

VARIABILITY IN LANDRACES OF PEARL MILLET IN RAJASTHAN*

K. L. VYAS¹ AND SRIKANT²

In the present investigation, 122 landrace collections were evaluated to have an idea of the genetic variability in them. Analysis of variance revealed highly significant variances in landraces for all the traits. The widest range was observed for plant height, grain yield, 1000 grain weight, ear length and grain density. The phenotypic and genotypic coefficient of variation were highest for effective tiller number followed by those for grain yield and ear length. Heritability was very high for days to flower, plant height, effective tiller number, leaf length, ear length, ear girth, grain density and 1000 grain weight. It was comparatively medium to high for stem thickness, leaf width and grain yield and was low for number of nodes. Maximum expected genetic advance was observed for tiller number followed by grain yield, and ear length. Consistency in estimates of heritability and genetic advance was exhibited by tiller number, grain yield and ear length.

In the past one and a half decade, genetic improvement of pearl millet has been primarily aimed through the development of F₁ hybrids. However, there is need to raise the production level of these hybrids. Another envisaged approach is through population improvement. However, the success of either approach could be best utilized through the introgression of Indian x exotic germplasm.

The major lacuna in realising the full impact of pearl millet in Rajasthan has probably been the lack of monitoring of local germplasm, that could be blended with rest of the germplasm for developing elite genotypes for local conditions. With this objective, a collection of over 350 local landraces was made from all 'bajra' growing districts of Rajasthan. On the basis of the preliminary observations, 122 landraces were selected for extensive screening and

to study the extent of genetic variation for different plant traits.

MATERIALS AND METHODS

The selected 122 landraces along with two local improved varieties, namely *Chadi* and *RSJ* and one popular hybrid BJ 104 were evaluated in a randomized block design with three replications at A.R.S. Durgapura, Jaipur, during *Kharif* 1980. Each plot comprised of 4 rows of five meter long, spaced 50 cm apart and plant to plant 15 cm apart. Ten random plants from each plot were selected for recording observations on i) days to flower, ii) plant height iii) effective tiller number iv) stem thickness v) leaf length vi) leaf breadth vii) number of nodes viii) ear length ix) ear girth x) grain density (measured as number of grains per sq. cm), xi) 1000 grain weight and xii) grain yield. Statistical analysis was done following method of Panse

* Part of the Ph. D. Dissertation submitted to the Rajasthan university by the senior author
1. Plant Breeder (Millets) 2. Asstt. Professor, Agril. Research Station, Jaipur-302015.

and Sukhatme (1961) for analysis of variance. The phenotypic and genotypic coefficient of variation, heritability and expected genetic advance were calculated following standard statistical procedures.

RESULTS AND DISCUSSION

The analysis of variance for all the 12 characters is presented in Table 1, which showed that variance due to landraces was highly significant for all the traits. The estimates of mean, range, phenotypic and genotypic coefficient of variation, heritability (broad sense) and the

genetic advance expressed at 5% selection intensity and the same expressed as per cent of mean are presented in Table 2.

The widest range was shown for plant height, followed by that for grain yield, ear length, grain density and 1000 grain weight. The phenotypic and genotypic coefficient of variation were the highest for effective tiller number followed by that for grain yield and ear length. Heritability was very high for days to flower, plant height, effective tiller number leaf length, ear length, ear girth, grain density and 1000 grain weight.

Table 1. Analysis of variance for different characters of land races

Sources	df.	MEAN			SQUARES		
		Days to flower	Plant height	Tiller Number	Stem thickness	Leaf length	Leaf breadth
Replications	2	0.05	95.00	0.096	0.0025	0.35	0.208
Landraces	124	26.62**	1264.19**	6.600**	0.0240**	109.87**	0.498**
Error	248	1.10	62.58	0.386**	0.0027	7.17	0.069

Table 1. Contd.

Sources	df.	MEAN			SQUARES		
		No. of nodes	Ear length	Ear girth	Grain density/ sq. cm	1000 grain weight	Grain yield
Replications	2	2.24	7.39	0.0015	0.91	1.59	2.98
Landraces	124	4.88**	120.77**	1.3700**	40.20**	1.34**	267.35**
Error	248	2.50	5.08	0.0870	2.25	0.09	55.81

Table - 2 Estimated mean range, phenotypic coefficient of variation (PCV), genotypic coefficient of variation (GCV), heritability (H_b), genetic advance (GA), and genetic advance as per cent of mean of landraces.

