Himachal Journal of Agricultural Research Vol. 33 (1): 119-120, 2007

Short Note

Variability and association studies for seed yield and related traits in ricebean (*Vigna umbellata*)

N. Kishore, R.K. Dogra, S.R. Thakur and R.K. Chahota
Department of Plant Breeding and Genetics
CSK Himachal Pradesh Krishi Vishvavidyalaya, Palampur- 176 062.

Ricebean [*Vigna umbellata* (Thunb.) Ohwi and Ohashi] is a non-traditional under-utilized legume, which has recently gained importance as supplementary food crop due to its high nutritional quality, high grain yield and multipurpose usage as food, animal feed, green manure and as soil enricher. It has wide climatic adaptability and tolerance to drought. Being a relatively new and underexploited pulse crop, information on its variability among various parameters has been lacking. It is with this objective that the present study on parameters of variability and associations among different traits was undertaken in ricebean in Himachal Pradesh.

The experimental material consisted of 13 diverse ricebean genotypes raised in randomized block design in 3 replications during the *kharif* seasons of 2001-2004 at CSK Himachal Pradesh Krishi Vishvavidyalaya, Palampur (1290m amsl). Each genotype was grown in five rows of three-metre length with row to row and plant to plant spacing of 30 and 10 cm, respectively. Observations were recorded on ten randomly selected competitive plants for days to 50% flowering, plant height, days to maturity and 100-seed weight. Seed yield was recorded on plot basis which was converted to kg/ha. Coefficients of variability were estimated as per method given by Johnson *et al.* (1955a). Correlation coefficients were calculated according to Johnson *et al.* (1955b) and path coefficient analysis as per method given by Dewey and Lu (1959).

Analysis of variance revealed significant differences among the genotypes for all the traits studied. In general, the magnitude of phenotypic coefficient of variability (PCV) was higher than that of genotypic coefficient of variability (GCV) for all the traits indicating the influence of environmental factors on these characters (Table 1). The GCV and PCV were found to be higher for 100-seed weight and seed yield/ha suggesting wide genetic diversity for these. Selection based on these traits would facilitate the isolation of the desirable types. High GCV and PCV for these traits were also reported by Borah *et al.* (2001).

GCV together with heritability estimates gives a better picture of the extent of advance that can be made through selection (Burton, 1952). High heritability was observed for all the traits studied. Therefore, 100-seed weight and seed yield/ha which showed high GCV along with high heritability could be improved through simple mass selection. Similar finding was also reported by Chakraborty and Mukherjee (2001).

High heritability coupled with high genetic advance (GA) render the selection effective as these traits are under the control of additive gene action (Johnson *et al.*, 1955a). High GA along with higher heritability estimates was recorded for 100-seed weight and seed yield/ha (Chaudhari *et al.*, 2001). The characters days to 50% flowering, days to maturity and plant height revealed high heritability estimates but low genetic advance which indicated their governance by non-additive genes and thus, could be further improved through some indirect selection methods.

Correlation coefficients give the extent of associations between yield and its component traits in making useful selections. The correlation

Table 1. Variance and parameters of variability for different characters in ricebean

Trait	Variance	Mean	Range	GCV (%)	PCV(%)	h^2_{bs}(%)	GA %
Days to 50% flowering	1123.48*	92.19 ± 1.31	70.33-118.75	19.76	20.01	97.5	38.98
Plant height (cm)	383.93*	132.99 ± 2.50	106.83-144.04	7.50	8.23	83.1	13.83
Days to maturity	1542.45*	134.28 ± 1.55	108.2-166.0	15.73	15.87	98.3	30.70
100-seed weight (g)	127.78*	9.93 ± 0.31	5.54-22.98	63.65	63.87	99.3	134.14
Seed yield (q/ha)	89.32*	8.98 ± 1.01	3.35-15.50	53.49	53.85	98.6	113.47

*Significant at 5% level

coefficient between different traits showed that seed yield/ha was significantly and negatively correlated with days to 50% flowering, days to maturity and 100-seed weight as shown in Table 2 (Sharma and Hore, 1994). Therefore, in ricebean, early maturing varieties having smaller seed size are desirable for getting more yield *per se*. Significant and positive correlations were observed for 100-seed weight with days to 50% flowering, plant height and days to maturity. Similar associations were also reported by Borah *et al.* (2001).

