UTILIZING VARIETAL RESISTANCE TO MANAGE TARNISHED PLANT BUGS IN COTTON

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Abstract

The tarnished plant bug (TPB) is the most important pest of cotton in Arkansas and the mid south. Large-plot trials were conducted at the University of Arkansas Northeast Research and Extension Center to evaluate the attractiveness and infestation levels of TPB on different commercially available cotton varieties during the 2008-2011 growing seasons. TPB numbers were monitored throughout each growing season and yields were taken at the end of each growing season. Varieties showing TPB resistance (ST4554B2RF, ST5458B2RF, ST4498B2RF and DP0935B2RF) reached the mid-south treatment threshold of 3 TPB/5 row-feet an average of 1.1 times over the 4 year period. Susceptible varieties (PHY375WRF, AR48, FM1704B2RF) reached the threshold an average of 2.3 times over the same period. In a survey of 24 commercial grower fields in Northeast Arkansas, resistant varieties were treated for TPB an average of 1.4 times versus an average of 3.2 times for susceptible varieties.

Introduction

The tarnished plant bug (TPB) is one of the most important pests of cotton in Arkansas. From 2004 to 2010 it caused more yield losses than any other pest averaging a loss of 49,787 bales per year in Arkansas (Williams 2010). Applying recommended insecticides when TPB reach treatment threshold is the most commonly used option to manage this pest (Studebaker 2011). However, increasing levels of resistance to insecticides are beginning to make some chemistries less effective. Therefore, it is important to evaluate other options for TPB management. Recent data from small plot studies has indicated that some commercially grown varieties may be less attractive or exhibit some level of resistance to TPB. Large block studies were conducted in 2008-2011 to evaluate the resistance of several varieties that exhibited low damage from TPB in small plot studies in previous years. Surveys were also conducted on commercially grown cotton fields in Northeast Arkansas to determine the difference in the amount of TPB insecticide applications being made on resistant and susceptible varieties in 2011.