Characters	Mean	Range	PCV	GCV	H _b	GA	GA as per cent of mean
Days to flower	56.38 ± 0.86	52.00 - 66.33	5.50	5.17	88.50	5.65	10.02
Plant height (cm)	186.09 ± 6.46	139.00 - 241.00	11.56	10.75	86.49	38.34	20.60
Tiller Number	3.19 ± 0.51	1.07 - 8.23	49.12	45.10	84.30	2.72	85.26
Stem thickness (cm)	1.02 ± 0.04	0.82 - 1.23	9.74	8.27	72.04	0.15	14.71
Leaf length (cm)	64.55 ± 2.18	53.36 - 76.90	9.96	9.06	82.65	10.95	16.96
Leaf breadth (cm)	3.56 ± 0.22	2.70 - 4.76	12.95	10.62	67.19	0.64	17.98
Number of nodes	10.15 ± 1.30	8.40 - 13.00	17.90	8.77	24.02	0.90	8.87
Ear length (cm)	30.02 ± 1.85	19.87 - 52.73	22.01	20.69	86.36	12.03	40.07
Ear girth (cm)	6.65 ± 0.24	5.73 - 9.99	10.51	9.59	93.14	1.23	18.50
Grain density per cm ²	21.38 ± 1.22	12.23 - 33.63	18.06	16.64	84.89	6.75	31.87
1000 grain weight (g)	7.97 ± 0.25	5.64 - 9.45	8.95	8.11	92.12	1.21	15.18
Grain yield (g)	31.42 ± 6.10	11.13 - 56.93	36.78	26.73	55.82	12.92	41.12

Maximum expected genetic advance to the extent of 85.26% was observed for effective tiller number, while it was 41.12% for grain yield and 40.70% for ear length. Thus consistency in estimates of very high heritability coupled with very high genetic advance was observed for effective tiller number, and medium to high heritability was associated with medium to high genetic advance for grain yield, ear length, and grain density.

The above results amply demonstrate that there is considerable variability in germplasm. The evaluation of old germplasm by Murty *et al* (1967) indicated that there was less variability in the Indian germplasm as a whole, while variability in days to flower only existed in Rajasthan germplasm. These observations were based on previous germplasm collection programme on an all India basis which was probably more directed towards sampling the various regions rather than extensive studies in a particular district. Medium to high heritability for grain yield in various groups of germplasm (Indian and Exotic) have been reported by Gupta and Athwal (1966), Gupta and Dhillon (1974) and Gupta and Sidhu (1972). They reported medium to low heritability for tiller number but the present investigations showed high heritability coupled with expected genetic

advance for this trait. Thus, the interesting feature of the present collection has been the increase in variability for tiller number.

In earlier germplasm evaluations, ear length did not seem to be an important selection criterion and hence less emphasis was laid on this trait. From the present investigation, it is clear that ear length coupled with grain density per sq. cm seem to be of great importance for genetic evaluation, since these traits had very high heritability coupled with high expected genetic advance.

REFERENCES

- GUPTA, V. P. and D. S. ATHVAL, 1966. Genetic variability, correlations and selection indices of grain characters in pearl millet. *J. Res. Pb. agric. Univ., Ludhiana*, 3: 111-17.
- GUPTA, V. P. and P. S. DHILLON, 1974. Variation and covariation of some plant and grain traits in pearl millet. *Indian J. Agric. Sci.* 44: 213-16.
- GUPTA, V. P. and P. S. SIDHU, 1972. Component analysis for grain yield in Bajra. *Plant Sci.* 4: 12-15.
- MURTY, B. R., M. K. UPADHYAY and P. L. MANCHANDA, 1967. Classification and cataloguing of world collection of genetic stocks of *Pennisetum*. *Ind J. Genet.* 27 A: 313-94.
- PANSE, V. G. and P. V. SUKHATME, 1961. *Statistical methods for agricultural workers*. I. C. A. R., New Delhi.