FINDING USEFUL TRAITS BY DNA MAPPING

R.G. Cantrell
New Mexico State University
Las Cruces, NM
S. Saha
USDA-ARS
Mississippi State, MS
S. Reddy, D. Stelly, B. Zhang, W. Raska, and Islam-Faridi
Texas A&M University
College Station, TX

Cotton researchers are attempting to locate genes in cotton that control economically important traits. This is like looking for a needle in a haystack because of the complex genetic nature of cotton. It has 52 chromosome arranged in 26 pairs. Genetic populations can be analyzed with new DNA markers to create genetic maps that provide landmarks for the search for important gene(s). Molecular cytogentic procedures can further localize the gene to a specific chromosome and region of DNA. Collaborative projects in many public university labs are working on various stages of the project. Once maps are created, the DNA markers can be located that are linked to genes controlling important traits. Specialized genetic stocks created by university and USDA researchers are used to place DNA markers on individual chromosomes. DNA markers have been found to be linked to some fiber quality, agronomic, and physiological traits. This information can be used in cotton breeding to enhance selection for these traits. Breeders can focus selection on progeny and germplasm that have the genetic potential for the trait. This does not replace what the breeder is already doing, it simply permits one to focus evaluation on breeding material that has genetic potential for high expression of the trait. Genetic diversity is very important to cotton breeding and this may be enhanced by careful utilization of DNA markers. DNA markers can be used to facilitate introgression of new genes from the many wild related species of cotton. With only conventional breeding and selection, this is a lengthy and a near impossible task. Markers can be used to “tag” the desired genes from the related species. Selection for the correct markers can speedup introgression of the trait, as well as reduce the amount of undesirable traits from the wild relative. The large collaborative project to understand the cotton genome will lead to long-term benefits to the cotton industry. It permits scientists to work with cotton traits from DNA to the cotton field.

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