*Plant Archives* Vol. 15 No. 1, 2015 pp. 201-203 *ISSN 0972-5210*

# VARIABILITY STUDIES FOR VARIOUS BIOMETRICAL PARAMETERS IN *KHARIF* SORGHUM

**R. B. Ghorade, V. V. Kalpande* and C. V. Sonone**

All India Coordinated Sorghum Improvement Project, Akola Centre, Sorghum Research Unit, Dr. Panjabrao Deshmukh Krishi Vidyapeeth, Akola – 444 001 (Maharashtra), India.

## Abstract

Thirty eight lines consisting of thirty derived sorghum lines (named as AKENT numbers), four susceptible line and four resistant source lines of *kharif* sorghum were evaluated for yield and yield components. The study revealed that the characters yield per plant and 100 seed weight showed high GCV and PCV values indicating thereby large amount of variation in these characters. All the characters showed close GCV and PCV values indicating less influence of environment of these characters. The high heritability estimate along with high value of expected genetic advance over mean was observed for yield per plant indicating that these characters would respond positively to selection. High values of heritability along with low value of expected genetic advance were observed for the characters like 50% flowering, panicle length, panicle breadth and 100 seed weight indicating that these characters are mainly governed by non additive component of variation, which is non fixable, heterosis breeding can be fruitfully exploited improving these characters.

***Key words :*** GCV, genetic advance, heritability, PCV.

## Introduction

Sorghum is one of the most important grain and fodder crops grown especially in tropical and sub-tropical regions of India. It is a chief source of palatable fodder for cattle in many parts of country. It is commonly known as 'great millet' due to large size among the millets. Genetic variability studies provide the basic information regarding the genetic properties of the population based on which the breeding methods are formulated for further improvement of the crop. Progress in any crop improvement venture depends mainly on the magnitude of genetic variability and heritability present in the source material. The extent of variability is measured by GCV and PCV, which provides the information about relative amount of variation in different characters. Since heritability is also influenced by environment, the information on heritability alone may not help in pin pointing the characters enforcing selection. Nevertheless, the heritability estimates in conjunction with the predicted genetic advance will be more reliable (Johnson *et al.*, 1955). Heritability gives the information on the magnitude of inheritance of quantitative traits, while genetic advance will be useful in formulating the suitable selection procedures.

***Author for correspondence:** E-mail: vvvkalpande@rediffmail.com

## Materials and Methods

The experimental material for the present study consisted of thirty eight lines consisting of thirty derived sorghum lines (named as AKENT numbers), four susceptible line (AKMS 14 B, ICS 70 B, MS 2219 B, AKMS 17 B) and four resistant source lines (IS 18551, IS 2205, ICSV 700, ICSV 705). The experiment was conducted during *kharif* 2005-06 at the Sorghum Research Unit, Dr. PDKV, Akola (Maharashtra), India. The experiment was laid out in randomized block design with spacing of 45 × 15 cm. in three replications. Observations were recorded on five biometrical parameters like days to 50% flowering, panicle length (cm), panicle breadth (cm), 100 seed weight (g) and grain yield/plant (g). Five competitive plants were selected from each entry in each replication for recording the observations on all the characters except days to 50 per cent flowering for which data was recorded on plot basis. Analysis of variance was done as per the method suggested by Panse and Sukhatme (1967). Genotypic and phenotypic coefficients of variation were estimated as per formulae given by Burton (1951). Heritability and genetic advance were estimated as per Johnson *et al*. (1955).

## Results and Discussion

The analysis of variance indicated highly significant differences among the genotypes for all the characters under study. High magnitude of variation in the experimental material was also reflected by wider range for all the characters under study (table 1).

Though, the phenotypic coefficient of variation (PCV) was greater than genotypic coefficient of variation (GCV) (table 2) for all the characters studied, the close resemblance between the corresponding estimates of PCV and GCV in almost all the characters except panicle breadth suggested that the environment had little role in the expression of these characters. High GCV and PCV values were recorded for the characters like grain yield per plant and 100 seed weight while moderate values were found for panicle length and low values for panicle breadth and days to 50 per cent flowering. Similar results of high GCV along with high PCV values for grain yield per plant were reported by Mahajan *et al*. (2011), Seetharam and Ganeshmurthy (2013). However for days to 50 per cent flowering Seetharam and Ganeshmurthy (2013) reported moderate values of GCV and PCV.

The heritability estimates (table 2) were interpreted as low, medium and high as indicated by Robinson *et al*. (1949). Broad sense heritability ranged from 98.40% (grain yield per plant) to 41.80% (panicle breadth). High heritability was observed for the characters like grain yield per plant, 100 seed weight, days to 50 per cent flowering and panicle length indicating that these characters would respond positively to selection because of their broad sense heritability. For grain yield per plant similar high broad sense heritability was reported by Seetharam and Ganeshmurthy (2013). Deeplakshmi and Ganeshmurthy (2007) also found similar high heritability for 100 seed weight. For days to 50 per cent flowering similar high heritability was reported by Jain and Patel (2012) and Seetharam and Ganeshmurthy (2013). For panicle similar results of high heritability were reported by Seetharam and Ganeshmurthy (2013). Moderate heritability was shown by the trait panicle breadth.

