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THRIPS ABUNDANCE AND EFFECTS OF INSECTICIDAL CONTROL ON COTTONGROWTH AND YIELD IN SOUTH GEORGIA

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Abstract

Thrips populations (*Frankliniella* spp.) in Tift County, GA, cotton fields were monitored with traps from 2001-2003. *F. tritici* was the most abundant species, followed by *F. occidentalis; F. fusca* was the least common. Insecticidal in-furrow, foliar, and seed treatments were evaluated for their effect on thrips abundance and cotton yield. In most instances, greater numbers of thrips were found in untreated cotton plots. In-furrow Temik® treatments and Orthene® foliar sprays generally provided good control of adult and nymphal thrips. Cruiser® seed treatment provided good control of nymphs, but was less effective against adults. None of the insecticidal treatments resulted in significant yield improvement. Given the long growing season in south Georgia, yield compensation may occur over the course of the season.

Introduction

Thrips in the genus *Frankliniella* are perennial pests of cotton in Georgia, and can have various impacts on cotton production, ranging from minor cosmetic damage, to delay of crop maturity, or even to stand destruction (Watts 1937, Hawkins et al. 1966). Thrips begin feeding on Georgia cotton immediately after seedling emergence. The cotton plants are at greatest risk early in the season, when the small plants can be quite susceptible to thrips injury caused by feeding on leaves and growing meristem. In some instances, damage is severe enough to cause abortion of the terminal and loss of apical dominance. Thrips populations vary greatly from year to year, but in severe infestations, they can reduce yields by as much as 50 or 60 percent if not controlled by insecticides in-furrow, as seed treatments, or foliar sprays (Johnson et al. 2001). Lambert (1985) states that dealing with the thrips problem in cotton is complex. Universities in many cotton producing states offer suggestions for thrips control, though their research rarely shows yield increases attributable to these control measures. Increased industry-grower interest in early season pest management has prompted us to monitor thrips numbers in Tift County, Georgia. Because different thrips species may respond differently to insecticidal control measures, it would be advantageous to examine the species that make up the complex (Kharboutli and Allen 2001).

The **objectives** of these studies were (1) to characterize the timing and abundance of several important thrips species, and (2) to evaluate the efficacy of insecticides for thrips management in south Georgia.

Materials and Methods

Thrips Trapping Survey

A survey of thrips abundance was undertaken from 2001-2003 in Tift County cotton fields. In each of two locations, 4 thrips traps were placed at the margins of fields before being planted to cotton. Traps were rectangular wells constructed of plexiglass, measuring 5.25 x 6.25 x 2.5 inches deep, and assembled with a hot glue gun. Traps were painted white on the outside and yellow on the inside. Each trap was mounted on an adjustable ring-stand to allow it to be maintained at the level of the top of the cotton plants as they grew. The traps were half-filled with a 50% aqueous solution of ethylene glycol and fitted with hardware cloth lids to minimize the possibility of ingestion by wildlife. Two 1/4" holes were drilled near the top of each trap and covered with a circle of fine mesh secured in place with hot glue. During periods of rain, these allowed for drainage without loss of the captured insects. The contents of each trap were poured into 1-pint jars and returned to the laboratory weekly for separation, counting and identification. Each sample was poured through a 120-mesh sieve (Hubbard Scientific Co., Northbrook, IL) and rinsed with tap water. The thrips (and other insects) were then flushed into a 100 x 15 mm plastic petri dish for microscopic counting, separation of adults and nymphs, and species determination of adults.

Insecticide Trials

Cotton (variety DPL 458B/RR) was planted on May 1, 2001, April 19, 2002, and May 2, 2003 at the Lang-Rigdon Farm of the Coastal Plain Experiment Station in Tift County, Georgia, using a Monosem pneumatic planter equipped to add granular insecticides in the furrow. Plots were 4 rows by 50 ft long, with a 36 inch row spacing and a minimum of 4 replications per treatment. Throughout the course of each season, all plots were irrigated for optimum growth. The treatments were (1) an untreated control, (2) thiamethoxam (Cruiser®)-treated seed (300 g/kg), (3) foliar applications of acephate (Orthene® 97) at 3.2 oz ai/acre (2x in 2001 and 2002; 3x in 2003), (4) aldicarb (Temik® 15G) applied in-furrow at 3.5 lbs per acre, (5) aldicarb (Temik® 15G) applied in-furrow at 5 lbs per acre (2003 only), (6) aldicarb (Temik® 15G) applied in furrow at 7.0 lbs per acre (2002 and 2003), and (7) imidacloprid (Gaucho®)-treated seed (300 g ai/100 kg seed). The foliar treatments were applied

