MANAGEMENT OF THRIPS ON COTTON IN THE TEXAS HIGH PLAINS: EFFICACY OF SEED TREATMENTS

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Abstract

Three different insecticide seed treatments were evaluated for their efficacy to control thrips in cotton under Texas High Plains growing conditions. Less than optimum growing conditions, mainly temperature and dry weather delayed seedling growth, which might have affected the overall benefit of insecticide seed treatments. Germination was delayed by two weeks and thrips sampling 25 days after planting (DAP) indicated that seedlings receiving insecticide seed treatments were not fully protected from thrips and resulting thrips populations were higher than the recommended economic threshold level at this growth stage. Such a scenario warrants producers to use additional, curative insecticide applications to manage thrips population in cotton. One foliar application of Orthene® or Vydate® at threshold was able to manage the thrips population and thrips number was not significantly different from insecticide seed treatments. The lint yield gain in seed treatments and foliar insecticide application treatments compared to the untreated control was in the range of 5-10 per cent.

Introduction

The Texas High Plains region, which accounts for approximately 66% of the cotton production in Texas, is the most intense cotton growing region in the nation (Williams 2012). Each year, thrips species are the primary pests of cotton in this region, which annually translates into one to two million thrips-infested cotton acres. Until a few years ago, thrips on cotton were effectively managed by the commonly used in-furrow application of aldicarb (Temik®). However, phasing out of this effective product (Temik®) from the market has led to the adoption of alternatives such as seed treatments and increased use of foliar insecticide applications.

Thrips injury can range between simple cosmetic injury to significant yield loss depending upon thrips abundance, weather conditions, plant health, and crop management. One of the resultant effects of thrips injury in cotton is the delay in crop maturity (Cook *et al*. 2013), which is a very important consideration for Texas High Plains producers because of the shorter growing season, as compared to more southern and southeastern cotton growing regions. Therefore, delayed crop maturity as a result of thrips injury can potentially lead to reductions in lint yields and fiber quality. The primary objective of this study was to evaluate three different neonicotinoid seed treatments and two foliar insecticides for their effectiveness in managing early season thrips.

Materials and Methods

This study was conducted at the Texas A&M AgriLife Research farm located at Halfway, TX. Cotton seeds of variety FM1944 B2R were planted on 3 May, 2013. Each plot was 35 row-ft long and 4 rows wide (40-inch seedbed spacing). There were six different treatments: 1) Aeris® seed treatment, 2) Gaucho® + Poncho® seed treatment, 3) Avicta Complete® seed treatment, 4) Orthene® 97S @ 3 oz./A at threshold, 5) Vydate® @ 8.5 fl oz./A at threshold, and 6) untreated control. The initial thrips sampling at the cotyledon stage was conducted 25 days after planting on

28 May. Subsequently, three more weekly thrips counts were preformed to record thrips numbers (both adults and nymphs). From each plot (35 feet by 4 rows), 10 seedlings were visually inspected and numbers were recorded for both adult and immature thrips. In the respective experimental plots, one application of both Orthene® and Vydate® were made as the thrips population was above the recommended threshold level. Insecticides were applied using a hand-held 2-row boom with 40-inch nozzle spacing, flat fan TeeJet XR8003VS nozzles, and 30 psi (resulted in 10 gpa total spray volume). Prior to harvest, plant height and the number/location of 1st-position harvestable and non-harvestable bolls were recorded to evaluate the effect of treatments on plant growth, especially with regard to delayed maturity. Finally, plots were hand harvested from 10 row feet (approximately 20-22 plants) and processed for ginning to obtain the lint yield.

Results and Discussion

Cool weather conditions immediately after planting delayed germination/seedling emergence by more than 2 weeks. The first week of thrips sampling indicated the number of thrips in the three seed treatments were significantly lower than the untreated control (Fig. 1A). Thrips numbers in the two foliar treatments are basically pre-treatment counts (first week of sampling; Fig. 1A). The plots for these two foliar treatments received the first insecticide applications immediately after the pre-treatment count, thus allowing the effect of the foliar application to be observed at the time of the 2nd week sampling (Fig. 1B). Although the number of thrips, especially the adults, during the first week of sampling was lower in the plots with seed treatments than the control, the number of thrips exceeded the recommended economic threshold. This situation would necessitate additional, curative foliar applications on the seed treatment plots. However, limited reproduction, as evident by number of immature thrips, occurred on the seed treatment plots, especially on the Aeris® and Avicta Complete® as compared to the control plots where more than three immature thrips per plant were recorded on the first week of sampling. The second week of sampling revealed that the overall thrips numbers in all the treatments were lower than the previous week and the numbers were not statistically different. It appears that the first applications of the two foliar insecticides (Orthene® and Vydate®) were able to reduce the number of thrips considerably (Fig. 1B). We recorded negligible reproduction of thrips during this period, irrespective of the treatments. Usually it is expected that the number of thrips would increase in the untreated control on the subsequent sampling dates. However, we did not see that trend and we speculate that there was no re-infestation of thrips into the study field and likely the weather conditions, such as low temperature and gusty winds, might have prevented the development of thrips during that period of time.

