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THRIPS EFFICACY TRIALS IN SOUTH GEORGIA

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Abstract

A set of studies was conducted in Tifton, GA, in 2005 to evaluate the efficacy of a variety of thrips-active products. In separate trials, compounds provided by Bayer (4 treatments evaluated), Syngenta (11 treatments evaluated; and two different planting dates), and Valent (16 treatments evaluated) were compared to against local standards. Immature and adult thrips were counted in the various treatments, plant densities and heights were measured, damage ratings were taken, and yields were assessed. Temik® provided significant control where used, but Gaucho Grande® and Orthene® also provided significant and comparable levels of control. Cruiser® generally performed well, but was improved by the addition of A14006 at 0.15 mg. Timing of boll opening was modified somewhat by treatments, but the warm, dry conditions of the late summer and early fall may have masked effects. Yields were unaffected by treatments.

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). 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, thrips can reduce yields by as much as 50-60%, if not controlled. This concern over potential crop injury and loss provides the impetus for continued evaluations of thrips management tools in southern Georgia. The objective of this study was to evaluate the efficacy of management tools for thrips in south Georgia. This poster reports only on the efficacy of the experimental treatments for thrips suppression.

Methods

Evaluations consisted of three trials performed on cotton planted on 4 May 2005, at the Lang-Rigdon Farm of the University of Georgia's Coastal Plain Experiment Station in Tift County, Georgia, using a Monosem pneumatic planter equipped to add granular insecticides in the furrow. Treated seed was provided by Bayer (DPL 555), Syngenta (DPL 555), and Valent (Stoneville 5599). In the trial with seed provided by Syngenta Corp., the trial was repeated in a second planting on 26 May (using DPL 555) to look for possible differences due to planting date. Plots were 4 rows by 50 ft long, with a 36 inch row spacing and a minimum of 4 replications per treatment. The treatments and cotton varieties in the respective trials are listed in Tables 1, 2, and 3.

Thrips were sampled on 16, 23, and 30 May 2005 (12, 19, and 26 DAP), except in the late-planted Syngenta trial, which was sampled on 6, 13, and 20 June (11, 18, and 25 DAP). 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 counting. Each sample was poured through a 120-mesh sieve (Hubbard Scientific Co., Northbrook, IL) and rinsed with tap water. The thrips were then flushed into a 100 x 15 mm plastic petri dish for microscopic examination. Adults and nymphs were counted, though the numbers of both stages were pooled for statistical analysis. In addition to thrips numbers, damage ratings were obtained by rating each plot (scale of 1-5, with 1 being no damage and 5 being total destruction). Ratings were made in all of the plots on 31 May, except the late-planted Syngenta trial, which was evaluated on 27 June.

Plant density (number of plants per 10 row feet) was assessed on 9 June by measuring the number of plants in 4 random samples of 10 feet each per plot. Plant heights and node numbers were evaluated on 9 and 20

June for 10 plants per plot, and height:node ratios were determined. Percentage of bolls open was used to assess possible developmental delays among treatments. All of the bolls on each of 10 plants per plot were examined late in the season and the percentage of bolls that were open was recorded (sample dates are in Tables 1-3). Seed cotton yields were taken by mechanically picking the middle 2 rows of each plot 14 November 2005.

Data were analyzed using analysis of variance (PROC GLM, SAS Institute 1999), followed by separation of significantly different means using the Waller Duncan Bayesian *k* ratio, with *k*=100 (equivalent to $p<0.05$) as the upper limit for significance (SAS Institute 1999). Percentage data (% bolls open) were transformed ($\arcsin\sqrt{x}$) prior to analysis. The results presented are back-transformed.

Results and Discussion

Bayer Trial: Thrips Numbers, Plant Damage

Thrips numbers in all treatments differed significantly from the controls on 23 May (Table 1). However, there were few other significant differences. In contrast, the damage ratings of the plots indicated clearly significant differences, with the untreated plots sustaining the heaviest damage (Table 2). The Cruiser plots were the second most-heavily damaged, and the Gaucho and L0263/L1012 treatment were statistically the same, with the lowest amount of damage. Thus, although the thrips numbers were not consistently reduced by the treatments, there were clear differences in the damage inflicted.

