EVALUATION OF AT-PLANT THRIPS INSECTICIDES AND EFFECTS OF PLANTING DATE ON THRIPS INFESTATIONS IN SEEDLING COTTON

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Introduction

Thrips are annual pests of seedling cotton in Georgia and a preventive insecticide is recommended at planting for their control. Failure to use a preventive insecticide at planting will necessitate the need for foliar thrips insecticides or economic damage may occur. Excessive thrips injury results in reduced yield potential, stunting of plants, and in severe cases loss of apical dominance and stand loss.

Several preventive insecticides are currently available for thrips control in cotton. Temik is a systemic insecticide applied in the seed furrow and is commonly used in Georgia and other areas of the southeast for thrips and nematode control. During recent years, seed treatments such as Gaucho and Cruiser have been commercialized. However these seed treatments have no activity on nematodes, which are important pests in some areas. In this study we evaluated an experimental seed treatment nematicide, STAN, for thrips control and the potential interaction with Cruiser seed treatment.

Orthene seed treatments have also been used for early season thrips control. Historically low rates of Orthene have been used which provide thrips control for about seven days. In this study we evaluated the effect of two high rates of Orthene as a seed treatment for thrips control and quantified effects on seedling germination.

Methods

Test 1: Cultivar DP 555BR was planted in an irrigated conventional tillage system on April 27, 2004 at the RDC Pivot on the Coastal Plain Experiment Station in Tift County GA. Two row plots 40 feet in length were arranged in a randomized complete block design with four replications. Treatments included Cruiser seed treatment, STAN (an experimental nematode seed treatment), Cruiser in combination with STAN, Temik 15G at 5 and 7 lbs/acre applied in the seed furrow at planting, and Cruiser plus 5 lbs/acre of Temik. Thrips control was evaluated by randomly selecting 5 seedlings per plot and immediately immersing and swirling plants in a container filled with 70 percent ethyl alcohol to dislodge thrips. Sample containers were returned to the laboratory and both immature and adult thrips were counted using a dissecting microscope. A subjective visual thrips damage rating was made using a scale from 1-5 where 1=no damage, 2=slight damage, 3=moderate but acceptable damage, 4=heavy damage, and 5=severe damage. Plant populations were determined by counting all plants in each plot. Mean plant height of each plot was determined by measuring five consecutive plants in each row. Plots were machine harvested on September 17, 2004.

Test 2: Cultivar DP 444BR was planted in a dryland conventional tillage system on April 27, 2004 at the TVP on the Coastal Plain Experiment Station in Tift County GA. Two row plots 60 feet in length were arranged in a randomized complete block design with three replications. Treatments included Temik 15G at 3.5 lbs/acre and two rates of an Orthene seed treatment (Orthene 97ST at 22.5 ozs/cwt and 30 ozs/cwt) with and without a foliar Orthene 97 (3 ozs/acre) application at 1-2 leaf. The Orthene seed treatment at 30 ozs/cwt evaluated in this trial is above the labeled rate and was used for test purposes only. Thrips counts, damage ratings, plant populations, and plant heights were determined as in Test 1. Plots were machine harvested on September 20, 2004.

Test 3 (Planting Date): Microplots were established at two week intervals from April 16, 2004 through July 23, 2004. Plots were one row wide and three feet in length with a 12 inch row spacing and arranged in a randomized complete block with four replications. Twenty-five DP 444BR seed were hand planted in each plot and were hand watered as needed except for the July planting dates. Seed utilized in this test and test 2 were commercially treated on April 14, 2004 and also included a seed treatment of Delta Coat and PGR IV. Plant populations and thrips infestations were quantified approximately 14 days after each planting as described above.

Results

Thrips infestations were relatively high at the RDC Pivot location (Test 1). Immature thrips counts per five plants are reported in Table 1. Adult thrips populations are not reported since immature counts provide a better measure of insecticide efficacy. However on May 7, treatments that included Temik and Cruiser had significantly fewer adult thrips compared with the untreated and STAN treatment. Very few immature thrips were observed in any plots on May 7, due to lack of sufficient time for thrips eggs to hatch. On May 12 (two weeks after planting) all treatments significantly reduced thrips populations compared with the untreated check. However the STAN treatment had significantly greater immature thrips compared with treatments that included Temik and Cruiser on May 12.

Table 1. The effect of Cruiser and STAN seed treatments alone and in combination and two rates of Temik on immature thrips populations and thrips damage ratings. RDC Pivot CPES, Tift County GA 2004.