The number of thrips (adults) observed in the seed treatment plots were approximately two per plant, which suggests that the efficacy of the chemicals on the seed treatments was low. The diminishing efficacy of seed treatments at this stage (33 days after planting) is relatively clear. Several studies conducted across the cotton belt have indicated that seed treatments are not highly effective beyond 3-4 weeks after planting. Therefore, if producers encounter situations where insecticide treated seeds are delayed in their germination and seedling emergence, the seed treatments are likely not able to fully protect the plants from thrips. The third week of sampling indicated that the Orthene® applied plots had fewer thrips than the Aeris® and Gaucho®+ Poncho® treatments (Fig. 1C). The fourth week of sampling indicated that, except for the control, all treatments had significantly lower number of thrips (<1 thrips/plant; Fig. 1D). By this time, the plants were at the 4-true leaf stage, thus plants were beyond cotton plants' thrips susceptibility window.

Pre-harvest plant mapping indicated that there were no significant differences in plant growth among the different treatment plots, as evidenced by the pre-harvest plant heights (Fig. 2). The number of non-harvestable bolls also did not vary significantly among the treatments, which suggests that there were no differences in crop maturity (Fig. 3). Although we observed high thrips numbers early in the season, likely these thrips did not colonize fully in order to cause extensive long-term injury. We observed numerical differences between the treatments and control plots in lint yield, but none of the differences were statistically significant (Fig. 4).

Summary

Based on the results from this study, seed treatments appear to be effective in reducing the number of thrips, especially Aeris® and Avicta Complete®, both performed equally in minimizing immature populations. However, realized protection from seed treatments may be less than expected in the event that seeds do not germinate in a timely manner. Foliar application of Orthene®, when thrips populations were above the action threshold, resulted in good thrips control, which means producers can use Orthene® as remedial applications if seed treatments do not provide adequate control. Outcome of thrips injury in terms of delayed maturity and yield reduction can vary from year to year. This is especially true for thrips since plants have enough time to compensate the injury received early in the season provided that the cotton receives good weather conditions, adequate moisture, and protection from late season pests. However, in the Texas High Plains region, growing conditions are typically characterized by periods of low rainfall and could also be limited by cool temperature during the fall, both of which call for attention in early season thrips management to get the plants off to a good start. This study will be repeated next year in multiple locations to hopefully observe the variation in crop response to thrips injury. Additionally, we will be recording the thrips species composition in our studies to understand if there are any relationships in efficacy of these seed treatments with specific thrips species.

Acknowledgments

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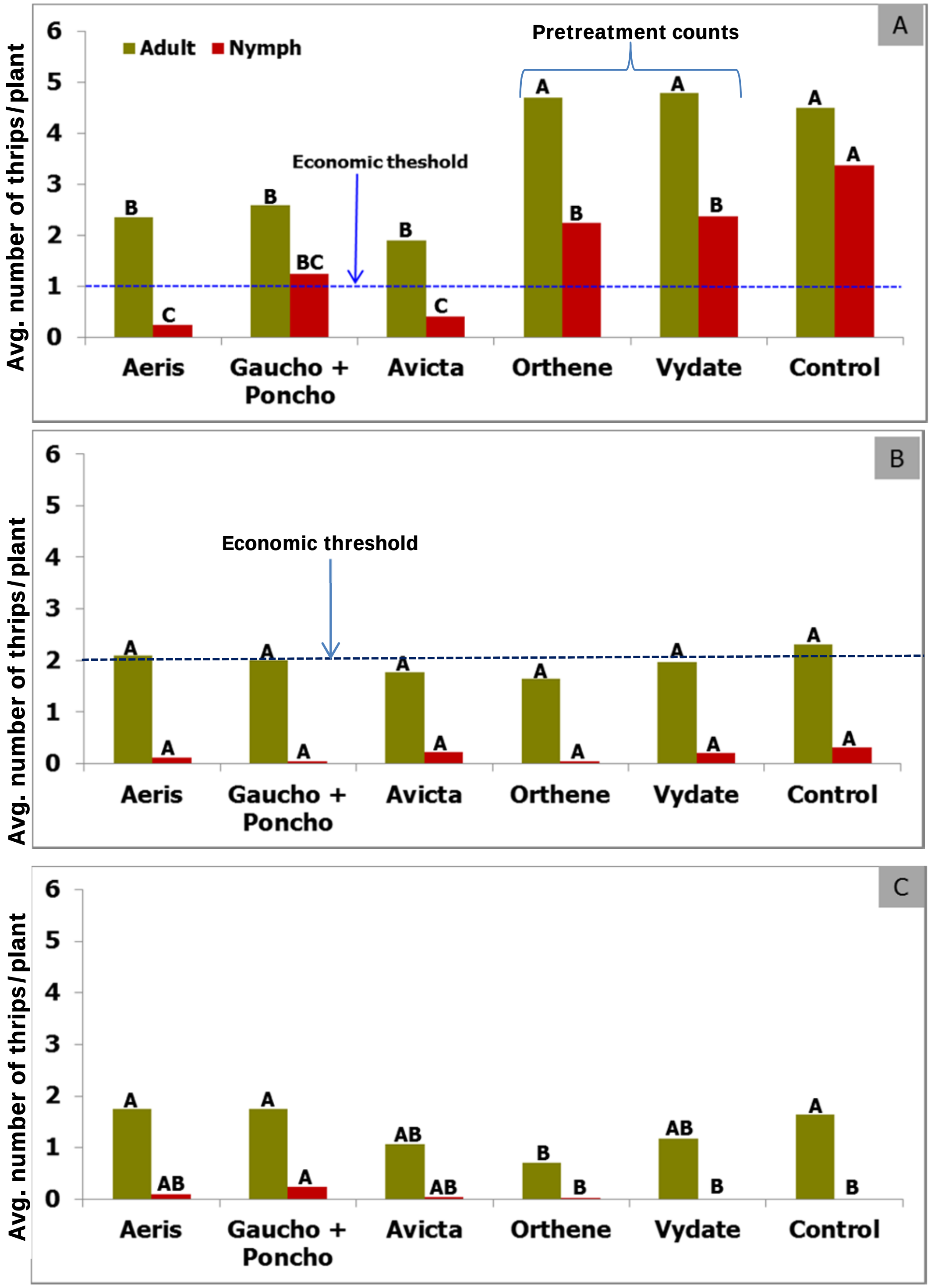
References

