MANAGING THRIPS USING ORGANICALLY APPROVED INSECTICIDES

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Abstract

Thrips are a recurring problem to seedling cotton in the Texas High Plains. It has been estimated that thrips impact to the High Plains cotton industry in 2010 was in excess of $6 million. A replicated trial evaluating 5 treatments, 4 OMRI approved foliar insecticides and an untreated check, was conducted near Muleshoe, TX. Thrips pressure was moderate and lower than normally experienced. One or more treatments may have provided some repellency which may extend past treatment boundaries. Entrust did provide suppression of thrips in this trial and residual activity seems to be cumulative. No treatment provided any benefit in lint yield.

Introduction

Thrips are a recurring problem to seedling cotton in the Texas High Plains. It has been estimated that thrips impact to the High Plains cotton industry in 2010 was in excess of $6 million. In irrigated cotton where thrips populations are historically high (usually areas where there is a significant acreage of wheat) many conventional growers may choose to utilize preventative insecticide seed treatments and/or foliar remedial insecticide treatments to suppress thrips. One of the most challenging factors facing organic cotton producers in the Texas High Plains is the effective management of early-season thrips in an organic production system. In 2011 13 Organic Materials Review Institute (OMRI) approved insecticides were investigated for suppression of thrips in cotton. The study was continued in 2012 but the treatment list was reduced to only those products which showed potential to provide significant thrips suppression in 2011. Organic Materials Review Institute (OMRI) provides organic certifiers, growers, manufacturers, and suppliers an independent review of products intended for use in certified organic production, handling, and processing. The objectives of this trial were to evaluate the efficacy of numerous OMRI approved insecticides for thrips suppression in cotton and verify any possible yield benefits.

Materials and Methods

The trial was conducted in commercial organic cotton field in Bailey County near Muleshoe, TX. Historically western flower thrips have been the dominant thrips species infesting cotton in this area. 'FiberMax 958' was planted 1 May, 2012 on 30-inch rows and irrigated using low elevation spray application (LESA) center pivot irrigation system. Plots were 4-rows wide × 45 ft long and were arranged in a randomized complete block design with 4 replicates. Treatments included 4 OMRI approved insecticides and an untreated check (UTC) (Table 1). All insecticides were applied in accordance with their respective label recommendations at 30 gallons/acre (GPA) total volume. Insecticide applications were made weekly, beginning at 85% emergence 19 May. Treatments were applied in a 10 inch band directly over the top of the crop row with a CO2 pressurized backpack sprayer and hand held boom equipped with hollow cone nozzles. Thrips were counted before treatment as well as 3-4 and 6-7 days after each insecticide application. Ten plants/plot were collected and washed in an alcohol solution; adult and immature thrips collected in solution were filtered out and counted under a dissecting stereo scope. Samples collected were also separated by life stage. Plant damage ratings, from 1 to 5, were assessed when most plants had reached the 6 true leaf stage. One of the two middle rows, in which no plants had been sampled from, was hand harvested in its entirety November 1. Bur cotton grab samples were taken from each plot. The samples were ginned at the Texas A&M AgriLife Research and Extension Center in Lubbock, Texas. Data were subjected to analysis of variance (ANOVA) and when a significant F test was observed, mean separation was performed using the least significant difference (LSD) at the 5% probability level. Thrips days were calculated by methodology described by Robert F. Ruppel (JEE, Vol. 76, No. 2, April 1983).

Table 1. Treatments and application detail from an organic thrips management trial, Muleshoe, TX, 2012.

Trade name	Common name	Rate	GPA
Untreated	---	---	---
Aza-Direct[1,2]	Azadirachtin	16 fl-oz/ac	30
Entrust[1]	Spinosad	2 oz/ac	30
Bugitol	Capsicum /Mustard oils	96 fl-oz/100 gal	30
Saf-T-Side + Ecotec	Petroleum oil + Rosemary/Peppermint oil	1 gal + 1 qt/100 gal	50

[1]*Ag-Aide added to spray mix at 8 fl-oz/100 gal (adjuvant)*
[2]*Constant BUpH-er added to the spray mix at 0.125% v/v (pH = 6)*

Results and Discussion

Environmental conditions at the trial site were harsh; extremely dry, very windy, and temperatures were erratic (Figure 1). Thrips pressure, in general, was moderate and lower compared to historical observations likely due to harsh conditions and lack of alternative hosts to support and bridge thrips populations until cotton emergence.

