EVALUATION OF INSECTICIDE APPLICATION INTERVALS TO OPTIMIZE TARNISHED PLANT BUG CONTROL

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Abstract

The tarnished plant bug, *Lygus lineolaris* (Palisot de Beauvois), is the most important insect pest of cotton in the Mid-South region of the U.S. It can cause severe yield loses if left uncontrolled for long periods of time and insecticide resistance makes management difficult. An experiment was conducted at multiple locations across the Mid-South in 2017 and 2018 to evaluate the impact of application interval on tarnished plant bug management. Regardless of application interval, two applications provided better control of tarnished plant bug than one application. Control was better when the second application was made at 4 days after the first application compared to 7 and 10 days. When the second application was made at 7 days, control was better than when the second application was made at 10 days. All insecticide treatments resulted in cotton yields greater than that in the untreated control. Also, when two applications were made at 4-7 day intervals, cotton yields were significantly greater than when only one application was made. These data will be important for improving our IPM recommendations for tarnished plant bug in cotton.

Introduction

The tarnished plant bug, *Lygus lineolaris* (Palisot de Beauvois), is the most important pest of cotton in the midsouthern region of the U.S. (Layton 2000). Additionally, the pest status of this species has increased in other areas of the eastern U.S. over the last few years. Currently, scouting and applying insecticides based on established thresholds is the primary component of current integrated pest management programs. Considerable research has been conducted throughout the midsouthern U.S. to determine appropriate sampling methods and action thresholds to adequately protect cotton yields and maximize the profitability of growers (Musser et al. 2007, Musser et al. 2009a, b, Gore et al. 2012). Currently, the states in the midsouthern U.S. recommend using a black drop cloth and treating when an average of 3 tarnished plant bugs are observed per sample during the flowering period. Additionally, Mississippi has an additional threshold based on damaged square counts of 10%.

The use of foliar insecticide sprays is the primary method used to control tarnished plant bug in cotton. However, the occurrence of widespread resistance to multiple classes of insecticides has led to difficulty achieving acceptable control with a single application (Snodgrass 1996, Snodgrass and Scott 2000, Snodgrass et al. 2009). As a result, tank mixes with multiple insecticides and sequential sprays are often needed to minimize excessive yield losses. Because of the frequency of sprays for insect pests in the midsouthern U.S., growers sometimes attempt to extend spray intervals for tarnished plant bug with the goal of reducing insecticide sprays. However, this may not be the most economical practice for growers and the impact of application intervals needed to be studied across a wide geography.

Materials and Methods

To determine the impact of insecticide spray interval on tarnished plant control, an experiment was conducted at various locations throughout Tennessee, Arkansas, Louisiana, and Mississippi during the summers of 2017 and 2018. Over those two years and four locations, data were collected and pooled across 10 site years for analysis. At all locations, the experiment was arranged as a randomized complete block with four replications. The treatments included:

1) a single application of Transform 50 WDG applied at 1.75 oz/A
2) a single application of Transform 50 WDG at 2.25 oz/A tank mixed with Acephate 90S at 0.75 lb ai/A
3) Transform 50 WDG at 1.75 oz/A followed by Acephate at 0.75 lb ai/A at 4 days
4) Transform 50 WDG at 1.75 oz/A followed by Acephate at 0.75 lb ai/A at 7 days
5) Transform 50 WDG at 1.75 oz/A followed by Acephate at 0.75 lb ai/A at 10 days
6) untreated control

A dual-gene Bt cotton variety was used at all locations and years to minimize the impact of lepidopteran pests on yield. If damaging levels of lepidopterans occurred at any location, all plots were sprayed with Prevathon, an insecticide that has no activity against tarnished plant bug. All plots within a location were sprayed as needed for tarnished plant bug prior to first flower and after the final drop cloth sample at the end of the experiment. Treatments were sprayed with a high clearance sprayer calibrated to deliver 10 GPA at all locations. Plots were established when tarnished plant bugs exceeded the current action threshold of 3 nymphs per 5 row feet on a black drop cloth. Tarnished plant bugs were sampled in each plot using a 2.5 ft. black drop cloth and 2 samples were taken per plot on each date. Plots were sampled at 4 days after the first application (4 DAT A), 7 DAT A, 10 DAT A, 14 DAT A, and 18 DAT A. For the samples taken at 4, 7, and 10 DAT A, plots were sampled immediately prior to the second application. The total number of tarnished plant bug adults and nymphs were counted and recorded for the two samples. At the end of the season, plots were harvested and seedcotton weights were recorded. All data were analyzed with analysis of variance using PROC GLIMMIX and means were separated with Fisher's Protected LSD.

