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Strategies for Managing Tarnished Plant Bugs in Cotton

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Strategies for Managing Tarnished Plant Bugs in Cotton

INTRODUCTION

Tarnished plant bugs have become the most important pests of cotton in the Midsouth states of Mississippi, Arkansas, Louisiana, Tennessee, and Missouri. One reason for their increase in pest status is the development of resistance to several classes of insecticides, particularly the organophosphates (Fig. 1). Because of this resistance, the efficacy of the most common insecticides such as acephate and Bidrin has become erratic, and a single application is generally less than adequate for control.

Figure 1 shows the levels of tarnished plant bug resistance from 1998–2007. Resistance gradually increased until 2005, increased dramatically during 2006, and then decreased slightly in 2007. Acephate and other similar organophosphates will not provide the same levels of control they did in the past, but they will remain an important component of an overall management plan for plant bugs.

Insecticide applications for tarnished plant bugs from pinhead square until first flower resulted in a significant impact on cotton yields in 2007 (Fig. 2). Under high bug infestations (more than 20 bugs per 100 sweeps), an increase in application frequency produced higher yields. However, other research has shown that in the absence of significant tarnished plant bug pressure, insecticide applications before first flower provide little economic benefit. Therefore, scouting fields regularly and using appropriate action thresholds remain important during the preflowering growth stages.

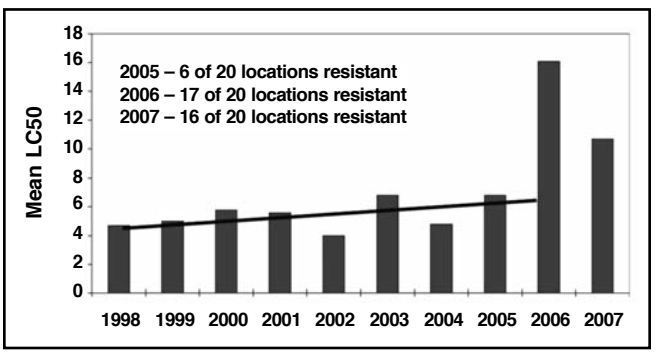

Figure 1. Acephate Resistance.

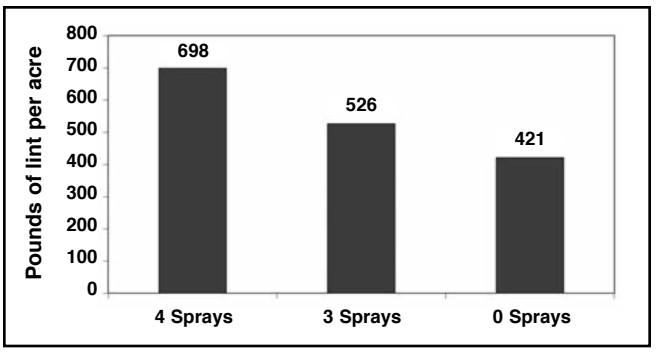

Figure 2. Early-Season Yield Losses.

The impact of tarnished plant bugs on cotton yields is influenced by application timing during the flowering period (Fig. 3). Cotton plants are more susceptible to tarnished plant bug injury during the third through sixth weeks of flowering than at other times during the flowering period. Management decisions should be most aggressive during the third through sixth weeks of flowering.

The purpose of this bulletin is to highlight alternative management options and insecticide use strategies that have been shown to reduce the impact of tarnished plant bugs.

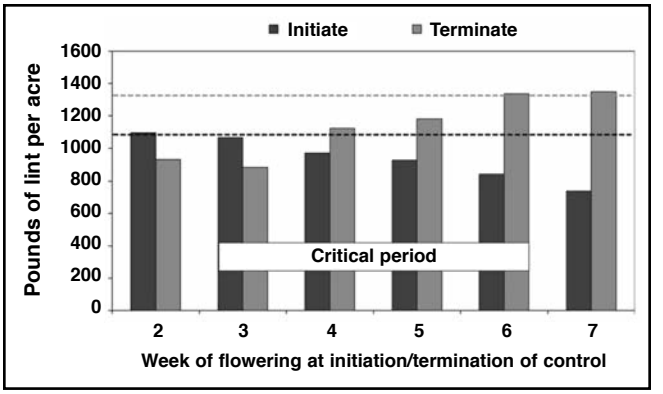

Figure 3. TPB Impacts on Yields.

