GENETIC VARIABILITY OF COTTON FIBER LENGTH DISTRIBUTION - A PROGRESS REPORT

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Abstract

There has traditionally been a lack of focus on length distribution by breeders and geneticists. Little is known about genetic versus environmental causes of (1) the distributional behavior of cotton fibers in the natural state on the seed and (2) how the length distribution is altered by fiber breakage when the cotton is exposed to the inevitable mechanical stresses required for harvesting, ginning, and manufacturing. Recent research has shown we can adequately parameterize the complex distribution patterns of cotton fibers and that useful inferences could be made about the intrinsic and process-related factors determining its shape (Krifa, 2006; Krifa, 2007; Krifa, 2008, 2009). The present research utilizes these new tools to evaluate the heritability of cotton fiber length distribution. Thirty seven experimental genotypes were selected to form a broad range in fiber properties and grown in Lubbock, TX in 2007, 2008 and 2009. The 2007 nursery was also replicated in College Station, TX. The Advanced Fiber Information System (AFIS) was used to generate length distribution data on lint samples available to date. The distribution data was parameterized using the mixed Weibull model (Krifa, 2008, 2009). Variance component analysis conducted on the distributional traits derived from the experimental data suggest significant effects of both genotype and growth environement on the length distribution shape of unprocessed fibers. When fiber damage occurs due to mechanical processing, two categories of distribution features are observed: (1) features that appear to vary under the impact of accumulated damage, and (2) those that appear invariable to fiber damage but are determined by genetic and plant growth factors. Additional samples are currently being prepared to further scrutinize these results.

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