Results and Discussion

All insecticide treatments reduced tarnished plant bug densities compared to the untreated control (Fig. 1A). Tarnished plant bug densities remained above the current action threshold of three per 5 row ft. (6/10 row ft.) in the two treatments that only received a single application (Fig. 1B). In contrast, the treatments that received two sequential applications reduced tarnished plant bug populations below the action threshold, but only after the second application. Extending the application interval resulted in tarnished plant bug populations remaining above the action threshold for a longer period of time (Fig. 1C). In general, the shorter application interval of 4 days provided better control of tarnished plant bug than the 7 and 10-day application intervals. Additionally, the 7-day application interval provided better control of tarnished plant bug than the 10-day application interval.

For cotton yields, the location by treatment interaction was not significant, so location was treated as a random effect. All insecticide treatments, including the single applications, resulted in greater cotton yields than the untreated control (Fig. 2). Two sequential applications applied at 4 and 7 day intervals resulted in greater cotton yields than the two single applications.

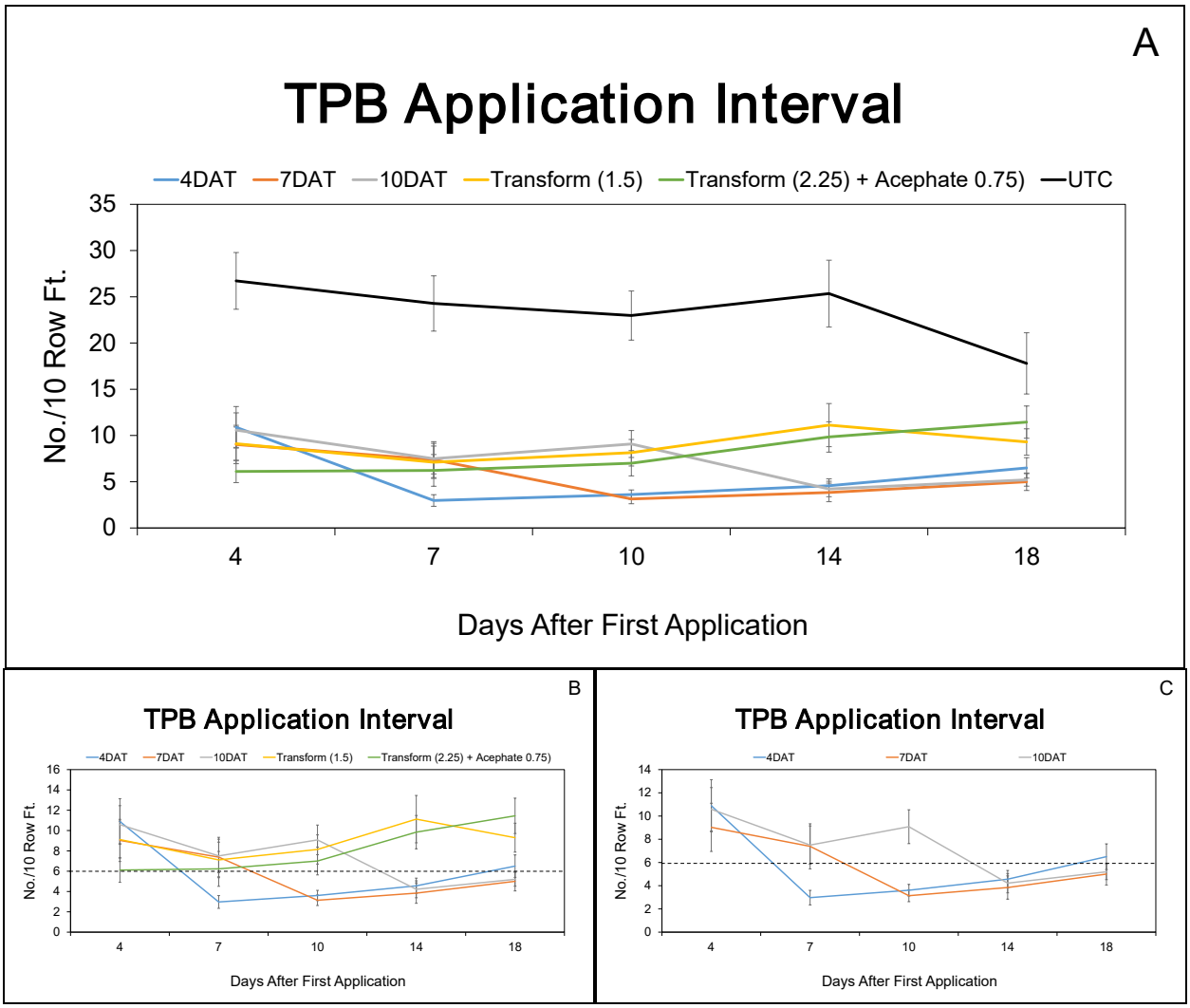

