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Short Communication

Phenotypic stability in buckwheat (*Fagopyrum esculentum* Moench) in the dry temperate region of north-western Himalayas

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Buckwheat (*Fagopyrum esculentum* Moench) is an important pseudo-cereal of high hills in dry temperate zone of the Himalayas and is cultivated mostly after harvesting peas (*Pisum sativum* L.). Relative performance of this crop varies over the years by the influence of environment. Very little efforts have been made so far to exploit the existing variability of the crop for genetic improvement of yield and to isolate the stable genotypes for better performance over the years. Therefore, there is an urgent need to examine and evaluate the stability of genotypes for seed yield and yield attributing traits among land races and other cultivated strains as well for achieving sustainable production of yield for a longer period. Hence an experiment was carried out on stability analysis among 14 genotypes of buckwheat for identifying stable and high yielding genotypes suitable for dry temperate regions of high hills in north-western Himalayas.

Fourteen genetically diverse genotypes of buckwheat were grown during the summer season for three years (1999-2001) at Sangla (78°15.016 N, 31°25.941 E) at an altitude of 2680 m (amsl). The experiment was laid in Randomized Block Design with three replications. Row-to-row and plant-to-plant spacings were maintained at 35 cm and 5 cm respectively in a plot size of 2.0 m × 1.5 m. The recommended agronomic practices were followed for raising the crop. Observations were recorded on seed yield (q/ha), days to maturity, plant height (cm) and branches/plant. Stability analysis was carried out as per Eberhart and Russell [1].

Analysis of variance (Table 1) indicated the presence of sufficient genetic variability for all the traits. High and significant mean squares of environment (linear) except branches/plant showed considerable differences among environments prevailed over three years due to variation in weather conditions particularly experienced by rainfall and temperature during cropping seasons. The mean squares for genotype × environment interaction effect appeared significant for all traits indicating differential response of genotypes in different environments. The results confirmed the earlier [2] findings that variability due to g × e interaction effect could be exploited for identifying desired genotypes suitable for this region. The non-significant effect of genotype × environment (linear) interaction against pooled deviation for these traits on the contrary, imposed restriction to evaluate and predict the genotypic performance accurately over the environments. The estimates of stability parameters (Table 2) however found suitable for identifying individual genotype [3].

Table 1. Pooled analysis of variance (mean squares) for different traits in buckwheat

Source	df	Seed yield (q/ha)	Plant height (cm)	Branches/ plant	Days to maturity
Genotypes	13	5.44*	103.21*	0.30*	18.88*
Environments	2	50.47*	5730.44*	0.43*	126.96*
Genotype × Environment	26	2.71*	60.09*	0.26*	7.05*
Environment + (Genotype × Environment)	28	6.12**	465.18**	0.28	15.62**
Environment (linear)	1	100.94**	11460.85**	0.86	253.84**
Genotype × Environment (linear)	13	3.02	70.08	0.19	7.25
Pooled deviation	14	2.22*	46.53*	0.32*	6.37*
Pooled error	78	0.66	5.48	0.02	1.33

* Significant against pooled error at P = 0.05
** Significant against pooled deviation at P = 0.05

Linearity in the expression of genotypic performance (S^2d) was recorded for all the cultivars except VL 7 and Kalpa for seed yield; USDA 1, Kalpa, Kilba and VL 7 for days to maturity. Jangi and Kilba exhibited significantly higher mean values for seed yield

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Table 2. Estimates of stability parameters for different traits in buckwheat

Genotype	Seed yield (q/ha)			Plant height (cm)			Branches/plant			Days to maturity		
	X_i	$b_i \pm se$	S^2 di	X_i	$b_i \pm Se$	S^2 di	X_i	$b_i \pm Se$	S^2 di	X_i	$b_i \pm Se$	S^2 di
Chango	7.56	1.65±0.44	1.18	104.96	0.59±0.20	29.44*	3.00	5.05±2.78	0.46*	109.33	0.76±0.44	2.96
Chini	6.30	1.74±0.20	0.07	95.04	1.14±0.09	4.16	3.17	0.31±0.99	0.06	106.78	1.64±0.30	−0.44
Giabong	7.28	0.02±0.00	−0.22	96.82	1.22±0.06	0.86	2.82	0.95±1.21	0.08*	110.33	1.27±0.26	−0.01
Harsowska	7.67	1.53±0.51	1.64	99.38	1.21±0.05	0.19	2.64	−1.27±0.00	−0.01	107.56	1.51±0.29	−0.35
Jangi	10.50	1.52±0.10	−0.15	91.94	0.82±0.06	0.64	3.34	0.38±3.71	0.83*	105.33	0.25±0.12	−0.06
Kalpa	8.31	1.11±0.76	3.91*	86.04	0.67±0.45	163.36*	2.90	2.79±0.40	0.00	105.22	0.47±0.16	14.81*
Kamru	8.19	1.20±0.35	0.68	99.61	0.85±0.20	31.29*	2.79	0.56±0.04	0.00	105.78	2.37±0.36	−0.45
Kilba	9.19	0.99±0.06	−0.19	85.56	0.71±0.28	62.68*	2.73	0.05±0.91	0.04	107.89	1.48±0.28	14.55*
OC 2	7.84	1.62±0.06	−0.19	98.07	0.96±0.07	2.46	2.73	1.84±0.00	−0.01	109.89	0.17±0.10	−0.45
PRB 9001	8.40	0.74±0.20	0.06	91.48	0.92±0.32	84.21*	3.16	−2.00±1.62	0.15*	106.78	1.13±0.25	0.77
Sangla	7.56	0.28±0.46	1.34	93.26	1.34±0.08	3.12	2.78	1.23±1.28	0.09*	110.67	1.27±0.26	−0.11
USDA 1	8.44	1.01±0.10	−0.15	94.32	0.74±0.39	119.14*	3.84	0.13±2.98	0.53*	104.22	0.70±0.20	44.50*
VL 27	6.68	0.97±0.35	0.68	93.13	1.24±0.35	96.97*	2.96	1.47±0.00	0.00	104.67	0.65±0.19	0.03
VL 7	4.75	−0.39±1.64	19.38*	84.30	1.58±0.19	27.32*	3.17	2.52±5.94	2.14*	102.33	0.32±0.13	7.24*
Grand mean	7.76			93.85			3.00			106.91		
SE (m) ±	1.05			4.82			0.40			1.78		
SE (b) ±	0.56			0.24			2.28			0.59		

*P = 0.05

over population mean while registered regression coefficient near unity.

On the basis of performance and stability parameters it was concluded that the two genotypes *viz.*, 'Jangi' and 'Kilba' were found suitable for large scale cultivation at high hills of dry temperate region in the north-western Himalayas, while the former produced high seed yield under favourable environmental conditions.

References

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