# THRIPS MANAGEMENT IN MID-SOUTH COTTON

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## Abstract

Studies were conducted to evaluate the performance of selected at-planting treatments against thrips infesting cotton seedlings. Thiamethoxam (Cruisier, Avicta Duo) and imidacloprid (Gaucho, Aeris) have been standards for thrips management for many years. In recent years resistance to thiamethoxam has been observed in tobacco thrips; which is the most common thrips species infesting cotton in the Mid-South. In studies conducted during 2018, thrips infestations were generally moderate at most locations. All of the at-planting insecticides reduced thrips densities, especially immatures, at the 1, 2, and 3-leaf growth stages. By the 4-leaf growth stage efficacy of many of the treatments had declined. All of the insecticide treatments reduced thrips injury. With one exception, all of the insecticide treatments resulted in thrips damage rating of <2 at all growth stages. No significant differences in yield were observed between treatments.

## 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. Many growers transitioned to the neonicotinoid seed treatments following their introduction, and following the removal of aldicarb from the market 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. However, resistance to thiamethoxam has been observed in tobacco thrips populations from many areas of the Mid-South (Huseth et al. 2016, Darnell-Crumpton et al. 2018). Also, performance of thiamethoxam has declined to the point that it is no longer recommended for thrips control in the Mid-South. An aldicarb product (AgLogic 15G) is currently available in some states, with plans for expanded availability in the future. Offerings of thiamethoxam as a seed treatment have decline and almost all of the commercial (from seed companies) seed treatment packages include imidacloprid. Many growers are supplementing neonicotinoid seed treatments (imidacloprid) with acephate either as an additional seed treatment or as an in-furrow spray. One reason for this strategy over supplemental foliar applications for thrips management is that some of the newer transgenic herbicide (dicamba tolerant crops) technologies do not allow co-application of an insecticide with the herbicide. During 2018 studies were conducted in Arkansas, Louisiana, Mississippi, Tennessee, and Texas to evaluate the performance of selected seed treatments alone and in combination with their respective companion nematicide products, AgLogic 15G, and several in-furrow spray treatments against thrips infesting cotton seedlings in the Mid-South.

## Materials and Methods

Studies were conducted during 2018 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. Phytogen 333 WRF cotton seed was used in all trials. Cotton seed were treated by Dr. Gus Lorenz. Seed treated with Avicta Elite received Dynasty CST (3.95 oz/cwt) fungicide, while seed for all other treatments received Trilex Advanced 300FS (1.6 oz/cwt) fungicide. Planting dates ranged from 28 Apr to 18 May.

Thrips densities were determined by sampling 5 plants per plot at the 1, 2, 3, and 4 leaf stage using a modified whole plant washing procedure. Also, plant damage was estimated at these timings using a 1 – 5 scale, with a rating of 1 = no damage and 5 = severe damage. 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 the 1-leaf growth stage all of the insecticide treatments, except Aeris, Avicta Elite, and Gaucho, resulted in significantly fewer thrips adults compared to the fungicide only control (Table 1). All of the insecticide treatments resulted in significantly lower densities of thrips immatures and total thrips compared to the fungicide only control. Plots treated with AgLogic also had significantly fewer thrips immatures and total thrips compared to plots treated with Admire Pro. All of the insecticide treatments resulted in significantly lower thrips damage ratings compared to the control. All of the insecticide treatments, except AgLogic, acephate in-furrow, and Admire Pro, resulted in significantly lower thrips damage ratings compared to acephate applied as a seed treatment. Thrips damage ratings for the insecticide treated plots were all < 1.5.

At the 2-leaf growth stage only AgLogic and acephate plus Gaucho (both seed treatments) resulted in significantly fewer thrips adults compared to the fungicide only control (Table 2). All of the insecticide treatments resulted in significantly fewer thrips immatures and total thrips compared to the fungicide only control. All of the insecticide treatments resulted in significantly less thrips damage compared to the fungicide only control. Also, all of the insecticide treatments, except acephate in-furrow and Admire Pro, resulted in significantly lower damage ratings compared to acephate as a seed treatment.

At the 3-leaf growth stage only AgLogic resulted in significantly fewer thrips adults, thrips immatures, and total thrips compared to the fungicide only control (Table 3). All of the insecticide treatments resulted in significantly lower thrips damage ratings compared to the fungicide only control. Plots treated with acephate plus Gaucho (both seed treatments), Gaucho, Aeris, Avicta Elite, AgLogic, acephate plus Admire Pro (both in-furrow), acephate in-furrow, or Admire Pro had significantly lower damage ratings compared to plots treated with acephate seed treatment.

At the 4-leaf growth stage none of the insecticide treatments significantly reduce densities of thrips adults compared to the fungicide only control (Table 4). Plots treated with Avicta Elite had significantly more thrips adults than the fungicide only control plots. Only plots treated with acephate plus Admire Pro in-furrow had significantly fewer thrips immatures and total thrips compared to the fungicide only control. All of the insecticide treatments resulted in significantly lower thrips damage ratings compared to the fungicide only control. Plots treated with acephate plus Gaucho seed treatment, Gaucho, Aeris, Avicta Elite, AgLogic, acephate plus Admire Pro in-furrow, or acephate in-furrow had significantly lower damage ratings compared to plots treated with acephate seed treatment.