Treatment	Immature Thrips per Five Plants				Damage Rating (1-5)		
	May 7	May 12	May 19	May 26	May 12	May 19	May 26
Untreated	0.00	81.50	90.75	21.00	4.00	4.50	4.50
Cruiser	0.00	13.00	20.25	36.25	2.88	3.38	3.12
STAN	0.50	39.25	50.50	29.75	3.50	4.00	3.50
Cruiser + STAN	0.00	3.50	11.50	41.50	2.38	3.12	2.75
Temik 5 lbs/acre	0.25	3.50	2.00	8.25	1.75	1.88	1.62
Temik 7 lbs/acre	0.00	2.75	2.75	6.50	2.00	2.12	1.75
Cruiser + Temik 5 lbs/acre	0.00	1.00	2.75	9.75	1.50	1.75	1.50
LSD (P=0.05)	0.06	20.73	33.92	26.22	0.37	0.32	0.26

At three weeks after planting (May 19) all treatments significantly reduced immature thrips populations compared with the untreated control. Treatments that included Temik and the Cruiser plus STAN treatment provided the greatest reduction in immature thrips counts and although not statistically different, the Cruiser plus STAN treatment had fewer immature thrips compared with Cruiser alone. At four weeks after planting May 26), Temik treatments had significantly fewer immature thrips compared to the Cruiser and Cruiser plus STAN treatment. Data on the May 26 sample date can be misleading in that plants in the untreated and STAN treatment were severely damaged and were not as suitable a host for thrips infestation compared with the Cruiser and Cruiser plus STAN treatments. Damage ratings are also presented in Table 1 and follow similar trends as immature thrips counts. Plant populations were not significantly different among treatments (Table 2). Plant heights were significantly greatest in the Temik treatments, however all treatments had significantly greater plant heights when compared with the untreated. Treatments including Temik and the Cruiser plus STAN treatment significantly increased yield compared with the untreated check.

Table 2. The effect of Cruiser and STAN seed treatments alone and in combination and two rates of Temik on plant population, plant height, and cotton yield. RDC Pivot CPES, Tift County GA 2004.

Treatment	Plants per 40 Feet	Plant Height (cm)	Yield (lbs lint/acre)[1]
	May 25	May 26	Sept 17
Untreated	86.88	9.15	1014
Cruiser	90.88	13.85	1184
STAN	92.38	13.32	1026
Cruiser + STAN	86.12	14.68	1334
Temik 5 lbs/acre	88.12	16.25	1362
Temik 7 lbs/acre	91.62	15.90	1591
Cruiser + Temik 5 lbs/acre	89.00	16.52	1351
LSD (P=0.05)	11.19	1.16	188

[1] Assumes 40 percent lint turnout.

Thrips infestations were extremely high at the TVP location, exceeding 60 thrips per plant on May 18 (Table 3). On all three-sample dates (May 11, 18, and 25) the Temik treatment and Orthene seed treatments significantly reduced immature thrips populations compared with the untreated. All treatments also significantly reduced thrips damage, i.e. damage ratings, compared with the untreated. However, Temik had a significantly lower damage rating compared with the Orthene seed treatments on each date. A significant reduction (about 10 percent) in plant stands was observed in the Orthene seed treatment plots compared with the untreated and Temik treatment. Yields for all insecticide treatments were similar and significantly greater than the untreated check. No significant differences were observed for any variables when a foliar Orthene application was applied at 1-2 leaf in conjunction with either rate of the Orthene seed treatment compared with the Orthene seed treatment alone.

The planting date study had two objectives. First we evaluated seedling emergence to quantify the effect of the Orthene seed treatment on germination over time. Secondly we quantified thrips populations by planting date. Percent emergence averaged approximately 80 percent (hand planted and watered) for the April, May, and June planting dates and no significant differences were observed between the untreated and the Orthene seed treatments (Figure 1). However, on the July 9 and 23 planting dates (3 months after seed treatments were applied) germination was significantly reduced in the Orthene seed treatment compared with the untreated. Immature thrips populations two weeks after planting were significantly reduced in the Orthene seed treatment plots compared with the untreated in the April and May planting dates compared with the untreated (Figure 2). Thrips populations were extremely low for the June and July planting dates and no treatment effects were observed. Figure 3 illustrates that the adult thrips populations declined from the middle of April until June and were then very low. These data support historical observations that the greatest thrips pressure occurs

in April and early May plantings.

Table 3. The effect of Temik and two high rates of an Orthene seed treatment on immature thrips populations and thrips damage ratings. TVP CPES, Tift County GA 2004.