with a CO2 backpack sprayer using a single TX6 nozzle calibrated to deliver 4.7 GPA. Weekly sampling was initiated ten days after planting. Each sample consisted of five plants that were picked and swirled in a 1-pint jar containing ca. 300 ml of water, with several drops of liquid dishwashing detergent added as a surfactant. Samples were returned to the laboratory for thrips identification as described above. Seed cotton yields were taken by mechanically picking the middle 2 rows of each plot. Data were analyzed using analysis of variance, followed by separation of significantly different means using Duncan's New Multiple Range Test, with $p<0.05$ as the upper limit for significance.

Results and Discussion

Thrips Trapping Survey

Average weekly trap catches of all three species were highest in 2001, with *Frankliniella tritici* the dominant species all three years (Fig.1), followed by *F. occidentalis* and *F. fusca*. Overall peak numbers were reached on 17 May in 2001 and 2003 and 26 April in 2002, although the peak varied slightly for the three species.

Insecticide Trials

Significant reductions in immature thrips numbers generally did not occur in 2001 though the opposite was true in 2002 and 2003 (Table 1). Cruiser® provided good levels of control in 2002 and 2003, but was marginal in 2001. Significantly lower numbers of adult thrips were found in some of the treated plots, particularly those receiving in-furrow Temik® treatments and multiple Orthene® foliar sprays in 2003 (Table 2). Cruiser® was generally less effective against adults than it was for nymphs. Temik® provided good levels of control at all rates for 2-3 weeks after planting. Gaucho® failed to provide adequate control of either nymphs or adults in any of the test years.

Yields varied among treatments, but the differences were not statistically significant, nor were yields consistently higher in plots receiving insecticidal treatment (Fig. 2). Yields in treated plots did not differ significantly from untreated plots in any year, but the treatments of Temik® 3.5 lb in-furrow, 2-3 applications of Orthene®, and Cruiser®-treated seed (300 g/kg) yielded consistently and comparably well all three years. All of the Cruiser® treatments yielded comparable to one another in 2003 (the only year when all were tested). The failure of the yield in the insecticide treatments to differ from yield in the untreated plots may be due to the extended growing season in south Georgia that may allows the plants to compensate for the damage incurred early in the season. Plant growth was affected significantly by thrips in 2001 and 2003 (not evaluated in 2002), and varied among treatments (data not shown here), resulting in developmental variability among treatments. Nevertheless, no difficulty was encountered in picking the crop at the end of the season due to developmental variability.

References Cited

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Table 1. Number of thrips nymphs per plant 2, 3, and 4 weeks after planting. Means followed by the same letter are not significantly different (P>0.05).

Treatment	2001			2002			2003		
	2 week	3 week	4 week	2 week	3 week	4 week	2 week	3 week	4 week
Untreated	3.40a	10.5a	15.1a	7.88a	7.80a	2.90a	2.74a	5.08a	4.96a
Cruiser® seed tmt 300 g ai/100 kg seed	1.30a	7.65a	20.3a	1.10c	4.75ab	2.32ab	0.24c	1.32bc	1.84bcd
Cruiser® seed tmt 30 g ai/100,000 seeds	Not tested	Not tested	Not tested	Not tested	Not tested	Not tested	0.24c	1.60bc	2.84abc
Cruiser® seed tmt 34 g ai/100,000 seeds	Not tested	Not tested	Not tested	Not tested	Not tested	Not tested	0.16c	1.72bc	1.64bcd
Cruiser® seed tmt 7.65 fl oz/100 lb seed	Not tested	Not tested	Not tested	Not tested	Not tested	Not tested	0.15c	0.60c	3.40ab
Gaucho® seed tmt 250 g ai/100 kg seed	Not tested	Not tested	Not tested	4.88b	7.28a	3.10a	1.25b	2.45b	1.75bcd
Orthene® 90SP foliar 3.2 oz ai/a 2x (3x 2003)	3.50a	1.25b	8.35a	0.35c	1.58b	0.52b	0.44c	0.11c	0.24d
Temik® 15G in-furrow 3.5 lb/a	0.15a	1.40b	11.55a	0.20c	0.82b	1.88ab	0.04c	0.40c	0.68cd
Temik® 15G in-furrow 5 lb/a	Not tested	Not tested	Not tested	Not tested	Not tested	Not tested	0.67c	0.16c	0.20d
Temik® 15G in-furrow 7 lb/a	Not tested	Not tested	Not tested	0.10c	0.70b	0.48b	0.0c	0.40c	0.12d