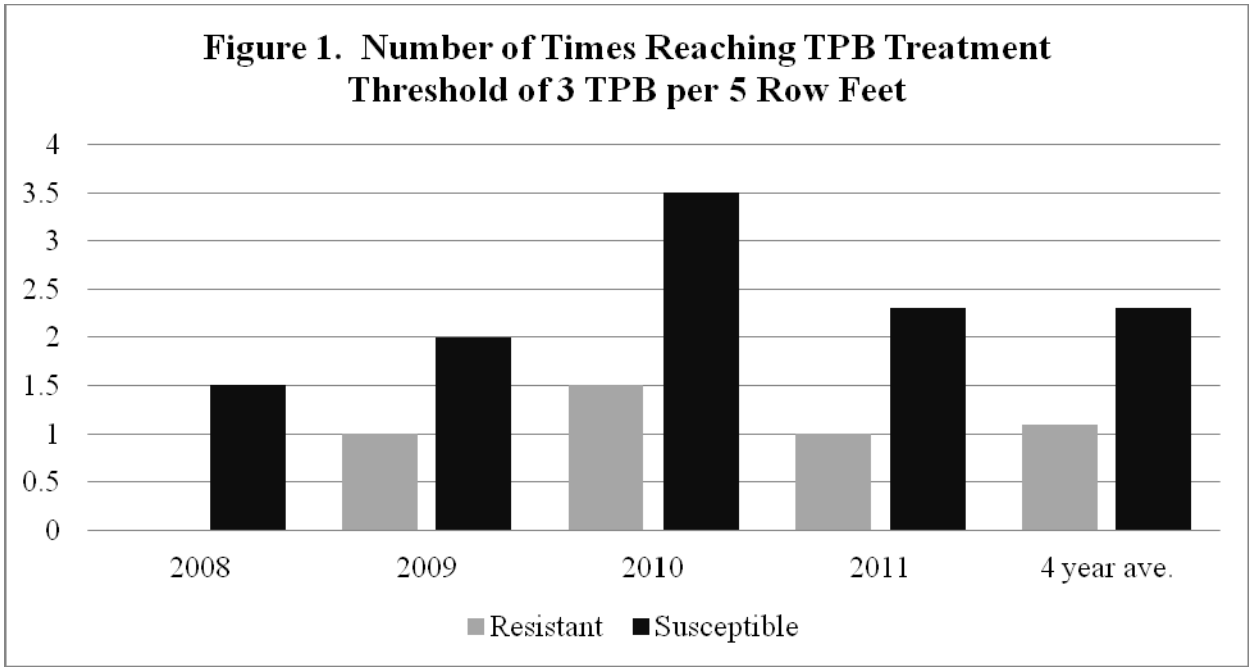
Materials and Methods

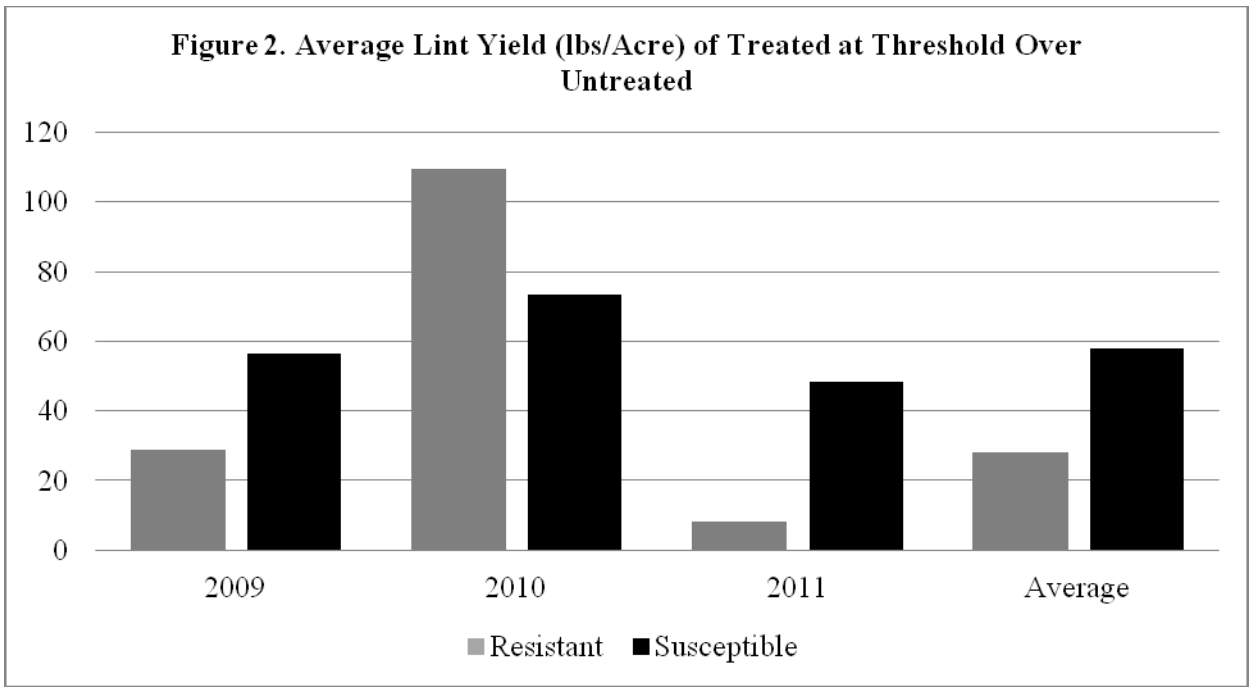
Trials were conducted at the Northeast Research and Extension Center, Keiser, AR. Plots were 16 to 24-rows by 90-ft long arranged in a randomized complete block design with 3 to 4 replications. Varieties showing low damage in small plots that were evaluated were; ST4554B2RF, ST5458B2RF, ST4498B2RF, and DP0935B2RF. Varieties exhibiting high damage in small plots that were evaluated were, FM1740B2RF, AR48, and PHY375WRF. Each variety had two treatment regimes; an untreated check and treated when TPB numbers reached 3/5 row-ft. Plots were sampled weekly. When TPB reached the treatment level of 3 bugs per 5-row feet, treatments were applied with a high clearance sprayer calibrated to deliver 10 gpa through two hollow cone nozzles per row. Acephate at 0.75 lbs ai/acre was applied when threshold was reached. In most years plots did not reach treatment level until after bloom. Yields were taken from the center 4-rows of each plot at the end of each season with the exception of 2008. All data were analyzed using Agricultural Research Manager (ARM) version 8 software (Gylling). Treatment means were separated at the P=0.05 alpha level. Grower fields were surveyed during the growing season of 2011. A field planted to a resistant variety was compared to another field planted to a susceptible variety in close proximity. A total of 12 resistant and 12 susceptible fields were monitored throughout the growing season.

