

Nature of association among some quantitative traits in barley (*Hordeum vulgare* L.)

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ABSTRACT

Twenty five genetically diverse strains of barley were studied for correlation among eight characters i.e. Germination percentage, plant height, number of productive tillers per plant, ear length, number of grain per ear, grains weight per ear, thousand grain weight and grain yield per plant. Correlations between grain yield and other characters were partitioned into direct and indirect effects. Number of grains per ear was the most important character in exerting maximum direct effect on grain yield.

Key words : Correlations, Direct effect, Indirect effect, Path analysis.

INTRODUCTION

Grain yield is a complex trait influenced by several genetic factors interacting with environment. Success of any breeding programme for its improvement depends on the efficiency of selection. For a successful selection, it is necessary to study the nature of association of the character in question, with other relevant traits. Path coefficient provides a better index for selection rather than mere correlation coefficient by separating the correlation coefficient of yield and its components into direct and indirect effects. The present investigation was, therefore, undertaken to estimate the phenotypic and genotypic correlations and their direct and indirect effects on yield of barley.

MATERIALS AND METHODS

Twenty five genetically diverse strains were evaluated in randomized complete block design with three replications during the *Rabi* season of 2003-04 at crop Research Farm, Nawabganj, C.S.A. University of Ag. & Tech., Kanpur. Each

genotype was grown in two rows with spacing of 23 cm in each replication. The data were recorded on five randomly selected plants from each plot and replication for eight quantitative characters viz., Germination percentage, plant height (cm), number of productive tillers per plant, ear length (cm), number of grains per ear, grain weight per ear (g), 1000 grain weight (g) and grain yield per plant (g). The mean data were utilized to estimate the correlation coefficients and their direct and indirect effects.

Path coefficient analysis was done by using the method suggested by Dewey and Lu (1959).

RESULTS AND DISCUSSION

The phenotypic and genotypic correlation coefficients among yield and yield components clearly indicated that grain yield per plant had positive and significant correlation with plant height, number of productive tillers per plant, ear length and grain weight per ear. Similar observation were reported in barley by Sethi and Singh (1972) and Mandal and Dana (1993).

Table 1: Estimates of genotypic (rg) and phenotypic (rp) correlation between different characters of barley

Characters	Germination (%)	Plant height (cm)	Number of productive tillers/plant	Ear length (cm)	Number of grain/ear (g)	Grain weight/ear (g)	1000 grain weight (g)	Grain yield/plant
Germination (%)	rp	-0.065	0.009	-0.001	0.010	-0.115	0.022	-0.088
	Rg	-0.340*	-0.044	-0.359*	-0.057	-0.241	-0.161	-0.278
Plant height (cm)		rp	0.657**	0.146	0.056	0.202	0.087	0.690**
		rg	0.876**	0.117	0.023	0.209	0.148	0.863**
Number of productive tillers/plant			rp	0.035	0.008	0.159	0.117	0.644**
			rg	0.000	0.122	0.216	0.128	0.920**
Ear length (cm)				rp	0.808**	0.480**	-0.351*	0.382**
				rg	0.935**	0.546**	-0.653**	0.468**
Number of grains/ear					rp	0.372**	-0.472**	0.329*
					rg	0.412*	-0.729**	0.430*
Grain weight/ear (g)						rp	0.185	0.487**
						rg	0.313	0.598**
1000 grain weight (g)							rp	0.130
							rg	0.071
Grain yield/plant (g)								Rp
								rg

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Table 2 : Direct and indirect effects of different characters on yield at genotypic level in barley for genotypic path

Characters	Germination (%)	Plant height (cm)	Number of productive tillers/plant	Ear length (cm)	Number of grain/ear (g)	Grain weight/ear (g)	1000 grain weight (g)	Grain yield/plant
Germination (%)	0.170	-0.691	0.057	0.474	-0.171	0.113	-0.231	-0.278
Plant height (cm)	-0.058	2.035	-1.141	-0.154	0.068	-0.098	0.212	0.863**
Number of productive tillers/plant	-0.007	1.783	-1.303	0.000	0.365	-0.101	0.184	0.920**
Ear length (cm)	-0.061	0.238	0.000	-1.321	2.805	-0.255	-0.937	0.468**
Number of grains/ear	-0.010	0.046	-0.158	-1.235	3.000	-0.193	-1.046	0.403*
Grain weight/ear (g)	-0.041	0.424	-0.281	-0.721	1.236	-0.468	0.499	0.598**
1000 grain weight (g)	-0.027	0.300	-0.167	0.863	-2.186	-0.146	1.435	0.071

Residual effect = 0.076.

The other positive and significant correlation were recorded for grain weight per ear with ear length and number of grains per ear; number of grains per ear with ear length. However, number of grains per ear and ear length showed negative correlation with 1000-seed weight.

The genotypic correlation coefficients were in general similar in direction but higher in magnitude than phenotypic correlation coefficients, hence the association between these traits might be due to pleiotropy rather than linkage (Falconer, 1989).

The correlations with yield were further partitioned into direct and indirect effects to establish the cause and effect relationship among the yield and its component characters. Path analysis revealed that number of grains per ear (3.000) recorded highest positive direct effect on grain yield per plant followed by plant height (2.035) and 1000 grain weight (1.435) indicating that these parameters could help breeders during effective indirect selections.

The similar findings were also recorded Ganusheva (1992) and Singh and Koul (1989). It was clearly indicated from low positive residual effect that most of the yield contributing traits were included in the study.

The present investigation suggested that the traits like number of grains per ear, plant height and 1000 grain weight, should also be given due importance during selection for high yielding genotypes.

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