## AN IPM APPROACH TO TARNISHED PLANT BUG MANAGEMENT IN COTTON

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#### <u>Abstract</u>

The tarnished plant bug, *Lygus lineolaris* [Palisot de Beauvios], is the most economically important pest of cotton in the Mid-South. While early season feeding can delay plant maturity and cause deformed plants, most economic damage is caused by feeding from first square (flower bud) to early bloom. During this time, it is a direct pest feeding on squares, flowers, and small bolls. Numerous insecticide applications are needed to control this pest annually in the Mississippi Delta Region. Recent research has shown that multiple agronomic management practices such as planting date, leaf pubescence, and nitrogen rate can impact tarnished plant bug management. The objective of this research was to combine multiple best management practices to determine if we can reduce the reliance on chemical insecticides to manage this pest.

#### **Introduction**

The tarnished plant bug has become an increasingly difficult pest to manage in Mississippi cotton, as well as the entire mid-south. In the year 2000, there were 812,000 acres of cotton planted in the Mississippi Delta. The cost of treatment and loss caused by the tarnished plant bug was \$9.06 per acre. In the year 2013, there were only 215,000 acres of cotton planted in the Mississippi Delta and the tarnished plant bug cost growers \$77.14 per acre. Although there were almost 600,000 more acres planted in 2000, growers lost 24,149 more bales of cotton from the tarnished plant bug in 2013. The decline in cotton planted in the Mississippi Delta is directly related to the rise of the pest status of the tarnished plant bug. This is due to the difficulty to control the tarnished plant bug with many insecticides that were once effective at controlling the pest. In 2000, Delta growers averaged just over 1 insecticide application targeted at the tarnished plant bug per acre, while in 2013, 6 applications per acre were needed. The objective of this research is to develop an integrated pest management program targeted at the tarnished plant bug combining several "best management strategies" to reduce the reliance on insecticide applications needed and increase the profitability of the Mississippi Delta cotton crop.

# **Best Management Strategies**

There has been a lot research focused on the tarnished plant bug in recent years trying to develop the "best management strategies" for tarnished plant bug. Unpublished studies have shown that hairy varieties have a type of feeding deterrence when compared to smooth varieties in an untreated situation. Research done at Mississippi State on the impact of planting date and varietal maturity found less yield loss with both early planting dates and early maturing varieties (Adams et al., 2013). Another strategy being worked on deals with nitrogen rates. Unpublished data shows that nitrogen rates of 80 lbs. required fewer insecticide applications needed for the tarnished plant bug than 120 lbs. of nitrogen. The final strategy is the use of Diamond 0.83EC. This insecticide is an insect growth regulator targeted at nymphs. Several tests have shown that the application of Diamond during the third week of squaring is the optimum time to apply the insecticide to receive good control of nymphs and increase cotton yields.

# **Methods**

Trials were set up in two locations in Mississippi, the Hills and the Delta region. The Hills trial was conducted at the R.R. Foil Plant Science Research Center at Mississippi State University in Starkville, MS. The Delta trial was conducted at the Delta Research and Extension Center in Stoneville, MS. Plots consisted of four rows 1.02 m wide and 22.86 m long with a seeding rate of four seeds per foot. Two treatments were used, the first was "Maximizing all Tarnished Plant Bug Best Management Practices (TPB BMP)" and the other was the "Current Standard Approach." Data was collected weekly. During the first two weeks of squaring square retention was recorded as well and 100

sweeps were done per treatment. From the third week of squaring through bloom 8 drops were taken with a black drop cloth. Thresholds were based on the 2014 Insect Control Guide for Agronomic Crops from Mississippi State University.

#### Tarnished Plant Bug Best Management Practices

Early planting BMP's were used when Stoneville 5288B2RF was planted on April 21, 2014 in the Hills and on April 24, 2014 in the Delta. This variety was chosen due to its hairiness and the fact that it is a mid-season maturing variety. Eighty pounds of nitrogen were applied for the growing season and Diamond 0.83EC was applied at the third week of squaring.

### Current Standard Approach

Late planting dates were used when Delta Pine 1050B2RF was planted on May 27, 2014 in the Hills and on June 13, 2014 in the Delta. This variety was chosen due to its smooth nature and that it is a late season maturing variety. One hundred twenty pounds of nitrogen were applied for the growing season and there was no triggered application of Diamond 0.83EC at the third week of squaring.

#### **Results**

When considering the total number of insecticide applications made at each location, the use of TPB BMP's did reduce the number of insecticides needed in the Delta, although the Hills TPB BMP's required more applications than the Current Standard Approach (Figure 1). This can be attributed to the differences in pest pressure between the two locations. The Delta has historically had much higher pest pressure than the Hills and this IPM program is designed for areas where pest pressure is high. It is difficult to reduce the amount of applications made when minimum applications are needed.



Figure 1. Total Number of Applications Made

When looking at yield differences, the Delta BMP stood out as the highest yielding treatment. There was significant increase in yield in the Delta BMP's, 154.6% increase in lbs. of lint per acre over the standard. Although there was a yield increase in the Hills, 21.5% more lbs. of lint per acre in the BMP's, it was not significantly different (Figure 2.).



Figure 2. Pounds of Lint per Acre

Finally, when looking at net income the Delta BMP made \$830.60 more than the Delta standard, while the Hills BMP made \$105.02 more than the Hills standard (Figure 3).



Figure 3. Gross Income per Acre

#### <u>Summary</u>

In high pressure situations, such as the Mississippi Delta, the IPM approach combining the best management practices for the tarnished plant bug reduced the amount of insecticide applications needed and increased gross profits by \$830.60 per acre. In the low pressure Hills region, the IPM based approach to tarnished plant bug management increased the number of insecticide applications, but increased profits by \$105.02 per acre.

## **References**

Adams, B., Catchot, A., Gore, J., Cook, D., Musser, F., & Dodds, D. (2013). Impact of Planting Date and Varietal Maturity on Tarnished Plant Bug (Hemiptera: Miridae) in Cotton. [Article]. *Journal of Economic Entomology*, *106*(6), 2378-2383. doi: 10.1603/ec12330