MANAGEMENT OF SPRING HOST PLANTS

Midsouth populations of tarnished plant bugs utilize a wide range of native and crop hosts before infesting cotton fields. Figure 4 shows tarnished plant bug densities on henbit and shepherdspurse on March 26, 2007. Numbers exceeded 30 per 25 sweeps in this area. Tarnished plant bugs break diapause and utilize winter annuals such as these for a food source and for reproduction from February through June.

Research by scientists with the USDA-ARS has shown that managing spring hosts with a selective herbicide provides significant economic benefits in cotton. In Figure 5, bars A and B compare producer expenses for tarnished plant bug control in cotton fields located in herbicide-treated and nontreated areas. Treating marginal areas (turn rows, ditches, roadsides, etc.) with a selective herbicide during March to terminate broadleaf hosts provided a $5.90 per acre economic benefit for growers.

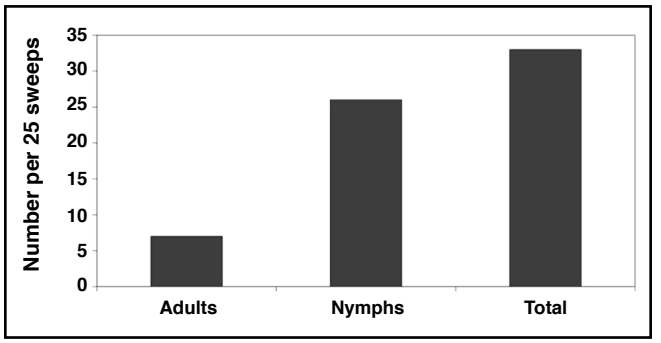

Figure 4. Population on Roadside Wild Hosts (March 26, 2007).

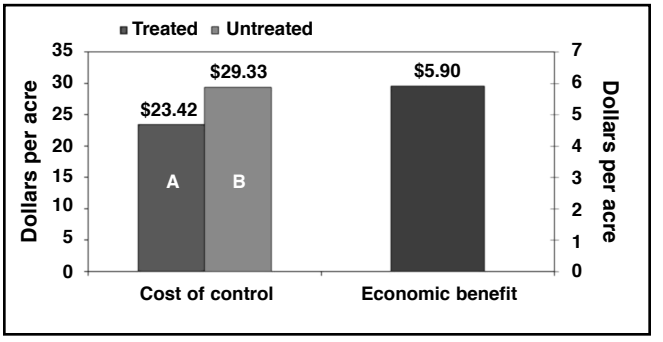

Figure 5. Economic Benefit of Areawide Management.

Variety Selection

Variety earliness can also influence tarnished plant bug management (Fig. 6 and 7). Figure 6 compares tarnished plant bugs in an early-season variety (DP 444 BR) with a late-season variety (DP 555 BR). The early variety reached cutout 1 week earlier than the late variety. The late variety did not reach cutout until after tarnished plant bug populations had peaked, and it required two additional insecticide applications. Figure 7 shows yields from different treatments applied to each of the varieties. The treatments included UTC (not treated), Season Long (sprayed twice weekly from pinhead square to cutout), Early Season (sprayed twice per week from pinhead square to first flower only), and Late Season (sprayed from first flower to cutout only). In the early-season variety, control during preflowering stages was more important than control during the flowering period. By contrast, both early-season and late-season control was important in the late-season variety to maximize yields.

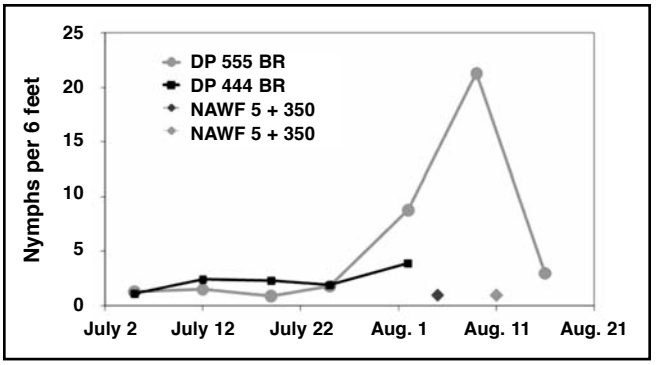

Figure 6. Plant Bugs in DP 444 vs. 555.

