

## EARLY-SEASON THRIPS CONTROL IN UNR COTTON

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### Abstract

Research was conducted in 1998 and 1999 to determine the impact of early-season insecticide treatments on thrips population densities, fruit production, and lint yield in ultra narrow-row (UNR) cotton production systems. Insecticides commonly used in conventional row-spacing cotton systems were used in UNR cotton plots. Differences in thrips control between treated plots and no treatment were observed in both years. Generally, early bloom counts did not differ in treated plots compared to untreated plots. In both years, treatments did not significantly impact lint yield compared with no treatment.

### Introduction

UNR cotton production has been tried for many years with limited success. As cotton production costs increase and lint prices decrease, the interest in UNR cotton production has been revived. In western Tennessee, erodible soils and marginal lands are areas where UNR production systems could be economically feasible. Advances in technologies, such as no-till cotton production systems, genetic resistance to insects and herbicides, plant growth regulators, and improved equipment design, have supplied producers with the tools to make UNR cotton production work. Cotton grown in UNR (10" or less) may enhance erosion control in areas where no-tillage production methods have been employed. For many years, growers have been treating conventional row cotton with insecticides to control early-season thrips and preserve lint yields. Little to no research has been directed towards early-season thrips control in UNR cotton production systems.

### Materials and Methods

An early-season thrips control trial was conducted at the Milan Experiment Station in Milan, TN, in 1998 and 1999. In both years, plots were planted on May 12 with a John Deere 750-grain drill into killed wheat. Treatments were arranged in a randomized complete block design with five replications. Plots were 15 ft (1 - 15 ft drill width = 24 - 7.5 inch rows) X 30 ft. In 1998, Paymaster (PM) 1220RR seed treated with fungicide were planted. Treatments consisted of

Temik 15G at four rates; 3.5 lb, 7.0 lb, 10.5 lb, and 14 lb/A applied in-furrow (IFG), Gaucho 480F 8 fl oz/cwt seed treatment (ST), and Orthene 90S 7.1 oz/cwt (ST) plus a foliar application (FS) of Bidrin 8E 3.2 oz/A, and a no-treatment plot. The foliar spray treatment was applied 17 DAP. In 1999, STV BXN 47 seed were planted. Treatments in 1999 consisted of Temik 15G at three rates; 5.0 lb, 7.5 lb, and 10.0 lb/A applied in-furrow (IFG), Gaucho 480F 8 fl oz/cwt seed treatment (ST), Orthene 90S 7.1 oz/cwt (ST), and Orthene 90S 7.1 oz/cwt (ST) plus a foliar application (FS) of Bidrin 8E 3.2 oz/A, and a no-treatment plot. The foliar spray treatment was applied 27 DAP.

In both years, efficacy of thrips control was measured by collecting eight plants per plot and placing them in appropriately labeled pint jars containing approximately 7 oz of 70% ethyl alcohol. Lids were then placed on the jars, which were gently inverted several times to 'wash' the thrips from the plants. Samples were taken to the laboratory and the plants were removed and placed in a standard US sieve No. 100 where they were rinsed with 70% ethyl alcohol. The alcohol remaining in the jar was poured through the sieve and the jar was rinsed to remove any remaining thrips. The sieve was back-rinsed with alcohol through a funnel into a glass vial. Samples were later counted using a stereo microscope and the number of thrips/eight plants was recorded. In 1998, thrips samples were collected 17, 24, 31, and 35 days (Dates 1-4, respectively) after planting (DAP), and in 1999, 19, 28, 34, and 40 DAP (Dates 1-4, respectively). Adult and larval thrips numbers were reported as the mean number of thrips per plant.

An additional measure of thrips control was documented using thrips damage ratings, made 28 DAP in 1998 and 26 DAP in 1999. The rating used a scale of 1 to 5 with 1 = no damage and 5 = severe damage. A rating of 2 had slight crinkling of the first true leaf; 5 had severe cupping and crinkling of the leaf.

Early blooms were counted to determine if at-planting insecticides had an impact on fruit production. The number of blooms in a single 7.5 inch row X 10-ft were counted on three dates within a 7-day period and the number of blooms/10 ft was recorded for data analysis. In 1998, blooms were counted 55, 59 and 62 DAP and the following year bloom counts were made 61, 65, and 68 DAP. The total number of blooms/10 row ft was reported.

In both years, after the thrips sampling period, plots were scouted for insects and treated with insecticide as needed. In 1998, plots were harvested on Oct. 1, using an Allis-Chalmers Model 760 finger-type stripper equipped with a 12 ¾ ft header. Cotton was harvested on Sept. 28, 1999, with a John Deere 7450 finger-type stripper equipped with a 10 ft Cencorp header, and lint yields were measured in pounds of

lint per A. Data were analyzed using Analysis of Variance, and means were separated using Duncan's Multiple Range Test ( $P < 0.05$ ).

