THRIPS CONTROL IN CONVENTIONAL AND ULTRA NARROW ROW COTTON

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Abstract

Field studies were conducted at the Southeast Research and Extension Center-Rohwer Division, near Rohwer. AR in 1998 to evaluate in-furrow insecticide treatments for thrips control in conventional and ultr narrow row cotton.

In general, good thrips control and damage protection was observed from insecticide treatments in both cotton systems. Although, differences were seen in thrips numbers, damage and phytotoxicity ratings they did not translate to yield. This effect may not have occurred due to the plants ability to compensate when grown with newer varieties and/or under conditions more conducive for adequate growth.

These studies demonstrate that seedling cotton grown under warm, dry conditions is tolerant of low numbers of thrips soon after emergence. Even when populations build later on, yield losses do not always occur.

Introduction

Thrips cause losses to early-season cotton each year in Arkansas. These insects feed on the sap of young tender tissue of the newly emerged seedlings causing discoloration and malformation in leaves and stunted plants. Infestations can sometimes reach high levels and, consequently, have the potential to exert a great impact on lint yield if left unchecked.

Excessive feeding by immatures and adults causes reduction in leaf area, plant height, population and early square set. Feeding on the terminal bud can cause abortion which results in excessive branching that delays crop maturity and may reduce yield (Micinski et al. 1990). Although cotton plants are able to outgrow and compensate for some thrips injury, studies have shown that high thrips populations and the associated feeding damage has resulted in reduced plant root development, leaf area, plant dry matter and yield (Roberts and Rechel 1996). Herbert (1995) reported that seedling damage by thrips reduced yields by an average of 177-198 lb lint/A.

Estimated yield loss in Arkansas due to thrips in 1997 was 23,042 bales (Williams 1998). Thrips control is achieved through insecticidal treatments and Temik 15G has been recommended as an in-furrow treatment. However, the effect on plants of using systemic insecticide such as Temik and Thimet has been a subject of debate among researchers (Goddard and Leser 1997). In addition, newer compounds are periodically introduced for thrips control and comparisons of the efficacies of old and new compounds are needed.

Materials and Methods

These studies were carried out in 1998 at the Southeast Research and Extension Center-Rohwer Division near Rohwer, AR.

Conventional Cotton

Conventional cotton was planted on 5-6-98 with NuCotn 33B and maintained with standard production practices. The test was conducted using a Randomized Complete Block Design with four replications of four 38" rows 40' long.

Gaucho ST (seed treatment) and Orthene ST was applied alone and in combination. Granular insecticides were dropped in-furrow at rates of 1.0 lb ai/A for Thimet 20G and 0.525, 0.75, and 1.05 lb ai/A for Temik 15G using a granular applicator on a John Deere 7300 Maxemerge planter. Liquid applications of Admire 2F was applied alone at .05 and .0375 lb ai/A and in combination with Orthene 90S and Orthene ST and Di-Syston 8E at .0375+.5, .0375+ST, .05+ST and .0375+.5 lb ai/A respectively. Orthene 90S at 1.0 lb ai/A was also used.

Adult and Immature thrips were evaluated at 9, 16 and 24 days after emergence (DAE) using the plant washing procedure described by Burris et al. (1990). Cotton injury, stand, yield and phytotoxicity effects were also evaluated. Data were subject to ANOVA and means separated by LSD at the 5% level.

Ulrta Narrow Row Cotton

Ultra Narrow Row Cotton study was planted on 6-4-98 with Stoneville 373 and maintained with practices conducive for this system. The study was conducted using a Unreplicated Strip Test with four subplots/treatment and planted with a 10' John Deere 750 No-Till Drill.

Gaucho ST and Orthene ST was applied alone and in combination. Orthene 90S at .2 lb ai/A was applied with Orthene ST. Granular applications of Thimet 20G at 2.0 lb ai/A and Temik 15G at 1.05 and 1.5 lb ai/A were also used. Treatment effects for Adult and Immature thrips were evaluated over the season and compared to the check. The effect of thrips treatments on stand and yield were also evaluated and data were analyzed using Kruskall-Wallis and means separated by LSD at the 5% level.

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Results and Discussion

Conventional Cotton

All treatments in the conventional cotton significantly reduced thrips up to 9 DAE (Table 1). A consistent trend in subsequent sampling, 16 and 24 DAE, resulted in control for Temik, Thimet, Orthene, and all treatment combinations as population shifted from Adult to Immature thrips. (Table 1).

All treatments reduced thrips damage and thrips damage was highly correlated with the number of thrips/plant ($P<0.001$, $r2=0.84$, 0.84, and 0.59) for the three sampling dates respectively (Table 1). Although Temik was highly effective at reducing injury (Table 1), the higher rate (1.05 lb ai/A) resulted in significantly higher phytotoxicity to cotton seedlings (Table 2) and in a significantly lower number of plants/ acre (Table 2). Statistically significant phytotoxicity was seen in the Thimet 1.0 lb ai/A treatment as well (Table 2).

No differences existed in lint yield among treatments (Table 2). The effect of insecticides on early season insect pest and cotton seedlings may not have translated to yield due to the ability of plants to compensate.

Ultra Narrow Row Cotton

Insecticide treatments were averaged across five sample dates taken over a period of 29 DAE for a seasonal mean of thrips/plant (Table 3). Temik at 1.05 and 1.5 lb ai/A respectively, Thimet at 2.0 lb ai/A and combinations of Gaucho ST+Orthene ST and Orthene ST+Orthene 90S at .2 lb ai/A controlled thrips when compared to the untreated check. Temik at 1.5 lb ai/A provided the best control at less than 5 thrips/plant for both adult and immatures during the season. Inadequate control was observed from seed treatments of Gaucho and Orthene, they averaged more than 21 and 26 thrips/ plant respectively.

