MONITORING FOR VARIETAL RESISTANCE TO TARNISHED PLANT BUG IN MID–SOUTH COTTON

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Abstract

The tarnished plant bug is a major pest of cotton in the Mid-South. Growers routinely make 3-6 insecticide applications each year to control this pest in cotton. Resistance to insecticides as well as loss of key insecticides has limited grower's options to manage this pest economically. Therefore, information on possible host plant resistance is important to growers as well as decision makers. Host plant resistance does appear to be available when looking at varieties in small plot research. However, the level of resistance found in small plots may not translate to larger field plots (preference vs true resistance/tolerance). It is important to evaluate possible resistant varieties in larger plots to verify their level of resistance to tarnished plant bugs. Large plot studies verifying resistance found in small plots were conducted as part of a continuing study. Results of these studies show that resistant varieties require approximately half as many insecticide applications as susceptible varieties and often do not require any insecticides until late in the season when compared to susceptible varieties.

Introduction

The tarnished plant bug, *Lygus lineolaris* (Palisot de Beauvois) is a major pest of cotton in the mid-Southern United States (Williams 2014). It is not uncommon for growers to make 3-6 applications of insecticide to control this pest in a normal growing season while some may make as many as 10 applications in situations of heavy pest pressure. Insecticides have been the primary line of defense against this pest in the past. However, the tarnished plant bug is developing resistance to many of the insecticides commonly used for control of this important pest (Hollingsworth et al. 1997, Holloway et al. 1998, Snodgrass and Scott 1988, Snodgrass and Elzen 1995, Snodgrass 2006). Reliance solely on insecticides to control a pest is not a good IPM practice, particularly with fewer effective products becoming available or are lost as recommended control options (Studebaker 2015). Some cotton varieties appear to exhibit a high level of resistance to tarnished plant bugs in ultra-small plots. However, data from small 1 or 2 row plots may imply that the insect merely prefers one variety over another instead of the variety being truly resistant. Varieties showing high levels of resistance in small plots should be tested in larger plots to determine the true level of resistance to tarnished plant bugs. The objective of this study was to take cotton varieties exhibiting a high level of resistance to the tarnished plant bug in small research plots and verify that resistance in much larger research plots.

Materials and Methods

Varieties that exhibited resistance as well as several that were highly susceptible in small plot research trials were planted into large plots at the Northeast Research and Extension Center, Keiser, AR during the 2015 growing season. Varieties used are reported in Table 1. Plot size was 24 rows in width by 100 ft in length. Plots were randomized and arranged in a split-plot design with both treated and untreated for tarnished plant bugs within each variety. Treated plots were sprayed with acephate at 0.75 lbs/acre when tarnished plant bugs reached the recommended treatment threshold of 3 plant bugs per 5 row feet. Tarnished plant bug numbers were determined by taking 2 shake sheet samples from the center of each plot on a weekly basis throughout the growing season until cotton reached cutout (NAWF=5) plus 250 accumulated heat units. Heat units were determined on a DD60 heat unit scale. Plots were taken to yield by harvesting the center rows in each plot with a small plot cotton picker.

Table 1. Cotton varieties tested in large plots in 2015.

Variety	Resistant	Susceptible
PHY 375 WRF		X
ST 5289 GLB2	X	
PHY 499 WRF		X
PHY 312 WRF		X
ST 4946 GLB2	X	
AM 1511 B2RF	X	

Results and Discussion

Tarnished plant bug populations reached a peak of over 45 per 10 row feet in the susceptible variety PHY 375 WRF (Figure 1). Tarnished plant bug numbers are reported in levels per 10 row-ft, therefore the economic threshold in the figure would be six. All varieties reached treatment threshold during the 2nd and 3rd week of flowering. Susceptible varieties required two more additional insecticide applications to control tarnished plant bugs. Yield loss was determined by subtracting yields from the untreated plots from those that were treated at threshold and is reported in Figure 2. The three resistant varieties experienced yield losses in the range of 225 to 365 lbs per acre while the three susceptible varieties had losses in the 500 to 700 lb range (Fig. 2). Lower yield losses would indicate there is some level of resistance or perhaps tolerance in these varieties.

