

Isolation and Analysis of Expansins from the *Gossypium barbadense* Cotton Elongating Fiber

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Gossypium barbadense L. is one of the most valuable cotton species due to its silkiness, luster, long staple, and high strength. Transferring the excellent fiber traits from *G. barbadense* as the secondary gene pool to the widely cultivated *G. hirsutum* via traditional and molecular-aided selection is an attractive aim of breeders. So identification of the novel genes functions from the *G. barbadense* fiber is important. Expansins are plant cell wall proteins first discovered in studies of plant cell enlargement, and they have unique "loosening" effects on plant cell walls. They should be very important in the elongating fiber. After analysis for genes of different expressions between *G. barbadense* and *G. hirsutum* at the same developmental stage, we isolated two expansins (temporary naming: GbEX2, GbEX3) from the normalized fiber cDNA library (from C2 to 25 DPA) of *G. barbadense* cv. 3-79. After alignments of the protein sequences and nucleotide acid sequences of the two expansins, we found that they had similar amino acid sequences (only several amino acids different), but the DNA sequences, especially the 3'-UTR, were different. GbEX2 was a truncated version of GbEX3, and it was about 70 amino acids shorter at the C-terminal, which was the carboxy-terminal domain (hypothesized to function as a polysaccharide-binding domain, this is not experimentally established). So GbEX2 possibly is a plant natriuretic peptide, which maintains water and solute homeostasis in the living organ. We also analyzed the expression of the two genes by RT-PCR, with primers specific for GbEX2 or GbEX3. The duration of GbEX2 expression was from 5DPA to 15DPA in the 3-79 fiber, and GbEX3 expressed in both 3-79 and TM-1 fiber from 5DPA to 15DPA. We obtained regenerated plantlets transformed by RNAi and over-expression vectors of the two genes.