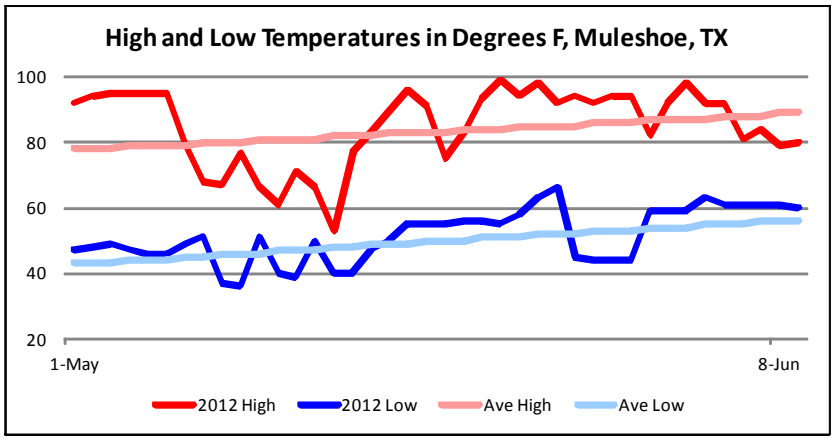


Figure 1. High and low temperatures from 2012 vs. the 30 year long term averages (1980-2010).

The cotton was very slow to develop, 18 days were required to attain 85% emergence 19 May and an additional 6 days from emergence until the 1st true leaf stage 25 May. Mean thrips numbers of untreated plots were less than 50% of action threshold when the initial insecticide application was applied (19 May, 85% emergence) but was near 5X the established action threshold of one thrips per true leaf by 23 May and remained near or above action threshold through the 5 true leaf stage 8 June (Table 2).

Table 2. Thrips numbers and action threshold.

Date	Thrips/ True Leaf[1]	Threshold[2]
5/19	.40	1
5/23	5.0	1
5/25	5.3	1
5/28	1.5	2
6/1	8.6	3
6/4	4.0	4
6/8	6.0	5

[1] *Mean thrips per true leaf of UTC*
[2]*Established action threshold is 1 thrips/true leaf.*

A significant difference was only observed between insecticide treatments and the untreated check at the 5 true leaf stage 8 June (Figure 2).

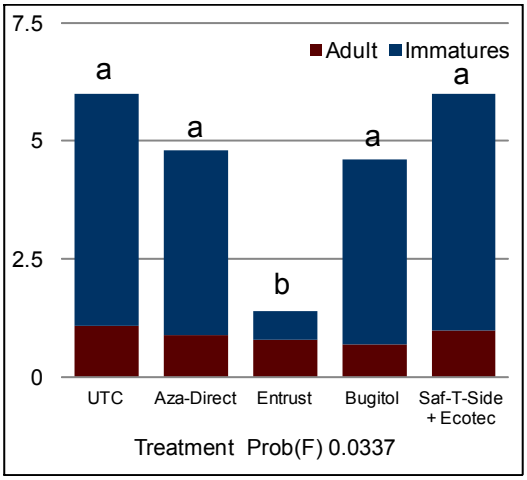
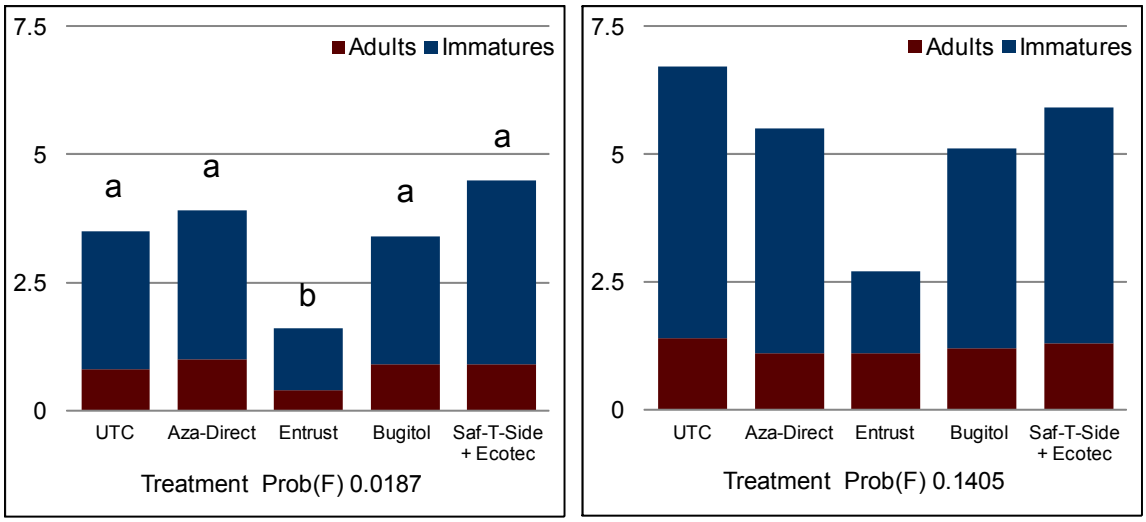


Figure 2. Mean thrips per plant at the 5 true leaf stage, 8 June.

