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IMPACT OF TILLAGE SYSTEMS ON THRIPS POPULATIONS

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Abstract

The impact of thrips damage to seedling cotton, yield and maturity delays has been documented for decades. Thrips (Thysanoptera: Thripidae) densities were measured in both no-till and conventional till cotton on both Cruiser ST-treated and untreated plants. Thrips samples were collected from plots seven times in 2003 and four times in 2004. In treated plots, adult thrips numbers were significantly higher in no-till plots over eleven sampling periods during the two years. On nine dates, there was no difference in tillage systems. In untreated plots, adult thrips numbers were higher June 17, 2003 in no-till plots and higher June 9, 2004 in conventional till plots. Thrips larval numbers were higher twice in treated conventional-till plots and twice in untreated conventional-till plots.

Introduction

Documented delays in maturity and reductions in yield have forced growers to elect one of three options (seed treatments, in-furrow treatments or foliar sprays) for control of thrips (Thysanoptera: Thripidae) on seedling cotton. As a greater percentage of the cotton acreage is converted to no-till and reduced tillage systems, questions remain concerning the effect of tillage on thrips control methods and on thrips populations. Earlier studies in ultra narrow row cotton production systems led us to believe that ground cover made it more difficult for thrips adults to find seedling cotton and thus populations might be lower in no-till and reduced tillage systems. These studies were designed to determine the impact of tillage system on thrips numbers and control.

Materials and Methods

In 2003, SG 215 BR variety cotton with and without Cruiser seed treatment was planted May 23 in 6-row x 30 ft long plots in both conventional (double-disked) and no-till systems. Soybean residue from the 2002 season was present in the no-till plots. Treatments were replicated three times. In 2004, ST 5599 BR variety cotton was planted May 7 in the same treatment plots as the previous year. Thrips samples were collected June 5, 10, 13, 17, 20, 23 and 26 in 2003 and May 19, 26, June 2 and 9 in 2004. Thrips samples were collected by gently pulling 4 plants from the center 4 rows of each plot and placing these in pint jars containing 150 ml of 70% ethyl alcohol. Duplicate samples were collected in each plot on each date. Samples were taken to the laboratory and poured through a US No. 100 sieve which collected both adult and larval thrips. These were backwashed into 20-ml scintillation vials and were later counted under a stereomicroscope. Plots were machine harvested October 20 and 30, 2003 and September 30, 2004.

Results and Discussion

In the Cruiser-treated plots in 2003, thrips adult numbers were significantly higher on June 17 and 20, 25 and 28 days after planting (DAP), respectively, in the no-till plots (Table 1). In 2004, there were no significant differences in adult thrips numbers on any of the four sampling dates (Table 2). In the untreated plots in 2003, thrips adult thrips numbers were significantly higher on June 17, 25 DAP, in the no-till plots (Table 3). In 2004, thrips adult numbers were significantly higher in the conventionally-tilled plots on June 9, 33 DAP (Table 4).

In the Cruiser-treated plots in 2003, thrips larval numbers were not significantly different in the two tillage systems on any of the seven sampling dates (Table 5). In 2004, thrips larval numbers were significantly higher in the Cruiser-treated no-till plots on June 2 and 9, 26 and 33 DAP, respectively (Table 6). In the untreated plots in 2003, thrips larval numbers were significantly higher in the conventionally-tilled plots on June 10 and 17, 18 and 25 DAP, respectively (Table 7). In 2004, there were no differences among tillage systems for thrips larval numbers in the untreated plots (Table 8).

Lint yield was reduced in the untreated conventionally-tilled plots at first harvest in 2003 (Table 9). There were no differences among the other first-harvest treatments. Total harvest yields in 2003 did not differ among treatments. There were no yield differences among treatments in the single harvest in 2004.

In treated plots, adult thrips numbers were significantly higher in no-till plots twice over eleven sampling periods during the two years. On nine dates, there was no difference in tillage systems. In untreated plots, adult thrips numbers were higher June 17, 2003 in no-till plots and higher June 9, 2004 in conventionally-tilled plots. Thrips larval numbers were higher twice in treated conventionally-tilled plots and twice in untreated conventionally-tilled plots. Based on these results, there is no reason to believe that thrips adult or larval numbers are influenced by tillage system.