## Results

### Thrips Control

Because immature thrips are wingless and unable to fly from plot to plot, we focus on larval thrips populations to evaluate treatment efficacy. In 1998, statistical differences were observed on Date 2, when only plots treated with Temik at 3.5 and 7.0 lb/A did not differ from untreated plots in larval thrips numbers. On all sampling dates in 1998, larval thrips numbers were numerically lower in treated compared to untreated plots (Tables 1-4). In 1999, on all sampling dates, treated plots had statistically fewer larval thrips than the untreated plots (Tables 8-11). Differences among treatments were observed only on Date 4, when greater numbers of larval thrips were collected from Gaucho ST and Bidrin FS plots than from the other treated plots.

Temik 14.0 lb/A and Gaucho ST plots had lower damage ratings in 1998 than untreated plots (Table 5). In 1999, thrips densities were greater than in the previous year, but all treatments, except the Orthene ST plus Bidrin FS and the Bidrin FS treatments, protected seedlings from thrips damage compared to untreated plots (Table 12).

### Early Bloom Counts

No differences in total early bloom production were observed among treatments or between treatments and untreated plots in 1998 (Table 6). In 1999, only the Temik 3.5 lb/A treatment produced plants with more total blooms than those in untreated plots (Table 13).

### Yield

No differences were observed in either year between treated plots compared to untreated plots in lint yield. No differences were seen among treatments in either year (Tables 7 and 14).

## Conclusions

Whether early-season thrips control treatments impact yield in UNR cotton systems has not been determined by these data. In a given year, such as 1998, at-planting insecticide treatments did not have a positive economic impact on yield. Rainfall was adequate except for a dry period (less than ¼ inch of rain) from the middle of July until harvest. Because few differences were observed in thrips damage ratings overall, and differences in thrips densities were rare over the sampling period, plants experienced minimal damage from thrips feeding. Delays in maturity (as evidenced by bloom counts) were not seen and yields were not affected.

Extremely dry conditions existed for most of the growing season in 1999, with below normal precipitation from July through September. Treatments provided better thrips control than no treatment over the sampling period and damage ratings were higher in untreated plots, but no statistical differences were observed in yield. However, four of six treatments provided enough increase in lint yield to justify the use of an insecticide treatment for early-season thrips control.

Based on a lint price of \$ 0.50/lb, the cost of the Bidrin FS treatment (~\$2/A) could be recovered with a 4 lb/A increase in lint yield. Lint yield increases of 70 to 90 lb would be needed to pay for the 10 – 14 lb/A Temik IFG treatments.

No statistical differences in lint yield resulting from the use of insecticide treatments for early-season thrips control have been observed in two years of UNR research. The lack of differences in yield may indicate that delays due to thrips injury in UNR cotton are not as critical when plants are setting approximately three fruit compared to conventional row cotton where bolls are set on several nodes. It has been widely documented that in conventional row-spaced cotton, use of insecticides at-planting can provide economic benefits by preserving lint yield. These data have not proven this to be true in UNR cotton systems.

Table 1. Number of thrips / plant 17 DAP. Milan, TN. 1998.

Treatment	Adults	Larvae
Temik – 3.5 lb	0.7 b	0.1
Temik – 7.0 lb	0.6 b	0.2
Temik – 10.5 lb	0.8 b	0.2
Temik – 14.0 lb	0.7 b	0.2
Gaucho ST	2.6 a	0.1
Orthene ST+ Bidrin FS	1.1 b	0.1
Untreated	1.1 b	0.3
P > F	0.0001	0.7374

FS applications 17 DAP.

Table 2. Number of thrips / plant 24 DAP. Milan, TN. 1998.

Treatment	Adults	Larvae
Temik – 3.5 lb	0.9	0.5 abc
Temik – 7.0 lb	1.0	0.7 ab
Temik – 10.5 lb	0.5	0.3 bc
Temik – 14.0 lb	1.0	0.3 bc
Gaucho ST	1.4	0.1 c
Orthene ST+ Bidrin FS	0.9	0.5 abc
Untreated	0.7	0.8 a
P > F	0.1594	0.0317

FS applications 17 DAP.

Table 3. Number of thrips / plant 31 DAP. Milan, TN. 1998.

Treatment	Adults	Larvae
Temik -3.5 lb	2.0	1.4
Temik - 7.0 lb	1.1	0.9
Temik - 10.5 lb	1.3	0.5
Temik - 14.0 lb	2.2	0.8
Gaucho ST	2.9	0.7
Orthene ST+ Bidrin FS	1.6	0.6
Untreated	1.8	1.6
P > F	0.1973	0.1028

FS applications 17 DAP.

Table 4. Number of thrips / plant 35 DAP. Milan, TN. 1998.

Treatment	Adults	Larvae
Temik -3.5 lb	1.1	2.6
Temik - 7.0 lb	1.1	4.8
Temik - 10.5 lb	1.3	3.1
Temik - 14.0 lb	1.2	2.1
Gaucho ST	2.6	1.9
Orthene ST+ Bidrin FS	1.8	2.4
Untreated	1.7	6.6
P > F	0.0946	0.1871

FS applications 17 DAP.

