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Short Note

Variability and association studies for some agro-morphological traits in buckwheat (*Fagopyrum* species) in the dry temperate regions of North-western Himalaya

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Abstract

Eight genetically diverse genotypes of buckwheat involving *esculentum* and *tataricum* species raised during the summer seasons of 2001-2004 at Sangla (distt. Kinnaur) showed high variability for all the traits studied. High GCV and PCV values were recorded for seed yield followed by plant height. High heritability coupled with high genetic advance (GA) was observed for seed yield, whereas plant height exhibited moderate GA. Plant height revealed significant positive association with seed yield and days to 50% flowering indicating enhanced seed yield following increased plant height. High positive direct effects of plant height were observed, whereas the indirect effects of 100-seed weight via plant height were also positive suggesting plant height and 100 seed weight are important traits for obtaining higher yields in buckwheat.

Key words: Buckwheat, variability, correlation, path analysis.

The buckwheats i.e. sweet (*Fagopyrum esculentum* L. Moench.) and bitter (*Fagopyrum tataricum* L. Gaertn.) are a rich source of lysine content along with other amino acids which the common cereal crops lack. It is an important catch crop taken after green pea in the high altitude, dry temperate regions of Himachal Pradesh. The flowers and green leaves are used for the extraction of rutin, a flavinoid, which is used for preparing medicines (Joshi and Paroda, 1991). Inspite having great importance, very little has been done to exploit the genetic potential of the crop in the recent past. Considering the scanty information on the extent of its nature and variation among various parameters, the present study was aimed to generate information on parameters of variability and associations among different traits in *esculentum* and *tataricum* species of buckwheat in Himachal Pradesh.

The experimental material consisted of eight diverse genotypes of buckwheat raised in randomized block design during the summer seasons (2001-2004) at Mountain Agriculture Research and Extension Centre, Sangla (2680m above mean sea level) in district Kinnaur. All the genotypes except for OC-2 (*esculentum* species) belonged to *tataricum* species. The experiments were conducted in randomized block design with three replications and each genotype was grown in $8m^2$ plot. Data were recorded on ten randomly taken plants from each plot for plant height (cm) and 100-seed weight (g), whereas on plot basis for days to 50% flowering, days to maturity and seed yield (q/ha). Coefficients of variability were estimated as per Johnson *et al.* (1955a). Correlation coefficients were calculated according to Johnson *et al.* (1955b) and path coefficient analysis was done as per Dewey and Lu (1959).

Analysis of variance showed high variability for all the traits studied as indicated by the significant differences among the buckwheat genotypes. In general, magnitude of phenotypic coefficient of variation (PCV) was slightly higher than that of genotypic coefficient of variation (GCV) for all the traits indicating the influence of environmental factors on these traits (Table 1). The minimum differences between the PCV and GCV values for all the characters studied suggested that these traits were the least affected by the environment. Seed yield showed the highest phenotypic and genotypic coefficient of variation, whereas these were moderate for plant height indicating that selection based on grain yield would help in the isolation of the desirable genotypes. High PCV and GCV for seed yield was also observed earlier by Joshi and Rana (1995). Seed yield showed high heritability coupled with highest genetic advance, whereas high heritability with moderate GA was observed for plant height. Joshi and Rana (1995) also

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reported high heritability coupled with high GA for seed yield, whereas moderate GA for plant height.

The correlation coefficients at genotypic level were generally of higher magnitude than the corresponding phenotypic values (Table 2). Plant height showed significant positive association with days to 50% flowering revealing increase in plant height with late flowering. Significant and positive association was also observed between plant height and seed yield indicating better seed yield with increased plant height. Similar finding was also reported earlier by Joshi (2005). The cause and effect relationship as suggested by the path coefficient analysis (Table 3) revealed high and positive direct effects of plant height on seed yield showing better seed yield following increased plant height but the direct effects of days to maturity were negative indicating that high seed yield may not be necessarily associated with late maturity. The indirect effects of days to 50% flowering via plant height were positive, whereas via days to maturity were negative suggesting the importance of plant height and early maturity for obtaining high seed yield. Positive indirect effects of 100-seed weight via plant height indicated the importance of the trait contributing towards seed yield via increased plant height. The above results are in conformity with the findings of Joshi and Rana (1995) and Joshi (2005).

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

Characters	Variance	Mean ± SE(m)	Range	PCV (%)	GCV (%)	h^2bs (%)	GA (%)
Days to 50% flowering	262.84*	58.84±1.80	43.25-67.25	14.90	13.54	82.50	25.32
Plant height (cm)	2946.59*	124.45±2.20	73.37-151.85	21.66	21.46	98.20	43.81
Days to maturity	543.72*	115.19±2.03	101.17-132.17	10.36	9.95	92.30	19.70
100-seed weight (g)	0.13*	2.49±0.02	2.19-2.75	7.49	7.30	95.0	14.47
Seed yield (q/ha)	202.59*	13.65±0.49	2.65-25.24	52.04	51.33	97.30	104.25

* Significant at 5% level of significance

Table 2. Genotypic (above diagonal) and phenotypic (below diagonal) correlation coefficients among different characters in buckwheat

Characters	Days to 50% flowering	Plant height (cm)	Days to maturity	100-seed weight (g)	Seed yield (q/ha)
Days to 50% flowering		0.79	0.47	0.59	0.52
Plant height (cm)	0.71*		0.02	0.44	0.89
Days to maturity	0.42	0.01		-0.06	-0.34
100-seed weight (g)	0.52	0.43	-0.05		0.43
Seed yield (q/ha)	0.49	0.87*	-0.31	0.41	

* Significant at 5% level of significance

Table 3. Phenotypic (P) and Genotypic (G) path coefficient analysis for different traits on seed yield in buckwheat

Characters		Days to 50% Flowering	Plant height (cm)	Days to maturity	100-seed weight (g)
Days to 50% flowering	P	**-0.008**	0.605	-0.130	0.019
	G	**-0.280**	0.835	-0.104	0.067
Plant height (cm)	P	-0.006	**0.861**	-0.002	0.016
	G	-0.220	**1.061**	-0.004	0.050
Days to maturity	P	-0.003	0.005	**-0.310**	-0.002
	G	-0.130	0.020	**-0.222**	-0.006
100-seed weight (g)	P	-0.004	0.366	0.015	**0.037**
	G	-0.165	0.467	0.013	**0.113**

Residual effects Genotypic (G) = 0.081, Phenotypic (P) = 0.144

. Thus, from the overall results it can be inferred that plant height is an important trait based on which high seed yield can be obtained, although simultaneous selection for early flowering genotypes with high seed weight will also be useful in bringing elevated yields in buckwheat.

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