

Genetic Variability in Dolichos Bean

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Dolichos bean is commercially cultivated in Chhotanagpur region of Jharkhand for its proteinaceous tender pods used as fresh vegetable. To boost up the productivity of this crop, development and cultivation of new improved varieties are of urgent need. To achieve this target through genetic improvement, it is essential to assess the genetic variability for yield and its components. Parameters of genotypic and phenotypic coefficients of variation (GCV, PCV) are useful in detecting the amount of variability present in the available germplasm. Heritability and genetic advance help in determining the influence of environment in expression of the characters and the extent

to which improvement is possible after selection (Robinson *et al.* 1949). The present study was undertaken to quantify the variability in the indigenously collected dolichos bean germplasm for 14 yield-related characters and to select the promising parental lines based on performance for utilization in genetic enhancement programme.

The experimental material consisted of 25 indigenously collected germplasm of dolichos bean. These were evaluated at Horticulture and Agro-forestry Research programme (HEFRP, Ranchi) during autumn-winter season of 2000-01 in RBD with three replications. A spacing of 1 m x 75 cm was maintained. Six plants

were grown in each replication. Ten randomly selected pods were used for recording pod characters in each replication. Data were recorded on number of primary branches/plant, leaf length, leaf breadth, peduncle length, days to 50% flowering, pod length, pod breadth, pod girth, pod weight, number of seeds/pod and fresh pod yield/plant. Analysis of variance was calculated by the method suggested by Panse and Sukhatme (1985). The PCV were estimated as per Burton (1952). Heritability in a broad sense and genetic advance were computed according to Johnson *et al.* (1955).

The analysis of variance indicated highly significant differences among 25 genotypes for all the 14 quantitative characters (Table 1). All the characters exhibited considerable range in their expression. The maximum extent of genetic variability was exhibited by number of pods/plant followed by number of pods/peduncle, pod weight and pod breadth. Similar results were obtained by Baswana *et al.* (1980) in dolichos bean. The characters possessing high GCV values have a better scope of improvement through selection. The difference between GCV and PCV was not of high magnitude for all the characters which indicated the minimum influence of

environment in expression of these characters. This suggests that selection can be effective on the basis of phenotype alone with equal probability of success. With the help of GCV alone, it is not possible to determine the extent of variation that is heritable. So, the knowledge of heritability of a character helps the plant breeder in predicting the genetic advance for any quantitative character and aids in exercising necessary selection pressure. The broad sense heritability was very high for pod weight, pod breadth, peduncle length, pod length, number of seeds/pod, number of pods/peduncle and number of pods/plant indicating less influence of environment on these traits. The heritability estimate of yield was of moderate level which suggested that environment effects constituted a major portion of total phenotype variation and hence, direct selection for yield would be less effective.

Johnson *et al.* (1955) reported that the heritability estimate along with genetic advance is more useful than the heritability alone in predicting the resultant effect of selecting the best individual genotype as it suggests the presence of additive gene effects (Panse, 1957). High heritability along with high genetic advance was

Table 1. Mean sum of squares (treatment), mean, range, parameters of variance, heritability and genetic advance for 14 characters in dolichos bean germplasm

Characters	Mean sum of squares	Mean	Range	Coefficient of variation		Heritability (%)	Genetic advance (K=2.06)	GA as %age of mean
				Genotypic (%)	Phenotypic (%)			
Number of primary branches/plant	0.69**	3.67	2.48-4.45	9.49	18.23	27.10	0.37	10.08
Leaf length (cm)	3.56**	7.60	5.08-9.48	12.96	16.72	60.04	1.57	20.65
Leaf breadth (cm)	3.50**	7.15	4.89-9.05	13.24	18.26	52.54	1.41	19.72
Peduncle length (cm)	138.61**	26.65	15.46-36.20	25.30	25.91	95.33	13.56	50.89
Days to 50% flowering	831.52**	105.88	68.00-121.67	15.29	16.55	85.43	30.83	29.18
Pod length (cm)	12.61**	10.54	4.74-13.69	19.27	19.81	94.62	04.07	38.61
Pod breadth (cm)	4.82**	2.53	1.21-5.21	49.96	50.25	98.83	02.59	102.37
Pod girth (cm)	0.06**	1.08	0.87-1.52	12.84	14.06	83.43	26.16	2422.22
Pod weight (g)	62.40**	9.08	3.30-19.60	50.14	50.30	99.38	09.36	102.97
Number of pods/peduncle	75.32**	7.19	2.34-19.50	68.53	72.02	90.55	09.65	134.21
Number of pods/node	6.49**	4.22	2.67-8.43	30.18	42.75	49.85	01.85	43.84
Number of pods/plant	130869.30**	273.10	96.99-933.19	75.08	79.19	89.90	400.52	146.71
Number of seeds/pod	0.86**	5.08	2.93-5.87	10.38	10.82	91.98	01.04	20.47
Fresh pod yield/plant (kg)	1.52**	1.88	0.88-3.95	34.05	44.38	58.86	1.01	56.11

** Significant at 1% level

recorded in characters viz.- pod weight, pod breadth, number of pods/peduncle and number of pods/plant. These characters also recorded high values of GCV and PCV which indicated that these characters could be improved through individual plant selection. The above results are in agreement with the findings of Baswana *et al.* (1980) who reported high values of GCV, heritability and genetic advance for pod weight, pod width and number of pods per cluster and Rathnaiah (1985) who reported the same trend for number of pods/plant in dolichos bean.

The high genetic variability and heritability along with genetic advance expressed by the above mentioned four characters indicated that the genotypes could be evaluated in multilocational trials and selected as donors for these traits and used as parents in hybridisation programme.

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