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GENETIC VARIABILITY AND ASSOCIATION ANALYSIS FOR VARIOUS QUANTITATIVE CHARACTERS IN LOCAL LANDRACES OF PEARLMILLET

Y. Singh, S.N. Sharma, A.K. Singh and D.L Singhania

Department of Genetics and Plant Breeding
Rajasthan Agricultural University
Agricultural Research Station
Durgapura, Jaipur (Rajasthan)

The genetic variability, heritability, genetic advance and correlations were studied for ten characters 102 treatments (100 inbreds and 2 hybrid checks). The phenotypic and genotypic coefficient of variance indicated that selection may be done for tiller number and grain yield. Plant height, tiller number, ear girth, grain density and 1000 - grain weight are positively and significantly associated with grain yield. However, these traits also found positive significant association with each other. Therefore, plant height, ear girth, grain density, 1000 grain weight and particularly tiller number should be given due importance while breeding for higher grain yield.

Key Words : Pearl millet, genetic variability, landraces, heritability, genetic advance, association analysis

Pearlmillet is an important crop of Rajasthan particularly for semi-ari conditions of Western Rajasthan due to its sustainability under various stresse However, number of high yielding hybrids and composite populations hav been developed but most of the farmers still continue to grow old loc landraces of their areas because of their greater adaptability and higher toleran to different stresses. Therefore, the genetic variability and correlation for yie components are of great value in selecting desired types amongst the loc landraces. For a planned breeding programme to improve yield, comple information on the genetic variability and inter- relationship in different yie component traits is necessary. The present investigation was carried out assess the variability and relative importance of different characters.

With the help of certain genetic parameters like coefficient of variabili heritability and genetic advance, and the inter-relationship among differe yield component traits from 100 landraces in different parts of Rajasthan, efficient breeding programme for yield improvement would be possible.

MATERIALS AND METHODS

One hundred landraces of Rajasthan alongwith two hybrid checks BJ 104 and CM 46 were studied in a randomised complete block design with three replications. Each plot comprised 2 rows of 5m length. A spacing of 50cm between rows and 15 cm within the row was adopted. All the normal agronomic practices were followed in raising the crops. Observations were recorded on ten randomly selected plants for 10 quantitative traits (Table 1).

Table 1. Phenotypic and genotypic coefficient of variation, heritability, genetic advance and genetic advance as percent of mean of land races

Character	Pcv	Gcv	h^2	GA	GA as per cent of mean
Days to flower	8.73	8.64	0.98	8.34	17.59
Days to maturity	5.34	5.26	0.97	8.34	10.68
Plant height(cm)	9.21	9.15	0.99	38.70	18.75
Ear length(cm)	15.40	15.01	0.95	7.48	30.15
Number of tiller	36.08	35.44	0.96	1.44	71.74
Ear girth(cm)	14.69	13.26	0.81	0.48	24.67
Number of node	10.40	9.39	0.81	1.58	17.47
Grain density/sq.cm.	12.61	12.55	0.99	6.71	25.72
1000 grain weight(gm)	12.53	12.26	0.96	1.93	24.69
Grain yield/plant(gm)	33.16	32.92	0.98	13.19	67.31

The phenotypic and genotypic coefficient of variability (PCV, GCV) were calculated according to the method suggested by Burton (1952), heritability (broad sense) and genetic advance (GA) as per Johnson *et al.* (1955). The formula developed by Al- Jibouri *et al.* (1959) was adopted for the calculation of correlations.

RESULTS AND DISCUSSION

Analysis of variance (Table 1) showed highly significant difference among all the characters studied. The higher phenotypic coefficient of variation and genotypic coefficient of variation were recorded for tiller number followed by grain yield but it was low for days to maturity, days to flower and plant height. The slight edge of PCV over GCV indicated a good scope for making selection of these characters. The magnitude at variability further suggested that there is enough scope of selection for number of tillers, ear girth and grain yield per plant.

