# Recent Progress of Cotton Research in China

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Cotton is a main economic crop in China which involves in thousands of farmers working on this crop. Meanwhile, cotton contributed most of the raw materials for the textile in China. China is a large country for both production and consumption in cotton, this is why the central government always paid attention to cotton production. The following is a general review on recent progress of cotton research in China based on what I know.

The planting system is diversified, farmers have more and more focus on income and multiple crop systems which pushed the cotton production research forward. Monocrop cotton production system is decreasing, and cotton intercropping with watermelon, peanuts, wheat, rapeseed, and so on is increasing fast. The latter put both cotton and food crop production forward.

Transplanting techniques are going innovation. As the hybrid cotton is spreading and the price of hybrid seeds is going up in China, the planting density is going down. Farmers wanted one seed one plant to decrease the seed cost, which lead to development of some novel transplanting techniques. Seedlings were produced in a nursery consisting of soft mixture substrates, then they were transplanted to field with the root system attached with substrates or not. These transplanting systems are spreading over the cotton production areas.

Cell engineering in cotton harvested a lot recently. This work was carried out in many institutes and universities, they surveyed hundreds of cotton varieties and found several cultivars are very easy to go embryogenesis and regeneration. Plant regeneration from wild cotton species and cell fusion were first realized in China, which forwarded the cell engineering work. In order to supply more transgenic plants for transgenic cotton breeding, China used more manpower and funding to develop efficient cotton transformation systems. Some labs can produce transgenic cotton in large scale recently. Pest-, disease-, drought-resistance genes, and some fiber developing related genes were introduced to cotton genome.

Many kinds of molecular markers were developed aiming to improve breeding selection. Coupled with EST isolation in some labs, EST-SSR richened the amount of SSRs available in cotton map construction. Meanwhile, SRAP, AFLP markers were also used in cotton structural genomics. A number of maps were published, some of them are with more than 1000 markers. These maps were used to map economic traits in cotton, which should be useful in future breeding program. It seems that molecular assisted selection is very helpful for the traits from wild cotton species to the cultivated species.

Functional genomics showed more progresses in China. Group led by Professor Zhu systematically analyzed the expression profiles during cotton fiber development, they found many pathways were involved in fiber development process. Ethylene was revealed to act a major role in fiber cell elongation, later they found saturated very-long-chain fatty acids promoted cotton fiber elongation by activating ethylene biosynthesis. Professor Chen's lab declared they found a new mechanism for pest control. RNAi structure of a P450 gene was introduced to cotton genome and found to be resistant to cotton pest via interfering pest development. Based on the SSH method, my lab investigated the genes controlling sea island cotton fiber development, somatic embryogenesis, and cell wall regeneration. We found complicated gene network existed during somatic embryogenesis. Many key functional genes were doing function test. We are sure that these results will contribute some to cotton genetic manipulation in future.

Hybrid cotton is completely spread and Bt cotton contributed a lot to hybrid cotton production. About 90% and 50% of the hectares were covered by hybrid cotton in Changjiang and Huanghe cotton

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production areas, respectively. Most of the hybrid cotton varieties used one Bt cotton as a parent. Almost all the hybrid seeds are produced by hand emasculation, naturally sterile lines still do not work in hybrid cotton seed production because of low yield or sterile plants existed in F1 generation. Bt genes contributed in production not only in pest control but also in increasing the ball number, which improved the cotton yield.

In summary, China government invested more in cotton research in the recent decade, which stimulated the progress in cotton research. As more functional genes and smart tools in detecting the economic traits are developed, super cotton with multiple traits improved may become true.