EVALUATION OF CHROMOSOME SPECIFIC RI LINES FOR IMPROVED FIBER TRAITS

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Abstract

Successful interspecific breeding involves difficult challenges that demand approaches that are different from conventional cotton breeding methods. The overall objective of this research was to evaluate genetic variations for fiber and agronomic traits of two chromosome-specific recombinant-inbred line (CS-RIL) populations involving segments of chromosomes 5 and 17 from *Gossypium barbadense* in *G. hirsutum* genetic background. The CS-RILs were developed from crosses of CS-B05sh and CS-B17 *G. barbadense* chromosome substitution lines with their common recurrent parent, inbred *G. hirsutum* TM-1. Each population included 50 CS-RILs, which were grown with commercial varieties DP393 and PHY 370 WR in four environments at Mississippi State University, MS. In each environment, we used a randomized complete block design with four replications. Four agronomic and five fiber traits were measured and analyzed separately for these two CS-RIL populations. Mean comparisons among different lines were conducted subject to ANOVA analysis with least significance difference (LSD) at probability level of 0.05. Both CS-RIL populations showed significant genetic diversity for all agronomic and fiber traits being investigated. The collective variation in each CS-RIL population was assessed by cluster analysis, using the Mahalanobis distance and Wald method, where all data were standardized with a variance of one and mean of zero. One RI line (CS-B5sh RIL5) had stronger fiber than DP393 and two RI lines (RIL 5 and 18) had stronger fiber than PHY 370 WR. Sixty percent of CS-B17 RI lines had lower micronaire than PHY 370 WR and 46% of CS-B17 RI lines had lower micronaire than DP393. Cluster analysis results showed that some of the CS-B5sh RI lines were close to DP393 suggesting their potential to improve fiber traits. Four groups were observed in the CS-B17 and CS-B5sh RI populations. Yield and fiber traits had no significant or weak correlations. This research provided a tool for additional resolution in genetic mapping and for the targeted exploitation of exotic germplasm to improve fiber quality in cotton breeding program.