

TARNISHED PLANT BUG RESPONSE TO COTTON VARIETIES**Glenn E. Studebaker****Fred M. Bourland****University of Arkansas Division of Agriculture
Keiser, AR****Abstract**

Tarnished plant bug (TPB) response to several cotton varieties (ST4554B2RF, DP117B2RF, SG105, ST393 and TX-Frego) was evaluated in 2007 and 2008. Each variety was treated at two treatment thresholds, 3 and 5 TPB/5 feet plus an automatic weekly application and an untreated control. Movement of TPB from TX-Frego into ST4554B2RF, SG105 and ST393 was also evaluated. TX-Frego required treatment at the 3 TPB/5 feet threshold 4 times in 2007 and 2 times in 2008. TX-Frego reached the 5 TPB/5 feet level 3 times in 2007, but never reached that level in 2008. DP117B2RF required treatment 2 times at the 3 TPB/5 feet threshold and 1 time at the 5 TPB/5 feet threshold. SG105 required treatment 2 times at the 3 TPB/5 feet threshold and 1 time at the 5 TPB/5 feet threshold. ST393 was evaluated in 2008 reaching the 3 TPB/5 feet level once. ST4554B2RF required treatment 1 time at the 3 TPB/5 feet threshold and 1 time at the 5 TPB/5 feet threshold in 2007, but did not reach either treatment level in 2008. TX-Frego had the highest yield loss of 326 lbs lint/acre in 2007. TX-Frego was also evaluated for possible utility as a trap crop for TPB management in cotton. TX-Frego consistently had higher TPB populations than the other adjacent cotton varieties. TPB numbers were higher within the first 7 rows of cotton next to TX-Frego with numbers significantly dropping at a distance of 12 rows away from TX-Frego.

Introduction

Tarnished plant bug (TPB) has risen in status as one of the most prominent pests of cotton in the mid-south. In Arkansas TPB has been ranked the number one pest of cotton, causing the highest crop losses each year since 2004 (Williams 2007). Insecticides are the most commonly used tool for managing TPB in cotton by growers. However, there is growing concern over the development of insecticide resistance in the TPB to some of the most commonly used insecticides such as acephate and dicotophos. Host plant resistance is one of the main tenants of integrated pest management and can be a useful tool in managing insect pests. Recent research indicates that certain cotton varieties are less attractive to TPB. ST4554B2RF has shown lower damage to large squares in small (2 row) plot trials in NE Arkansas. In the early 1970's frego-bract cotton lines were found to be much less attractive to boll weevil (Mitchell et al. 1973). However, it was also discovered that these lines were very attractive to TPB (Lincoln et al. 1971). The attractiveness of frego-bract cotton may make it a potential candidate as a trap crop for managing TPB in mid-south cotton production.

The objective of this research study was to evaluate the attractiveness of a range of varieties that vary in their attractiveness to TPB in larger plots (12 rows x 75 feet). A second aspect of the research was to examine the movement of TPB from a highly attractive frego-bract variety into ST4554B2RF, a much less attractive variety, and evaluate the utility of frego-bract lines as a trap crop for TPB.

Materials and Methods

ST4554B2RF (low attraction to TPB), DP117B2RF (moderate attraction), SG105 (moderate), ST393 (moderate) and TX-Frego (highly attractive) cotton varieties were planted in 12 row by 75 foot plots replicated 4 times at the Northeast Research and Extension Center in Keiser, AR in 2007 and 2008. DP117B2RF and SG105 were only evaluated in 2007 and were not used in 2008 due to lack of availability of seed. ST393 showed similar attractiveness to SG105 and was used in 2008. Plots were arranged and analyzed in a Factorial design with variety and threshold being the two factors. Plots were monitored weekly for TPB with a drop cloth and treated with 0.5 lbs acephate/acre according to the following thresholds:

- 1) Automatically treated each week
- 2) 3 TPB per 5 row feet
- 3) 5 TPB per 5 row feet
- 4) Untreated control

Eight row strips of TX-Frego were planted next to 12 row strips of ST4554. TPB numbers were monitored weekly

at distances of 1, 7 and 12 rows over from the TX-Frego to detect movement from Frego into ST4554. All plots were taken to yield at the end of the growing season.