Table 1. Number of thrips per plant 12, 19, and 26 days after planting in the Bayer trial (planted 4 May 2005). Tift Co., GA. 2005.

Treatment/rate	16 May	23 May	30 May	Season Avg.
Untreated	0.25 ± 0.38 a	7.00 ± 1.72 a	9.25 ± 2.86 a	5.50 ± 1.48 a
Gaucho 0.375 mg AI/seed	0.65 ± 0.44 a	2.95 ± 1.25 b	8.50 ± 2.38 a	4.03 ± 1.02 ab
L0263 150 g AI/100 kg seed plus L1012 350 g AI/100 kg seed	0.60 ± 0.52 a	3.15 ± 0.52 b	10.00 ± 2.51 a	4.58 ± 0.72 ab
Cruiser® seed tmt 5FS 0.3 mg/seed	0.80 ± 0.36 a	2.55 ± 1.61 b	6.60 ± 2.66 a	3.32 ± 1.40 b

Means followed by the same letter within columns are not significantly different (P>0.05).

Table 2. Damage ratings of plots in relation to thrips treatment in the Bayer trial (rated 31 May 2005). Ratings are from 1 to 5, with 1 being no damage and 5 being total destruction.

Treatment	Rating
Untreated	3.8 ± 0.29 a
Gaucho 0.375 mg AI/seed	1.8 ± 0.29 c
L0263 150 g AI/100 kg seed plus L1012 350 g AI/100 kg seed	1.9 ± 0.63 c
Cruiser® seed tmt 5FS 0.3 mg/seed	2.6 ± 0.48 b

Means followed by the same letter within columns are not significantly different (P>0.05).

The apparently contradictory abundance and damage results may indicate that the predominant thrips in the study was *Frankliniella fusca*, as this species is reported to feed less on plant tissues containing imidacloprid (Groves et al. 2001, Joost and Riley 2005). In contrast, *Frankliniella occidentalis* was reported to increase feeding when imidacloprid was present. Neither of these cited studies was conducted on cotton plants, but the same behavioral modifications also may apply to cotton. Regardless of mechanisms, it was clear that the experimental treatments significantly improved the condition of the plants, and that the Gaucho and L0263/L1012 treatments had the greatest positive impact.

Syngenta Trial: Thrips Numbers, Plant Damage

Early-planted trial. The numbers of thrips were moderate during both periods of the study, and the plants sustained considerable damage. Thrips numbers were significantly reduced in many treatments relative to the control plots on 2 of 3 sample dates (Table 3). Thrips numbers were low on the first sample date, with no significant differences. The Temik and local standard treatments generally had the fewest thrips on the 2 later sample dates (Table 3). Cruiser treatments did not differ significantly from the untreated control, except on the 2nd sample date and with the addition of A14006. Thiram combined with Temik reduced thrips numbers somewhat, but generally not as much as the Temik alone or some of the local standard treatments.

Table 3. Number of thrips per plant 12, 19, and 26 days after planting in the Syngenta trial (planted 4 May and 26 May 2005). Tift Co., GA. 2005.

