SURFACE RESIDUE INFLUENCE ON INSECTICIDE RATE REQUIREMENTS FOR THRIPS MANAGEMENT

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Abstract

Field experiments were conducted in conservation tillage cotton to determine the influence on tobacco thrips (*Frankliniella fusca* (Hinds)) of cover crop (wheat and crimson clover), herbicide burndown timing (30, 15, and 5 days) of the cover crops prior to planting, and 3 different insecticide treatments (Temik[tm] (aldicarb) applied in furrow (0.6 kg a.i./Ha), Temik applied by precision placement in seed hills (0.1 kg a.i./Ha) or seed treatment with Cruiser[tm] (thiamethoxam) (0.34 mg/seed). Results showed significant reduction in thrips numbers in non-insecticide treated cotton in conservation tillage as compared to conventional tillage, but degree of control was usually not as good as with any of the three types of insecticide treatments during 30 days of sampling. In conservation tillage, thrips numbers were similar on cotton planted in either wheat or crimson clover residues. Significantly higher numbers of thrips were found in crimson clover plots treated with a burndown timing of 30 days in one location, but a similar trend did not occur in the second test. Insecticide treatments reduced thrips population, but the reduction in Temik rate (6x reduction in per acre rate compared to the conventional in-furrow application rate) in precision placement plots had an additive control effect with conservation tillage (wheat cover only) in reducing thrips populations.

Introduction

Since the 1980s, conservation tillage practices for field crops like cotton have increased greatly. Conservation tillage changes the cropping environment and can influence risks for different pests in a positive, negative or neutral manner as compared to conventional tillage (All 1989). More than a decade ago we noted that thrips (mostly tobacco thrips, *Frankliniella fusca* (Hinds)) infestations in seedling cotton were reduced in conservation tillage systems (All et al. 1994) as compared to conventional tillage, and this observation has been verified in many experiments with cotton. Wheat and crimson clover are two cover crops that may influence hazard for thrips infestations in conservation tillage cotton. These cover crops are killed with herbicides prior to planting cotton (burndown) and timing of burndown application may influence whether resident thrips populations have suitable harborage before cotton seedlings germinate. Unfortunately, conservation tillage does not eliminate economic damage on cotton at the same level as systemic insecticides such as Temik (aldicarb), which controls thrips for 45 days or more. Cotton is planted in rows at a 0.15 to 0.3 m "hill" spacing, and the rate of Temik required for thrips control in conventional tillage cotton can be reduced if the granules are applied by precision placement in cotton hills as compared to the conventional application method of dribbling granules along the seed furrow (Lohmeyer and All 2003). Recently insecticide seed treatments such as Cruiser[tm] (thiamethoxam) have shown promise for thrips control in cotton. The objectives of the study were to evaluate the effect of cover crop, burndown timing, and insecticide treatment individually and in combination on hazard for economic damage by thrips in conservation tillage cotton.

Methods

Field tests were conducted at the University of Georgia (UGA) Plant Sciences Farm near Athens and at the UGA Southeastern Branch Research and Education Center (SEB) in Burke County. Fields approximately 1.5 Ha in size were separated into 12 blocks, four blocks each were planted with wheat or clover or left fallow. In May each block of wheat and clover was separated into equal sized, randomized plots for application of one of the following glyphosate (broadcast application @ 0.83 kg a.i./Ha) burndown regimes: 30 days, 15 days, and 5 days before planting cotton. The fallow blocks were plowed at least three times beginning 15 days before planting so that a smooth seed bed was present for conventional tillage treatments. Four row plots of insecticide treatment (and a non-chemical check) were randomized in each burndown plot. The insecticide treatments were Cruiser treated seed at (0.34 mg a.i./seed), in-furrow application of Temik (0.6 kg a.i./Ha), and precision placement of Temik (0.1 kg a.i./Ha). The cotton variety used in the test was DP543BIIRR which was tolerant to glyphosate, and the herbicide was used as needed for weed control during the season following thrips sampling. Other standard agronomic

practices for cotton at the locations were applied at appropriate times. The thrips were sampled on the cotton seedlings at 7, 14, and 30 days after planting by immersing 10 randomly selected seedlings in a specimen cup containing alcohol. Thrips were counted and identified using a dissecting microscope. Data analysis utilized SAS (Statistical Analysis System) procedures for ANOVA at $P<0.05$ considering experiment design with mean separation using Tukey's Studentized Range Test.