Results and Discussion

TPB populations were much higher in 2007 than in 2008. In both years TX-frego cotton had higher numbers of TPB than the other varieties in the untreated plots (Figures 1 and 2). TX-frego reached the 3 TPB/5 feet treatment threshold 4 times in 2007 and 2 times in 2008 (Figure 3). ST4554B2RF reached the 3 TPB/5 feet threshold once in 2007 and zero times in 2008 (Figure 3). The other varieties were in between TX-frego and ST4554B2RF (Figure 3) which correlated well with the small 2 row plot data from previous years. Yield for 2007 are reported in Table 1. There was a significant interaction between variety and threshold ($\text{Prob}(F)=0.0001$). TPB had the biggest impact on yield in TX-frego in 2007. There was little impact on ST4554B2RF yield at the higher TPB thresholds. However, there did appear to be negative effects from weekly applications of acephate on this variety, with this treatment having the lowest yield in the test (Table 1). This negative effect did not show up in 2008 (Table 2). Yields for 2008 are reported in Table 2. There were no significant differences in yield in 2008 ($\text{Prob}(F)=0.86$). This was most likely a result of the low TBP numbers throughout the 2008 growing season.

TPB movement data from TX-frego into ST4554B2RF is shown in Figure 5. TPB numbers were extremely low in the test until July 30. On the Jul 30 and Aug 4 sample dates TPB numbers in frego were significantly higher than in the adjacent ST4554. In ST4554 TPB numbers were significantly higher in the first row adjacent to frego than numbers in the 7th and 12th rows over on both these dates. There were no significant differences on the last sampling date (Aug 13).

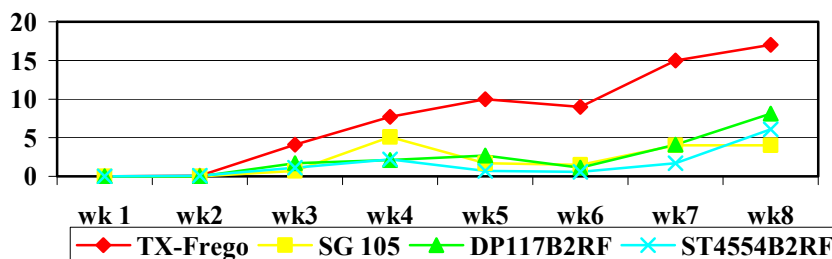


Figure 1. TPB per 5 row feet in untreated control plots in 2007.

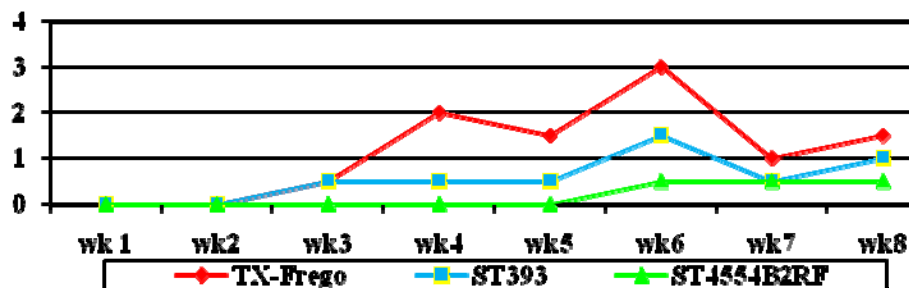


Figure 2. TPB per 5 row feet in untreated control plots in 2008.

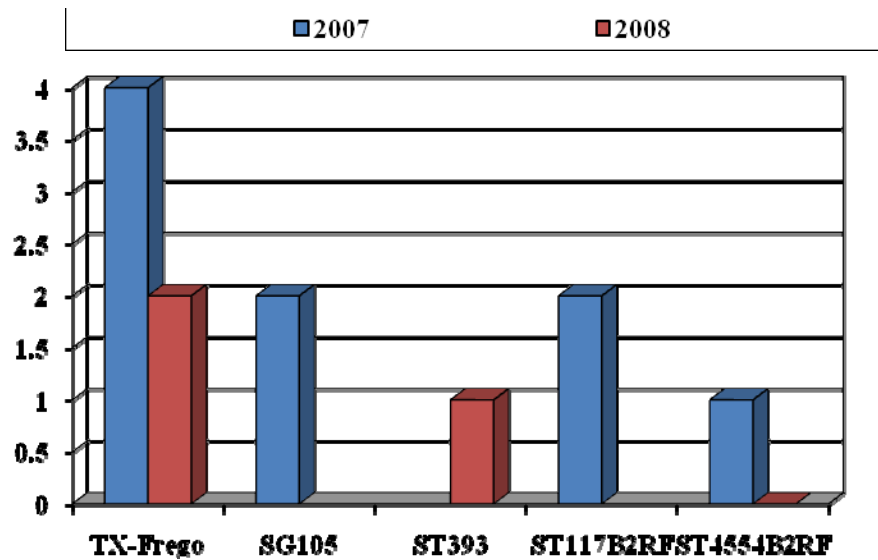


Figure 3. Number of times the 3 TPB/5 row feet threshold was reached in 2007 and 2008.

