MONITORING TARNISHED PLANT BUG RESISTANCE IN COTTON VARIETIES

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Abstract

Tarnished plant bug, *Lygus lineolaris* (TPB) is one of the most prominent pests of cotton in Arkansas. It has been ranked as the number one pest of cotton, causing the highest crop losses in recent years. The objective of this research study was to evaluate TPB populations on a range of cotton (*Gossypium hirsutum* L.) cultivars that vary in their resistance to TPB in larger plots (16 rows by 100 feet). Four cultivars (DP 1518B2XF, DP 1820B2XF, PHY 350W3FE and ST 4949GLT) exhibited minimal yield loss under high TPB populations. These data could potentially reduce the number of grower insecticide applications as well as delay resistance to commonly used insecticides and provide growers with additional knowledge of what cotton cultivars work best for their pest management programs.

Introduction

Tarnished plant bug (TPB) has risen as the most prominent pest in cotton in Arkansas causing the highest crop losses each year since 2004 (Williams, 2017). Insecticides are the most commonly used tool for managing TPB in cotton (Studebaker, 2018). Due to the growing development of resistance in the TPB to some of the most commonly used insecticides, it is important to evaluate other management options such as host plant resistance. Host plant resistance is one of the main tenants of integrated pest management and can be a useful tool in managing insect pests (Studebaker et al., 2008). Previous small plot research has indicated certain cotton cultivars to be less attractive to TPB. Therefore, large plot studies such as this are needed to validate conclusions made from small plot studies.

Materials and Methods

A field trial was planted on the Northeast Research and Extension Center at Keiser to validate TPB resistance in larger field plots. Plots were 16 rows by 100 feet long arranged in a randomized complete block design with four replications. Six varieties showing resistance from the 2017 small plot data (ST 4949GLT, PHY 312WRF, PHY 350W3FE, PHY 430W3FE, DP 1518B2XF and DP 1820B2XF) were evaluated. CROPLAN 9608B3XF and DG 3214B2XF were planted as susceptible checks to validate TPB populations within the test. 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.

Results and Discussion

Tarnished plant bug populations were high, reaching a peak of over 75 per 10 row feet in some varieties near the end of the season (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 economic threshold. CROPLAN 9608B3XF, DP 1518B2XF, PHY 350W3FE and PHY 430W3FE reached threshold three times, while ST 4949GLT, PHY 312WRF, DP 1820B2XF and DG 3214B2XF reached threshold four times. Yield loss was determined by subtracting yields from the untreated plots from those that were treated at threshold and is reported in Figure 2. PHY 350W3FE, DP 1820B2XF, DP 1518B2XF and ST 4949GLT had the lowest yield loss, while PHY 312WRF, PHY 430W3FE, CROPLAN 9608B3XF and DG 3214B2XF had the highest yield losses (Fig. 2). Lower yield losses would indicate there is some level of resistance or tolerance in ST 4949GLT, PHY 350W3FE and DP 1820B2XF. Results have been variable with some varieties over time. DP 1518GLT has exhibited some resistance in small plots, yet it has shown the highest yield loss in large plots the previous two years (Studebaker et al. 2017, Jackson et al. 2018). However, this year DP 1518GLT had little yield loss from TPB, indicating large plot data correlates well with small plot data. Similar results were exhibited by PHY 312WRF with high yield loss three years ago and this year, yet showing low losses the two years in between (Studebaker et al. 2017, Jackson et al. 2018). This may indicate that resistance may be affected by environmental factors or other growing conditions in these varieties. Results from this variety test indicate the need to continue to verify resistance found in ultra- small plots.

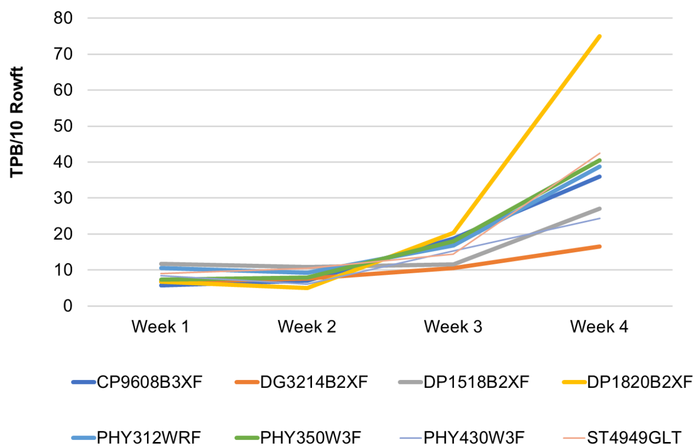

Figure 1. Tarnished Plant Bug Density in Untreated Plots

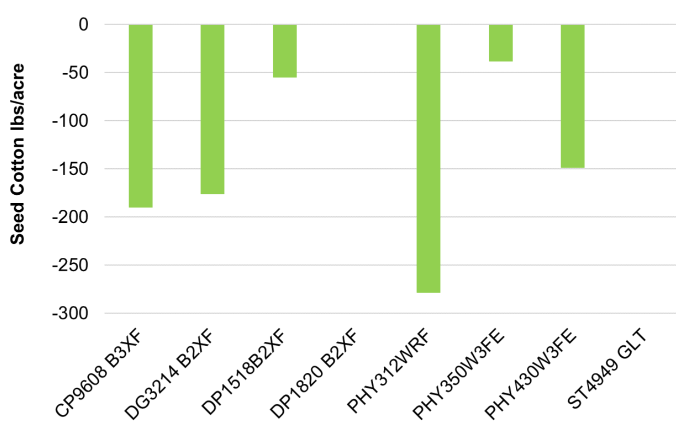

Figure 2. Lint Yield Loss from Tarnished Plant Bug (lbs/acre).

Summary

While resistance/tolerance is evident in some varieties, they still may require multiple applications to control TPB under heavy pressure. However, it appears that with some varieties, yield loss is reduced, even under high TPB populations. Environmental conditions may also influence the expression of resistance in certain varieties, resulting in variable results in large plots.

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