Planting plots with conventional in-furrow insecticides

Sampling cotton seedlings in plots

Thrips immatures and adults were washed from cotton leaves into cup

Results and Discussion

Table 1 shows data from sampling dates at 7 (seedlings had small cotyledon leaves), 14 (plants had large cotyledon leaves), and 30 (plants had large cotyledon leaves and a small vegetative branch leaf) days after planting at Athens and from sampling dates of 7 (small cotyledon leaves) and 14 (large cotyledon leaves) at Midville. The data demonstrates that thrips populations were significantly greater on cotton in conservation tillage (overall) as compared to conventional tillage. Adult populations were over 98% tobacco thrips at both locations. Adult counts predominated in the 7-day sample, but immatures were more numerous in the other sample dates. The cover crops in conservation tillage of wheat and crimson clover had statistically similar populations during the sampling periods at both locations (Table 2). Significantly higher numbers of thrips were present on cotton 7 and 14 days after planting in conservation tillage with crimson clover cover, where a 30 day burndown with glyphosate (as compared to 5 day crimson clover burndown and all burndown dates in wheat) was applied and was similar to the conventional tillage plots (Table 3). The trend for higher thrips numbers in the 30 and 15 day crimson clover burndown timing treatments did not occur at the Midville location. At Athens, most of the insecticide treatments produced significant reduction in thrips numbers during the 30 days of sampling (Table 4). The higher rate of Temik (0.6 kg a.i./Ha) applied in-furrow and Cruiser treated seed produced better control as compared to the lower rate of Temik (0.1 kg a.i./Ha) that was precision applied in seed hills. However, an additive effect of conservation tillage and Temik precision placement was indicated in the wheat cover crop plots in all 3 burndown timing regimes at both locations.

Table 1. Effect of tillage practice on thrips populations on seedling cotton in two locations.

	Location and Days after Planting					
	Athens			Midville		
	7	14	30	7	14	30
Tillage Practice	# Thrips / Plant					
Conservation	1.8 a	0.9 a	0.5 a	0.9 a	2.8 a	4.1 a
Conventional	3.9 b	3.6 b	1.0 b	5.7 b	7.6 b	15.3 b

Means within the same columns with the same letter are not significantly different, Tukey (P<0.05)

Table 2. Effect of cover crop in conservation tillage treatments vs conventional tillage on thrips populations in two locations.

	Location and Days after Planting					
	Athens			Midville		
	7	14	30	7	14	30
Cover Crop	# Thrips / Plant					
Wheat	0.7 a	2.7 a	0.6 a	0.7 a	2.7 a	4.2 a
Clover	1.1 a	2.9 a	0.5 a	1.1 a	2.9 a	4.0 a
Conv. Till	5.7 b	7.6 b	0.9 a	5.7 b	7.6 b	15.3 b

Means within the same columns with the same letter are not significantly different, Tukey (P<0.05)

Table 3. Effect of burndown (glyphosate) timing on total thrips populations at two locations.

Burndown Timing and Cover Crop	Location and Days after Planting							
	Athens				Midville			
	7	14	30	Total	7	14	30	Total
	# Thrips / Plant							
Conservation Till								
Clover – 30 days	3.4 a	3.8 a	0.8 a	8.0	1.4 b	3.3 b	6.7 a	11.4
Clover – 15 days	1.5 ab	1.4 ab	0.5 a	3.4	0.4 b	2.2 b	2.4 b	5.0
Clover – 5 days	0.0 b	0.8 b	0.3 a	1.1	1.3 b	3.1 b	2.8 b	7.2
Wheat – 30 days	0.9 b	1.0 ab	0.8 a	2.7	0.7 b	3.7 b	5.4 a	9.8
Wheat – 15 days	1.2 ab	0.6 b	0.6 a	2.4	0.3 b	2.4 b	2.8 b	5.5
Wheat – 5 days	0.3 b	0.3 b	0.3 a	0.9	1.1 b	2.1 b	4.4 ab	7.6
Conventional Till	3.9 a	3.6 a	1.0 a	8.5	5.7 a	7.6 a	15.3 c	28.6

Means within the same columns with the same letter are not significantly different, Tukey (P<0.05)

Table 4. Effect of insecticide treatments on total thrips populations in two locations.

Burndown Timing and Cover Crop	Location and Insecticide Treatment							
	Athens				Midville			
	Temik In-furrow	Temik PP	Cruiser	Check	Temik In-furrow	Temik PP	Cruiser	Check
	Total # Thrips / Plant During 30 Days							
Conservation Till								
Clover – 30 days	0.6 a	3.0 ab	1.3 a	8.2 b	3.1 a	5.8 ab	3.1 a	7.8 b
Clover – 15 days	0.4 a	1.8 ab	0.7 a	4.7 b	2.4 a	2.5 a	1.4 a	4.1 a
Clover – 5 days	0.4 a	1.3 a	0.3 a	2.1 a	3.5 a	4.5 ab	2.4 a	7.5 ab
Wheat – 30 days	0.4 a	0.7 a	0.8 a	2.8 b	1.4 a	3.6 a	2.1 a	4.2 a
Wheat – 15 days	0.6 a	0.8 a	0.8a	2.5 b	1.9 a	3.2 ab	0.9 a	4.3 b
Wheat – 5 days	0.2 a	0.4 a	0.5 a	0.8 a	3.4 a	6.4 ab	2.3 a	7.6 b
Conventional Till	0.6 a	2.4 ab	0.9 a	8.5 b	6.5 a	17.3 b	7.6 a	21.9 b

Means across rows at each location with the same letter are not significantly different, Tukey (P<0.05)

References

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