Treatment/rate	Cotton Planted 4 May, 2005				Cotton planted 26 May, 2005			
	16 May	23 May	30 May	Season Avg.	6 June	13 June	20 June	Season Avg.
Untreated	0.50 ± 0.38	2.50 ± 1.00a	6.30± 4.17ab	3.10 ± 1.39 ab	2.60 ± 1.17a	5.90 ± 3.53a	1.55 ± 1.00ab	3.35 ± 1.33 a
Cruiser® seed tmt 5FS 0.3 mg/seed	0.15 ± 0.10	1.80 ± 0.99ab	7.90± 0.97a	3.28 ± 0.42 a	0. 70 ± 0.53bc	2.75 ± 1.56 ab	1.35 ± 0.85ab	1.60 ± 0.74 b
Cruiser® seed tmt 5FS 0.34 mg/seed	0.15 ± 0.19	1.20 ± 0.49bc	6.80± 1.77ab	2.72 ± 0.67 abc	1.45 ± 0.52b	1.95 ± 1.26 b	1.55 ± 0.52ab	1.65 ± 0.53 b
Cruiser® seed tmt 5FS 0.34 mg/seed plus A14006 0.15 mg/seed	0.05 ± 0.10	0.90 ± 0.53bc	4.80± 3.51abc	1.92 ± 1.19 bcde	0.75 ± 0.34 bc	1.95 ± 2.46 b	1.05 ± 0.44ab	1.25 ± 0.70 b
Temik® 15G in-furrow 3.5 lb/a	0.00 ± 0.00	0.35 ± 0.19c	1.75 ± 0.41c	0.70 ± 0.13 e	0.75 ± 0.70bc	1.50 ± 1.19 b	0.45 ± 0.44 b	0.90 ± 0.66 b
Temik® 15G in-furrow 5 lb/a	0.25 ± 0.25	0.30 ± 0.12c	1.55 ± 0.91c	0.70 ± 0.23 e	0.55 ± 0.30bc	0.65 ± 0.55 b	0.40 ± 0.16 b	0.53 ± 0.20 b
Thiram 41 GA/100 kg seed plus Temik® 15G in-furrow 5 lb/a	0.20 ± 0.28	1.20 ± 0.99bc	3.20 ± 3.92bc	1.53 ± 1.66 cde	0.50 ± 0.20c	1.05 ± 0.57 b	0.50 ± 0.35 b	0.68 ± 0.30 b

Means followed by the same letter within columns are not significantly different (P>0.05).

The damage ratings reflected the thrips numbers (Table 4), with the greatest damage in the control plots, and the least damage expressed in the Temik and local standard treatments. The high-rate Cruiser treatments also suffered significantly less damage than did the control plots.

Table 4. Damage ratings of plots in relation to thrips treatment and planting date in the Syngenta trials (rated 31 May and 27 June for planting dates of 4 May and 26 May, respectively). Ratings are from 1 to 5, with 1 being no damage and 5 being total destruction.

Treatment	Planting date	
	4 May	26 May
Untreated	3.9 ± 0.25 a	2.9 ± 0.25 a
Cruiser® seed tmt 5FS 0.3 mg/seed	3.3 ± 0.29 b	2.6 ± 0.48 ab
Cruiser® seed tmt 5FS 0.34 mg/seed	3.0 ± 0.41 bc	2.3 ± 0.29 bc
Cruiser® seed tmt 5FS 0.34 mg/seed plus A14006 0.15 mg/seed	2.9 ± 0.48 bcd	2.0 ± 0.41 cd
Local standard	2.4 ± 0.25 defg	2.1 ± 0.48 bcd
Local standard 1	2.0 ± 0.50 g	2.0 ± 0.00 cd
Local standard 2	2.8 ± 0.45 cde	2.2 ± 0.57 bc
Local standard 3	2.4 ± 0.48 defg	1.6 ± 0.25 de
Temik® 15G in-furrow 3.5 lb/a	2.1 ± 0.25 fg	1.4 ± 0.25 e
Temik® 15G in-furrow 5 lb/a	2.3 ± 0.29 efg	1.3 ± 0.29 e
Thiram 41 GA/100 kg seed plus Temik® 15G in-furrow 5 lb/a	2.6 ± 0.63 cdef	1.3 ± 0.29 e

Means followed by the same letter within columns are not significantly different (P>0.05).

Late-planted trial. Thrips numbers tended to be somewhat lower in this trial than in the early-planted trial. There were significant differences among the treatments on all sample dates, with the untreated controls having the highest numbers on each day except 20 June (Table 3). The general pattern was similar to that observed in the early-planted trial, with the Temik treatments and several of the local standards typically exerting the greatest reduction in thrips populations. The Thiram+Temik treatment also performed well in this trial, although not significantly better than Temik alone.