Treatment	Immature Thrips per Five Plants			Damage Rating (1-5)		
	May 11	May 18	May 25	May 11	May 18	May 25
Untreated	98.33	325.00	28.00	4.00	3.83	4.50
Temik 3.5 lbs/acre	5.67	3.33	8.00	1.67	1.50	1.67
OST 30 ozs/cwt	12.00	9.00	7.33	2.17	2.33	2.83
OST 22.5 ozs/cwt	11.67	8.33	10.67	2.00	2.33	2.83
OST 30 ozs/cwt fb Orthene foliar	8.67	14.33	10.33	2.33	2.17	2.50
OST 22.5 ozs/cwt fb Orthene foliar	5.00	4.33	7.67	2.00	2.17	2.67
LSD (P=0.05)	53.49	34.50	11.72	0.32	0.49	0.72

Table 4. The effect of Temik and two high rates of an Orthene seed treatment on plant population, plant height, and cotton yield. TVP CPES, Tift County GA 2004.

Treatment	Plants per 120 Feet	Plant Height (cm)	Yield (lbs lint/acre)[1]
	May 25	May 25	Sept 20
Untreated	277.33	11.30	1084
Temik 3.5 lbs/acre	290.67	19.57	1451
OST 30 ozs/cwt	257.00	16.33	1353
OST 22.5 ozs/cwt	254.67	17.43	1483
OST 30 ozs/cwt fb Orthene foliar	257.67	16.33	1363
OST 22.5 ozs/cwt fb Orthene foliar	250.33	17.43	1476
LSD (P=0.05)	19.01	3.52	178

[1] Assumes 38 percent lint turnout.

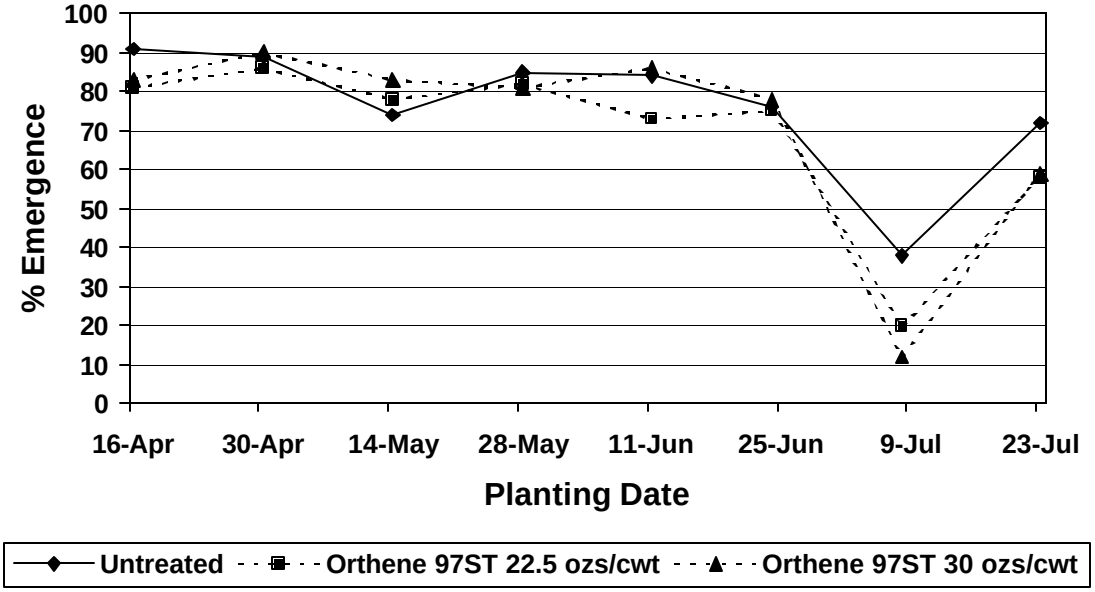

Figure 1. Percent emergence for two rates of Orthene treated seed and non-Orthene treated seed planted at two week intervals. Seed treatments were applied on Arpil 14, 2004. CPES Tift County GA 2004.

