EFFICACY OF FOLIAR AND PREVENTIVE INSECTICIDES TOWARDS THRIPS IN THE TEXAS HIGH PLAINS

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Abstract

Thrips are the dominant pest of seedling cotton in the Texas High Plains. In-furrow applications of Temik are the standard by which other thrips management programs are measured. However, the high toxicity of Temik has growers searching for alternatives. A trial was conducted to determine the efficacy of several foliar insecticides, a seed treatment and in-furrow application of Temik to control thrips. This study was conducted in Castro County near Dimmitt, TX. Prior to the first foliar spray, on 27 May, 12 days after planting none of the plots slated for a foliar treatment regime differed from the untreated check both the Avicta CC and Temik treated plots had fewer thrips than the untreated. Two days following the initial foliar application, all of the foliar sprays except ProNatural Micronized Sulfur reduced the thrips population to levels equivalent to Temik and Avicta CC. The sulfur treatment did not differ from the untreated. By 7 DAT with the foliar sprays the sulfur still did not differ from the untreated and Dimethoate had significantly more thrips than Orthene and Temik. A second foliar application was applied on 3 June and counts 8 days (31 DAP) after treatment indicated Sulfur was the only treatment below threshold. Numbers in the Sulfur treatment were low probably because it had already suffered heavy damage and was no longer attractive for thrips colonization. By 31 DAP both Avicta CC and Temik were no longer providing adequate control. At 35 and 37 DAP neither Temik nor Avicta CC differed from the untreated in total thrips and Dimethoate and Orthene were the only treatments providing control. A final damage rating taken at 37 DAP indicated Temik suffered the least damage but did not statistically differ from Orthene. ProNatural Micronized Sulfur did not provide adequate control, and Dimethoate did not appear to offer as long of residual control as Orthene.

Introduction

Thrips continue to be the dominant pest of seedling cotton in the Texas High Plains. In 2008, almost 2 million acres of cotton were reported infested with thrips, of which over 50% was treated preventively for thrips with a seed treatment or in-furrow application of Temik. An additional 267,000 acres received at least one foliar insecticide application targeting thrips following preventive treatments or instead of preventive treatments. When not treated, damage to cotton by thrips will often reduce yield by as much as 20% on the Texas High Plains and depending on temperatures, as few as 1 thrips per 2 plants may result in significant damage and yield loss. On the Texas High Plains, the western flower thrips, *Frankliniella occidentalis* (Pergande), is the dominant thrips species comprising 70-100% of the population infesting cotton, which makes West Texas somewhat unique relative to other areas of the U.S. cotton belt and may influence how insecticides perform relative to other areas. In-furrow applications of Temik is the standard by which other thrips management programs are measured in the Texas High Plains. However, because of the high toxicity of Temik, many growers have sought alternatives. Seed treatments have gained popularity for managing thrips. They are very easy to use and safer to handle than Temik. However, they tend to not last as long as Temik and are thus more likely to require follow-up foliar insecticides once they lose efficacy. The other alternative to Temik is to strictly utilize a foliar insecticide spray program. Research has demonstrated that this approach can be effective and less costly but application timing can be critical (Vandiver 2009). Another problem facing some High Plains cotton growers is identifying a cost effective thrips management insecticide for use on organic acreage. Currently OMRI approved products for thrips control are simply too expensive to economically justify.

The objective of this research is to determine the relative efficacy of several foliar insecticides (including an OMRI approved organic treatment), a seed treatment and in-furrow application of Temik.

Materials and Methods

This study was conducted in Castro County near Dimmitt, TX in cooperation with Brian and Rex Reinert. Cotton, FiberMax 9180 B2F was planted on 40-inch rows on May 15, 2009. The test site was irrigated using a pivot irrigation system. The seedling rate was ~15-lbs seed per acre. Plots were 4-rows × 50-ft. The test was a randomized complete block design with four replicates.

Table1. Products, rates and application methods for insecticides evaluated

Treatment[a]	**Rate**	**Application**
Temik 15G	3.5 lbs/ac	In-furrow
Avicta Complete Cotton	NA	Seed Treatment
Orthene 97	3 oz/ac	Foliar
Dimethoate 4E	0.5 pt/ac	Foliar
ProNatural Micronized Sulfur	4.2lbs/ac	Foliar
Untreated	NA	NA

[a]Rates for Dimethoate and Sulfur were determined by using a similar cost/ac ($2.80) of Orthene 97 at 3 oz/ac

Temik (aldicard), Avicta CC (thiamethoxam + abamectin), and Orthene (acephate) were all tested at standard use rate for the geographical region (Table 1). The rates for Dimethoate 4E and the OMRI approved ProNatural Micronized Sulfur were determined by setting their use rate equivalent to the cost per acre rate of Orthene 97 which was approximately $2.80. Foliar insecticides were applied on 27 May, and 3 and 12 June.