Figure 1. Tarnished plant bug density in untreated plots in 2015

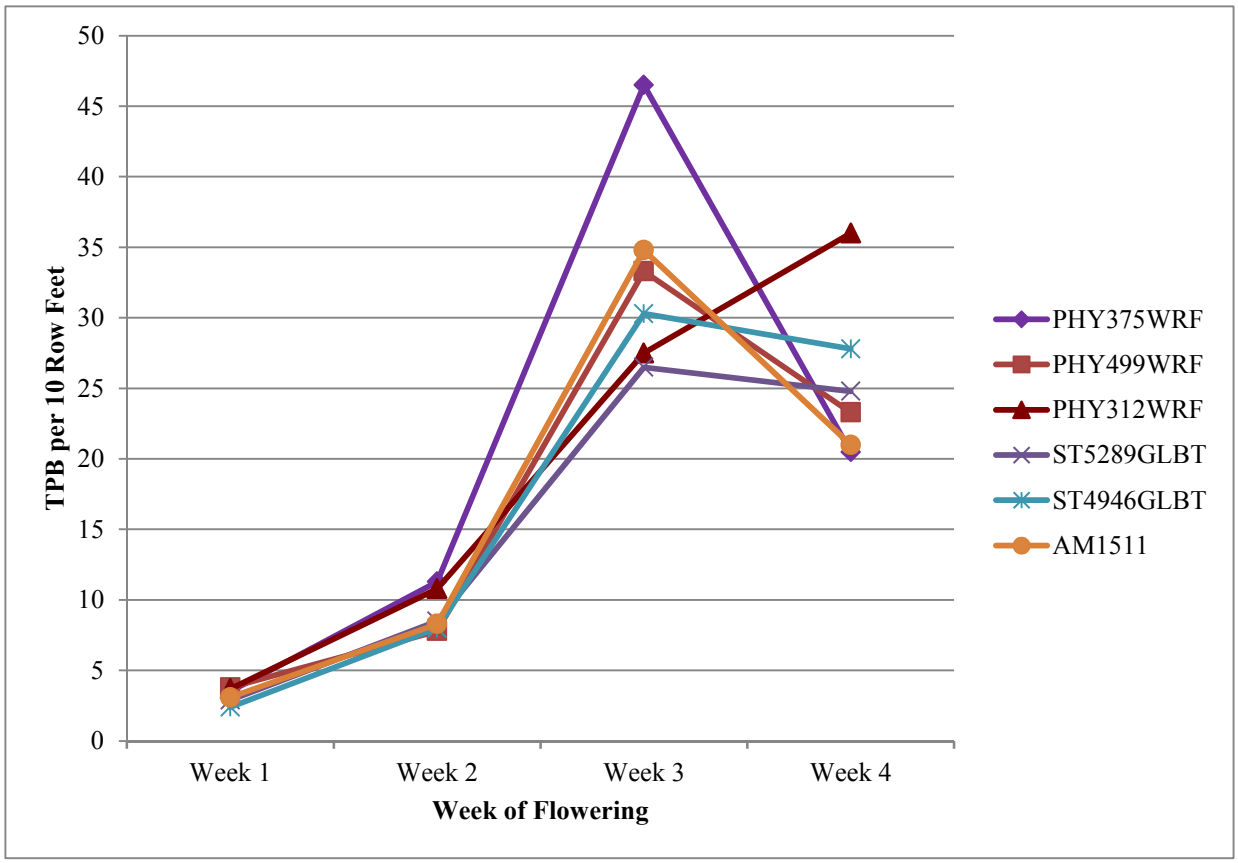
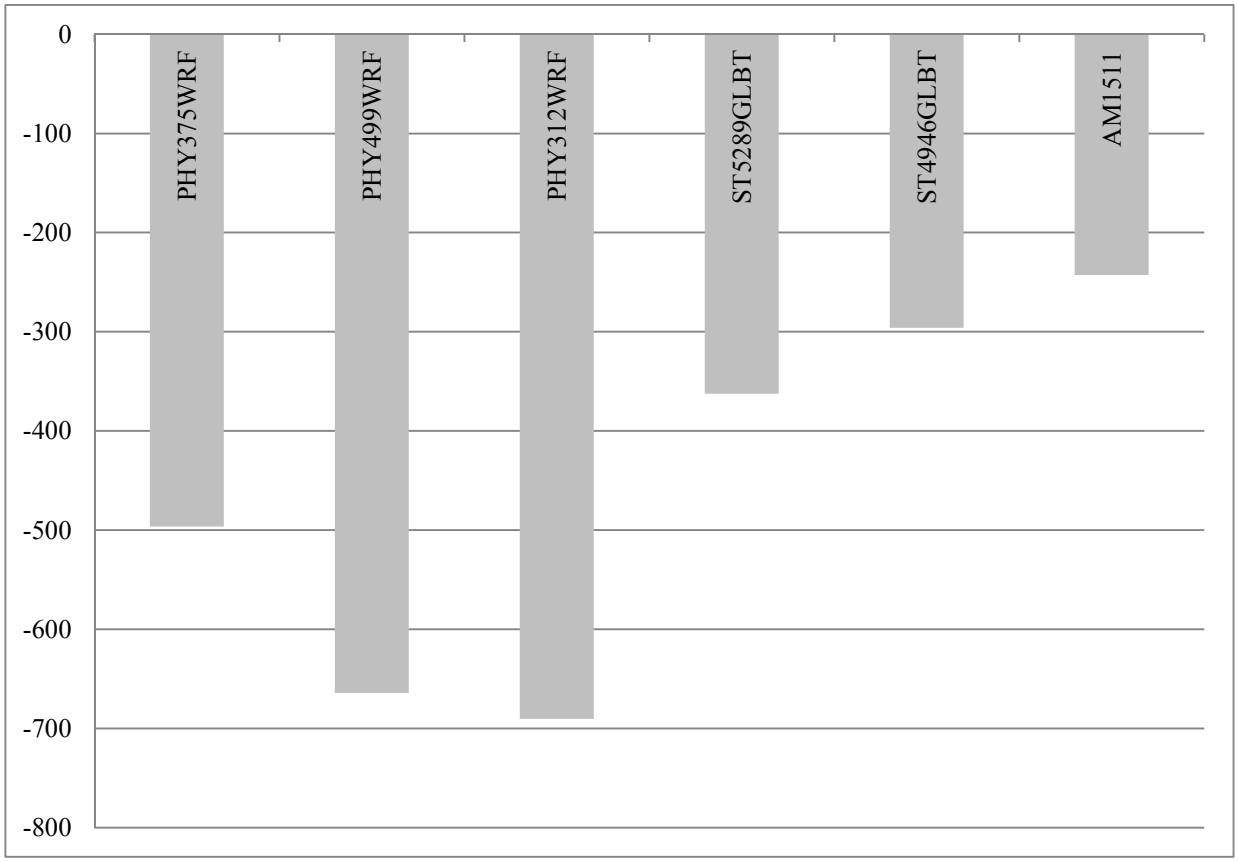


Figure 2. Seed cotton yield loss from tarnished plant bugs in 2015



Summary

Resistance measured in small plots does appear to translate to large plots as well as to grower fields. On average, resistant varieties required half as many insecticide applications for tarnished plant bugs. By utilizing resistant or tolerant varieties growers could minimize yield loss and reduce costs associated with tarnished plant bugs. As resistance issues continue to develop, an added benefit is the possible delay of insecticide resistance development in this insect by reducing the number of insecticide applications.

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