FIBER-SPECIFIC EXPRESSION OF A PROTEIN-BASED POLYMER GENE IMPROVES FIBER QUALITY

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Abstract

Transgenic cotton plants expressing a protein-based synthetic polymer gene, regulated by a fiber-specific promoter, were produced by *Agrobacterium*-mediated transformation. Fiber from more than 30 independently transformed R_0 lines were +analyzed for fiber quality. Average physical properties of transgenic cottons were measured with conventional (as used by cotton breeders) laboratory instruments including Stelometer, Fibrograph, Micronaire, and Arealometer). The distributions of single fiber physical properties were also determined using AFIS (Advanced Fiber Information System), Mantis, and image analysis of the fiber cross-sections. Tests with the standard laboratory instruments showed that, in general, the transgenic lines showed significant increases in length, strength, and elongation of the transformed cottons compared to the non-transformed controls. In particular, fiber mean length increased by approximately ten percent; fiber tenacity increased of the order of twenty percent; fiber bundle elongation increased by about fifteen percent; and energy to rupture the bundles increased by almost forty percent. Results based upon measuring the distributions of single fiber properties were found to support the findings obtained with the laboratory instruments. Moisture retention analyses indicated that fibers from transgenic lines absorbed equal amounts of water compared to the non-transformed controls but upon heating to 60-100 ˚C, they released more moisture (5-20% more than the controls).