Data were further analyzed by calculating seasonal means by treatment and days after treatment (DAT) (Figures 3 and 4). The Entrust treatment had significantly fewer thrips/plant compared to all other treatments and the UTC but no other treatment significantly differed from the UTC 3 DAT. The same analysis showed no significant differences 7 DAT.



Figures 3 and 4. Seasonal mean thrips per plant 3 and 7 DAT respectively.

When comparing thrips numbers/plant in all treatments and the UTC across all sampling dates, it appears that one or more of the treatments may be repelling thrips from the test area resulting in reduced pressure shortly after application followed by a population rebound (Figure 5). This phenomenon was observed following 2 of 3 insecticide applications. This and a comparison of seasonal means 3 and 7 DAT also suggests a very short residual activity of suspected repellency.

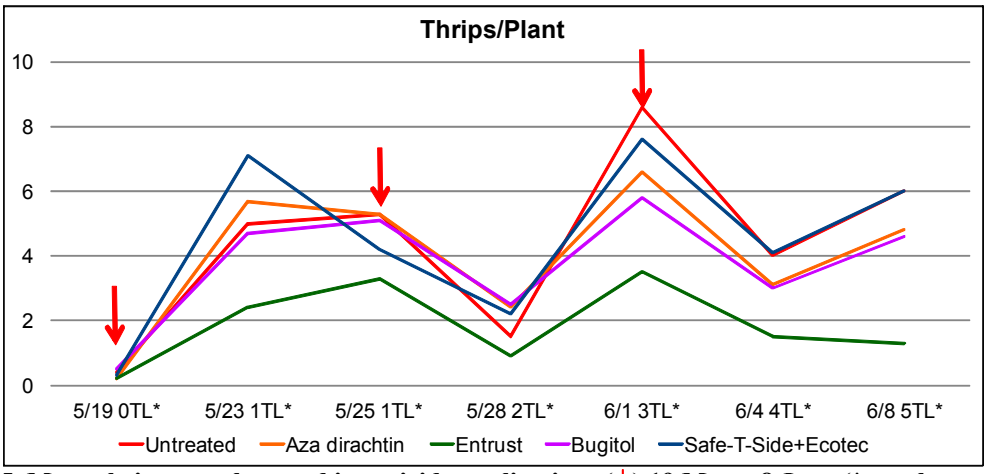


Figure 5. Mean thrips per plant and insecticide applications (↓) 19 May – 8 June (*true leaves/plant).

Damage ratings, where 1 was least damage and 5 was greatest damage, taken at the 6 true leaf stage on 18 June showed Entrust with least damage with a rating of 2.3; Aza-Direct, Bugitol, Safe-T-Side+Ecotec, and the untreated had statistically similar damage ratings (Figure 6). Typically, damage ratings must exceed 3 to elicit a yield response.

The percent of a thrips population which is immature is a good indicator of that population's ability to colonize; a higher percentage of immatures suggests a higher degree of colonization. When data from all post treatment sampling dates were merged and analyzed, the Entrust treatment had a significantly lower percentage of immature thrips compared to all other treatments (Figure 7). Based on this data, Entrust appears to suppress colonization to a greater degree compared to the other treatments.

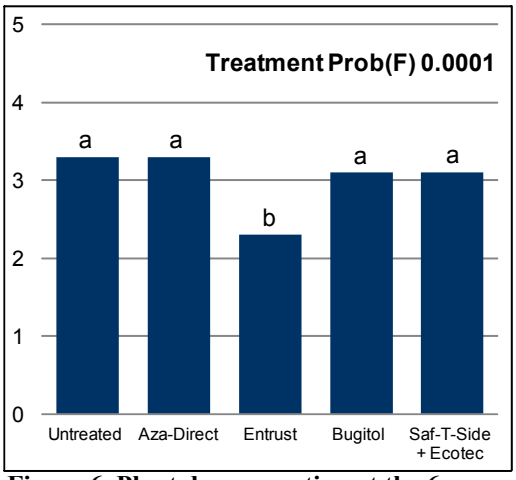


Figure 6. Plant damage rating at the 6 true leaf stage.