Table 2. Genotypic and phenotypic correlation coefficients among different characters in ricebean

Trait	Days to 50% flowering	Plant height (cm)	Days to maturity	100-seed weight (g)	Seed yield (q/ha)
Days to 50% flowering		0.62	0.96	0.85	-0.65
Plant height (cm)	0.56*		0.59	0.64	-0.23
Days to maturity	0.96*	0.52		0.84	-0.76
100-seed weight (g)	0.83*	0.59*	0.83*		-0.63
Seed yield (q/ha)	-0.64*	-0.20	-0.75*	-0.62*	

*Significant at 5% level Values below and above the diagonal represents phenotypic and genotypic correlation coefficients, respectively

Path analysis (Table 3) showed that days to 50% flowering exerted highest positive direct effect on seed yield followed by plant height but negative direct effects were exerted by days to maturity and 100-seed weight.

Table 3. Genotypic (G) and phenotypic (P) path coefficient analysis of different traits on seed yield

Trait		Days to 50% flowering	Plant height (cm)	Days to maturity	100-seed weight (g)
Days to 50% flowering	P	**0.833**	0.128	-1.434	-0.167
	G	**1.713**	0.155	-2.320	-0.201
Plant height (cm)	P	0.464	**0.229**	-0.779	-0.119
	G	1.069	**0.248**	-1.393	-0.152
Days to maturity	P	0.796	0.119	**-1.499**	-0.168
	G	1.671	0.145	**-2.379**	-0.200
100-seed weight (g)	P	0.690	0.135	-1.245	**-0.202**
	G	1.448	0.159	-2.000	**-0.238**

Residual effects Genotypic = 0.21 Phenotypic =0.33

Sharma and Hore (1994) also reported negative effects of days to maturity on seed yield. This suggested that high seed yield may not be necessarily associated with late maturity. The indirect effects of days to 50% flowering, plant height and 100-seed weight via days to maturity were high and negative. Similarly, indirect effects via 100-seed weight were also negative revealing that this is not an important yield component.

Thus it can be concluded from the present study that varieties having early maturity and small seed size are desired for obtaining high seed yield in ricebean.

References

Borah H K, Debchoudhary P K, Sheikh I A and Barman B 2001. Genetic parameters correlations and yield characters in ricebean (*Vigna umbellata* (Thunb.) Ohwi and Ohasi). Madras Agric. J. **88**: 629-632.

Burton G W 1952. Quantitative inheritance in grasses. Proc. 6th Int. Grassland Cong. **1**: 277-288.

Chakraborty M and Mukherjee A K 2001. Variation and character association in ricebean (*Vigna umbellata*). J. Res. **13**: 45-49.

Chaudhari G B, Patil J V and Barhate K K 2001. Genetic variability in ricebean (*Vigna umbellata*). Madras Agric. J. **87**: 348-349.

Dewey D R and Lu K H 1959. A correlation and path coefficient analysis of components of crushed wheat grass seed population. Agron. J. **51** : 518.

Johnson H W, Robinson H F and Comstock R E 1955 a. Estimates of genetic and environmental variability in soybeans. Agron. J. **47**: 314-318.

Johnson H W, Robinson H F and Comstock R E 1955 b. Genotypic and phenotypic correlation in soybean and their implication in selection. Agron.J. **47**: 477-482.

Sharma B D and Hore D K 1994. Association of yield attributes in ricebean (*Vigna umbellata*). Legume Res. **17**: 135-137.