# EVALUATION OF SUSCEPTIBILITY TO TARNISHED PLANT BUG IN COTTON CULTIVARS EXHIBITING RESISTANCE IN ULTRA-SMALL PLOTS G. Studebaker F. Bourland C. Spinks University of Arkansas System Division of Agriculture

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## <u>Abstract</u>

Tarnished plant bug (TPB), Lygus lineolaris is one of the most damaging 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). Two cultivars (PHY 390 W3FE and PHY 350 W3FE) exhibited low yield loss under high TPB populations. One cultivar, Armor 9608B3XF showed no significant yield loss under high TPB populations indicating potential useful resistance to TPB. Use of 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**

The tarnished plant bug (TPB) is a key pest of cotton in the Mid-South (Williams, 2016). Increasing levels of insecticide resistance as well as loss of key insecticides has limited grower's options to control this pest. Overuse of insecticides can also have adverse effects on predatory insects and pollinators. Host plant resistance in an important component of IPM and should not be overlooked. Utilizing varietal resistance as a tool for TPB management in cotton should reduce the number of insecticide applications made annually for this pest, help delay the further development of insecticide resistance and reduce long term effects on non-target organisms. As new cultivars become available, it is important that their level of resistance or susceptibility to tarnished plant bug should be evaluated.

## **Materials and Methods**

A field trial was planted on May 20, 2021 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. Seven cultivars showing resistance from the small plot data from the previous year (NG 3195 B3XF, DP 1646 B2XF, DP 1725 B2XF, PHY 360 W3FE, PHY 390 W3FE, PHY 350 W3FE and Armor 9608 B3XF) were evaluated. DG 3317 B3XF was also evaluated as a susceptible check to validate TPB populations within the test.

Treated plots were sprayed with acephate at 0.75 lb./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 eight center rows in each plot with a small plot cotton picker. All data were analyzed using Agriculture Research Manager (ARM) version 2020 software. Means were separated using LSD at the p=0.05 level.

### **Results and Discussion**

Tarnished plant bug populations were high, reaching a peak of 21 per 10 row feet in DG 3317B3XF (susceptible) as well as DP 1646B2XF on week 3 (Fig. 1). Tarnished plant bug numbers are reported in levels per 10 row-ft, therefore the economic threshold in the figure would be six. Cultivars could be divided into three separate groups based on TPB numbers in untreated plots. DG 3317B3XF, DP 1646B2XF and NG 3195B3XF had overall high populations; PHY 350W3FE, PHY 360W3FE and PHY 390W3FE had moderate populations, while TPB numbers remained low in DP 1725B2XF and Armor 9608B3XF throughout the season (Fig. 1). Cultivars reached economic threshold ranging from 2 to 4 times throughout the season. All eight cultivars reached threshold at least twice. Yield

loss was determined by subtracting yields from the untreated plots from those that were treated at threshold and is reported in Table 1. Armor 9608B3XF was the only cultivar that did not experience significant yield loss due to TPB (Table 1, P=0.05). Lack of significant yield loss indicates there is a good level of resistance or tolerance in Armor 9608B3XF. The B2XF version of this cultivar was also evaluated in 2019 and did not experience any significant yield loss that year as well (Table 1). Both Armor 9608B3XF and DP 1725B2XF experienced similar TPB populations throughout the season, both reaching economic threshold twice. However, DP 1725B2XF experienced yield loss similar to the susceptible check DG 3317B3XF and both had approximately 1000 lbs. more loss in yield than Armor 9608B3XF. While DP 1725B2XF exhibited decent resistance in ultra-small plots in previous years, this did not translate in the large plot study.

While resistance/tolerance is evident in some cultivars, they still may require multiple applications to control TPB. However, it appears that with some varieties, (Armor 9608 B3XF for example) yield loss is reduced. Environmental conditions may also influence the expression of resistance in certain cultivars, resulting in variable results in large plots.

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#### **References**

Williams, M.R. 2016. Cotton Insect Losses. 2015. pp. 507-525. In: Proc., Beltwide Cotton Prod. Res. Conf., New Orleans, La. 5-7 Jan. National Cotton Council, Memphis, Tenn.



Figure 1. Tarnished plant bug numbers in untreated plots for each cultivar.

Cultivar	Yield Loss (lb. seedcotton/acre)		
	2021	2020	2019
DG 3317 B3XF (susceptible check)	1423.4* (3)	1056.3* (4)	
DP 1646 B2XF	875.8* (3)	609.8 (2)	583
NG 3195 B3XF	1059.9* (4)	859.8* (2)	
DP 1725 B2XF	1393.7* (2)	860.3*(2)	1080*
PHY 360 W3FE	899.8* (2)	306.0 (2)	
PHY 390 W3FE	609.4* (3)		
PHY 350 W3FE	630.0* (2)		246.2
Armor 9608 B3XF	485.9 (2)		5.1

Table 1. Seedcotton yield loss attributed to tarnished plant bug

\* - indicates cultivars with losses that were statistically significant (P=0.05). Number in parenthesis indicate the number of times cultivar was treated for TPB.