Cook, D. R., B. G. Leonard, E. Burris, and J. Gore. 2013. Impact of thrips infesting cotton seedlings on cotton yield distribution and maturity. *Journal of Cotton Science* **17**: 23-33.

Williams, M. R. 2012. Cotton insect loss estimates - 2011, pp. 1001-1012. *In* Proc. Beltwide Cotton Conferences, National Cotton Council of America, Memphis, TN.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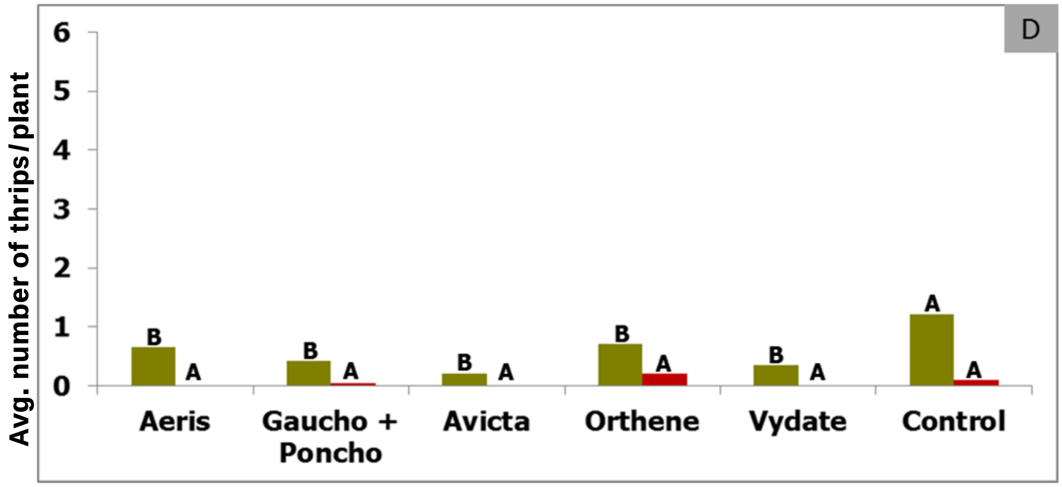

Figure 1. Number of adult and immature thrips per plant at four sampling dates/days after planting (DAP). A. 25 DAP, B. 35 DAP, C. 44 DAP, and D. 51 DAP.