Planting date had a similar affect on tarnished plant bug management. Tarnished plant bugs had no impact on yield when cotton was planted in April. As planting date increased, yield losses from tarnished plant bug increased (23-42%, Fig. 8).

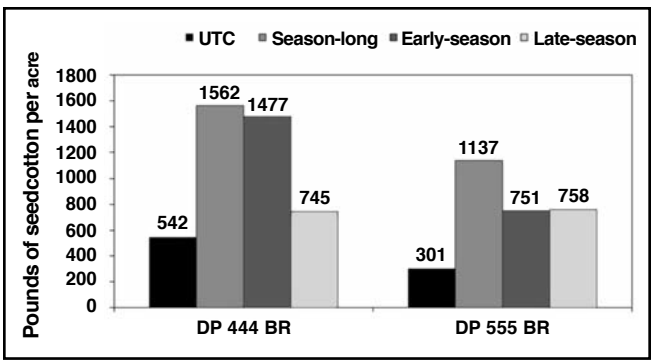

Figure 7. TPB Control in 444 and 555.

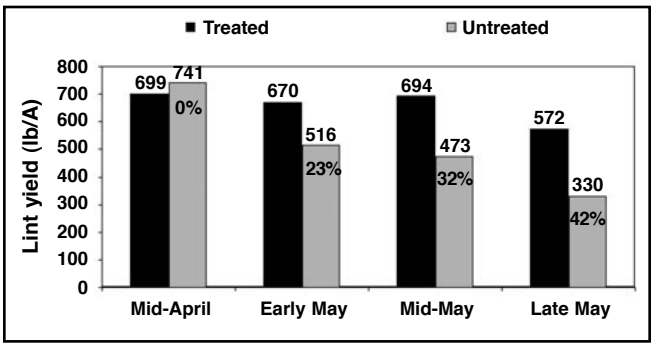

Figure 8. Impact of tarnished plant bugs on cotton yields at four different planting dates. Treated plots were sprayed once or twice per week throughout the season.

Managing Field Borders

Tarnished plant bug densities and subsequent crop injury are generally greater along field edges, especially where cotton is adjacent to corn. Arranging crops to minimize edges and planting cotton in large contiguous blocks can reduce plant bug injury.

Side-dress applications of Temik in cotton adjacent to corn or other plant bug sources may provide a significant economic benefit (Fig. 9). During 2007, these applications gave 60–80% control 10 days after treatment and 10–31% control 20 days after treatment.

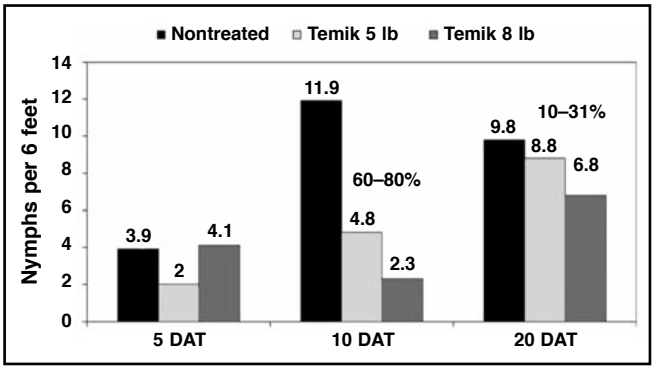

Figure 9. Temik Side-Band Applications.

Insecticide Application Strategies

As insecticide efficacy declines, all factors associated with the application procedures become more important. Figure 10 shows the impact of different nozzle types on plant bug control. Orthene, Centric, and Karate all provided better control when applied through hollow-cone nozzles compared with air-induction nozzles designed to produce larger droplets and reduce drift.

Against persistent infestations of tarnished plant bug, reducing application intervals between sprays can improve tarnished plant bug control (Fig. 11). A second application of Orthene at 0.5 pound of active ingredient per acre 4 or 5 days after the first 0.5-pound Orthene application provided 100% control. When the application interval was extended to 6 or 7 days, control declined to 70% and 20%, respectively.

