Screening Cotton Mini-core Collection for Characterizing the Genetic Variability of Drought Resistance Traits and Selection of Suitable Mapping Population Parents for Genetic Dissection of Drought Resistance and Fiber Quality Traits

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In the face of a global scarcity of water resources, drought has already become a primary factor in limiting crop production worldwide. In cotton, fiber productivity and quality is strongly influenced by water stress at any point of time during flowering to boll forming phases, and hence, it is imperative to improve the drought tolerance of cotton. This implies a need for a better characterization of the biodiversity available for drought tolerance and a complete perception of the physiological mechanisms, which are crucial to assure fiber yield and quality under water limited environments. The diversity for drought resistance at morphological, physiological, biochemical, and molecular levels has been evaluated in a cotton mini-core germplasm collection both under pot and field conditions subjected to water stress at flowering phase. Results of this study have shown that significant variation for most of the evaluated traits exists in this cotton germplasm. To locate the genetic determinants for drought adaptation, recombinant inbred lines are being developed by crossing contrasting drought resistance and genetically diverse parents. The construction of a genetic linkage map with markers developed from expressed regions of the cotton genome is proposed to identify candidate genes for drought tolerance and fiber productivity and quality under water stress. Besides advancing the holistic understanding of drought resistance in cotton, identification of functional molecular markers linked to drought resistance and fiber related traits could increase the efficiency of development of cotton for superior fiber productivity and quality under water limited environment through marker-aided selection.