Treatments were evaluated by destructively sampling 10 plants per plot and visually counting the number of adult and immature thrips per plant. Evaluations were made immediately prior to the first foliar application, and 2-3 and 5-8 days after treatment (DAT). In addition to counting thrips, damage ratings were taken on 11 and 17 June. Plots were subjective rated for damage on a 1-5 scale where 1 = no damage and 5 = severe damage. On 17 June, five plants were removed from each plot and transported to the laboratory where a LI-COR meter was used to determine the leaf area of each plant.

Data were analyzed using PROC MIXED and the means were separated using an F protected LSD ($P \leq 0.05$).

Results and Discussion

Prior to the first foliar spray, on 27 May, 12 days after planting (DAP), none of the plots slated for a foliar treatment regime differed from the untreated check (Figure 1). However, both the Avicta CC and Temik treated plots had fewer thrips than the untreated and did not differ from each other. Thus indicating that both preventive treatments were effective at 12 DAP. At this time almost all of the thrips counted were adults, indicating initial colonization.

Two days following the initial foliar application, all of the foliar sprays except ProNatural Micronized Sulfur reduced the thrips population to levels equivalent to Temik and Avicta CC indicating rapid activity (Figure 2A). The sulfur treatment did not differ from the untreated. By 7 DAT with the foliar sprays, the sulfur still did not differ from the untreated, and Dimethoate had significantly more thrips than Orthene and Temik (Figure 2A). Thus, Dimethoate appears to be shorter lived than Orthene at the rates tested. Although Avicta CC did not differ from the Temik in total thrips, it did contain more immature thrips, indicating that it was beginning to break by 21 DAP and should have had foliar oversprays initiated.

On 5 June, 2 days after the second foliar application thrips counts were low due to precipitation (Figure 3A). But by 8 DAT (31 DAP), the population had increased and Sulfur was the only treatment below the threshold of 3 thrips per plant on 3 true leaf cotton but did not differ from the untreated (Figure 3B). It was obvious that by 31 DAP that both Avicta CC and Temik were no longer providing adequate control and should have had oversprays of a foliar insecticide. Numbers in the Sulfur treatment were low probably because it had already suffered heavy damage and was no longer highly attractive for thrips colonization (Figure 4).

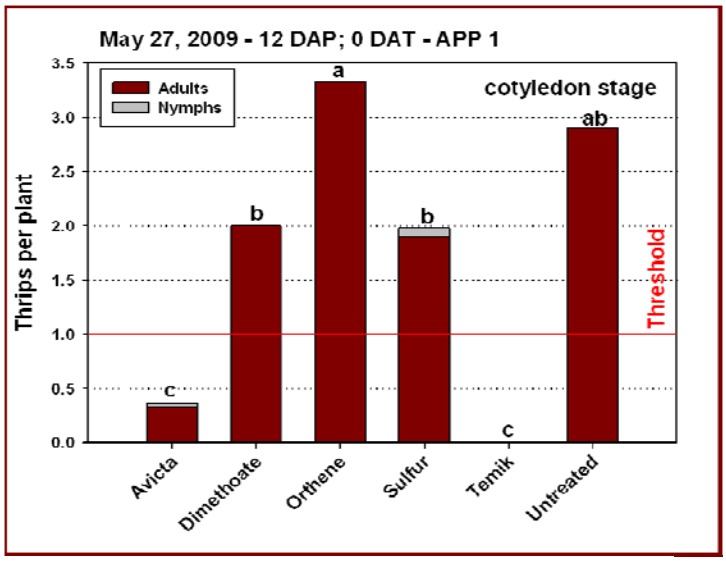

Figure 1. Mean thrips per plant at 12 DAP. None of the foliar sprays had been applied. Bars capped with the same letter are not significantly different in total thrips based on a *F* protected Mixed Procedure (LSD, $P < 0.05$).