The damage ratings were generally lower than was the case in the early-planted trial (Table 4). This is to be expected, as thrips populations tend to decline as the season progresses. Damage was lowest in the Temik and Thiram/Temik treatments, with local standard 3 comparable. Cruiser in combination with A14006 performed similar to most of the local standards, all of which were superior to the untreated control. There was an apparent rate effect with Cruiser, as the higher rate performed somewhat better than the lower rate.

Valent Trial: Thrips Numbers, Plant Damage

The numbers of thrips were rather high during the study, and the plants sustained considerable damage. Thrips numbers were significantly reduced in many treatments relative to the control plots on all sample dates (Table 5). The treatments of Venom alone numerically reduced thrips numbers relative to the controls, but were not significantly different on any sample date. The addition of Orthene to the Venom treatments resulted in generally significant reductions in thrips at the higher rates of Venom, but not at the lowest rate (75 g ai/100 lbs seed). None of the Venom treatments with Orthene performed better than Orthene alone. The V10170 alone treatments (112 and 150 g ai/100 lbs seed) did not reduce thrips numbers significantly relative to the controls. The addition of Orthene to the V10170 treatments generally reduced thrips numbers significantly. Generally, the best treatments in the trial for reducing thrips numbers were Orthene alone and Gaucho Grande.

Table 5. Number of thrips per plant 12, 19, and 26 days after planting in the Valent trial (planted 4 May 2005). Tift Co., GA. 2005.

Treatment	16 May	23 May	30 May	Season Avg.
Untreated	1.30 ± 0.20ab	6.20 ± 1.82ab	11.25 ± 5.89ab	6.25 ± 2.58ab
Venom 75 g ai/100 lb seed	0.35 ± 0.57cd	4.20 ± 2.65abcde	12.95 ± 3.69a	5.83 ± 1.85abc
Venom 150 g ai/100 lb seed	1.40 ± 0.49a	4.95 ± 1.33abcd	9.65 ± 2.66ab	5.33 ± 0.95abcd
Venom 200 g ai/100 lb seed	0.90 ± 0.53abcd	6.50 ± 0.89a	9.85 ± 4.14ab	5.75 ± 1.80abcd
Orthene 15 oz ai/100 lb seed	0.90 ± 0.12abcd	3.00 ± 0.49cde	7.10 ± 1.15bc	3.67 ± 0.28cdef
Venom 75 g ai/100 lb seed plus Orthene 15 oz ai/100 lb seed	0.70 ± 0.62abcd	4.20 ± 2.54abcde	10.50 ± 1.10ab	5.13 ± 0.98abcde
Venom 150 g ai/100 lb seed plus Orthene 15 oz ai/100 lb seed	0.50 ± 0.35cd	2.45 ± 1.86de	9.30 ± 2.64abc	4.08 ± 0.48bcde
Venom 200 g ai/100 lb seed plus Orthene 15 oz ai/100 lb seed	0.35 ± 0.30cd	2.40 ± 1.02de	9.35 ± 2.17abc	4.03 ± 0.87bcdef
V10170 150 g ai/100 lb seed	0.80 ± 0.00abcd	3.40 ± 1.01bcde	10.85 ± 2.80ab	5.02 ± 1.22 abcde
V10170 112 g ai/100 lb seed plus Orthene 15 oz ai/100 lb seed	0.25 ± 0.25d	2.60 ± 2.14cde	6.10 ± 3.26bc	2.98 ± 1.18ef
Gaucho 0.375 mg AI/seed	0.65 ± 0.41bcd	3.25 ± 2.22bcde	6.50 ± 1.00bc	3.47 ± 0.55def
Cruiser® seed tmt 5FS 0.3 mg/seed	0.90 ± 0.20abcd	4.45 ± 2.38abcde	12.95 ± 2.42a	6.10 ± 0.74ab
V10170 75 g ai/100 lb seed plus Orthene 15 oz ai/100 lb seed	0.50 ± 0.38cd	3.35 ± 1.96bcde	10.00 ± 2.42ab	4.62 ± 1.04abcde
V10170 150 g ai/100 lb seed plus Orthene 15 oz ai/100 lb seed	0.70 ± 0.50abcd	2.30 ± 2.02de	8.25 ± 4.12abc	3.75 ± 1.74cdef
V10170 112 g ai/100 lb seed	1.05 ± 0.74abc	5.65 ± 2.38abc	13.70 ± 5.80a	6.80 ± 2.35a

Means followed by the same letter within columns are not significantly different (P>0.05).