Treatment effects on stand counts were not seen in this study (Table 3). Plant populations ranged from 121000 plants/A for the check to 158752 plants/A for Orthene ST (Table 3). No differences in lint yield were seen among treatments (Table 3). Thimet produced numerically the highest yield at 1152 lb/A, and Gaucho ST produced the least lint/A at 825 lbs (Table 3). Plant compensation for early season thrips damage undoubtedly obscured any effect insecticide treatments might have had on yield. We would expect yield effects to be more apparent under conditions of higher thrips populations.

Conclusions

In 1998, thrips insecticides provided, in general, good thrips control and damage protection. Differences in thrips numbers, damage and phytotoxicity were seen in our studies. However, these differences did not translate to yield losses. Cold tolerant varieties and planting at the optimum time may be providing many benefits. Cold tolerant varieties provide healthy, rapidily growing seedlings. Optimum time of planting provides seedlings with warmer and dryer soils causing reduced disease pressure, enhanced emergence and increased seedling vigor. New post-emergence herbicides for cotton have given growers today the option of using less residual herbicide (PPI) which under certain conditions can delay plant growth. These improvements in early season plant culture have improved seedling tolerance to thrips.

This study demonstrates that seedling cotton grown under warm, dry conditions is tolerant of low numbers of thrips soon after emergence. Even when populations build later on, yield losses do not always occur.

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Table 1. Thrips counts and damage ratings following at planting insecticide and seed treatments for thrips control. Rohwer, AR 1988.

Treatment	Rate Lbs Ai/A	Thrips/Plant			Thrips Damage Rating (%)
		9 DAE	16 DAE	24 DAE	18 DAE
Check		1.5 a	12.73 a	13.53 ab	60 a
Temik 15G	.525	.20 bc	1.53 cd	1.98 e	13 e
Temik 15G	.75	.05 c	.88 cd	4.23 e	14 e
Temik 15G	1.05	.20 bc	.48 d	2.53 e	14 e
Thimet 20G	1.0	.60 bc	7.03 a-d	7.03 cde	37 bc
Gaucho ST		.18 bc	6.38 a-d	10.90 a-d	27 cde
Admire 2F	.05	.88 b	8.88 ab	12.73 abc	45 b
Admire 2F	.0375	.45 bc	7.80 abc	15.03 a	31 cd
Admire 2F+	.0375	.10 c	3.85 bcd	3.88 e	27 cde
Orthene 90S	.5				
Admire 2F+	.0375	.13 bc	2.20 bcd	3.0 e	17 de
Di-Syston 8	.5				
Orthene ST+		.20 bc	5.55 bcd	5.35 de	17 de
Admire 2F	.0375				
Orthene ST+		.18 bc	1.80 cd	2.93 e	17 de
Admire 2F	.05				
Orthene 90S	1.0	.18 bc	1.83 cd	3.98 e	18 de
Gaucho ST+		.30 bc	2.03 bcd	7.88 b-e	21 de
Orthene ST					
Orthene ST		.08 c	2.33 bcd	3.33 e	26 cde

Means in columns followed by the same letter are not statistically different at the 5% level of significance.

Table 2. Phytotoxicity rating, stand count and lint yield following various at planting and seed treatments for thrips control. Rohwer, AR 1988.

Treatment Rate	Lb Ai/Ac	Phytotoxicity Rating (%)	Plants/Ac	Lint yield Lb/Acre
Check		21 c	61900 ab	766.4 a
Temik 15G	.525	25 bc	59149 abc	788.3 a
Temik 15G	.75	26 bc	58003 abc	767.3 a
Temik 15G	1.05	30 ab	50437 c	768.2 a
Thimet 20G	1.0	33 a	64193 ab	716.1 a
Gaucho ST		22 c	63047 ab	795.6 a
Admire 2F	.05	21 c	64193 ab	809.3 a
Admire 2F	.0375	21 c	64881 ab	781.0 a
Admire 2F+	.0375	22 c	60295 ab	783.8 a
Orthene 90S	.5			
Admire 2F+	.0375	28 abc	61442 ab	744.5 a
Di-Syston 8	.5			
Orthene ST+		24 bc	61900 ab	739.9 a
Admire 2F	.0375			
Orthene ST+		24 bc	63734 ab	771.9 a
Admire 2F	.05			
Orthene 90S	1.0	23 c	56169 bc	741.7 a
Gaucho ST+		26 bc	59149 abc	732.6 a
Orthene ST				
Orthene ST		21 c	67632 a	768.2 a

Means in columns followed by the same letter are not statistically different at the 5% level of significance.

Table 3. Seasonal thrips count, stand counts and lint yield following various at planting and seed treatments for thrips control in Ultra Narrow Row Cotton. Rohwer, AR. 1998

Treatment	Rate Lb Ai/Acre	Seasonal Thrips/Plant	Plants/Acre	Lint yield Lb/Acre
Check		29.67 a	121000 a	1090.8 ab
Gaucho ST		26.03 ab	123420 a	825.0 ab
Orthene ST		20.71 abc	158752 a	982.0 ab
Orthene ST fb Orthene 90S	.2	16.51 bc	140360 a	1112.8 ab
Gaucho ST+ Orthene ST		15.32 bcd	142780 a	997.8 ab
Thimet 20G	2.0	12.40 cde	122452 a	1152.3 a
Temik 15G	1.05	5.46 de	136972 a	922.8 ab
Temik 15G	1.5	4.39 e	128260 a	992.5 ab

Means in columns followed by the same letter are not statistically different at the 5% level of significance.