Table 2. Number of thrips adults per plant 2, 3, and 4 weeks after planting. Means followed by the same letter are not significantly different (P>0.05).

Treatment	2001			2002			2003		
	2 week	3 week	4 week	2 week	3 week	4 week	2 week	3 week	4 week
Untreated	4.40a	2.05ab	1.75a	0.78abc	1.28ab	2.65ab	1.94b	1.40abc	2.22a
Cruiser® seed tmt 300 g ai/100 kg seed	4.00a	2.45ab	0.95ab	1.18ab	1.18ab	2.40ab	0.84cd	1.88a	1.64abc
Cruiser® seed tmt 30 g ai/100,000 seeds	Not tested	Not tested	Not tested	Not tested	Not tested	Not tested	0.92cd	1.80a	1.76ab
Cruiser® seed tmt 34 g ai/100,000 seeds	Not tested	Not tested	Not tested	Not tested	Not tested	Not tested	1.20bc	1.52ab	1.40abc
Cruiser® seed tmt 7.65 fl oz/100 lb seed	Not tested	Not tested	Not tested	Not tested	Not tested	Not tested	0.65cd	0.95abcd	0.85abc
Gaucho® seed tmt 250 g ai/100 kg seed	Not tested	Not tested	Not tested	1.02abc	1.58a	2.15ab	2.85a	2.00a	1.10abc
Orthene® 90SP foliar 3.2 oz ai/a 2x (3x 2003)	0.80c	1.85b	0.30b	0.75abc	0.68ab	2.75ab	0.20d	0.16d	0.22bc
Temik® 15G in-furrow 3.5 lb/a	2.10b	3.05a	1.05ab	0.22c	0.40b	2.48ab	0.28d	0.32cd	1.08abc
Temik® 15G in-furrow 5 lb/a	Not tested	Not tested	Not tested	Not tested	Not tested	Not tested	0.20d	0.40bcd	0.33bc
Temik® 15G in-furrow 7 lb/a	Not tested	Not tested	Not tested	0.35bc	0.90ab	1.72b	0.24d	0.88abcd	0.40bc

