THE STUDY OF A COTTON "FIBER-SPECIFIC" PROMOTER, *GH-1* IN TRANSGENIC TOBACCO AND COTTON

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Abstract

Cotton fibers (*Gossypium hirsutum* L.) are highly elongated trichomes that grow from epidermal cells of cotton ovules. Analysis of genes that are specifically expressed during fiber differentiation can provide insights into the molecular events that control cotton fiber development. One such gene, called *Gh-1*, has been isolated and characterized. Deletion analysis of the 5' flanking sequences of the *Gh-1* gene was performed to identify the putative regulatory elements responsible for fiber specific expression. The *Gh-1* promoter, along with various lengths of 5' flanking sequences, were fused with the b-glucuronidase (*GUS*) reporter gene and transferred into tobacco and cotton plants via *Agrobacterium*-mediated transformation. Tobacco plants that carry the *Gh-1::GUS* gene construct with 1010 bp of 5' flanking sequence (-1010) from the first AUG start codon typically showed very weak *GUS* activity in vascular tissues and guard cells, and, in some plants, expression was seen in small glandular trichomes. Similar expression patterns were also seen in plants that carried -780, and -680 *Gh-1::GUS* promoter constructs. A dramatic increase in specific expression in large glandular trichomes was observed in plants that carried a -550 *Gh-1::GUS* promoter construct. Promoter deletion constructs -355 *Gh-1::GUS* or shorter showed no observable GUS staining. In transgenic cotton, promoter deletion -1010 *Gh-1::GUS* construct showed no observable GUS staining in stem and 0-3 DPA ovules. However, promoter deletion -550 *Gh-1::GUS* showed strong GUS staining in guard cells, glandular trichomes in the stem, 0-3 DPA ovules, and 20 DPA cotton fibers. These results indicated that a trichome and guard cell "specific" regulatory element apparently exist between -550 and -355 of the *Gh-1* promoter.

We have also isolated another cotton "fiber-specific" gene, *Gh-10*. Promoter deletion experiments were performed. Various deletions of *Gh-10* promoter were fused with b-Glucuronidase reporter gene and mobilized into tobacco and cotton plants. Initial analyses of transgenic tobacco and cotton plants are in progress. Furthermore, comparison of DNA sequences between *Gh-1* and *Gh-10* promoters may give us insights on regulatory elements necessary for "fiber-specific" gene expression.

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