Stability analysis in sorghum [*Sorghum bicolor* (L.) Moench]

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SUMMARY
Nineteen genotypes of sorghum comprising varieties, hybrids and elite lines were evaluated under three environments (sowing dates) for ten quantitative traits including grain yield. The significant value of G x E interactions revealed differential response of the genotypes to varying environmental conditions. Stability parameters revealed that the genotype SPV-1592 possesses average stability for grain yield, suggesting its suitability for inclusion in breeding programme for the development of stable variety.

Key words : *Sorghum bicolor,* Stability, G x E interaction

The ultimate aim of any plant breeding is to develop cultivars with high-yielding potential with consistent performance over diverse environments. Productivity of population is the function of its adaptability, while later is the compromise of fitness, stability and flexibility. Thus, the predictability of performance i. e. stability depends upon the adaptability of the genotype.

Sorghum [*Sorghum bicolor* (L.) Moench] is one of the most important food and fodder crops of the world in general and of semi-arid tropics in particular. In the Maharashtra State as a maincereal crop, *rabi* sorghum is grown in varying conditions as residual moisture and major area under this is on medium to light soils. The present investigation was planned to identify well buffered stable genotypes among varieties, hybrids and elite populations of sorghum.

MATERIALS AND METHODS
Nineteen genotypes involving the existing varieties, hybrids and newly developed lines were evaluated during *rabi* 2002 in three environments i. e. sowing dates, I) 27th September 2002, ii) 11th October 2002 iii) 26th October 2002 at Post Graduate Institute Farm, Mahatma Phule Krishi Vidyapeeth, Rahuri (M. S.) Each entry was sown in a 4 row plot of 4.5 m length with 45 cm interrow and 15 cm distance between the plants. All the treatments received recommended package of practices to ensure satisfactory crop growth. Ten randomly selected plants per plot in each replication were used to record data for the characters *viz.,* days to 50 per cent flowering, days to maturity, plant height, earhead length, earhead girth, number of grains per earhead, 1000 grain weight, grain yield per plant, grain yield per hectare and dry fodder yield per hectare. Data from three environments as well

as pooled data were subjected to analysis of variance (Panse and Sukhatme, 1995). The traits, which showed significant genotype-environment (G x E) interaction, were subjected to stability analysis as per Eberhart and Russell (1966). The three stability parameters, i) overall mean performance of each genotype across the environments (X), ii) the regression of genotype on the environmental index (bi)and iii) squared deviation from regression coefficient (S^{2}di) were worked out for all the genotypes. The significance of stability parameter(bi) and its deviation from unity were tested by students 't' test.

RESULTS AND DISCUSSION
The analysis of variance for phenotypic stability (Table 1) indicated that the mean differences due to genotypes were significant for all the characters except days to maturity when tested against G x E interaction. Significant differences were also observed for all the characters when tested against pooled deviation. Except for earhead length and earhead girth, environmental variances were found significant for all the characters. The highly significant G x E interaction observed for all the characters indicated that genotypes showed varied response to different environments. Bakeit (1990) and Reddy *et al.* (2004) also reported significant G x E interaction in most of the traits studied.

On partitioning the variances of G x E into linear and non-linear components, the linear component of G x E interaction was significant for all the traits except earhead length and girth suggesting that a large portion of G x E interaction was accounted for by the linear regression. Also, non-linear component (pooled deviation) was found highly significant for most of the characters except days to 50 per cent flowering and grain yield per