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Genetic Variability in Pearl Millet (*Pennisetum typhoides* Stapf and Hubb.)

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ABSTRACT

Informations based on 12 Bajra varieties has revealed that earlength had higher phenotypic as well as genotypic coefficient of variation, heritability and genetic advance. Yield per plant exhibited moderate genotypic and phenotypic coefficient of variation, heritability and genetic advance indicated the presence of additive gene effects in these two characters and improvement can be made through phenotypic selection in above varieties. Genetic advance as per cent of mean indicated that earlength can be improved through selection by 50 per cent. On the other hand 100-seed weight, days to maturity, number of tillers per plant and ear girth had shown minimum genotypic and phenotypic coefficient of variation, heritability and genetic advance revealed that these characters are governed by non-additive gene effects and no further improvement can be done through phenotypic selection.

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INTRODUCTION

Bajra (Pearl millet) is an important crop of Rajasthan. Before initiating any breeding programme it is essential to evaluate the existing variability of genetic material. Studies on nature and magnitude of heritable and non-heritable component of variation in bajra are quite a few (Burton, 1951; Shankar *et al.* 1963; Pokhriyal *et al.* 1967). With this object in view, heritable component of overall variability in bajra was estimated by determining genetic parameters such as genotypic variance, phenotypic variance, genotypic and phenotypic coefficient of variations, heritability and genetic advance expressed as per cent of mean.

MATERIALS AND METHODS

The experiment was conducted on twelve bajra varieties viz. PSB-3, PSB-6, PSB-7, PSB-8, PSB-10, DC-3, Vishakha, WC-Cx75, New Vijay, BJ-104, HB-7 and Local sown during kharif, 1977 at Agricultural Research Station, Sumerpur (Rajasthan). Each plot consisted of seven rows each of five meters length with row to row spacing of 50 cm and plant to plant spacing of 10 cm. Five plants were

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selected at random from each plot in each replication. Observations were recorded on days to flowering, days to maturity, plant height, number of effective tillers per plant, ear length, ear girth, 100 seed weight and yield per plant. Data were subjected to statistical analysis as suggested by Snedecor and Cochran (1967) and presented in Table 1.

Genetic coefficient of variation was calculated according to Burton (1951), heritability (broad sense) in percentage and genetic advance according to Johnson *et al.* (1955).

RESULTS AND DISCUSSION

The range, mean, F value, critical difference and coefficient of variation are presented in Table 1. Plant height, number of tillers per plant, ear length, 100-seed weight and yield per plant among varieties ranged widely.

TABLE 1

Range, mean, F value, critical difference (at 5%) and coefficient of variation for various characters in Bajra.

Character	*Range*	*Mean*	*'F' Value*	*CD at 5%*	*CV*
Days to flowering	44-57	50.972	5.83**	3.56	3.84
Days to maturity	66-82	74.944	3.06*	5.08	3.73
Plant height (cms)	176-266	216.194	2.61*	31.85	8.09
Number of tillers per plant	1.3-5.0	2.705	1.29	1.37	27.73
Ear length (cms)	14.0-33.5	25.325	27.66**	3.26	7.07
Ear girth (cms)	5.5-8.1	6.903	1.75	1.65	13.09
100-seed weight (gms)	0.30-0.65	0.482	1.93	0.12	14.07
Yield per plant (gms)	17.6-42.3	32.016	4.39**	8.87	15.22

* Significant at 5% level.

* Significant at 1% level.

Analysis of variance indicated that varieties differed significantly among themselves for all the characters except number of tillers per plant, ear girth and 100-seed weight.

Estimates of genotypic variance, phenotypic variance, genotypic coefficient of variation, phenotypic coefficient of variation, heritability in percentage, genetic advance and genetic advance as percentage of mean are presented in Table 2.

TABLE 2

Genotypic variance, phenotypic variance, genotypic coefficient of variation, phenotypic coefficient of variation, heritability, genetic advance and genetic advance as per cent of mean for various characters in Bajra.

Character	*Genotypic variance*	*Phenotypic variance*	*Genotypic coefficient of variation*	*Phenotypic coefficient of variation*	*Heritability (per cent)*	*Genetic advance*	*Genetic advance as per cent of mean*
1. Days to flowering	6.18	10.02	4.87	6.21	61.70	4.02	7.89
2. Days to maturity	5.35	13.15	3.08	4.83	40.70	3.04	4.05
3. Plant height	164.42	470.39	5.93	10.03	34.95	15.61	7.22
4. No. of tillers per plant	0.05	0.61	8.60	29.03	8.78	0.14	5.25
5. Ear length	28.52	31.73	21.08	22.24	89.88	10.43	41.18
6. Ear girth	0.20	1.02	6.55	14.64	20.01	0.41	6.03
7. 100-seed weight	0.0001	0.006	2.07	16.07	1.66	0.0026	0.53
8. Yield per plant	26.88	50.64	16.19	22.22	53.08	7.78	24.30

The genotypic and phenotypic variances were higher for plant height, ear length and yield per plant indicating wide range of variability in these characters as the range also indicated that the variability was higher in these three traits. The ear length and yield per plant, showed high genetic coefficient of variation while other characters showed moderate and 100-seed weight showed lowest genotypic coefficient of variation. Sangha and Singh (1973) also observed the lowest genotypic coefficient of variation for 100-seed weight in pearl millet. In general, phenotypic coefficient of variation was found to be higher than genotypic coefficient of variation for all the characters.

Heritability was higher for ear length (89.88%) and days to flowering (61.70%) and was moderate for yield per plant (53.08%). This indicated that these characters were relatively less influenced by environment. The low heritability for 100-seed weight, number of tillers per plant and ear girth indicated larger influence of environmental conditions.

High heritability combined with high genetic advance for ear length and yield per plant indicated that these characters were governed largely through the additive effect of genes and improvement in these traits may be achieved through phenotypic selection. Johnson *et al.* (1955) have also suggested that heritability estimates along with genetic advance shall be more helpful in predicting gain under phenotypic selection than heritability estimates alone. Days to flowering showed high heritability with low genetic advance. Such a situation may be caused by non-additive gene action i.e. dominance and epistasis. But 100-seed weight and number of tillers per plant had very low heritability as well as genetic advance, indicated that very little improvement can be achieved by phenotypic selection in these traits.

The genetic advanceas per cent of mean, indicated that ear length is more amenable for selection and could improve this character by fifty per cent. The 100-seed weight and days to maturiy could not be improved by applying selection pressure at five per cent level since the genetic advance as per cent of mean recorded were the lowest.

In general ear length exhibited higher heritability, phenotypic and genotypic coefficient of variation and genetic advance thereby that this character is little influenced by environment and has very high genetic as compared to other variables under study. This had been a deviation from the earlier findings of Sangha and Singh (1973). 100 seed weight had expressed least variability in the material studied in respect of both phenotypic and genetic parameters and very little advance can be made in this character through direct selection. Pokhriyal *et al.* (1967) also reported the similar findings for this character in Bajra.

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