Yields in these studies ranged from 1,256 to 1,358 lb lint per acre. There were no significant differences among treatments for yield (Table 5).

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.

| Treatment | Application Method | Rate | Thrips / 5 Plants | | | Damage Rating |
|---|---|---|---|---|---|---|
| | | | Adults | Immatures | Total | |
| Fungicide only | Seed Treatment | - | 5.1a | 12.8a | 17.9a | 2.03a |
| Acephate 97S | Seed Treatment | 6.4[1] | 2.2c | 3.5bc | 5.7bc | 1.37b |
| Acephate 97S + Gaucho 5FS | Seed Treatment | 6.4[1]+0.375[2] | 2.3bc | 2.1bc | 4.3bc | 1.15c |
| Gaucho 5FS | Seed Treatment | 0.375[2] | 3.3abc | 1.5bc | 4.8bc | 1.17c |
| Aeris[4] | Seed Treatment | 0.75[2] | 4.4ab | 1.8bc | 6.1bc | 1.16c |
| Avicta Elite[3] | Seed Treatment | 0.525[2]+0.375[2] | 5.4a | 1.8bc | 7.1b | 1.17c |
| AgLogic 15G | In-Furrow Granule | 0.6[5] | 1.3c | 0.9c | 2.2c | 1.22bc |
| Acephate 97S + Admire Pro 4.6SC | In-Furrow Spray | 1.0[6] +0.33[6] | 2.2c | 3.2bc | 5.4bc | 1.18c |
| Acephate 97S | In-Furrow Spray | 1.0[6] | 1.6c | 3.8bc | 5.3bc | 1.31bc |
| Admire Pro 4.6SC | In-Furrow Spray | 0.33[6] | 2.6bc | 4.6b | 7.2b | 1.27bc |
| *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 Elite applied at the listed rate contains 0.375 mg AI thiamethoxam (Cruiser), 0.15 mg AI abamectin, and 0.375 mg AI imidacloprid.
[4]mg AI / seed. Aeris applied at the listed rate contains 0.375 mg AI imidacloprid (Gaucho) and 0.375 mg AI thiodicarb.
[5]lb AI / per acre, in-furrow granule.
[6]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.

| Treatment | Application Method | Rate | Thrips / 5 Plants | | | Damage Rating |
|---|---|---|---|---|---|---|
| | | | Adults | Immatures | Total | |
| Fungicide only | Seed Treatment | - | 3.0a | 34.5a | 37.5a | 2.28a |
| Acephate 97S | Seed Treatment | 6.4[1] | 2.4ab | 4.9b | 7.2b | 1.61b |
| Acephate 97S + Gaucho 5FS | Seed Treatment | 6.4[1]+0.375[2] | 1.6bc | 4.3b | 5.9b | 1.24cde |
| Gaucho 5FS | Seed Treatment | 0.375[2] | 2.8a | 9.6b | 12.4b | 1.32cde |
| Aeris[4] | Seed Treatment | 0.75[2] | 2.4ab | 8.5b | 10.9b | 1.24cde |
| Avicta Elite[3] | Seed Treatment | 0.525[2]+0.375[2] | 2.0ab | 10.1b | 12.1b | 1.26cde |
| AgLogic 15G | In-Furrow Granule | 0.6[5] | 0.8c | 1.9b | 2.7b | 1.09e |
| Acephate 97S + Admire Pro 4.6SC | In-Furrow Spray | 1.0[6] +0.33[6] | 2.1ab | 3.9b | 6.0b | 1.22de |
| Acephate 97S | In-Furrow Spray | 1.0[6] | 2.6ab | 7.8b | 10.3b | 1.47bc |
| Admire Pro 4.6SC | In-Furrow Spray | 0.33[6] | 2.7ab | 10.7b | 13.5b | 1.38bcd |
| *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 Elite applied at the listed rate contains 0.375 mg AI thiamethoxam (Cruiser), 0.15 mg AI abamectin, and 0.375 mg AI imidacloprid.
[4]mg AI / seed. Aeris applied at the listed rate contains 0.375 mg AI imidacloprid (Gaucho) and 0.375 mg AI thiodicarb.
[5]lb AI / per acre, in-furrow granule.
[6]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.

