

Genetic diversity for morpho-physiological traits in parental lines of *Gossypium hirsutum* L.

G.D. DHORAN, P.K. JAGTAP AND SANJAY PAWAR

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SUMMARY

The important objective of biometrical measurements is to judge the possibilities of classifying individual genotypes into different groups which require sound knowledge about divergence between them. Intra and inter-cluster distances serves as an index for selection of genetically diverse parents. The 26 genotypes studied were grouped into ten clusters indicates the maximum genetic distance ($D = 137.51$) between the parental line RHC-056 and DS-28 while minimum ($D=10.24$) was observed between RHC-006 and RHBB-9923. Among 10 clusters, cluster I included maximum genotypes (8), cluster II (7), cluster IV (4) and remaining were monogenotypic/solitary. Cluster I showed characteristic feature of low CSI and low leafarea, while it showed highest harvest index and high lint yield per plant.

Key words : Genetic diversity, Morpho-physiological traits, *Gossypium hirsutum* L.

Cotton is the most important textile fibre crop and is the second most important oilseed crop in the world (Cherry and Leffler, 1984). Prerequisite of successful and efficient breeding programme is proper selection of parents. Ultimately the generation of genetic variability - depends on genetic diversity in the parental material being crossed to generate genetic variability. Time has come to maintain some level of genetic diversity at the parental level itself. Naturally, numbers of workers have studied the diversity for various agronomic, morphological and molecular traits in cotton (Kaur and Chahal, 2001 and Kumar *et al.*, 2003). However, very few attempts have been made to study genetic diversity jointly at physiological and morphological level. Important physiological attributes such as Chlorophyll Stability Index (CSI), stomata density need to be involved to get reliable improvement in yield both by selection and by exploitation of hybrid vigor. Hence the present investigation was undertaken to study genetic diversity among these parental lines.

MATERIALS AND METHODS

The material for present study consists of four restorer lines, nineteen female/male parental lines and three checks LRA-5166, JLH-168, PKV -Rajat (Table 1) were sown in Randomized Block Design with three replications on 14th May, 2007 at All India Coordinated Cotton Improvement Project, Mahatma Phule Krishi

Vidyapeeth, Rahuri. Each entry was sown in two rows of 4.8 m length spaced 90 cm apart and spaced at 60 cm within a row. Recommended cultural practices and fertilizers (@ 100 kg N: 50 kg P2O5: 50 kg K2O/ ha) were applied. The observations on nine morpho-physiological characters were recorded on ten random plants in each replication. The data on physiological parameters were recorded at 50 per cent flowering while those of yield and yield components were recorded after harvesting. The generalized distance between any two populations was worked out as per Mahalanobis (1936) and Tocher's method as described by Rao (1952) was followed for cluster formation.

RESULTS AND DISCUSSION

Twenty six parental lines were grouped into 10 clusters (Table 1) indicated that the genotypes studied possess ample variability for different characters under study. Parental line RHC-056 and DS-28 were genetically distanced because of maximum distance ($D = 137.51$) observed between them and naturally placed in different cluster. On the contrary the parental line RHC-006 and RHBB-9923 had the lowest genetic distance ($D = 10.24$) between them *i.e.* they are the most closely related and therefore placed in the same cluster. This indicated the relationship of genotypes expressed in individual distances from each other as a basis for clustering pattern.

The cluster I accommodated the largest number of (8) genotypes followed by cluster II and IV with 7 and 4 genotypes, respectively. Cluster III, V, VI, VII, VIII, IX and X were mono-genotypic. Among the clusters I, II and IV, cluster IV had least number of genotypes (4). Nevertheless it exhibited maximum intra-cluster

Correspondence to:

G.D. DHORAN, Oilseeds Research Station, Nanded Road, LATUR (M.S.) INDIA

Authors' affiliations:

P.K. JAGTAP AND SANJAY PAWAR, Oilseeds Research Station, Nanded Road, LATUR (M.S.) INDIA