2004 BELTWIDE COTTON CONFERENCES, SAN ANTONIO, TX – JANUARY 5-9

SCREENING UPLAND COTTON FOR RESISTANCE TO COTTON FLEAHOPPER

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Abstract

Cotton fleahopper (*Pseudatomoscelis seriatus* Reuter) is consistently one of the most damaging insect pests in cotton. Crop maturity is delayed by cotton fleahopper (CFH) feeding on early season fruit forms and thus increasing vulnerability to late season pests such as bollworms (*Helicoverpa zea* Boddie) and budworms (*Heliothis virescens* Fabricius). Presently, CFH is being controlled by chemical measures, but use of chemicals leads to destruction of natural enemies.

The objectives of this research were to develop rapid and reliable methods to screen cotton genotypes for genetic resistance to CFH damage, including field and greenhouse methods, and evaluate cotton lines for resistance to CFH. Genotypes included in the study had a range of plant characters suspected of impacting cotton fleahopper injury. These include trichome density and nectariless, plus several lines identified as having tolerance based upon field observations in breeding trials.

In the summer of 2002 and 2003, four replications of each of twenty-one genotypes, including one genotype of *G. arboreum*, were all planted in pots and grown in the greenhouse. Pilose was included in 2003 only. These plants were transferred to an insectary when all plants reached the 10^{th} node stage of growth. Plants were confined in cages made of loose weave cotton fabric. Six CFHs were released into each cage and held for 72 hours. Numbers of live CFHs were determined after 72 hours and percent square damage was determined 48 hours following the removal of the CFHs. Differences were observed among the genotypes in percent square damage. Percent square damage was highest in *Gossypium arboreum,* while Acala 1517-99, Deltapine 50, and TAM 96WD-69s exhibited lower ($p=0.05$) percent square shed.

Seventeen genotypes, Pilose only included in 2003, were planted in a split block design (with treated and non-treated blocks) with 4 replications. CFH (adults and nymphs) numbers and percent square set were determined on 5 consecutive plants in each single row sub-plot on multiple dates during 2002 and 2003. Across all dates, the mean number of CFHs per plant were higher in *Gossypium arboreum,* otherwise no consistent differences in mean number of CFHs per plant were observed among these genotypes. Square set was significantly higher in Suregrow 747, Stoneville 474, Lankart 142, and TAM 96WD-22h (hairy-leaf genotype) and Deltapine 50 and TAM 96WD-69s (smooth-leaf genotype). Field and no-choice feeding tests in both 2002 and 2003 suggested that Lankart 142, Suregrow 747, and Stoneville 474 were the most resistant hairy-leaf genotypes and not different in resistance than the smooth leaf genotypes Deltapine 50 and TAM 96WD-69s.

Studies also included determining the feasibility of using excised squares for screening against CFHs. Pin-head, match head, and one-third grown squares were removed from plants and placed alternately in a circle on an agar medium in a Petri-plate in 4 replications. Four CFH adults were placed in each plate and allowed to feed for 48 hours and then removed. After an additional 24 hours, each square was cut in half and the internal tissue examined for CFH feeding damage under a microscope. Control plates were the same except no CFHs were present. Evidence of brown areas along the anthers and brown and shrunken pollen sacs were considered evidence of CFH feeding. Each trial was replicated four times and the entire trial repeated four times. Fleahopper damage was most evident on pin-head sized squares, a few of the match-head sized squares contained damage and none of the one-third grown squares were damaged. Results suggest this method has the potential to rapidly screen for resistance, which is necessary when large amounts of germplasm must be screened.