

# Cotton Molecular Breeding in CCRI

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## Abstract

China is the largest cotton producer and consumer in the world. Cotton production plays a very important and irreplaceable role in the national economy of China, which has over 10% output value of cotton industry with only 3% of total crop plant area. Revenue from the export of cotton fiber and its by-products is 110 billion dollars, about 25% of the total export revenue. Cotton planting is the primary means to get rich for 200 million Chinese farmers. Cotton planting offers 19 million jobs for textile and apparel industries. However, cotton production in China has problems such as budworm, *Verticillium wilt* disease, low fiber quality (strength and fiber types) and adverse environments. Through the four stages of cotton improvement in China, great advance has been made in cotton industries with main characteristics such as high-yield, high-quality, low gossypol, early-maturity, resistance to disease and pest, tolerance to drought and salinity, and color cotton types. A strike of progress on cotton molecular breeding has been achieved and biochemical-assisted breeding technology has been established based on genetic mechanism and inheritance correlativity of biochemical substances in cotton plants including the antioxidant enzyme activity and MDA, chlorophyll, IAA and ABA contents. High performance transgenic technology systems have been constructed including agro-bacterial transformation system, pollen-tube mediation system, gene-gun bombardment system. *Ghcysp*, encoding a cysteine proteinase, has been isolated from senescent cotton *cv. Liaomian 9* by RACE-PCR. Through the “973” national high-tech key project on functional genomics of cotton fiber quality and its molecular genetic improvement that was launched from 2004, new methods to efficiently separate proteins for proteomic analysis of developing cotton fibers have been developed to clarify a simplified model of the regulatory mechanism controlling cotton fiber cell. The detailed progress of this national initiative on cotton molecular breeding will be presented.

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