Figure 1. Impact of insecticide spray interval on tarnished plant bug populations in cotton from experiments conducted during 2017 and 2018 in Arkansas, Louisiana, Mississippi, and Tennessee.

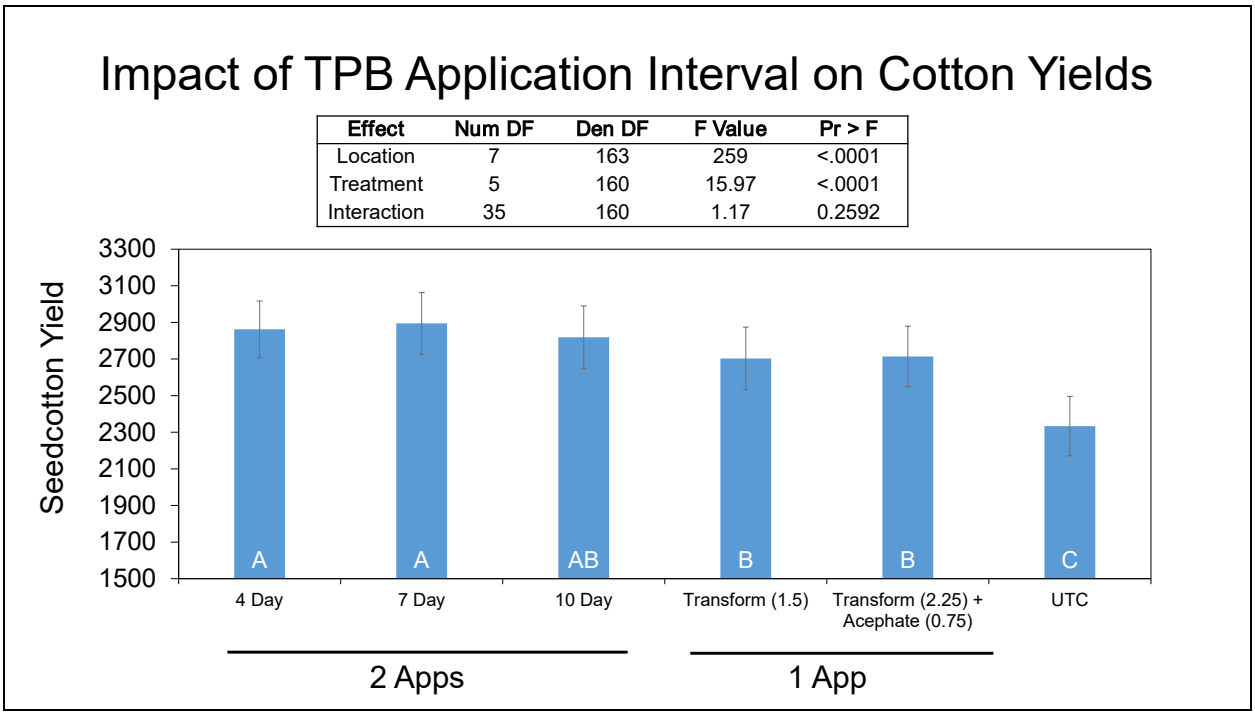

Figure 2. Impact of insecticide spray interval for tarnished plant bug on cotton yields from experiments conducted during 2017 and 2018 in Arkansas, Louisiana, Mississippi, and Tennessee.

Summary

Overall, these data suggest that spray intervals of 4-7 days provided the greatest level of tarnished plant bug control while also providing the best yield protection. Results from this study will be important for improving our tarnished plant bug IPM program in the midsouthern U.S.

Acknowledgements

The authors thank Cotton Incorporated and the cotton producers in Louisiana, Mississippi, Tennessee, and Arkansas for providing funding for this study. The assistance provided by numerous other University employees is also greatly appreciated. The use of trade, firm, or corporation names in this publication (or page) is for the information and convenience of the reader. Such use does not constitute an official endorsement or approval by the United States Department of Agriculture or the Agricultural Research Service of any product or service to the exclusion of others that may be suitable.

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