Rotating insecticides in sequential applications is an effective means of maintaining efficacy against tarnished plant bugs (Fig. 12). The arrows at the bottom of the graph show application dates. On August 4, all 12 plots were treated with Orthene at 0.5 pound of active ingredient per acre. Five days later (August 9), four of the plots were treated with a second Orthene application (Line B), four plots were treated with Centric (2 ounces of product per acre, Line C), and four plots were not treated (Line A). Tarnished plant bug densities in the plots treated with two sequential applications of Orthene exceeded the action threshold 11 days after the second application. By contrast, plant bug numbers in the Centric-treated plots remained below threshold 11 days after the second application. All plots were sprayed with a third application of Orthene (0.5 pound of active ingredient per acre) 11 days after the second application.

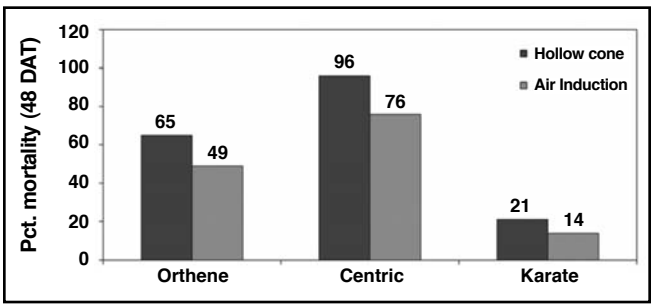

Figure 10. Impact of Nozzle Type on Plant Bug Control.

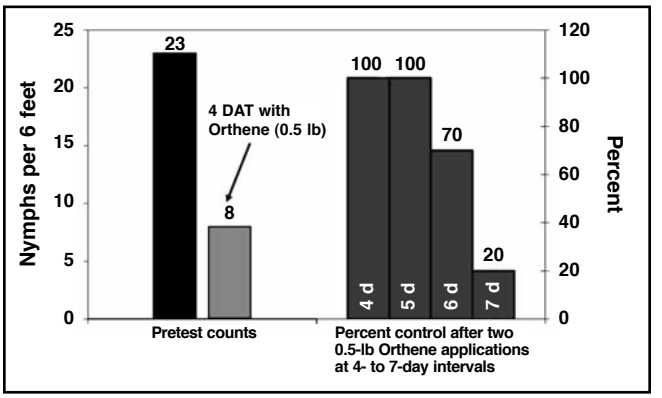

Figure 11. Insecticide Application Intervals.

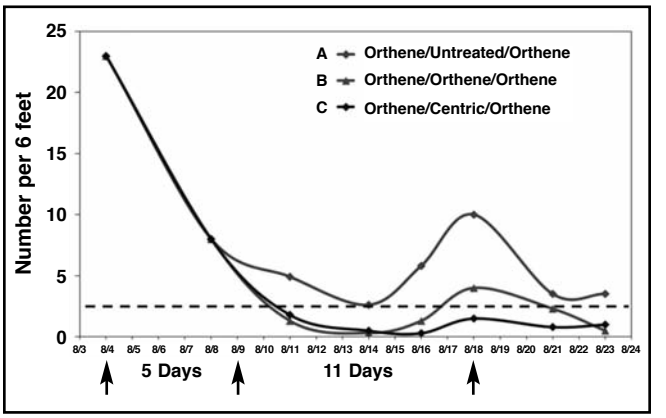

Figure 12. Insecticide Rotations.

Summary and Conclusions

Tarnished plant bugs have become difficult to manage in recent years, and insecticidal control has become erratic. Currently, there are very few insecticides available that provide adequate control and no new insecticides will be available in the near future. The management options outlined in this bulletin will not provide a "silver bullet" for plant bug control, but each of these strategies can reduce their impact in cotton. These strategies are designed to be used in conjunction with insecticides, appropriate scouting methods, and sound action thresholds to provide an overall management plan.

Common Spring Host Plants for TPB in Mississippi

Henbit

Weedy Roadside

Shepherdspurse

Geranium

Dock

Primrose

Printed on Recycled Paper

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