

Resistance to Tarnished Plant Bugs in Cotton Varieties?

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Since boll weevils have been essentially eradicated, and Heliothine species (worms) are mostly controlled by Bt cotton, tarnished plant bug (TPB) has become the major insect pest in the mid-south cotton. Resistance to TPB is needed to reduce injury to the crop and to reduce cost of control. The primary known source of resistance to TPB is the nectariless trait. Plants that do not produce nectar are less attractive to TPB, and will harbor lower populations of the insect. Nectariless varieties have been made available to producers, but none are now widely grown. Varieties having dense pubescence have also been shown to resist TPB when compared to glabrous or smooth varieties. However, these traits only provide a partial degree of resistance. Newly developed transgenic varieties that resist TPB may be available in the future.

To measure variation in TPB resistance, we have evaluated cotton lines in small 1-row plots replicated up to 12 times. Each test includes a Frego bract cotton (check), which is highly susceptible to TPB. The tests are planted between Frego bract cotton strips (4-rows), which are planted about 2-4 weeks earlier. No TPB insecticide control is used in the plots. TPB populations typically build up in the susceptible strips then move to the younger cotton as the cotton in the strips mature. Once anther damage is apparent on the susceptible checks, six white flowers per plot are examined daily over about five consecutive days. The flowers are classed as having either the presence or absence of damage anthers (dirty flowers). An accumulate percentage of dirty flowers is then determined over sample dates.

Using this method, dirty flower data have been collected on entries in the Arkansas Cotton Variety Test and several regional and state strain tests since 2005. Variation among cotton varieties has been found to be relatively consistent over years, but distinct groupings have not been found. Cotton varieties tend to vary continuously from about 30 to 50% dirty flowers, while the Frego bract check normally has about 90% dirty flowers. Nectariless and highly pubescent lines tend to have the lowest % dirty flowers, but do not differ from some nectaried, glabrous lines. Data for varieties in these tests are reported the annual Arkansas Cotton Variety Tests (available at www.ArkansasVarietyTesting.com).

Based on the small plot dirty flower data, contrasting resistant and susceptible varieties were selected and evaluated in large plot trials. TPB populations were lower and required more time to reach treatment threshold level on the resistant varieties than the susceptible varieties. These tests indicate that costs of controlling TPB can lowered by choosing varieties that have low dirty flower percentages in our small plot tests.

The TPB resistance found in the nectaried, glabrous lines indicates that additional resistance mechanisms may exist. To possibly combine different mechanisms of resistance, nectariless lines have been crossed with nectaried lines having low % dirty flowers. A selection technique that could be used on individual plants would greatly facility developing lines have more than one resistance mechanism. To possibly expedite screening for TPB resistance, TPB survival on stem cuttings have been evaluated in the laboratory. The technique can distinguish variation in

resistance, but needs refining before it can be used to screen a large number of cotton lines. For now, we will continue to use normal selection practices to select plants from these crosses and then test resultant strains for TPB resistance. Hopefully, a recombinant will be found that has TPB resistance that exceeds the level of resistance that now exists.