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Genetic variability and drought tolerant studies in sorghum

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SUMMARY

Genetic variability and drought tolerant measures were worked out for fifteen characters in 100 genotypes of sorghum *(Sorghum bicolor* L.) of diverse origin. Based on mean performance and drought tolerance indices, the genotypes such as B35, CO21, CO22, AS5078, K3, Murungapatti local, VS1564, VS1560, AS6616, AS8038, Tenkasi1, MS7819, AS2059 AS8021 AS4289, CO24, AS2752, CO1 were found to be promising for drought. For all the characters studied, phenotypic co-efficient of variation (PCV) was higher than the genotypic co-efficient of variation (GCV) indicating the influence of environment on the expression of these traits. The characters *viz.*, stay green, root volume, leaf area index, plant height and harvest index showed high value for phenotypic and genotypic co-efficient of variation showed higher estimates of heritability and expected genetic gain indicating the presence of additive gene effect.

Key words : Sorghum, Genetic variability, Drought tolerance, Coefficient of variation.

Sorghum is one of the most important crops grown for food and feed. It is a dual purpose crop and is valued both for its grain as well as for its excellent fodder. It forms the major source of staple food among the rural population in Tamil Nadu. It is the crop suited to hot and dry ecologies where it is difficult to grow other food grains. Owing to its drought tolerance capacity, its cultivation in drought prone areas is effectively providing food and fodder through on sustainable basis. The potential of this low input demanding crop for diverse uses such as feed and biofuel crop besides as a supplier of raw materials for other industrial uses is anticipated to bring significant benefits to the farmers in the years to come. Hence, to meet out the need of sorghum based industries and to cater the basic requirement of the farming community, identification of genotypes with high, stable yields with drought tolerance capacity is essential. In the present investigation, a total of 100 sorghum germplasm accessions was screened for drought tolerance using drought tolerance indices and an attempt was made to study the genetic variability in germplasm accessions for biometrical traits in order to gather knowledge of yield and yield component characters towards drought tolerance in sorghum crop.

MATERIALS AND METHODS

The present investigation comprised of 100 accessions of sorghum, which include local land races, adapted to different agroclimatic zones of Tamil Nadu. The trial was laid out in a randomized block design (RBD) with two replications under two different situations at Department of millets, Tamil Nadu Agricultural University, Coimbatore during 2006-2007. The first set was under irrigation and another set was treated as drought imposed. Water stress was imposed by with-holding irrigation at anthesis stage and continued till maturity. One set of treatments with normal irrigations from planting to maturity served as control. The drought indices like drought susceptibility index, relative yield, yield stability ratio were recorded for characterizing the drought tolerant genotypes. Observations on metric traits like plant height, days to 50% flowering, earhead length, leaf area index, relative water content, SPAD chlorophyll reading, root length, root volume, root dry weight, earhead weight, 1000 grain weight, biological weight, stay green score, harvest index and grain yield were recorded on single plant basis for five randomly selected competitive plants in each genotype from replication of each set separately. The genetic information has been sought through analysis of genetic variability, heritability in broad sense and genetic advance as per cent of mean was estimated according to Allard (1960). Phenotypic and genotypic co-efficient variation was estimated as per Burton (1952). Genetic advance as % of mean was estimated according to Johnson *et al.* (1955).

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RESULTS AND DISCUSSION

The mean, phenotypic (σ^2p) and genotypic variances, the co-efficient of phenotypic and genotypic variation, heritability and expected genetic advance are given in Table 1 and 2. The results furnished hereunder only for the stress condition. The analysis of variance for the