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YIELD PROTECTION STRATEGIES FOR THRIPS IN VIRGINIA COTTON

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Abstract

Tobacco thrips, *Frankliniella fusca* (Hinds), is considered the number one cotton insect pest in Virginia. Estimated losses during the 5-year period from 1997-2001 totaled 5,156 bales. Two hundred and twenty insecticide product/rate/delivery-type treatment combinations have been evaluated over the 5-year period from 1997-2001 to develop a better understanding of the impact of early season thrips injury to cotton seedlings, and to develop management recommendations for growers. Plant mapping showed that compared with insecticide-protected plants, untreated plants grew taller, had more nodes, set fewer fruit, and set fruit later in the season. Insecticide treatments resulted in numerically higher lint yields compared with untreated controls 99 percent of the time, and statistically higher lint yields 78 percent of the time. Over all experiments and years, the average yield increase compared with the untreated controls equaled 339 lb lint per acre. Further summaries are presented.

Introduction

Tobacco thrips, *Frankliniella fusca* (Hinds), is considered the number one cotton insect pest in Virginia. Estimated losses during the 5-year period from 1997-2001 totaled 5,156 bales, 1.75 times greater than losses caused by the next most damaging pest complex, the Heliothines (Williams 1997-2001) (Table 1). A total of 29 field experiments have been conducted over that same period at the Virginia Tech Tidewater Agricultural Research and Extension Center to determine the impact of thrips injury on cotton, and to develop protection strategies. These experiments evaluated 220 insecticide product/rate/delivery-type treatment combinations. Data on plant stand, plant mapping, thrips injury ratings, thrips identification and lint yields have been compiled and summarized to develop management recommendations for growers. Representative data and general summary conclusions are presented.

Materials and Methods

Insecticide Control Strategies Evaluated

In-furrow at planting time treatments included granule and liquid formulations. Seed treatments included both commercially applied products as well as those applied onto seed in the hopper box. Liquid foliar sprays were applied alone, in addition to in-furrow treatments, or in addition to seed treatments. They were either banded, or broadcast, at either the late cotyledon-1st true leaf stage or the 2-3 leaf stage.

Products Evaluated

In-furrow at planting time: (granules) Payload 15G, Temik 15G, Di-Syston 15G, TSX Di-Syston Granular, Thimet 20G, or CGA-293343 2GR; (liquids) Di-Syston 8E, TSX Di-Syston EC, Orthene 75S and 97, Furadan 4F, or Admire 2F. Seed treatments: (commercially applied) Gaucho 480, Gaucho 600FS, Adage 5FS, or Adage SR; (seed hopper box) Orthene 75S. Liquid foliar sprays: Orthene 75S and 97, TD 2344-02 0.83EC, Provado 1.6F, Tracer 4SC, CGA-293343 25WG, Centric 40WG, Vydate C-LV, Capture 2EC, Karate Z, Baythroid 2EC, Decis 1.5EC, or Novaluron 0.83EC.

Experimental Procedures

Experiments were conducted at the Virginia Tech Tidewater Agricultural Research and Extension Center research farm located in southeastern-most Virginia. All fields are in a 3-year corn/peanut/cotton rotation. Tillage was rip-strip into a herbicide-killed winter wheat cover crop stubble. Plots were planted the first week in May, and harvested in mid-October. Cotton cultivars were DP 51 (1997-1999), SG 125RR (2000), and PM 1199 R (2001). A RCB experimental design was used with four replicates. Plots were four, 36-inch rows x 40 ft long. The center two rows of each plot were treated and evaluated.

Evaluation Procedures

Stand counts were taken by counting all seedlings in the center two rows, but not in all tests or all years. PMAP (Landivar 1993) and COTMAN (Zang et al. 1993) plant-mapping procedures were used on five randomly selected plants per plot, but not in all tests or all years. Thrips injury to plants was rated weekly from treatment time to recovery (5-6 weeks after emergence) using a 0-5 scale, where 0=no injury and 5=dead plants. Species identity was ‘spot checked’ by periodically collecting and identifying random samples of adult thrips taken from untreated plants throughout the experiment fields. At crop maturity, the center two rows of each plot (80 row-ft/plot) were harvested with a 2-row John Deere combine. Sub-samples were ginned to determine percent lint. Means were compared using standard ANOVA procedures, P=0.05.