Table 5. Thrips Damage Ratings 26 DAP. Milan, TN. 1998.

Treatment	Rating
Temik -3.5 lb	2.4 a
Temik - 7.0 lb	2.3 ab
Temik - 10.5 lb	2.3 ab
Temik - 14.0 lb	2.1 b
Gaucho ST	2.0 b
Orthene ST+ Bidrin FS	2.3 ab
Untreated	2.6 a
P > F	0.0112

Ratings made on 1-5 scale. FS applications 17 DAP.

Table 6. Cumulative Total of Blooms per 10 ft. Milan, TN. 1998.

Treatment	#/10 ft
Temik -3.5 lb	9.0
Temik - 7.0 lb	16.0
Temik - 10.5 lb	13.0
Temik - 14.0 lb	18.8
Gaucho ST	14.0
Orthene ST+ Bidrin FS	10.6
Untreated	11.2
P > F	0.2115

Blooms counted 62, 65, & 68 DAP.

Table 7. Lint Yield 143 DAP. Milan, TN. 1998.

Treatment	lb lint/A
Temik -3.5 lb	966
Temik - 7.0 lb	1,004
Temik - 10.5 lb	967
Temik - 14.0 lb	1,027
Gaucho ST	873
Orthene ST+ Bidrin FS	900
Untreated	1,026
P > F	0.552

Harvested Oct. 1.

Table 8. Number of thrips / plant 19 DAP. Milan, TN. 1999.

Treatment	Adults	Larvae
Temik - 5 lb	0.3	0.1 b
Temik - 7.5 lb	0.4	0.1 b
Temik - 10.0 lb	0.3	0.4 b
Gaucho ST	0.6	0.5 b
Orthene ST+ Bidrin FS	0.6	0.7 b
Bidrin FS	0.7	4.8 a
Untreated	0.8	4.7 a
P > F	0.3725	0.0001

FS applications 27 DAP.

Table 9. Number of thrips / plant 28 DAP. Milan, TN. 1999.

Treatment	Adults	Larvae
Temik - 5 lb	0.3 c	1.7 b
Temik - 7.5 lb	0.5 bc	2.5 b
Temik - 10.0 lb	0.6 bc	2.1 b
Gaucho ST	1.2 b	4.2 b
Orthene ST+ Bidrin FS	0.8 bc	4.8 b
Bidrin FS	0.6 bc	4.7 b
Untreated	2.1 a	10.7 a
P > F	0.0003	0.0001

FS applications 27 DAP.

Table 10. Number of thrips / plant 34 DAP. Milan, TN. 1999.

Treatment	Adults	Larvae
Temik - 5 lb	1.3 d	1.3 b
Temik - 7.5 lb	0.7 d	1.6 b
Temik - 10.0 lb	1.6 cd	1.8 b
Gaucho ST	1.7 cd	3.4 b
Orthene ST+ Bidrin FS	2.9 ab	1.5 b
Bidrin FS	3.8 a	1.8 b
Untreated	2.4 bc	7.6 a
P > F	0.0001	0.0001

FS applications 27 DAP.

Table 11. Number of thrips / plant 40DAP. Milan, TN. 1999.

Treatment	Adults	Larvae
Temik - 5 lb	0.6 b	0.4 d
Temik - 7.5 lb	0.7 b	1.6 d
Temik - 10.0 lb	1.0 b	1.7 cd
Gaucho ST	2.2 a	2.8 bc
Orthene ST+ Bidrin FS	1.3 ab	1.6 cd
Bidrin FS	1.9 a	3.7 b
Untreated	2.0 a	5.4 a
P > F	0.0022	0.0001

FS applications 27 DAP.

Table 12. Thrips Damage Ratings 28 DAP. Milan, TN. 1999.

Treatment	Ratings
Temik - 5 lb	2.3 b
Temik - 7.5 lb	2.1 b
Temik - 10.0 lb	2.3 b
Gaucho ST	2.4 b
Orthene ST+ Bidrin FS	3.6 a
Bidrin FS	4.0 a
Untreated	4.0 a
P > F	0.0001

Ratings made on 1-5 scale. FS applications 27 DAP.

Table 13. Cumulative Total of Blooms per 10 ft. Milan, TN. 1999.

Treatment	#/10 ft
Temik – 5 lb	38.0 a
Temik – 7.5 lb	31.6 ab
Temik – 10.0 lb	33.6 ab
Gaucho ST	18.8 c
Orthene ST+ Bidrin FS	23.8 bc
Bidrin FS	18.0 c
Untreated	23.0 bc
P > F	0.0092

Blooms counted 61, 65, & 68 DAP.

Table 14. Lint Yield 141 DAP. Milan, TN. 1999.

Treatment	lb lint/A
Temik – 5 lb	918
Temik – 7.5 lb	919
Temik – 10.0 lb	930
Gaucho ST	795
Orthene ST+ Bidrin FS	938
Bidrin FS	844
Untreated	859
P > F	0.527

Harvested Sept. 28.