Damage ratings were significantly different among treatments on 31 May, but only the Gaucho treatment differed significantly from the control (Table 6). Damage in all plots was moderate to heavy, and the damage in the control plots was numerically highest, despite the lack of statistical significance.

Table 6. Damage ratings of plots in relation to thrips treatment in the Valent trial (rated 31 May 2005). Ratings are from 1 to 5, with 1 being no damage and 5 being total destruction.

Treatment	Damage rating
Untreated	3.8 ± 0.29 a
Venom 75 g ai/100 lb seed	3.4 ± 0.25 a
Venom 150 g ai/100 lb seed	3.5 ± 0.00 a
Venom 200 g ai/100 lb seed	3.6 ± 0.25 a
Orthene 15 oz ai/100 lb seed	3.5 ± 0.00 a
Venom 75 g ai/100 lb seed plus Orthene 15 oz ai/100 lb seed	3.1 ± 0.75 ab
Venom 150 g ai/100 lb seed plus Orthene 15 oz ai/100 lb seed	3.3± 0.29 a
Venom 200 g ai/100 lb seed plus Orthene 15 oz ai/100 lb seed	3.0 ± 0.41 ab
V10170 150 g ai/100 lb seed	3.3 ± 0.29 a
V10170 112 g ai/100 lb seed plus Orthene 15 oz ai/100 lb seed	3.3 ± 0.29 a
Gaucho 0.375 mg AI/seed	2.4 ± 0.63 b
Cruiser® seed tmt 5FS 0.3 mg/seed	3.3 ± 0.87 a
V10170 75 g ai/100 lb seed plus Orthene 15 oz ai/100 lb seed	3.1 ± 0.25 ab
V10170 150 g ai/100 lb seed plus Orthene 15 oz ai/100 lb seed	3.0 ± 0.71 ab
V10170 112 g ai/100 lb seed	3.6 ± 0.25 a

Means followed by the same letter within columns are not significantly different (P>0.05).

Bayer Trial: Boll Opening and Yield

There was considerable variability in the data for boll opening, which necessitated a transformation of the data before analysis (arcsin√x). The results presented are back-transformed. The percentage of open bolls was determined on 12 October, and between 70 and 80% of the bolls had opened in all treatments, with no significant differences among them (Table 7). Thus, by this point in the season, there was no developmental advantage resulting from the various thrips treatments. An earlier assessment may have indicated differences. However, we had an exceptionally warm and dry late summer and early fall that were ideal for boll maturation. The results quite likely would differ in a more "normal" year.

The cotton was harvested on 14 November, and there were no significant differences among treatments for yields (Table 7). The Gaucho treatment was numerically highest, but all of the treatments were similar in their yields.

Table 7. Percent of bolls open on 12 October and yield (lbs seed cotton/acre) in the Bayer trial at harvest on 14 November in relation to thrips treatment. Tift Co., GA. 2005.

Treatment	% open bolls	Yield/acre
Untreated	79.9 ± 5.9	2773.3 ± 366.4
Gaucho 0.375 mg AI/seed	79.1 ± 14.9	3056.5 ± 592.4
L0263 150 g AI/100 kg seed plus L1012 350 g AI/100 kg seed	73.8 ± 8.8	2628.1 ± 585.5
Cruiser® seed tmt 5FS 0.3 mg/seed	75.3 ± 6.6	2668.0 ± 87.4

Means followed by the same letter within columns are not significantly different (P>0.05).

