Genetic diversity for morpho-physiological traits in inbreds, maintainers, restorers and male sterile lines of pearl millet

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

Accepted : September, 2009

SUMMARY

Thirty five genotypes studied in the present investigation were grouped into 9 clusters. The intra-cluster distance was maximum within cluster III (D=15.6), while it was minimum within cluster IV (D=9.6). The inter-cluster distance was maximum between cluster II and IV (D=67.8), while it was minimum (D=14.65) between cluster V and VII (both solitary). Cluster VIII had characterized by genotype having highest grain yield, highest number of productive tillers, low CSI and low stomata density (both abaxial/adaxial) and was the best cluster. The trichome density showed the highest percentage of contribution towards divergence (61.08%) followed by earhead length (19.33%).

Key words : Pearl-millet, Genetic diversity, Morpho-physiological traits

Pearl millet [*Pennisetum glaucum* (L.) R.Br.] is an important food crop of semi-arid tropics and stands fifth among the cereals. In India, the total area under this crop is 10 million hectares with the production of 8.55 million tonnes and productivity 707 kg per hectare. In Maharashtra, it is cultivated in 15.29 lakh hectares with production of 11.26 lakh tonnes and productivity of 656 kg per hectare (Anonymous, 2008). Crop improvement depends on the magnitude of genetic variability and the extent to which the desirable characters are heritable. Naturally, number of workers has studied the diversity for various agronomic, morphological and molecular traits in bajra (Upadhyay and Murthy, 1970; Reddy and Sharma, 1984). 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 needs to be involved to get reliable improvement in the yield both by selection and by exploitation of hybrid vigour because in India bajra is mostly grown in rainfed condition. So, it frequently suffers from intermittent droughts. Therefore, it becomes necessary to breed for rainfed bajra hybrids/composites having desirable physiological background which is represented by CSI and stomata density. Therefore, in addition to the A, B, R lines an inbreds were also subjected to know the genetic diversity for morpho-physiological components of yield.

Correspondence to:

P.K. JAGTAP, Oilseeds Research Station, LATUR (M.S.) INDIA

Authors' affiliations:

SANJAY PAWAR AND G.D. DHORAN, Mahatma Phule Krishi Vidyapeeth, Rahuri, AHMEDNAGAR (M.S.) INDIA

MATERIALS AND METHODS

Total 35 genotypes, including male sterile lines, maintainers, restorers and inbreds of Pearl millet received from AICRP on Bajra, Dhule were used for the present study. The experiment was laid out in Randomized Block Design with three replications. Two rows of 4.5 meter length were grown for each genotype in each replication, at the spacing of 45 x 15 cm. The recommended package of practices was followed. Fertilizer dose @ 60 kg N, 30 kg P_2O_5 and 30 kg K_2O per hectare were applied, of which half dose of N and full dose of P and K was applied at the time of sowing. Remaining half dose of nitrogen was top dressed one month after sowing. The mean values of ten randomly selected observational plants for ten different traits were used for statistical analysis. The generalized distance between any two populations was evaluated as per Mahalanobis (1936) and Tocher's method as described by Rao (1952) was followed for cluster formation.

RESULTS AND DISCUSSION

In the present investigation, 35 parental lines were grouped into 9 clusters. Male sterile DHBL-709 and inbred DHBL-735 were genetically farthest (D=72.62) and were naturally placed in different clusters. On the contrary, male 74 sterile line DHBL-711 and DHBL-712 had least genetic distance (D=4.45) between them and were genetically closest to each other and, therefore, found place in the same cluster. In spite of much diverse material and large number of clusters the genetic distance between individual genotypes studied by Mukherji *et al.* (1981) varied from 1.62 to 20.69 only.

Nine different clusters formed in the present study indicated that the genotypes studied possessed ample