Results

Impact of Thrips Injury to Seedlings on Plant Architecture and Fruit Set

Plant maps generated from PMAP procedures illustrate the season-long impact of thrips injury to seedlings (Figure 1 – A, B, and C). Compared with insecticide-protected plants, untreated plants grew taller, had more nodes, set fewer fruit, and set fruit later in the season. These differences increase our understanding of the impact of early season thrips injury and the resulting yield reductions.

General Findings

Tobacco thrips, *Frankliniella fusca* (Hinds), comprised more than 90 percent of all adult thrips sampled. Of the 220 treatment combinations evaluated over the 5-yr period: 1) insecticide treatments resulted in numerically higher lint yields compared with untreated controls 99 percent of the time, and statistically higher lint yields 78 percent of the time; 2) over all experiments and years, the average yield increase compared with the untreated controls equaled 339 lb lint per acre (Table 2); 3) foliar treatments improved the performance of in-furrow or seed treatments 74 percent of the time, and by an average of ca. 70 lb lint/acre (example, 1999 data, Figure 2); 4) foliar treatments, alone, rarely resulted in yields equal to those conferred by in-furrow or seed treatments; 5) foliar treatments generally worked best if applied at the late cotyledon-1st true leaf stage; 6) results from banding vs. broadcasting foliar treatments varied and appeared to be more dependent on rate and coverage (example, 2000 data, Figure 3); 7) Gaucho 480 at 8 oz/cwt, alone, rarely resulted in yields equal to Temik at 5 lb/acre; 8) Gaucho plus a foliar treatment resulted in yields equal to Temik 75 percent of the time; and 9) pyrethroids show promise as foliar treatments, but there are some concerns about early season use and the potential for affecting resistance levels in Heliothine populations.

References

Landivar, J. A. 1993. PMAP, a plant map analysis program for cotton. Texas Agricultural Experiment Station, MP. 1740. Texas Agricultural Experiment Station, College Station, TX.

Williams, M. R. 1997-2001. Beltwide Cotton Insect Losses Report. Mississippi State University, Mississippi State, MS.

Zang, J. P., M. J. Cochran, N. P. Tugwell, F. M. Bourland, and D. M. Oosterhuis. 1993. Integrating crop and weather information for efficient end-of-season cotton management. Proc. Beltwide Cotton Confs. National Cotton Council of America, Memphis, TN, pp. 416-421.

Table 1. Estimated cotton losses for Virginia, 1997-2001. From, "Cotton Insect Losses Report," M.R. Williams, Mississippi State University.

	Estimated bales lost			
	Thrips	**Bollworm/budworm**	**Lygus**	**Other**
1997	972	914	0	96
1998	9	12	0	2
1999	529	481	0	0
2000	2060	1530	77	0
2001	1586	0	481	0
Total	5,156	5,937	558	98

Table 2. Evaluation of yield reduction to thrips feeding on seedling cotton in Virginia, 1997-2001. D.A. Herbert, Jr., Virginia Tech.

29 field tests with 220 product/rate/delivery methods combinations evaluated:		
	Avg. lb. lint increase over untreated controls	
	No. treatments tested	**lb. increase**
1997	38	380
1998	44	208
1999	22	332
2000	50	422
2001	66	352
5-yr avg.;		339

