TEMPORAL SUSCEPTIBILITY OF COTTON TO EARLY SEASON THRIPS

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Introduction

Thrips are predictable, consistent and economic pests of seedling cotton in Georgia. Preventive insecticides such as Temik or neonicotinoid seed treatments are used at planting by most growers to manage thrips. However, supplemental foliar insecticides are also needed in some environments to mitigate economic losses. Foliar treatments are recommended when 2-3 thrips per plant are counted and immatures are present; the presence of numerous immatures suggests the preventive insecticide used at planting is no longer active. Foliar treatments are rarely necessary after plants reach the 4 true leaf stage and are growing vigorously.

Early season foliar insecticide applications applied for thrips are broad spectrum and disruptive of natural controls such as predatory and parasitic insects. The reduction of beneficial insects increases the risk of secondary pest outbreaks such as spider mites and aphids and thus intervention with foliar insecticides for thrips should only be made when absolutely necessary. The objective of this project was to better define the susceptibility of cotton seedlings at various growth stages to thrips injury.

Materials and Methods

Field trials were established at the Coastal Plain Experiment Station in Tift County Georgia during 2009 and the Sunbelt Agricultural EXPO in Colquitt County Georgia during 2010 to evaluate the susceptibility of cotton seedling growth stages to thrips infestations and injury. Plots were four rows wide and 40 feet in length with four replications arranged in a randomized complete block. Trials were grown in a conventional tillage irrigated environment and were established on April 30 (DP 0935 B2RF) in 2009 and May 12 (DP 0949 B2RF) in 2010. Treatments included progressive and regressive foliar treatment regimes, Temik applied in-furrow at planting, Temik plus foliar insecticides, and an untreated check. Foliar treatments were applied to seedlings which were not treated with a preventive at plant insecticide and included applications of acephate at 0.2 lb. ai/acre at 0 days after emergence (DAE), 0 and 7 DAE, 0, 7, and 14 DAE, 0, 7, 14, and 21 DAE, 0, 7, 14, 21, and 28 DAE, 7, 14, 21, and 28 DAE, 14, 21, and 28 DAE, 21, and 28 DAE, and 28 DAE. Acephate was also applied to the Temik plus foliar insecticide treatment at 0, 7, 14, 21, and 28 DAE. Plots were sampled weekly for thrips beginning at emergence for five weeks and two days after each foliar acephate spray by collecting five random plants per plot which were immediately immersed and swirled in a container filled with 70% ETOH to dislodge and preserve thrips specimens. Thrips samples were returned to the laboratory and immature and adult thrips were enumerated. Subjective thrips injury ratings were also assigned to individual plots on a scale of 1-5 where 1=no damage, 3=moderate (acceptable

damage), and 5=severe damage. Individual plant (above ground plant parts) dry weights were quantified 35 days after emergence by cutting five random plants per plot at the soil surface, bagging, and drying plants for 48 hours at 60C in a forced air oven. The center two rows were spindle picked and a 38 percent lint fraction was assumed when calculating lint yields. Data were subjected to analysis of variance and means were separated using LSD, p=0.05

Results and Discussion

Thrips populations were moderate to high during both years. Adult infestations peaked at 2-3 days after emergence (DAE) in untreated plots and immature infestations peaked one week later at 15 and 20 per plant in 2009 and 2010 respectively (Figure 1). Plant growth was more vigorous during 2010 compared 2009, due in part to increased accumulation of heat units or DD 60s (Table 1). Seedlings reached the 4 leaf stage approximately five days earlier in 2010 compared with 2009. At 35 DAE, 721 DD 60s had accumulated during 2010 compared with only 528 during 2009. Vigorous growing seedlings shorten the susceptibility window and may allow seedlings to better tolerate thrips infestations.

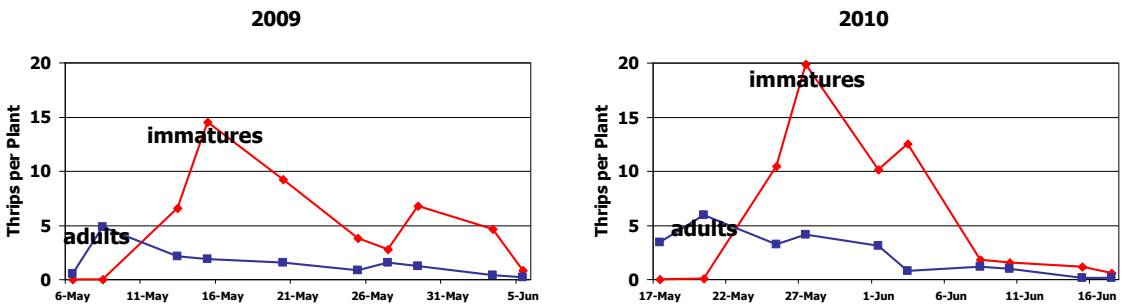

Figure 1. Adult and immature thrips population dynamics in untreated plots, Coastal Plain Experiment Station in 2009 and Sunbelt Agricultural EXPO in 2010.

Table 1. Cumulative heat unit accumulation after emergence at the Coastal Plain Experiment Station during 2009 and the Sunbelt Agricultural EXPO during 2010.

