

## Cotton Fiber Quality Improvement by Introducing Sucrose Synthase (SuS) Gene into *Gossypium hirsutum* L.

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**Abstract :** The demand for long staple fiber having better strength and length is increasing with the introduction of modern spinning and weaving industry in Pakistan. Work on gene discovery from developing cotton fibers has helped to identify dozens of genes that take part in cotton fiber development and several genes have been characterized for their role in fiber development. Sucrose synthase (SuS) is a key enzyme in the metabolism of sucrose in a plant cell, in cotton fiber it catalyzes a reversible reaction, but preferentially converts sucrose and UDP into fructose and UDP-glucose. UDP-glucose (UDPG) is a nucleotide sugar act as a donor for glucose residue in many glycosylation reactions and is essential for the cytosolic formation of sucrose and involved in the synthesis of cell wall cellulose. The study was focused on successful *Agrobacterium*-mediated stable transformation of SuS gene in pCambia 1301 into cotton under a CaMV35S promoter. Integration and expression of the gene were confirmed by PCR, GUS assay, and real-time PCR. Young leaves of SuS overexpressing lines showed increased total soluble sugars and plant biomass as compared to non-transgenic control plants. Cellulose contents from fiber were significantly increased. SEM analysis revealed that fibers from transgenic cotton were highly spiral and fiber twist number increased per unit length when compared with control. Morphological data from field plants showed that transgenic plants performed better in field conditions. Incorporation of genes related to cotton fiber length and quality can provide new avenues for fiber improvement. The utilization of this technology would provide an efficient import substitution and sustained production of long-staple fiber in Pakistan to fulfill the industrial requirements.

**Keywords :** *agrobacterium*-mediated transformation, cotton fiber, sucrose synthase gene, staple length

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