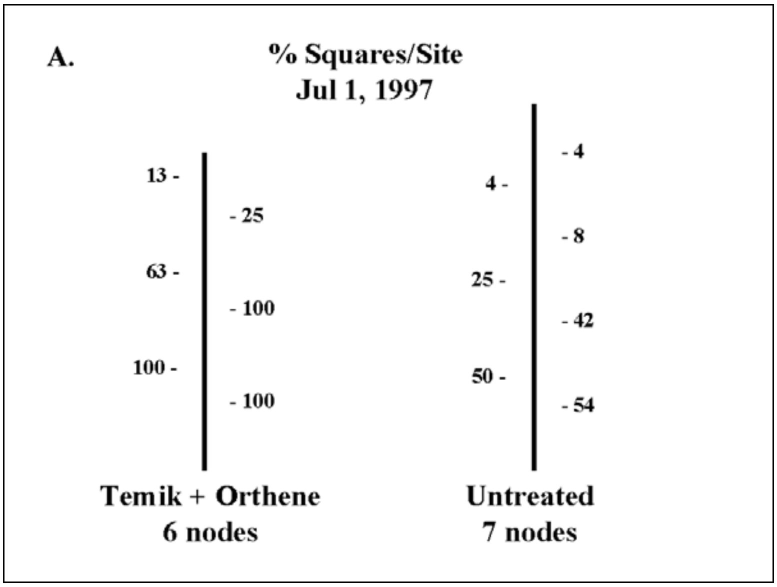

Figure 1.A. Cotton growth map created by PMAP procedures July 1, 1997. (Temik was applied at 5 lb/acre in-furrow and Orthene 75S was applied as a 4 oz band at the late cotyledon-1st true leaf stage). D.A. Herbert, Jr., Virginia Tech.

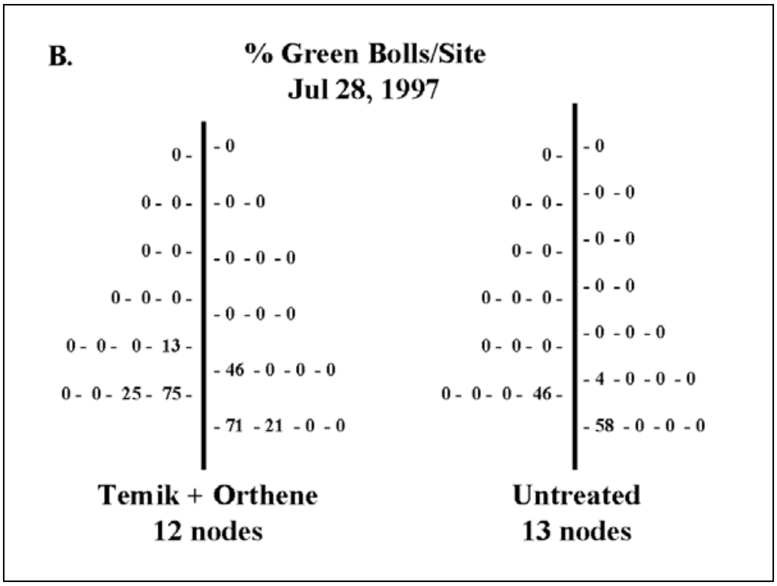

Figure 1.B. Cotton growth map created by PMAP procedures, July 28, 1997. D.A. Herbert, Jr., Virginia Tech.

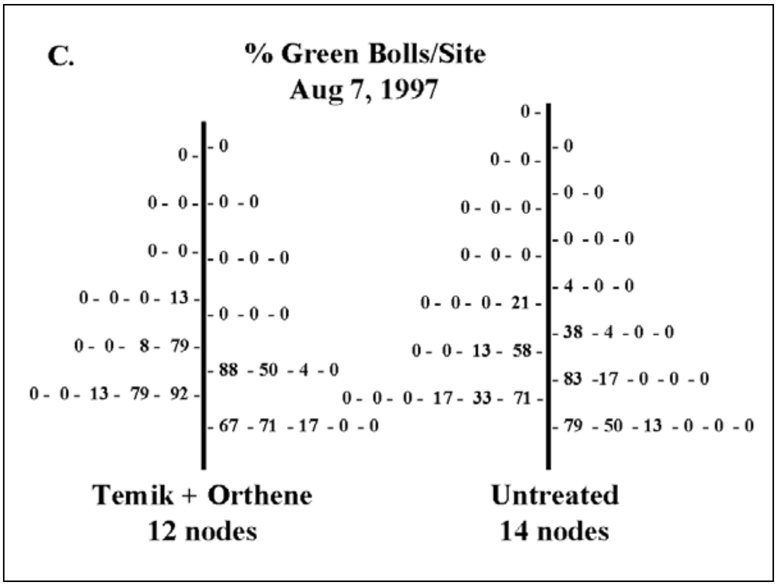

Figure 1.C. Cotton growth map created by PMAP procedures, August 7, 1997. D.A. Herbert, Jr., Virginia Tech.