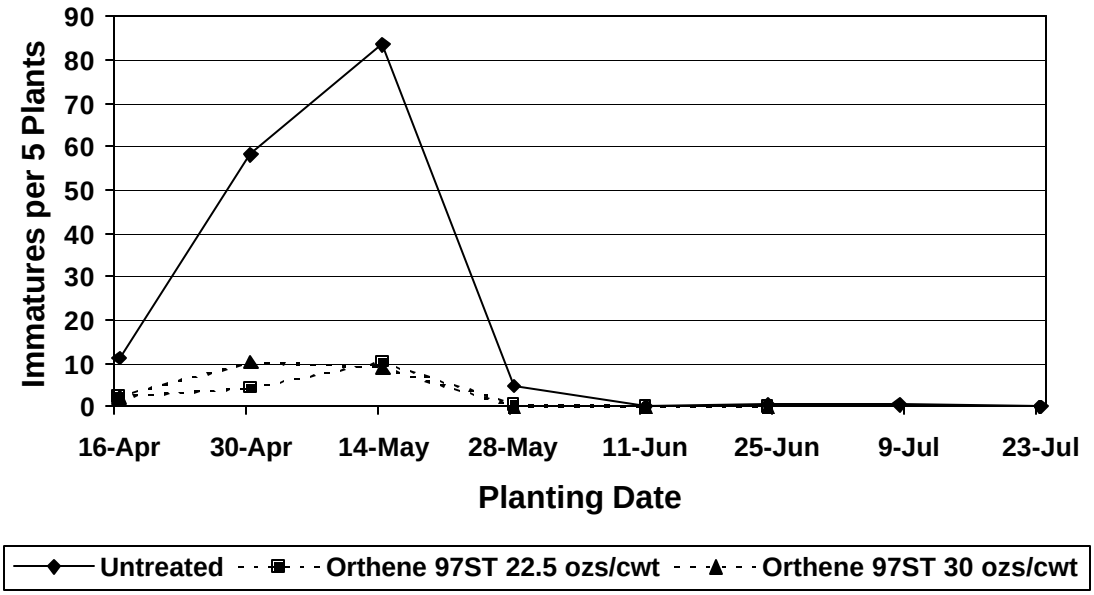

Figure 2. Immature thrips infestations 14 days after planting for two rates of Orthene treated seed and non-Orthene treated seed planted at two week intervals. Seed treatments were applied on Arpil 14, 2004. CPES Tift County GA 2004.

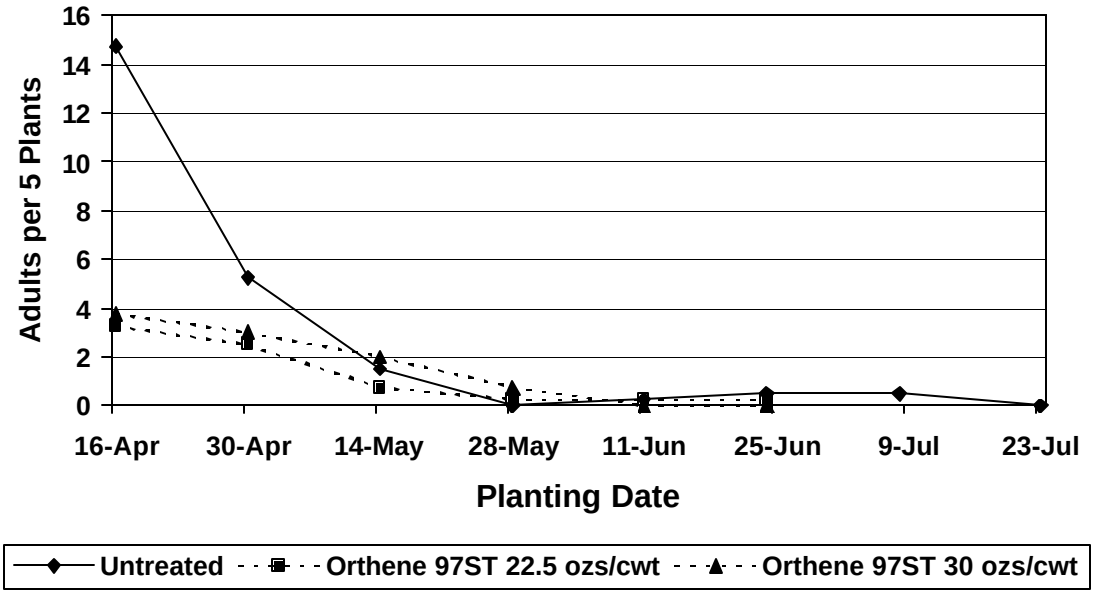

Figure 3. Adult thrips infestations 14 days after planting for two rates of Orthene treated seed and non-Orthene treated seed planted at two week intervals. Seed treatments were applied on Arpil 14, 2004. CPES Tift County GA 2004.