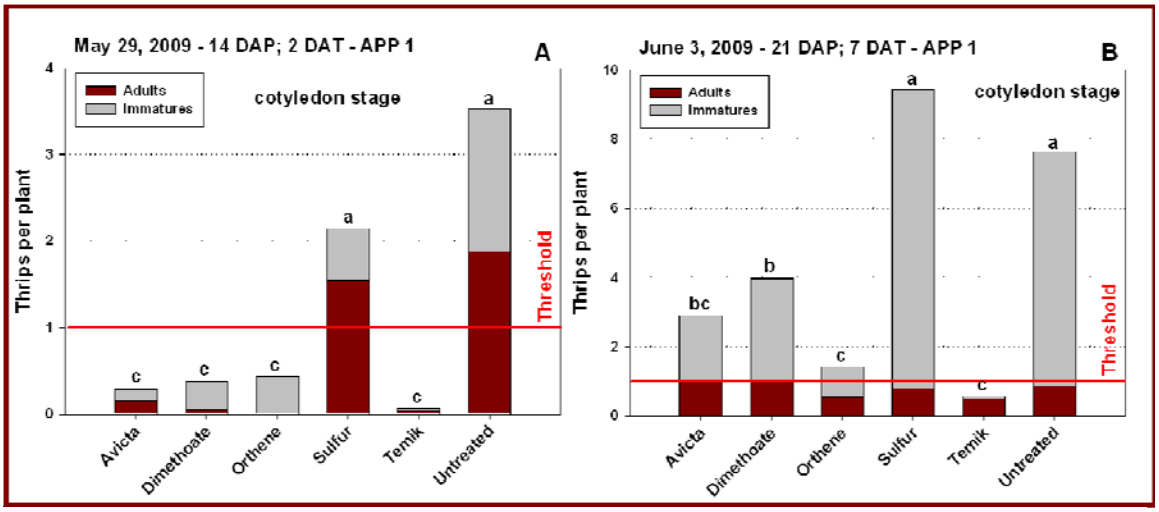

Figure 2. Mean thrips per plant at 14 DAP; 2 DAT foliar (A) and 21 DAP; 7 DAT foliar (B). Bars capped with the same letter are not significantly different in total thrips based on a *F* protected Mixed Procedure (LSD, $P < 0.05$).

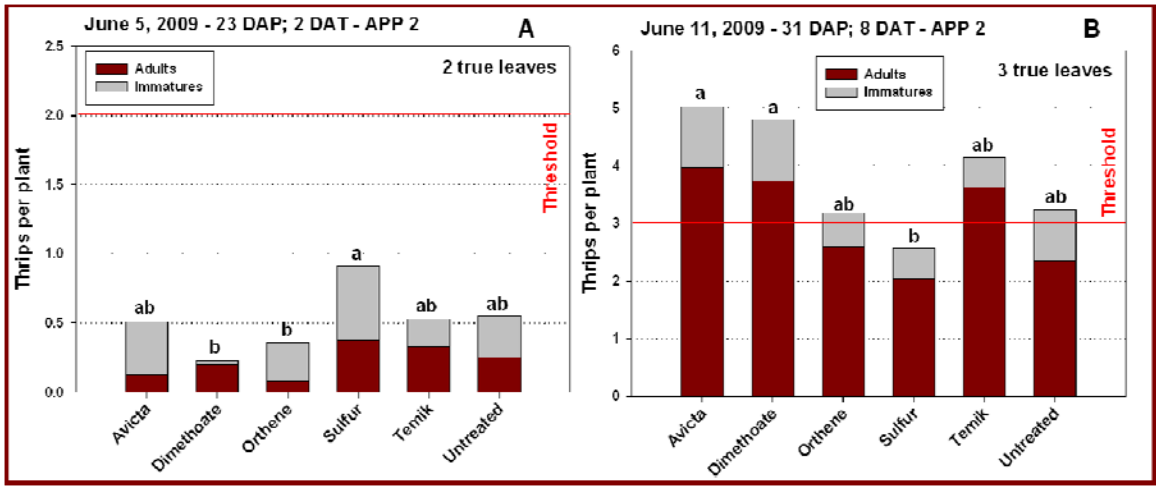

Figure 3. Mean thrips per plant at 23 DAP; 2 DAT foliar (A) and 31 DAP; 8 DAT foliar (B). Bars capped with the same letter are not significantly different in total thrips based on a *F* protected Mixed Procedure (LSD, $P < 0.05$).

