

## RESEARCH REPORT

Title: Breeding Cotton for Yield and Quality in Alabama

Project Number: 02-172-AL

Principle Investigator: David B. Weaver

A cotton breeding project was initiated at Auburn University in 2001 by making crosses among several well-adapted cultivars and germplasms. Our overall objectives were several: First to develop cotton germplasm with improved lint yield and fiber quality traits adapted to Alabama, second to study the genetic variability and heritability of various quantitative traits in cotton in early and late generations of inbreeding, and third to determine the effects of various inbreeding methods on the variance and heritability of those same traits. Traits of particular interest are lint yield, lint percentage, fiber weight per seed, earliness, and AFIS (Advance Fiber Information Systems) fiber quality traits, particularly those related to length, length uniformity, short fiber content, fiber maturity, and neps. During 2002, six  $F_2$  populations, along with their parents and  $F_1$  progeny were grown in the field and over 1500 individual plants were sampled and fiber analyzed by AFIS. During 2003, we grew approximately 1300 progeny rows from these individual  $F_2$  plants ( $F_{2:3}$  lines) (pedigree method) and also grew single plant progenies from each  $F_2$  plant (single-seed descent method). Three plants were sampled from each of the  $F_{2:3}$  lines (pedigree) lines for determination of fiber traits by AFIS. In 2004, we grew single-plant progenies from a random sample of the sampled  $F_3$  plants (about 2000  $F_{3:4}$  rows) primarily for the purpose of producing seed for yield-testing of lines in 2005. We also grew 200  $F_{3:4}$  lines derived by single-seed decent, for the purpose of comparing the two inbreeding methods.

Based on fiber data from individual  $F_3$  plants collected the previous year, a selection index was applied to the pedigree lines based on upper quartile length of fibers (inches, by fiber weight), short fiber content (count) and lint weight seed<sup>-1</sup>. From each population the best 50  $F_4$  rows from  $F_3$  plants with the highest UQL, lowest SFC, and highest LWS were selected. One hundred ninety-five  $F_4$  lines derived from the single-seed descent populations were also harvested without selection. This leaves us with a minimum of 300 lines derived by pedigree and 195 lines derived by SSD for future evaluation.

During 2005, at the Plant Breeding Unit at Tallassee, we evaluated 108 lines derived from pedigree and 92 lines derived by single-seed decent, for a total of 200 lines evaluated from the six populations. We also evaluated 48 pedigree-derived lines from one population at Prattville. Each population was evaluated in a different test. Plots were two rows, 6.1 m in length, with a spacing of 1 m between rows, replicated 3 times. Data were collected by sampling 50 bolls from each plot for determining lint percentage, boll size, lint weight per seed, and fiber quality. The entire plot was spindle-harvested to determine seed and lint yield.

The growing season in 2005 was excellent. Yields were high, usually an average of more than 1200 lbs of lint per acre, however results at this stage are very preliminary. Fiber analysis is still being conducted, so fiber quality data are not available. Meaningful yield data will take at least another year to obtain, and we will grow these lines for another year prior to selection of lines for more intensive evaluation at multiple locations.