INHERITANCE OF RESISTANCE TO TARNISHED PLANT BUG IN COTTON BASED ON INJURY TO ANTHERS.

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Abstract

With the development of resistance to insecticides and the lack of commercially available biological control agents for tarnished plant bug (*Lygus lineolaris* Palisot de Beauvois), there is an increasing need for identification and development of genetic resistance to tarnished plant bug (TPB) in current cotton genotypes. The objective of this study was to determine the inheritance of resistance and the appropriate breeding approach to improve resistance to TPB utilizing an anther damage screening technique. Evaluation of anther damage rather than yield may more accurately reflect low levels of resistance to TPB in cotton genotypes. Tests conducted in 1993 and continued in 1994 and 1995 focused on the establishment of a screening protocol for TPB resistance in cotton lines utilizing previously developed techniques of interplanting of mustard, evaluating TPB injury by anther damage, and establishing maturity by monitoring of nodal development.

Parents, F_1 progeny, and a highly susceptible Frego bract line were evaulated at Fayetteville and Clarkedale in 1995. Random samples of 20 squares per plot which exhibited no signs of worm or boll weevil feeding were collected and sliced with a razor blade to expose the anthers on three dates at each location. Parents and F_1 progeny had a similar TPB injury response over sampling dates, with greater variation among lines was observed at Fayetteville than at Clarkedale for % damaged squares (DAMSQR) and % anther damage (ANTDAM). There are significant differences in crosses for TPB injury at Fayetteville, with highest injury levels occuring on August 8. A Model I Method 4 combining ability analysis was conducted for F_1 crosses at Fayetteville on August 8 to partition differences into general combining ability (GCA) and specific combining ability (SCA). Significant GCA effects for reduced DAMSQR and ANTDAM were observed in DES 119, while Ark. 8606-50 significantly increased DAMSQR and ANTDAM. The only cross exhibiting significant SCA effects for DAMSQR was Acala Maxxa x GA89-308. Timok 811 x Acala Maxxa and DES 119 x Hartz H1215 significantly increased ANTDAM based upon their SCA effects.

This study indicates high field infestations of TPB are required to detect variation in TPB resistance and variation in TPB resistance can be discovered in the absence of nectariless lines. At high TPB levels (August 8 sampling date, Fayetteville), significant genetic effects were found, with both additive and non-additive gene actions operational. Improvement of TPB resistance will require precise techniques to achieve high injury levels and specific parental combinations.

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