	CPES 2009		EXPO 2010	
Days After Emergence	Cumulative DD 60s	True Leaves	Cumulative DD 60s	True Leaves
7	115	1	145	1
14	188	2	262	3.5
21	285	4	399	5.5
28	411	6.5	560	8.5
35	528	9	721	11.5

Planting Date: April 30, 2009 and May 12, 2010
Emergence Date: May 6, 2009 and May 17, 2010

All treatments except foliar Orthene sprays initiated at 14, 21, and 28 DAE significantly reduced thrips damage at 35 DAE compared with the untreated during 2009 (Table 2). However, only treatments including Temik and foliar spray regimes which included applications at 0 and 7 DAE had damage ratings less than or equal to three which is defined as acceptable control. There was no significant reduction in thrips damage when additional foliar sprays were applied after the 0 and 7 DAE applications. In general, Temik treatments had significantly lower thrips damage ratings compared with foliar spray regimes. Temik treatments and foliar spray regimes initiated at 0 or 7 DAE significantly increased plant dry weights at 35 DAE compared with the untreated during 2009. There was no significant increase in plant dry weights when additional foliar sprays were applied after 0, 7, and 14 DAE applications. Delaying the initial foliar spray from 0 DAE to 7 DAE significantly reduced plant dry weight. A significant reduction in plant dry weight was also observed when the initial spray was delayed to 14 DAE when compared with the 7 DAE foliar spray regime. Temik treatments and the most aggressive foliar spray treatment significantly increased yield compared with the untreated. An outbreak of spider mites occurred in the trial area and required multiple treatments to preserve the integrity of the trial.

Table 2. Thrips damage ratings and plant dry weights at 35 DAE and yield, Coastal Plain Experiment Station, 2009.

2009 Treatment	Thrips Damage Rating (1-5)	Plant Dry Weight (g)	Yield (lbs. lint/acre)
Untreated	4.25 a	8.36 f	1498 bc
28 DAE Orthene	4.38 a	10.88 ef	1476 abc
21+28 DAE Orthene	4.00 a	9.29 ef	1579 c
14+21+28 DAE Orthene	4.00 a	8.62 f	1473 c
7+14+21+28 DAE Orthene	3.13 b	15.02 de	1476 abc
0 DAE Orthene	3.13 b	22.11 bc	1613 c
0+7 DAE Orthene	2.75 bc	16.92 cd	1649 abc
0+7+14 DAE Orthene	2.88 bc	19.00 bcd	1635 abc
0+7+14+21 DAE Orthene	2.50 cd	23.29 ab	1688 abc
0+7+14+21+28 DAE Orthene	2.75 bc	16.88 cd	1639 ab
Temik	2.13 d	24.50 ab	1753 a
Temik+Orthene	1.50 e	29.21 a	1755 a

Means followed by the same letter in a column do not significantly differ (P=0.05, LSD)

All treatments except foliar sprays initiated at 21 DAE significantly reduced thrips damage ratings at 35 DAE compared with the untreated during 2010 (Table 3). However only foliar spray regimes initiated at 0 and 7 DAE had damage ratings less than or equal to three which is defined as acceptable control. There was not a significant reduction in thrips damage when additional foliar applications were made after 0 DAE. Although thrips populations were generally higher in 2010 compared with

2009, damage ratings tended to be lower and this is likely attributable to the rapid seedling growth observed during 2010 (see Table 1). Thrips damage ratings were generally lower in 2010 compared to 2009. Foliar spray regimes initiated at 0 and 7 DAE and Temik treatments significantly increased plant dry weights compared with the untreated. No significant differences in yield were observed during 2010. We experienced problems applying Temik during 2010 in that only a portion of individual Temik plots actually received Temik. Damage ratings and plant dry weights were collected from treated areas of Temik plots.

Table 3. Thrips damage ratings and plant dry weights at 35 DAE and yield, Coastal Plain Experiment Station, 2010.

2010 Treatment	Thrips Damage Rating (1-5)	Plant Dry Weight (g)	Yield (lbs. lint/acre)
Untreated	4.33 a	13.50 f	1203 a
28 DAE Orthene	3.50 bc	24.68 ef	1328 a
21+28 DAE Orthene	4.00 ab	17.45 ef	1343 a
14+21+28 DAE Orthene	3.17 cd	22.22 ef	1400 a
7+14+21+28 DAE Orthene	2.50 de	27.81 de	1595 a
0 DAE Orthene	2.33 e	39.91 cd	1188 a
0+7 DAE Orthene	1.83 ef	49.81 bc	1470 a
0+7+14 DAE Orthene	2.00 ef	56.10 b	1607 a
0+7+14+21 DAE Orthene	2.00 ef	41.55 c	1425 a
0+7+14+21+28 DAE Orthene	2.00 ef	43.95 bc	1591 a
Temik[1]	2.00 ef	55.80 b	1403 a
Temik+Orthene[1]	1.50 f	70.37 a	1550 a

Means followed by the same letter in a column do not significantly differ (P=0.05, LSD)
[1]Application problems occurred in Temik treatments and some areas of the plots were not treated. Thrips damage ratings and plant height and dry weight data were collected from treated areas of plots whereas yield was taken from the entire plot and included cotton which was not treated with Temik.

In summary, thrips populations and field environments are unique and vary by location. Such variability demands proper pest and damage monitoring. Preventive insecticides used at planting provide a consistent benefit. However, foliar sprays may be needed to supplement control in some environments. These data demonstrate that protection from early season thrips during early stages of seedling development (the first 14 days) is critically important.