received a common fungicide seed treatment (Trilex Advanced 300FS, 1.6 oz/cwt). Due to wet conditions planting dates varied among locations from 30 Apr to 5 Jun. Thrips densities were determined by sampling 5-10 plants per plot at the 1, 2, 3, and 4 leaf stage using a modified whole plant washing procedure. Also, plant damage was also estimated at these timing using a 1 – 5 scale, with a rating of 1 = no damage and 5 = severe damage. Lint yield data was also collected. Data were subjected to ANOVA procedures, with means separated according to Fisher's Protected LSD.

Results

Significant differences among treatments were observed for numbers of thrips adults at the 1 leaf growth stage (Table 1), however none of the insecticide treatments reduced densities below those in the fungicide only treatment. Acephate applied at 15.0 oz/cwt resulted in significantly fewer thrips adults that Cruiser, Avicta Duo, and Gaucho. All of the insecticide treatments significantly reduced densities of thrips immatures compared to the fungicide only treatment. Also, all of the insecticide treatments resulted in significantly lower damage ratings compared to the fungicide only treatment. Plots treated with Aeris had significantly lower damage ratings compared to plots treated with Acephate (6.4 or 15.0 oz/cwt) or Cruiser.

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

		Thrips / 5 Plants			
Treatment	Rate	Adults	Immatures	Total	Damage Rating
Fungicide only	-	1.5abc	7.5a	8.9a	1.9a
Acephate	6.4[1]	1.4abc	1.0b	2.3bcd	1.5b
Acephate	15.0[1]	0.6c	0.7b	1.3cd	1.5b
Acephate	24.0[1]	0.8bc	0.4b	1.1d	1.4bc
Cruiser	0.375[2]	2.3a	1.7b	3.9bc	1.5b
Avicta Duo	0.525[3]	2.0a	2.2b	4.3b	1.4bc
Gaucho	0.375[2]	1.8ab	2.0b	3.8bcd	1.4bc
Aeris	0.75[3]	1.7abc	1.2b	2.9bcd	1.3c
P>F		0.02	<0.01	<0.01	<0.01

Means within a column followed by a common letter are not significantly different (FPLSD 0.05).
[1]oz product / cwt.
[2]mg AI / seed.
[3]mg AI / seed. Avicta Duo and Aeris applied at the listed rates contain 0.375 mg AI, thiamethoxam (Cruiser) and imidacloprid (Gaucho), respectively.

Only Acephate (all rates) reduced densities of thrips adults compared to the fungicide only treatment at the 2 leaf growth stage (Table 2). All of the insecticide treatments significantly reduced densities of thrips immatures compared to the fungicide only treatment at the 2 leaf growth stage. Plots treated with Acephate (all rates), Gaucho, or Aeris had significantly fewer thrips immatures compared to plots treated with Cruiser. All of the insecticide treatments, except Cruiser, significantly reduced the number of total thrips compared to the fungicide only treatment. Acephate (all rates), Gaucho, and Aeris resulted in significantly fewer total thrips compared to Cruiser. All of the insecticide

treatments resulted in significantly lower damage ratings compared to the fungicide only treatment. Plots treated with Acephate (15.0 or 24.0 oz/cwt), Aeris, or Gaucho had significantly lower damage ratings compared to plots treated with Cruiser.

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

		Thrips / 5 Plants			
Treatment	Rate	Adults	Immatures	Total	Damage Rating
Fungicide only	-	2.5ab	8.7a	11.2a	2.6a
Acephate	6.4[1]	1.2c	2.5cd	3.7cd	2.0bc
Acephate	15.0[1]	1.4c	1.5cd	2.9d	1.8cd
Acephate	24.0[1]	1.1c	0.9d	2.0d	1.6d
Cruiser	0.375[2]	3.0a	5.4b	8.4ab	2.3b
Avicta Duo	0.525[3]	2.5ab	3.5bc	6.0bc	2.1bc
Gaucho	0.375[2]	1.8bc	2.8cd	4.6cd	1.9cd
Aeris	0.75[3]	2.2abc	2.4cd	4.6cd	1.6d
P>F		<0.01	<0.01	<0.01	<0.01

Means within a column followed by a common letter are not significantly different (FPLSD 0.05).
[1]oz product / cwt.
[2]mg AI / seed.
[3]mg AI / seed. Avicta Duo and Aeris applied at the listed rates contain 0.375 mg AI, thiamethoxam (Cruiser) and imidacloprid (Gaucho), respectively.