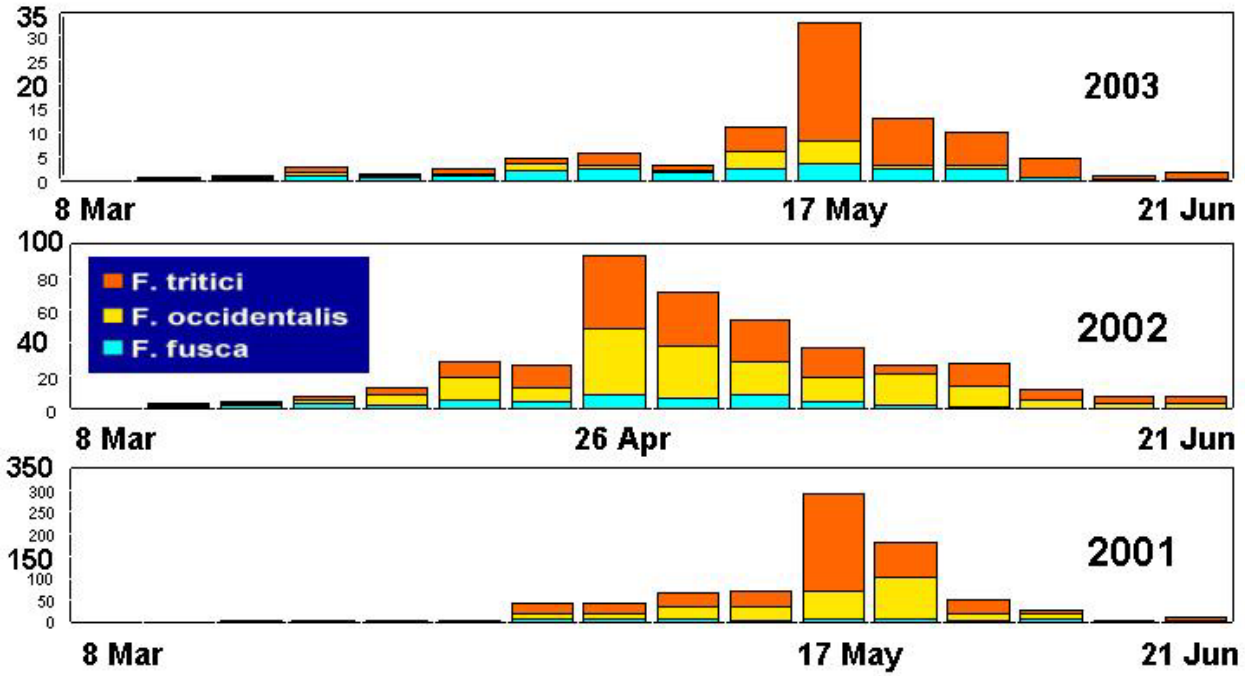

Figure 1. Abundance of three species of *Frankliniella* adult thrips in relation to date (Tift Co., GA). Note that y-axis scales vary.

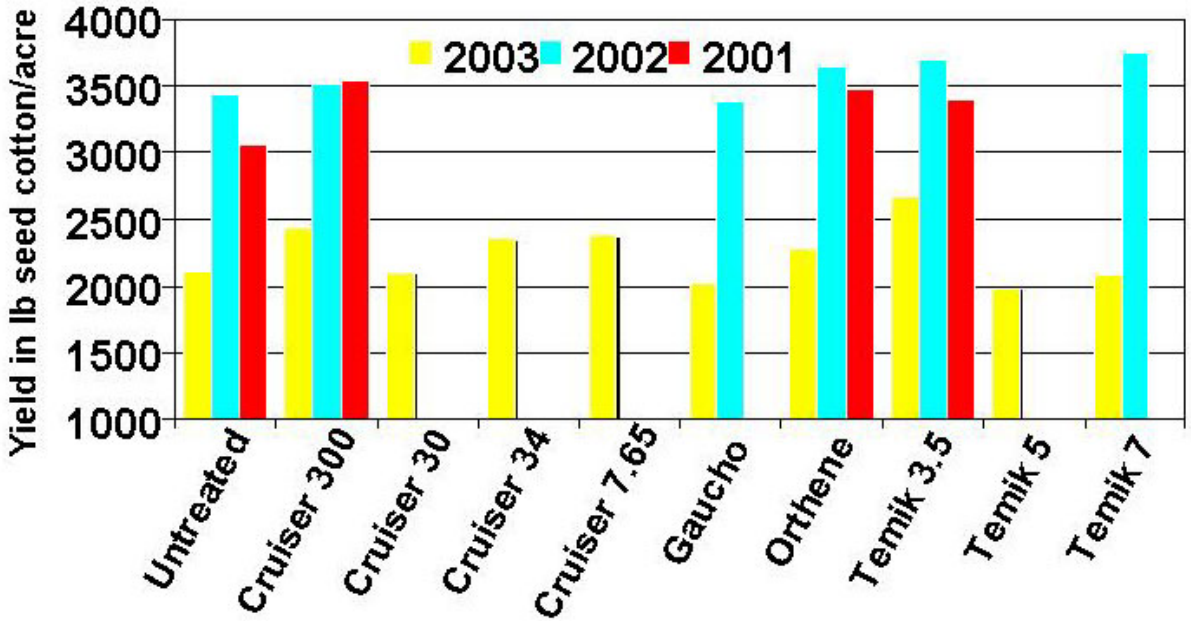

Figure 2. Seed cotton yield in relation to insecticidal treatments for thrips in 2001-2003 in Tifton, GA. No statistically significant differences were observes in any year. Note that not all treatments were tested every year.