

Genetical Genomics Dissection of Cotton Fiber Quality

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Cotton fiber is a commodity of key economic importance in both developed and developing countries. The two cultivated species, *Gossypium hirsutum* and *G. barbadense*, are tetraploid ($2n=4x=52$, 2.3 Gb). Cotton fibers are single-celled trichomes of the outermost epidermal layer of the ovule and elongate extensively to 25-50 mm. The final quality of the fiber results from complex developmental processes and improvement of cotton fiber quality remains a challenge for many research groups worldwide. Although traditional breeding methods have proven efficient, the contribution of molecular genetics and genomic tools are gaining interest and the cotton fiber transcriptome has attracted a lot of attention in recent years. The major objective of the project (acronym Cotton_RILs) sponsored by the French National Research Agency (ANR), is the genetic and genomic dissection of important fiber quality characteristics using a combination of classical QTL mapping and of gene expression QTL mapping. The integrated genetics and genomics approach (or genetical genomics approach) in this project is centered on a population of interspecific *G. hirsutum* × *G. barbadense* recombinant inbred lines (RILs) created by CIRAD. Specific objectives are: 1. Construction of a saturated genetic map, 2. QTL mapping through multi-site phenotypic evaluation on 4 continents, 3. Population-wide gene expression analysis through microarray and cDNA-AFLP profilings and for 1 or 2 key developmental stages, and 4. Genetic fine mapping of selected QTLs using a large F₂ population. The 3 participants in the project, CIRAD (Montpellier, France), Bayer Crop Science (Gent, Belgium), and CSIRO (Canberra, Australia), have active research programs in applied genetics both through classical breeding and using modern biotechnology. Past achievements of the 3 laboratories are recognized worldwide and they are highly complementary in terms of their scientific expertise. Apart from greenhouses and biotechnology laboratories in their respective primary sites, they provide access to a broad range of field experimental sites on 4 continents, in Brazil and Cameroon through CIRAD partnerships and in the USA for Bayer CS.