REDUCING INSECTICIDE REQUIREMENTS FOR THRIPS MANAGEMENT IN CONSERVATION TILLAGE COTTON

J. N. All
Department of Entomology, University of Georgia, Athens Campus

Introduction

Thrips (primarily tobacco thrips, *Frankliniella fusca* (Hinds)), infestations on seedling cotton are often reduced in conservation tillage systems (All et al. 1992). Reduction in thrips on seedling cotton in conservation tillage (which varies by an estimated 20 to 50% as compared to plow tillage systems) have generally not reduced infestations to the level of suppression that standard rates of Temik^{R} provide to young plants. In tests with various rates of Temik^{R} in plow tillage systems, there is a reductive response in thrips numbers with increasing Temik^{R} rates on seedling plants (All 1994, 1995; Roberts and All 1998; Roberts et al. 1999). These tests were conducted to determine if the reduction effect of conservation tillage on infestations would enable reduced rates of Temik to be used for thrips management on seedling cotton.

Materials and Methods

A field was planted at the Plant Science Farm (PSF) near Athens and the Southeastern Branch Research and Education Center (SEBRC) near Midville in wheat in the fall of 2007. Plow tillage blocks were plowed 3 weeks and 1-2 days before planting. Plots were 4 rows x 30 ft long x 38 in row width arranged in a random complete block split plot design with 4 replications. The fields were divided into eight 30-foot blocks (4 conservation tillage and 4 plow tillage) with 5 ft alleys. The conservation tillage blocks were treated with glyphosate 7 days before planting to “burn down” the wheat. Seven insecticide treatments were applied during planting: aldicarb (Temik 15G (clay granule)) in-furrow @ 5 lbs (product)/A, 3.5 lbs/A, 2.5 lbs/A, 1.75 lbs/A, and 0.88 lbs/A, precision placement (dropping granules adjacent to seed prior to closing the furrow) of Temik^{R} @ 1.28 lbs/acre, thiomethoxam Cruiser 5FS (2.9 ml/lb of seed (0.25 mg a.i./seed) treated with a Wintersteirger Hege II centrifugal seed treater), and an untreated check, on 05/15/2008. The entire field was chiseled 12 in deep with a KMC^{R} stripper. Seed was planted with a John Deere four-row vacuum planter and had 3.2-inch seed spacing in rows. Seed for the Cruiser plots was treated in the lab prior to planting using a Wintersteiger Hege II seed treater. The precision placement plots were treated with a hand-held applicator (bazooka) modified for precision placement of Temik^{R} over each seed. The furrow was left open at the time of planting these plots, which allowed visible seeds to be treated, and the furrow was closed after treating. The Midville field was irrigated as needed within the center pivot irrigation program for the experiment station. Irrigation was not possible at the Plant Science Farm field and the crop had severe drought damage after midseason; yield was not taken in the plots.

One-hundred milliliter specimen cups were filled half full of alcohol and labeled for use in collecting thrips from seedling cotton. Ten plants were taken at random from the two

middle rows of each plot and immersed in the alcohol to remove thrips at 14 and 22 days after planting. Thrips samples were returned to the laboratory where immature and adult thrips were identified and counted using a dissecting microscope.

At Midville the cotton plant heights were taken 47 days after planting on 25 consecutive plants in the left middle row of each plot on 7/2/2008, and in 10 feet of the right row the numbers of plants were counted. At Midville the two outside rows of each plot were harvested and weighed on 10/28/2008 with an International 1822 two-row picker with single row weighing capabilities to determine yield. Data was analyzed using SAS ANOVA ($P<0.05$) procedures and T-tests. Tukey's HSD analysis was used for separation of means.