Expected genetic advance per cent over mean (table 2) was estimated for different characters and it was observed that expected genetic advance per cent over mean was in the range of 1.13 to 36.22 percent for different characters. The highest expected genetic advance per cent over mean was observed for the character yield per plant (36.22%) followed by days to 50% flowering (9.03%), panicle length (4.77%), panicle breadth (1.76%) and 100 seed weight (1.13%). All the characters except yield per plant showed low expected genetic advance. Higher value of genetic advance for grain yield per plant was reported by Seetharam and Ganeshmurthy (2013). Low values of expected genetic advance for panicle breadth and 100 weight were also reported by Hemlata *et al*. (2006).

In general high heritability accompanied with high expected genetic advance for the characters suggest that the genes governing these character may have additive effect. It can be mentioned here that the character yield per plant exhibited high heritability value along with high value of expected genetic advance. The phenotypic expression of this character may be governed by the genes acting additively and thereby indicating the importance

**Table 1:** Range, mean and the best genotype for different characters.

| S. no. | Character | Range | Mean | Best genotype |
|---|---|---|---|---|
| 1. | Days to 50% flowering | 67.67 - 90.67 | 78.37 | AKENT-34 |
| 2. | Panicle length (cm) | 15.55 - 26.68 | 22.53 | AKENT-52 |
| 3. | Panicle breadth (cm) | 12.33 - 19.00 | 15.45 | AKENT-51 |
| 4. | 100 seed weight (g) | 1.12 - 3.41 | 2.32 | AKENT-37 |
| 5. | Grain yield/plant (g) | 16.29 - 85.50 | 48.83 | AKENT-52 |

**Table 2 :** Estimation of genetic parameters –GCV, PCV, $h^2$ and EGA.

| S. no. | Character | Genotypic coefficient of variation | Phenotypic coefficient of variation | $h^2$ % | EGA as % over mean |
|---|---|---|---|---|---|
| 1. | Days to 50% flowering | 6.22 | 6.91 | 80.90 | 9.03 |
| 2. | Panicle length (cm) | 12.00 | 14.01 | 73.40 | 4.77 |
| 3. | Panicle breadth (cm) | 8.56 | 13.25 | 41.80 | 1.76 |
| 4. | 100 seed weight (g) | 24.78 | 25.95 | 91.10 | 1.13 |
| 5. | Grain yield/plant (g) | 36.30 | 36.59 | 98.40 | 36.22 |

of these characters for selection. For yield per plant similar high heritability accompanied with high expected genetic advance was reported by Jain *et al*. (2009).

High values of heritability along with low value of expected genetic advance were observed for the characters like 50% flowering, panicle length, panicle breadth and 100 seed weight. Regarding these characters, the heritability is mainly due to non additive gene effect (dominance and epitasis) hence the expected genetic advance would be low. Since, the characters are mainly governed by non additive component of variation, which is non fixable, heterosis breeding can be fruitfully exploited improving these characters. Hemlata *et al*. (2006) reported high value of heritability along with low values of expected genetic advance for panicle breadth and 100 weight.

## References

Burton, G. W. (1951). Quantitative inheritance in pear millet. *Agron. J*., **43(9)** : 409-417.

Deepalaxmi, A. J. and K. Ganeshmurthy (2007). Studies on variability and character association in *kharif* sorghum. *Indian J. Agric.Res.*, **41(3)** : 177-182.

Sharma, Hemlata, D. K. Jain and Vithal Sharma (2006). Genetic variability and path coefficient analysis in sorghum. *Indian J. Agric. Res*., **40(4)** : 310-312.

Jain, S. K., M. Elangovan and N. V. Patel (2009). Genetic and environmental variability in dual sorghum, for yield and related traits, *Forage Res*., **34(4)** : 201-204.

Jain, S. K. and P. R. Patel (2012). Genetic variability in land races of forage sorghum (*Sorghum bicolor* (L.) Moench) collected from different geographical origin of India. *International Journal of Agric. Sci*., **4(2)** : 182-185.

Johnson, H. W., H. F. Robinson and R. E. Comstock (1955). Estimate of genetic and environmental variability in Soybean. *Agron. J*., **47(6)** : 314.

Mahajan, R. C., P. B. Wadikar, S. P. Pole and M. V. Dhuppe (2011). Variability, correlation and path analysis studies in sorghum. *Research Journal of Agricultural Science*, **2(1)** : 101-103.

Panse, V. G. and P. V. Sukhatme (1967). *Statistical methods for Agri. Workers*. ICAR Publication, New Delhi.

Seetharam, K. and K. Ganeshmurthy (2013). Chracterization of sorghum genotypes for yield and other agronomic traits through genetic variability and diversity analysis. *Electronic J. Plant Breeding*, **4(1)** : 1073-1079.