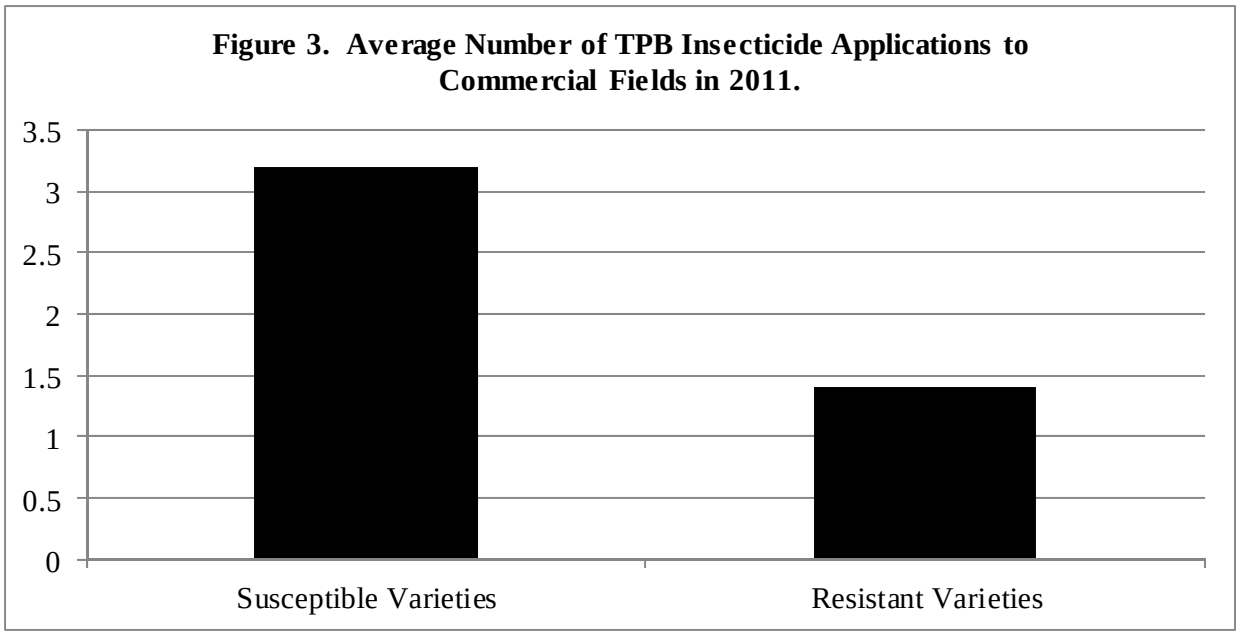
Results and Discussion

The comparative number of times resistant and susceptible varieties reached a treatment threshold of 3 TPB/5 row-ft in the large plot studies each year are shown in Figure 1. Resistant varieties averaged 1.1 TPB insecticide applications while susceptible varieties required approximately twice as many applications, 2.3 TPB apps, over the course of the study. Average increase in lint yields over untreated plots are shown in Figure 2. While resistant varieties consistently reached TPB treatment threshold fewer times than the susceptible varieties, yields were not consistently higher in the treated plots with these same varieties (Figure 2). One would expect yield increases to be lower over treated plots in resistant varieties that typically reach treatment threshold less often than susceptible

varieties which did occur in 2009 and 2011 (Figure 2). However, the opposite occurred in 2010, with the larger yield increase occurring in the resistant varieties. The results of the commercial grower field surveys are shown in Figure 3. Resistant varieties were treated for plant bugs an average of 1.4 times while susceptible varieties were treated an average of 3.2 times in 2011.







Summary

Resistant varieties received approximately half as many TPB insecticide applications throughout the course of the study. Yield increases were detected when varieties were treated at the TPB threshold and this increase was more pronounced with susceptible varieties in two of the three years. In 2010 the yield increase was more pronounced in the resistant varieties.

Results of the replicated plot studies did appear to translate to commercially grown cotton fields. On average the fields planted to resistant varieties received approximately half as many TPB insecticide applications when compared to susceptible varieties. By utilizing resistant varieties, growers could potentially reduce insecticide applications for TPB in half. Reducing the number of applications for this pest could also reduce the incidence of flaring other secondary pests, particularly cotton aphids and spider mites, providing additional savings to the grower as well as reducing the potential pesticide load to the environment.

Acknowledgements

The authors would like to thank Cotton, Inc., for sponsoring the large plot research, EPA for sponsoring the demonstrations and surveys and the Northeast Research and Extension Center for providing a location to conduct the studies.

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