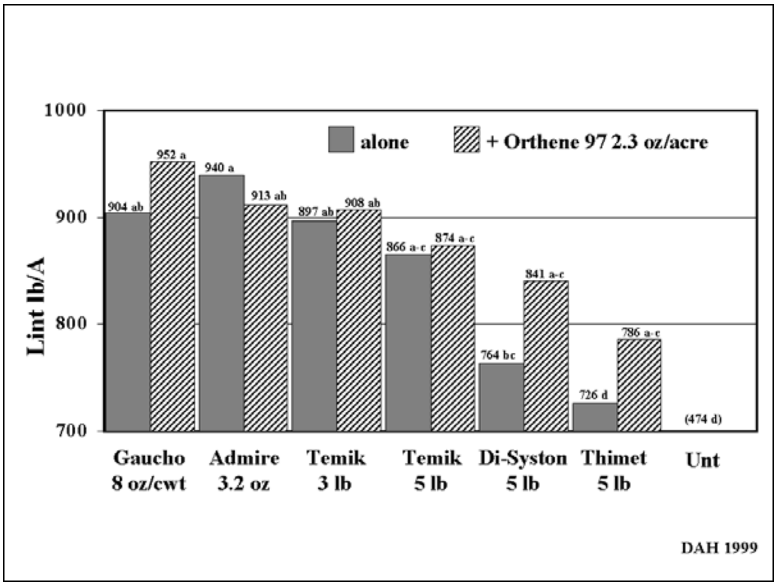

Figure 2. Cotton yield advantage with and without an additional foliar insecticide band at 1st true leaf stage. Tidewater Agricultural Research and Extension Center, Suffolk, VA, 1999.

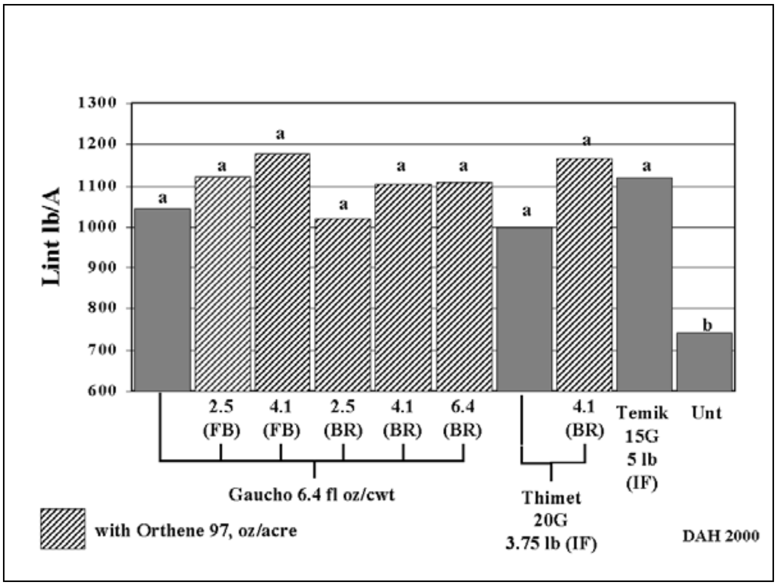

Figure 3. Cotton yield after in-furrow, seed and additional foliar insecticide treatment for thrips. FB = foliar band, BR = broadcast, IF = in-furrow. Tidewater Agricultural Research and Extension Center, Suffolk, VA, 2000.