There were no significant differences among treatments observed for thrips adults at the 3 leaf growth stage (Table 3). All of the insecticide treatments, except Cruiser and Avicta Duo, significantly reduced densities of thrips immatures and total thrips compared to the fungicide only treatment. All of the insecticide treatments resulted in significantly lower damage ratings compared to the fungicide only treatment. Acephate (all rates), Gaucho, and Aeris resulted in significantly lower damage ratings compared to Cruiser or Avicta Duo.

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

		Thrips / 5 Plants			
Treatment	Rate	Adults	Immatures	Total	Damage Rating
Fungicide only	-	3.4	24.6a	28.0a	2.8a
Acephate	6.4[1]	2.4	11.6b	14.0b	1.7c
Acephate	15.0[1]	2.1	9.4b	11.5b	1.7c
Acephate	24.0[1]	2.7	9.2b	11.8b	1.7c
Cruiser	0.375[2]	2.2	21.6a	23.8a	2.3b
Avicta Duo	0.525[3]	3.5	21.9a	25.4a	2.2b
Gaucho	0.375[2]	3.4	10.4b	13.8b	1.6c
Aeris	0.75[3]	2.8	4.9b	7.7b	1.5c
P>F		0.39	<0.01	<0.01	<0.01

Means within a column followed by a common letter are not significantly different (FPLSD 0.05).
[1]oz product / cwt.
[2]mg AI / seed.
[3]mg AI / seed. Avicta Duo and Aeris applied at the listed rates contain 0.375 mg AI, thiamethoxam (Cruiser) and imidacloprid (Gaucho), respectively.

At the 4 leaf growth stage only Cruiser and Aeris resulted in significantly lower densities of thrips adults compared to the fungicide only treatment (Table 4). Only Acephate (15.0 and 24.0 oz/cwt) and Aeris significantly reduced densities of thrips immatures and total thrips compared to the fungicide only treatment. All of the insecticide treatments resulted in significantly lower damage ratings compared to the fungicide only treatment. Plots treated with Acephate (15.0 or 24.0 oz/cwt) or Aeris had significantly lower damage ratings compared to plots treated with Cruiser or Avicta Duo.

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

		Thrips / 5 Plants			
Treatment	Rate	Adults	Immatures	Total	Damage Rating
Fungicide only	-	9.9ab	40.5a	50.5a	2.5a
Acephate	6.4[1]	7.8bc	33.2ab	40.9abc	1.7bc
Acephate	15.0[1]	7.8bc	26.1b	33.8bc	1.5cd
Acephate	24.0[1]	8.5abc	25.4b	34.1bc	1.2d
Cruiser	0.375[2]	7.1c	40.8a	47.9a	2.0b
Avicta Duo	0.525[3]	9.0abc	32.2ab	41.5abc	1.9b
Gaucho	0.375[2]	10.7a	34.0ab	44.6ab	1.6bc
Aeris	0.75[3]	6.5c	24.2b	30.6c	1.2d
P>F		0.04	<0.01	<0.01	<0.01

Means within a column followed by a common letter are not significantly different (FPLSD 0.05).
[1]oz product / cwt.
[2]mg AI / seed.
[3]mg AI / seed. Avicta Duo and Aeris applied at the listed rates contain 0.375 mg AI, thiamethoxam (Cruiser) and imidacloprid (Gaucho), respectively.

Yields ranged 1,101.8 to 1,201.6 lb lint / acre (Table 5). No significant differences among treatments were observed for yield.

Table 5. Impact of selected seed treatments on cotton yield.

Treatment	Rate	lb Lint / Acre
Fungicide only	-	1,101.8
Acephate	6.4[1]	1,152.3
Acephate	15.0[1]	1,107.4
Acephate	24.0[1]	1,146.0
Cruiser	0.375[2]	1,110.4
Avicta Duo	0.525[3]	1,182.2
Gaucho	0.375[2]	1,182.0
Aeris	0.75[3]	1,201.6
P>F		0.09

Means within a column followed by a common letter are not significantly different (FPLSD 0.05).
[1]oz product / cwt.
[2]mg AI / seed.
[3]mg AI / seed. Avicta Duo and Aeris applied at the listed rates contain 0.375 mg AI, thiamethoxam (Cruiser) and imidacloprid (Gaucho), respectively.

Thrips densities were lower than those observed in similar studies conducted during 2014 (Cook et al. 2014). However, trends for the performance of Cruiser (thiamethoxam) were similar to those observed during 2014. On some sample dates the performance of Gaucho was not significantly better than that of Cruiser. No differences among treatments were observed for yield. However, yields from the Gaucho treated plots were among the highest, while yields from Cruiser treated plots were among the lowest in the studies.

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