The estimate of heritability of a character provides a measure of the effectiveness of selection for that character. The heritability was very high for plant height, ear density, days to flower, grain yield, days to maturity, tiller number and 1000 grain weight. It was comparatively high for ear length, ear girth and number of nodes. Similar results were obtained by Gupta and Sindhu (1972); Gupta and Dhillon (1974); Apparudai and Subramanian (1975); Vyas (1983). The highest genetic genetic advance (as % of mean) was obtained for tiller number (72%), followed by grain yield/plant (67%), ear length (30%), grain density (26%), ear girth (25%) and 100 grain weight (25%; Table 1). Heritability alone may mislead during selection, therefore, genetic advance and heritability should be taken into-consideration during selection programme (Johnson *et al.*, (1955)). In the present study the traits which had high genetic advance were also accompanied by high heritability (Table 1), it may be due to pre-dominance of additive gene effects (Panse, 1957)). Therefore, it appears that selections for those traits would be effective and satisfactory for practical purpose. High genetic advance along with high heritability was also reported in pearl millet by Shinde *et al.* (1984), Goswami and Asthara (1984) and Kunbir and Patil (1986), which support the present finding.

The phenotypic, genotypic correlation coefficients between grain yield and its nine components are furnished in Table 2. The results clearly indicate that grain yield was positively and significantly associated with plant height, number of tiller, ear girth, grain density and 1000 grain weight, whereas other characters showed positive and non-significant correlation with grain yield. It is, therefore, evident that these components though contribute to grain yield but the effect are not very perceptible. It is probably due to highly selected material which has minimized the variation for these component characters. The phenotypic correlation coefficients were highest in most of the characters than the corresponding genotypic correlation coefficient indicated that the environment had a significant role to modify the full expression of the character and/or characters and are in accordance with earlier reports in **bajra** (Kunbir and Patil, 1986; Phul *et al.*, 1974; Singh and Singh, 1976; Pokhriyal *et al.*, 1976; Yadav, 1977; Mukherji *et al.*, 1982) that selection for number of tiller, ear girth and grain weight would bring about simultaneous improvement in grain yield.

The results of correlation coefficients of mutual association of traits further revealed that plant height had positive and significant association with ear length, number of nodes, grain density and 1000 grain weight. Number of tiller was also highly positively correlated with ear girth, number of nodes and grain density, similarly ear girth had a positive and significant association with number of nodes and grain density. Grain density had positively and significantly association with plant height, ear length, number of tiller, ear girth and number of nodes. Whereas, 1000 grain weight showed positive and

significant association with days to maturity, plant height, ear length, number of nodes and grain density. From the foregoing association, it would be reasonable to infer that the lines high in grain yield tended to be tall and late in flowering and maturity.

Table 2. Phenotypic and genotypic correlations in landraces

Characters		Days to maturity	Plant height	Ear length	Tiller number	Ear girth	Number of nodes	Grain density	1000 grain weight	Grain yield
Days to flower	P	0.989**	0.234*	0.289**	0.51**	0.18	0.27**	0.01	0.034	0.14
	G	0.912	0.078	0.28	0.201	0.11	0.378	0.001	0.05	0.001
Days to maturity	P		0.212*	0.189	0.04	0.18	0.245*	0.07	0.70**	0.067
	G		0.22	0.189	0.03	0.101	0.28	0.001	0.10	0.067
Plant height	P			0.50**	0.16	0.045	0.44**	0.934**	0.62**	0.26**
	G			0.378	0.123	0.17	0.423	0.95	0.63	0.123
Ear length	P				0.012**	0.20*	0.445**	0.389**	0.289**	0.16
	G				0.13	0.11	0.134	0.20	0.08	0.167
Tiller number	P					0.28**	0.956**	0.901**	0.08	0.901**
	G					0.312	0.98	0.912	0.08	0.923
Ear girth	P						0.60**	0.90**	0.08	0.389**
	G						0.40	0.58	0.012	0.05
Number of nodes	P							0.38**	0.64**	0.05
	G							0.334	0.18	0.01
Grain density	P								0.43**	0.24*
	G								0.21	0.11
1000grain weight	P									0.589**
	G									0.234

* Significant at 5 per cent level

** Significant at 1 per cent level

Based on present investigations it is concluded that plant height, number of tiller, ear girth, grain density and 1000 grain weight are the major contributing characters towards the grain yield. Hence, if selection force is confined for any one or more of these traits, it will definitely lead to the improvement in pearl millet yield. However, number of tillers could be most effective among these characters as it also has very high heritability and genetic advance. Thus, these character should be given due importance while breeding for higher grain yield in pearl millet.

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