At 31 DAP and 2 foliar spray treatments at a 7 day interval, all of the treatments suffered less damage than the untreated (Figure 4). Temik suffered less damage than Avicta CC suggesting that Temik provided longer residual.

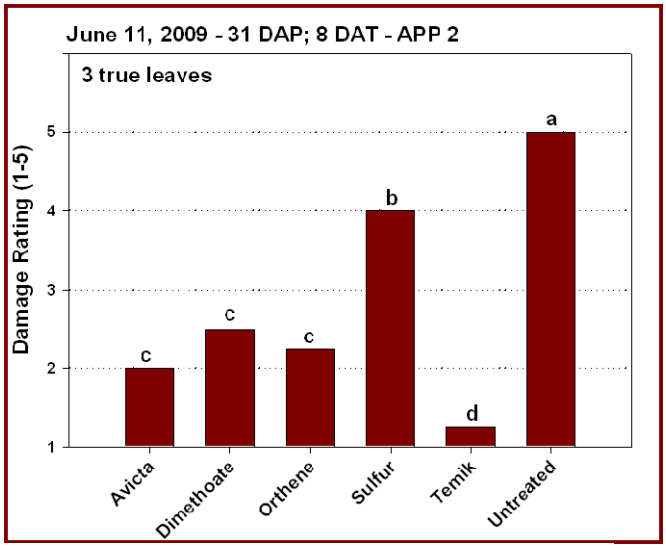

Figure 4. Mean thrips damage rating (1-5 scale with 1 = no damage and 5 = severe damage) at 37 DAP. Bars capped with the same letter are not significantly different in total thrips based on a *F* protected Mixed Procedure (LSD, $P < 0.05$)

At 35 and 37 DAP neither Temik nor Avicta CC differed from the untreated in total thrips, and Dimethoate and Orthene were the only treatments providing control (Figure 5).

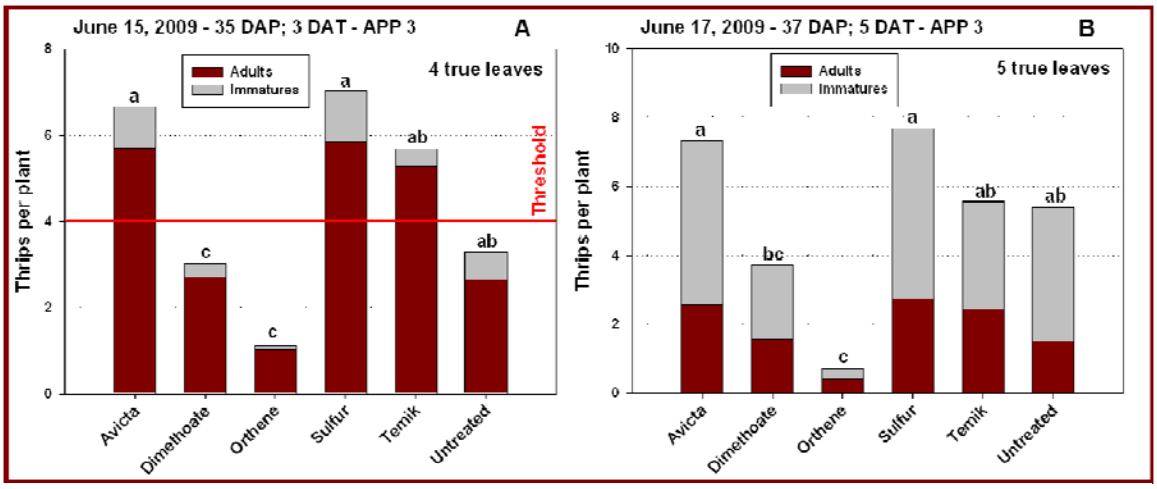

Figure 5. A) Mean thrips per plant at 35 DAP; 3 DAT foliar (A) and 37 DAP; 5 DAT foliar (B). Bars capped with the same letter are not significantly different in total thrips based on a F protected Mixed Procedure (LSD, $P < 0.05$)

Based on the final damage rating taken at 37 DAP, Temik suffered the least damage but did not statistically differ from Orthene (Figure 6). The damage Temik suffered indicates that at least one foliar overspray would have been justified. Avicta CC suffered more damage than Temik suggesting that it would have required oversprays earlier than Temik. ProNatural Micronized Sulfur did not provide adequate control, and Dimethoate did not appear to offer as long of residual control as Orthene.

