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Effect of Chromosome Substitutions from *Gossypium barbadense* L. 3-79 into *G. hirsutum* L. TM-1 on Agronomic and Fiber Traits

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Pima cottons (*Gossypium barbadense* L.) possess fiber properties that are superior to the more widely grown Upland cottons (*G. hirsutum* L.). Incorporating the superior fiber properties from Pima into Upland cotton has generally not achieved stable introgression because of genome incompatibility. Using a set of stable lines (CS-B) containing chromosome or chromosome arm substitutions from *G. barbadense* (3-79) backcrossed into a *G. hirsutum* (TM-1) background, traits from the TM-1 parent that varied significantly could be attributed to genes in the substituted chromosome, to other residual 3-79 chromatin material, and/or their interaction with the other 25 chromosomes from TM-1. In 2002, seeds from 13 different CS-B lines, and the TM-1 and 3-79 parents, were planted in replicated tests at two locations in Mississippi and one location in Arizona for evaluation of agronomic and fiber properties. Compared with TM-1, the CS-B lines with substitutions for chromosomes 16, 18, 14sh and 22sh from 3-79 had reduced seed cotton yield and lint yield. The CS-B lines with alien chromosomes 2, 6, 16, 18, 5sh, 22Lo and 22sh from 3-79 had improved lint percentage. The CS-B line with substitution of chromosome 25 from 3-79 had reduced micronaire and increased fiber strength. All of the substituted chromosomes except 2, 4, and 6 had reduced boll weight. The CS-B lines 14sh, 15sh, and 25 had increased fiber length. The results provided information on the association of specific chromosomes with genes for agronomic and fiber traits. These new genomic resources will provide additional approaches for improvement of Upland cotton and will enable development of chromosome-specific recombinant inbred lines for higher resolution mapping.