| Treatment | Application Method | Rate | Thrips / 5 Plants | | | Damage Rating |
|---|---|---|---|---|---|---|
| | | | Adults | Immatures | Total | |
| Fungicide only | Seed Treatment | - | 3.9 | 15.2a | 19.1a | 3.02a |
| Acephate 97S | Seed Treatment | 6.4[1] | 2.8 | 4.4b | 7.3b | 2.18b |
| Acephate 97S + Gaucho 5FS | Seed Treatment | 6.4[1]+0.375[2] | 2.3 | 2.4b | 4.7b | 1.21d |
| Gaucho 5FS | Seed Treatment | 0.375[2] | 2.3 | 3.1b | 5.4b | 1.33d |
| Aeris[4] | Seed Treatment | 0.75[2] | 3.4 | 2.8b | 6.3b | 1.39cd |
| Avicta Elite[3] | Seed Treatment | 0.525[2]+0.375[2] | 3.3 | 2.8b | 6.2b | 1.47cd |
| AgLogic 15G | In-Furrow Granule | 0.6[5] | 2.8 | 6.2b | 9.0b | 1.52cd |
| Acephate 97S + Admire Pro 4.6SC | In-Furrow Spray | 1.0[6] +0.33[6] | 2.6 | 1.8b | 4.3b | 1.47cd |
| Acephate 97S | In-Furrow Spray | 1.0[6] | 3.1 | 2.7b | 5.8b | 1.68c |
| Admire Pro 4.6SC | In-Furrow Spray | 0.33[6] | 2.1 | 1.9b | 4.0b | 1.49cd |
| *P>F* | | | 0.65 | <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 Elite applied at the listed rate contains 0.375 mg AI thiamethoxam (Cruiser), 0.15 mg AI abamectin, and 0.375 mg AI imidacloprid.
[4]mg AI / seed. Aeris applied at the listed rate contains 0.375 mg AI imidacloprid (Gaucho) and 0.375 mg AI thiodicarb.
[5]lb AI / per acre, in-furrow granule.
[6]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 |
| Fungicide only | Seed Treatment | - | 6.4bc | 19.3ab | 25.6abc | 2.70a |
| Acephate 97S | Seed Treatment | 6.4[1] | 5.0c | 13.8bc | 18.7bc | 1.98b |
| Acephate 97S + Gaucho 5FS | Seed Treatment | 6.4[1]+0.375[2] | 6.3bc | 15.2bc | 21.5bc | 1.43cd |
| Gaucho 5FS | Seed Treatment | 0.375[2] | 5.7bc | 15.6bc | 21.2bc | 1.70bc |
| Aeris[4] | Seed Treatment | 0.75[2] | 7.4abc | 18.9ab | 26.3ab | 1.70bc |
| Avicta Elite[3] | Seed Treatment | 0.525[2]+0.375[2] | 9.6a | 23.6a | 32.5a | 1.48cd |
| AgLogic 15G | In-Furrow Granule | 0.6[5] | 5.2c | 13.5bc | 18.7bc | 1.28d |
| Acephate 97S + Admire Pro 4.6SC | In-Furrow Spray | 1.0[6] +0.33[6] | 6.0bc | 11.2c | 17.4c | 1.30d |
| Acephate 97S | In-Furrow Spray | 1.0[6] | 6.7bc | 18.1ab | 24.7abc | 1.60c |
| Admire Pro 4.6SC | In-Furrow Spray | 0.33[6] | 8.5ab | 17.0abc | 25.7ab | 1.70bc |
| *P>F* | | | 0.04 | 0.03 | 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 Elite applied at the listed rate contains 0.375 mg AI thiamethoxam (Cruiser), 0.15 mg AI abamectin, and 0.375 mg AI imidacloprid.
[4]mg AI / seed. Aeris applied at the listed rate contains 0.375 mg AI imidacloprid (Gaucho) and 0.375 mg AI thiodicarb.
[5]lb AI / per acre, in-furrow granule.
[6]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) |
|---|---|---|---|
| Fungicide only | Seed Treatment | - | 1,256 |
| Acephate 97S | Seed Treatment | 6.4[1] | 1,309 |
| Acephate 97S + Gaucho 5FS | Seed Treatment | 6.4[1]+0.375[2] | 1,358 |
| Gaucho 5FS | Seed Treatment | 0.375[2] | 1,289 |
| Aeris[4] | Seed Treatment | 0.75[2] | 1,313 |
| Avicta Elite[3] | Seed Treatment | 0.525[2]+0.375[2] | 1,336 |
| AgLogic 15G | In-Furrow Granule | 0.6[5] | 1,343 |
| Acephate 97S + Admire Pro 4.6SC | In-Furrow Spray | 1.0[6] +0.33[6] | 1,344 |
| Acephate 97S | In-Furrow Spray | 1.0[6] | 1,302 |
| Admire Pro 4.6SC | In-Furrow Spray | 0.33[6] | 1,356 |
| *P>F* | | | 0.29 |

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 Elite applied at the listed rate contains 0.375 mg AI thiamethoxam (Cruiser), 0.15 mg AI abamectin, and 0.375 mg AI imidacloprid.
[4]mg AI / seed. Aeris applied at the listed rate contains 0.375 mg AI imidacloprid (Gaucho) and 0.375 mg AI thiodicarb.
[5]lb AI / per acre, in-furrow granule.
[6]lb AI / per acre, in-furrow spray.

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