Syngenta Trial: Boll Opening and Yield

Percentage of open bolls was similar among all treatments for the first planting date, and quite variable among treatments on the second planting date, with only the Temik 3.5 lb treatment (highest percentage) and the Cruiser treatment (lowest percentage) being significantly different (Table 8). No other treatment effects were observed.

The cotton was harvested on 14 November for both planting dates, so that some of the later opening plots had had an opportunity for their bolls to open. As a result, there were no significant differences among treatments for yields for either planting date, despite the significant treatment effects on thrips numbers and plant damage (Table 8). There was, however, considerable variability among the treatments, and the relative rankings of the treatments were inconsistent across planting dates.

Table 8. Percent of bolls open on 11 October and yield (lbs seed cotton/acre) in the Syngenta trial at harvest on 14 November in relation to thrips treatment. Tift Co., GA. 2005.

Treatment	% open bolls		Yield/acre	
	Planted 4 May	Planted 26 May	Planted 4 May	Planted 26 May
Untreated	69.0 ± 10.6	50.6 ± 18.0 ab	1727.9	2526.5
Cruiser® seed tmt 5FS 0.3 mg/seed	67.6 ± 15.0	43.6 ± 9.7 ab	2112.7	3608.2
Cruiser® seed tmt 5FS 0.34 mg/seed	67.1 ± 17.6	38.5 ± 6.0 b	2199.8	3169.0
Cruiser® seed tmt 5FS 0.34 mg/seed plus A14006 0.15 mg/seed	68.0 ± 4.7	45.1 ± 9.9 ab	2145.3	2047.3
Temik® 15G in-furrow 3.5 lb/a	64.8 ± 6.5	56.2 ± 9.5 a	1960.2	2762.4
Temik® 15G in-furrow 5 lb/a	64.6 ± 13.9	42.9 ± 6.0 ab	2036.4	2384.9
Thiram 41 GA/100 kg seed plus Temik® 15G in-furrow 5 lb/a	61.1 ± 10.4	41.4 ± 7.5 ab	2141.7	2958.5

Means followed by the same letter within columns are not significantly different (P>0.05).

Valent Trial: Boll Opening and Yield

Boll opening was delayed in the control plots relative to some of the other treatments (Table 9). Boll opening in the Venom only and the V10170 only plots was generally not significantly different from the controls (except V10170 112 g ai/100 lbs seed). The plants were most advanced in the Cruiser and Gaucho Grande plots, as well as the some of the Venom and V10170 treatments where Orthene was added. There was considerable variability in the data for boll opening.

The cotton was harvested on 14 November, so that some of the later opening plots had had an opportunity for their bolls to open. As a result, there were no significant differences among treatments for yields (Table 9). The addition of Orthene to Venom and V10170 produced variable results, with some yields increasing (Venom 75g and Venom 200g, and V10170 150g) and others decreasing (Venom 150g and V10170 112g). However, none of these differences were statistically significant. The Cruiser and Gaucho Grande treatments yielded comparable to the other treatments, although numerically they were among the highest yielding treatments.

Table 9. Percent of bolls open on 24 October and yield (lbs seed cotton/acre) in the Valent trial from harvest on 14 November in relation to thrips treatment. Tift Co., GA. 2005.