Results and Discussion

Microscopic observation of thrips in ethanol samples collected at 14 and 22 days after planting at both Midville and Athens indicated that >95% were tobacco thrips and others were either western flower thrips, *Frankliniella occidentalis* (Pergande), or flower thrips, *Frankliniella tritici* (Fitch). Thrips infestations on untreated plow tillage cotton were substantial at Midville during 22 days after planting and were significantly higher (87.8%) than in conservation tillage plots (Table 1). The difference and damage impact by thrips feeding on untreated plants in plow tillage plots was obvious for up to 47 days after planting, when height measurements were taken showing significantly reduced growth as compared to cotton in the untreated conservation tillage plots. Reduction in thrips numbers during 22 days was similar in untreated conservation tillage plots to the various in-furrow Temik^{R} treatments in plow tillage. Thrips numbers on plants in the various Temik^{R} in-furrow treatments in conservation tillage were reduced by half or greater as compared to their counterpart plots in plow tillage. At the PSF there was similar reduction in the number of thrips infesting untreated conservation tillage cotton (84%) compared to plow tillage plots, however, the various insecticide treatments had similar good levels of control in both tillage systems (Table 3).

Cruiser^{R} (0.25 mg/seed) plots had significantly reduced numbers of thrips on plants compared to the untreated checks in plow tillage at both PSF and SEREC, but generally produced less control than any of the Temik^{R} treatments (Tables 2 and 3). The precision placement treatment of Temik^{R} (@ 1.28 lbs/ acre) is an idea that we have worked on for several years and again verified in these tests that a reduced per acre rate of the insecticide can be applied with the seed and produce similar control as higher in-furrow rates of the chemical (Lohmeyer et al 2003).

Overall, the results at the SEBRC suggest that in-furrow rates of Temik^{R} can be reduced in conservation tillage and produce adequate thrips management. The data indicates that an additive effect may occur between conservation tillage and insecticide in reducing thrips populations on cotton during the seedling stage, contributing to reduced injury and optimum growth and yield.

Table 1. Tobacco thrips management with selected rates of Temik^{R} or Cruiser^{R} seed treatment in conservation tillage or plow tillage cotton, Midville, GA.

Insecticide Rate & Application Method	Mean number (Adult + Immature) Thrips/Plant 14 and 22 days after planting	
	Plow Tillage	Conservation Tillage
	Total	Total
Check	3.6a	0.8cde
Cruiser 0.25 mg/seed	2.2b	1.0cde
Temik 0.88 IF	1.4c	0.6cde
Temik 1.75 IF	1.2cd	0.6cde
Temik 2.5 IF	1.2cde	0.7cde
Temik 3.5 IF	1.4cde	0.5de
Temik 5.0 IF	1.2cde	0.4e
Temik 1.28 PP	0.9cde	0.5de

Table 2. Tobacco thrips management with selected rates of Temik^{R} or Cruiser^{R} seed treatment in conservation tillage or plow tillage cotton, Athens, GA.

Insecticide Rate & Application Method	Mean number (Adult + Immature) Thrips/Plant	
	Plow Tillage	Conservation Tillage
	Total	Total
Check	2.3a	0.6b
Cruiser 0.25 mg/seed	0.5bc	0.3bcd
Temik 0.88 IF	0.3cd	0.2cd
Temik 1.75 IF	0.2cd	0.1d
Temik 2.5 IF	0.1d	0.1d
Temik 3.5 IF	0.2cd	0.2cd
Temik 5.0 IF	0.1d	0.1d
Temik 1.28 PP	0.2cd	0.1d

Table 3. Plant height (48 days after planting) and yield in conservation tillage & plow tillage cotton treated with selected rates and application methods of Temik^{R} & Cruiser^{R} insecticides.

Insecticide Rate & Application Method	Plant Heights (cm)		Yield in Lint lbs/Acre	
	Plow Tillage	Conservation Tillage	Plow Tillage	Conservation Tillage
Check	32.2c	50.4ab	1145.6b	1694.8ab
Cruiser 0.25 mg/seed	47.6ab	55.5a	1346.9ab	1763.5a
Temik 0.88 IF	42.8bc	51.7ab	1255.5ab	1437.1ab
Temik 1.75 IF	51.0ab	52.6ab	1358.5ab	1405.7ab
Temik 2.5 IF	50.5ab	50.2ab	1408.6ab	1424.3ab
Temik 3.5 IF	50.8ab	54.8ab	1162.5b	1415.8ab
Temik 5.0 IF	49.4ab	56.5a	1419.6ab	1453.4ab
Temik 1.28 PP	51.5ab	50.1ab	1520.3ab	1501.1ab

Means followed by the same letter are not different at p = 0.05.

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