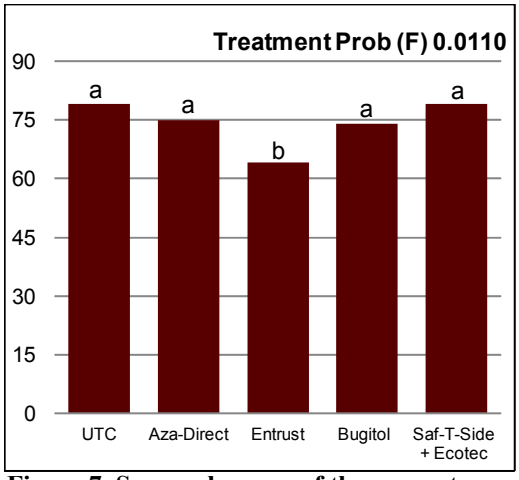


Figure 7. Seasonal means of the percent immature thrips.

Cumulative thrips days can give an overall indication of crop protection provided by insecticide treatments. Entrust reduced thrips days by over 50% when compared to all other treatments and the untreated check (Figure 8). This decrease is an indication of a reduction in overall thrips pressure and feeding duration.

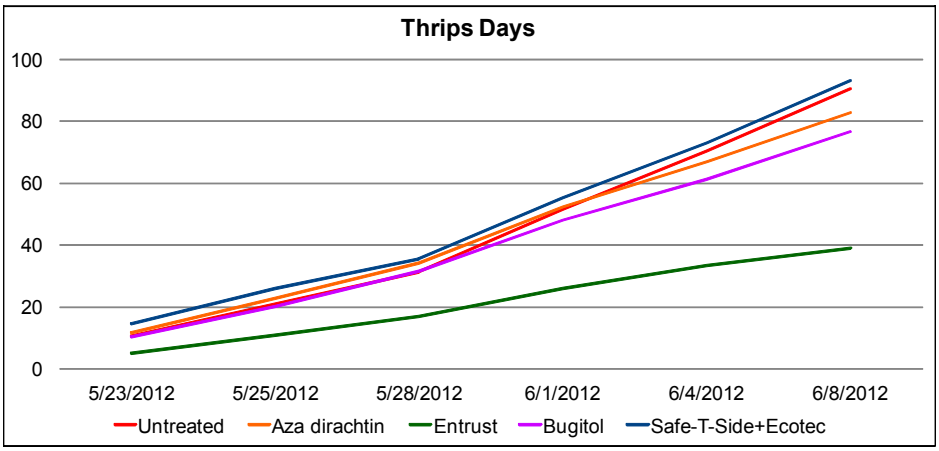


Figure 8. Cumulative thrips days (Ruppel, 1983, JEE)

The trial mean lint yield across all treatments was 788 lbs/acre which is fair for the area; no differences between treatments were observed (Figure 9). Visual symptoms of phenoxy herbicide drift appeared across the trial shortly after thrips and plant damage data collection was completed. This plant injury may or may not have impacted yield.

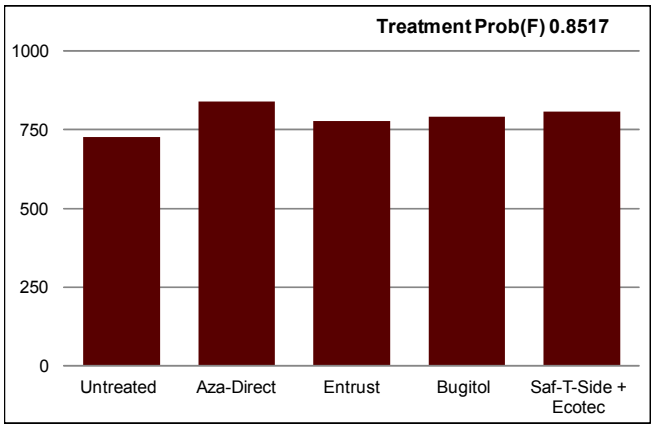


Figure 9. Lint yield in lbs/acre.

Conclusions

Thrips pressure was moderate but still less than normally experienced. One or more treatments may be providing repellency which may extend past treatment boundaries. Entrust did provide suppression of thrips in this trial and residual activity seems to be cumulative. Entrust clearly reduced thrips days, appeared to curb colonization to a greater degree, as well as reduce visual plant damage. No treatment provided any benefit in lint yield.

Acknowledgements

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