Treatment	% open bolls	Yield (lbs seed cotton/acre)
Untreated	34.2 ± 5.2 d	1836.8 ± 742.0
Venom 75 g ai/100 lb seed	42.9 ± 13.1 bcd	1851.3 ± 726.0
Venom 150 g ai/100 lb seed	48.5 ± 14.4 abcd	2580.9 ± 978.8
Venom 200 g ai/100 lb seed	40.6 ± 6.1 cd	1786.0 ± 301.6
Orthene 15 oz ai/100 lb seed	50.9 ± 10.9 abcd	2243.3 ± 520.9
Venom 75 g ai/100 lb seed plus Orthene 15 oz ai/100 lb seed	62.7 ± 7.6 a	2733.4 ± 704.5
Venom 150 g ai/100 lb seed plus Orthene 15 oz ai/100 lb seed	39.2 ± 2.7 cd	1600.8 ± 317.8
Venom 200 g ai/100 lb seed plus Orthene 15 oz ai/100 lb seed	54.5 ± 18.7 abc	2439.4 ± 926.9
V10170 150 g ai/100 lb seed	38.5 ± 10.0 cd	2123.6 ± 435.3
V10170 112 g ai/100 lb seed plus Orthene 15 oz ai/100 lb seed	42.9 ± 7.8 bcd	1775.1 ± 332.4
Gaucho 0.375 mg AI/seed	53.8 ± 9.7 abc	2417.6 ± 969.1
Cruiser® seed tmt 5FS 0.3 mg/seed	58.3 ± 15.8 ab	2642.6 ± 1013.2
V10170 75 g ai/100 lb seed plus Orthene 15 oz ai/100 lb seed	44.1 ± 4.4 bcd	2156.2 ± 781.2
V10170 150 g ai/100 lb seed plus Orthene 15 oz ai/100 lb seed	49.0 ± 11.8 abcd	2580.9 ± 1157.7
V10170 112 g ai/100 lb seed	42.6 ± 4.8 bcd	2301.4 ± 364.5

Means followed by the same letter within columns are not significantly different (P>0.05).

Conclusions

In most instances, the various seed treatments reduced thrips numbers, some significantly. Temik® performed well in the Valent and Syngenta trials (Tables 2, 3). Gaucho Grande® also performed reasonably well in the Valent trial, where thrips pressure was the greatest, as did those treatments to which Orthene® was added in the same trial (Table 3). In the Bayer trial, all of the experimental treatments yielded comparable suppression (Table 1). In the Syngenta trial, Temik provided the greatest level of suppression, and the low rate of Cruiser® provided somewhat more variable levels of suppression than did the higher rate (Table 2). The addition of A14006 to the high rate of Cruiser® tended to improve overall suppression in the Syngenta trial for both planting dates. The late-planted Syngenta trial experienced thrips numbers slightly mower than the early-planted trial the first two weeks, but pressure declined thereafter (Table 2), and the pattern of results was similar to that obtained in the early-planted trial. The greatest thrips numbers were encountered in the Valent trial 4 weeks post-planting (Table 3). The mechanism for this substantial difference is unclear. The thrips may exhibit a preference for Stoneville 5599 over DPL 555, or maturation rates may have differed between varieties, affecting exposure to thrips. The increased thrips pressure also may have delayed maturity in the Stoneville 5599. Though planted the same day, the Stoneville 5599 was not ready for harvest until more than two weeks after the DPL555 in the Bayer and early-planted Syngenta trials.

The timing of boll opening was significantly affected by treatments, but the pattern was not always as expected. For example, in both Syngenta trials, the percentage of open bolls in the untreated plots was at the high end on both planting dates. In contrast, the untreated plots had the lowest percentage of open bolls in the Valent trial, and this trial lagged behind the others in boll opening. Yield did not differ among treatments in any of the trials, probably due largely to the exceptionally warm, dry conditions of the fall in 2005 that allowed considerable opportunity for the plants to compensate.

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References

Groves, R.L., C.E. Sorenson, J.F. Walgenbach, & G.G. Kennedy. 2001. Effects of imidacloprid on transmission of tomato spotted wilt tospovirus to pepper, tomato and tobacco by *Frankliniella fusca* Hinds (Thysanoptera: Thripidae). Crop Prot. 20: 439-445.

Hawkins, B. S., H. A. Peacock, and T. E. Steele. 1966. Thrips injury to upland cotton (*Gossypium hirsutum* L.) Varieties. Crop Sci. 6: 256-8.

Joost, P.H., and D.G. Riley. 2005. Imidacloprid effects on probing and settling behavior of *Frankliniella fusca* and *Frankliniella occidentalis* (Thysanoptera: Thripidae) in tomato. J. Econ. Entomol. 98: 1622-1629.

SAS Institute. 1999. SAS/STAT User's guide, version 8.02. SAS Institute, Cary, NC.

Watts, J. G. 1937. Reduction of cotton yields by thrips. J. Econ. Entomol. 30: 860-863.