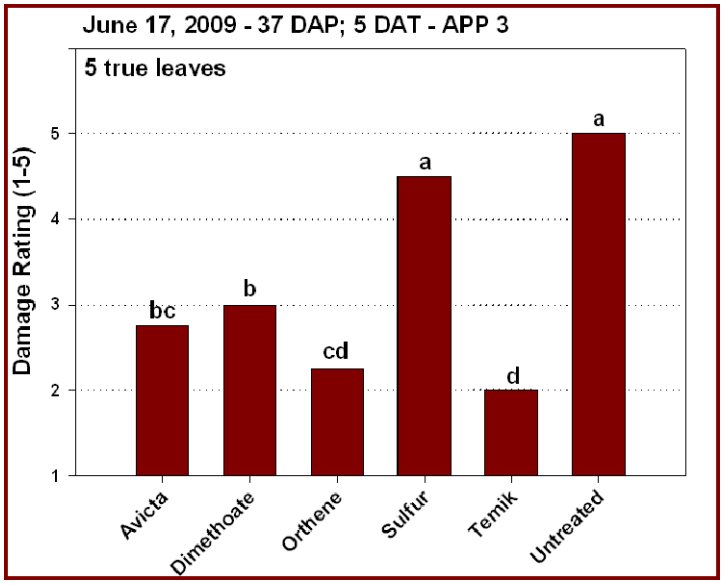

Figure 6. Mean thrips damage rating (1-5 scale with 1 = no damage and 5 = severe damage) at 37 DAP. Bars capped with the same letter are not significantly different in total thrips based on a F protected Mixed Procedure (LSD, $P < 0.05$)

On 17 June, the plants in the Temik-treated plots had the greatest leaf area, but did not statistically differ from the Orthene-treated plots (Figure 7). These data match closely with the subjective damage ratings (Figure 6). Leaf area data for the other treatments also appeared to closely follow that of the subjective damage ratings. The only treatment that did not differ from the untreated in leaf area was ProNatural Micronized Sulfur.

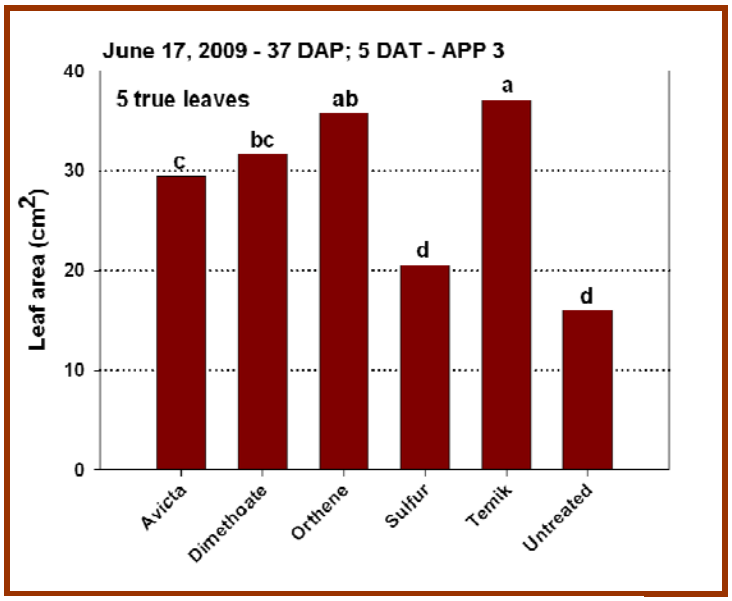

Figure 7, Leaf area per plant; depicting thrips damage intensity. Bars capped with the same letters are not significantly different in total thrips based on a F protected Mixed Procedure (LSD, $P < 0.05$).

Between the preventative treatments, Temik and Avicta Complete Cotton, Temik at 3.5 lbs/ac provide the longest control, lasting 23-30 days after planting. Avicta appeared to offer about 21 days of control. Both treatments should have received foliar applications of insecticide after their residual control diminished. Among the foliar insecticides, Orthene appeared to offer slightly longer residual activity (about 5 days) than Dimethoate (about 3 days). The OMRI approved organic treatment, ProNatural Micronized Sulfur, did not offer adequate control at the rate we tested.

Acknowledgements

Financial support for this project was provided in part by Plains Cotton Growers, Inc.