Table 1. Mean number of adult thrips per 4 plants on Cruiser ST – treated plants. Jackson, Tennessee 2003

	June						
Treatment	5	10	13	17	20	23	26
No-Till	1.2	3.2	1.5	18.0 a[1]	4.3 a	4.0	3.5
Conventional-Till	1.3	2.7	1.5	6.2b	0.5 b	2.3	1.8
	N.S.	N.S.	N.S.			N.S.	N.S.

[1] Means followed by the same letter do not differ significantly (P=0.05, Duncan's NMRT).

Table 2. Mean number of adult thrips per 4 plants on Cruiser ST – treated plants. Jackson, Tennessee. 2004

Treatment	May 19	May 26	June 2	June 9
No-Till	4.8	2.5	9.7	4.3
Conventional-Till	5.7	1.7	8.7	8.2
	N.S.	N.S.	N.S.	N.S.

Table 3. Mean number of adult thrips per 4 plants on untreated plants. Jackson, Tennessee. 2003

	June						
Treatment	5	10	13	17	20	23	26
No-Till	11.2	7.7	3.8	15.0 a[1]	6.7	4.5	3.2
Conventional-Till	15.7	17.3	9.3	5.7 b	3.5	3.3	4.3
	N.S.	N.S.	N.S.		N.S.	N.S.	N.S.

[1] Means followed by the same letter do not differ significantly (P=0.05, Duncan's NMRT).

Table 4. Mean number of adult thrips per 4 plants on untreated plants. Jackson, Tennessee. 2004

Treatment	May 19	May 26	June 2	June 9
No-Till	11.5	2.8	18.3	11.8 a[1]
Conventional-Till	17.7	3.2	16.7	19.0 b
	N.S.	N.S.	N.S.	

[1] Means followed by the same letter do not differ significantly (P=0.05, Duncan's NMRT).

Table 5. Mean number of larval thrips per 4 plants on Cruiser ST – treated plants. Jackson, Tennessee. 2003

	June						
Treatment	5	10	13	17	20	23	26
No-Till	0.0	0.2	0.2	3.8	1.0	3.8	18.5
Conventional-Till	0.0	0.3	0.0	1.2	0.3	5.7	3.8
	N.S.	N.S.	N.S.	N.S.	N.S.	N.S.	N.S.

Table 6. Mean number of larval thrips per 4 plants on Cruiser ST– treated plants. Jackson, Tennessee. 2004

Treatment	May 19	May 26	June 2	June 9
No-Till	0.0	1.5	6.5 a[1]	20.7 a
Conventional-Till	0.0	4.0	12.2 b	45.0 b
	N.S.	N.S.		

[1] Means followed by the same letter do not differ significantly (P=0.05, Duncan's NMRT).

Table 7. Mean number of larval thrips per 4 plants on untreated plants. Jackson, Tennessee. 2003

	June						
Treatment	5	10	13	17	20	23	26
No-Till	3.2	22.8 a[1]	35.2	22.5 a	7.5	27.2	24.7
Conventional-Till	1.3	43.2 b	100.5	34.8 b	6.8	39.7	23.5
	N.S.		N.S.		N.S.	N.S.	N.S.

[1] Means followed by the same letter do not differ significantly (P=0.05, Duncan's NMRT).

Table 8. Mean number of larval thrips per 4 plants on untreated plants. Jackson, Tennessee. 2004

Treatment	May 19	May 26	June 2	June 9
No-Till	2.8	72.0	29.0	58.3
Conventional-Till	1.3	114.0	40.5	84.2
	N.S.	N.S.	N.S.	N.S.

Table 9. Impact of tillage system and insecticide treatment for thrips control on cotton yield. Jackson, Tennessee.

Treatment	Tillage System	Yield (lbs lint/A)		
		2003		2004
		First	Total	Total
Cruiser ST	No-Till	709 a[1]	867	1480
Cruiser ST	Con.-Till	734 a	988	1540
Untreated	No-Till	658 a	851	1515
Untreated	Con.-Till	553 b	836	1509
	P>F	0.0081	N.S.	N.S.

[1] Means followed by the same letter do not differ significantly (P=0.05, Duncan's NMRT).