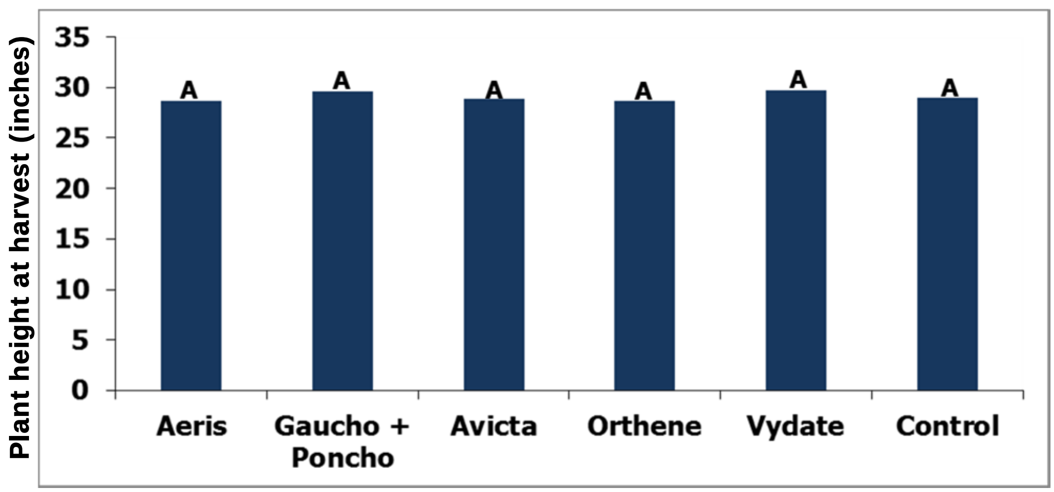

Figure 2. Average plant height (inches) during the pre-harvest crop stage.

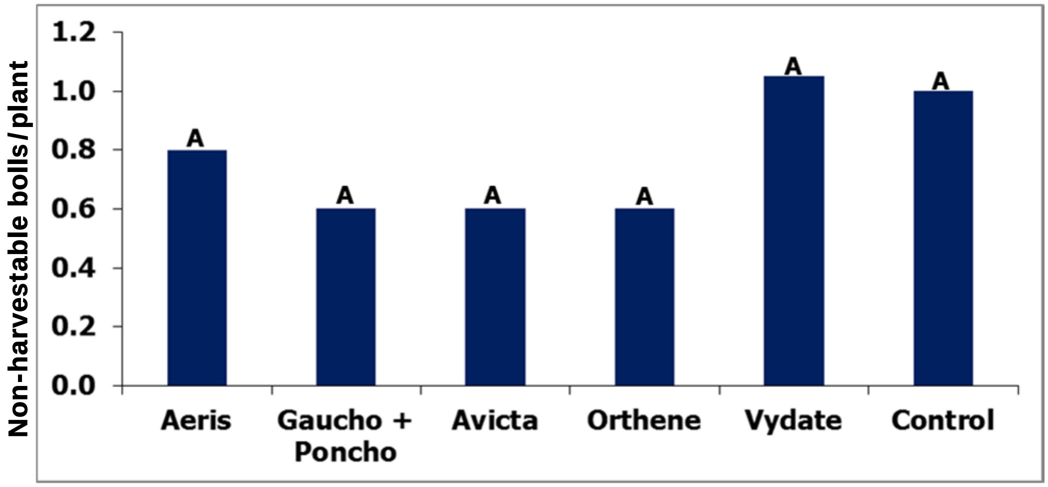

Figure 3. Average number of non-harvestable bolls per plant in different treatments.

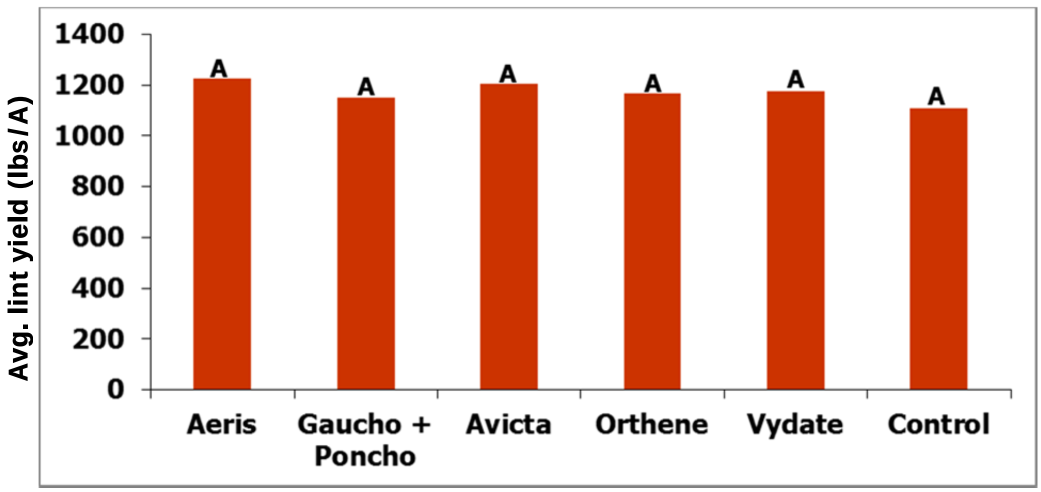

Figure 4. Average lint yield in different treatments.