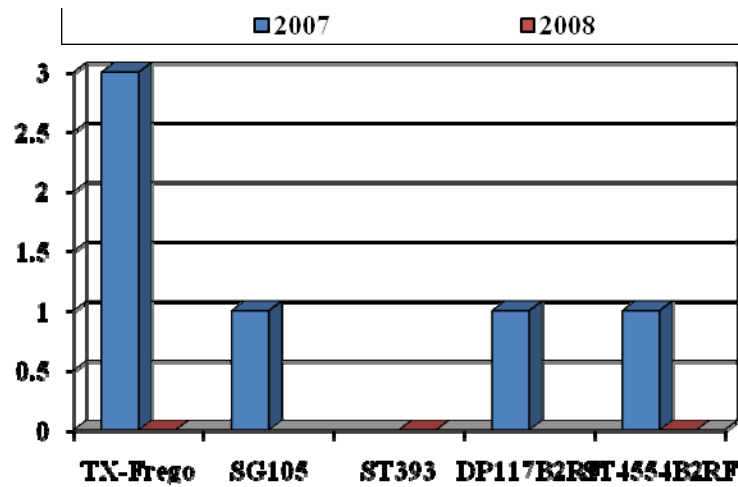


Figure 4. Number of times the 5 TPB/5 row feet threshold was reached in 2007 and 2008.

Table 1. Variety by TPB threshold cotton yields in 2007.

Threshold	TX-Frego	SG105	DP117B2RF	ST4554B2RF
Weekly	1047	1366	1246	996
3 TPB/5 feet	1032	1074	1168	1159
5 TPB/5 feet	982	1188	1130	1090
Untreated	730	953	1151	1070
LSD=122				

Table 2. Variety by TPB threshold cotton yields in 2008.

Threshold	TX-Frego	SG393	ST4554B2RF
Weekly	1118	1366	1375
3 TPB/5 feet	1118	1344	1364
5 TPB/5 feet	1001	1264	1209
Untreated	1086	1231	1318
LSD	NS	NS	NS

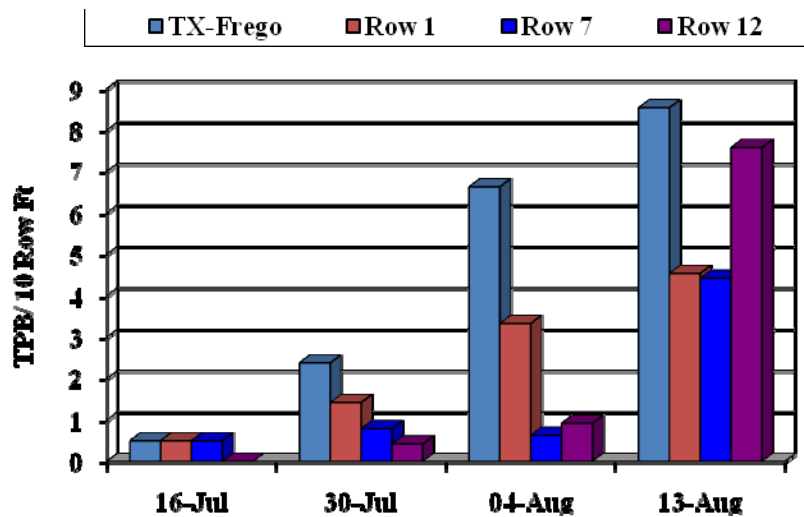


Figure 5. TPB in ST4554B2RF next to TX-frego.

Summary

Both studies verify that frego-bract cotton is much more attractive and negatively affected by TPB. In both years ST4554B2RF reached treatment threshold for TPB fewer times than the other varieties evaluated. The varieties that showed intermediate attractiveness to TPB in ultra-small plots also showed intermediate attractiveness in the large plots evaluated in this test. The movement study indicates that frego-bract cotton may be a candidate as a trap crop for TPB. At least under low TPB populations, frego-bract cotton appears to attract and hold TPB while next to a less attractive cotton variety. TPB numbers did not begin to increase in the adjacent ST4554 until mid-August. This movement into ST4554 appeared to be correlated to the TX-frego variety reaching cut-out and no longer being as attractive to TPB.

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