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Correlation and Path Analysis in Pigeonpea Production Traits

A. V. Viramgama and S. N. Goyal

Department of Ag. Botany & Plant Breeding,
N. M. College of Agriculture, Gujarat Agricultural University, Navsari-396 450

For designing any sound breeding programme, the critical assessment of nature and magnitude of genetic variability is one of the pre-requisite for any plant breeder. Yield, which is a complex character can be improved if its association and magnitude with yield contributing characters are known. The present study was therefore conducted to know such association in pigeonpea.

Seventy pigeonpea genotypes collected from different pigeonpea growing areas of the country were planted on Instruction farm of Agriculture College Navsari in *kharif*, 1990. The sowing was done in single row plot of 5 m length having a spacing of 90 x 20 cm following randomised block design with 3 replications. Observations on 5 randomly selected plants were recorded for 10 characters and their means were used for computing correlations (Al Jibouri *et al.* 1958). Path analysis was done as per method described by Dewey and Lu (1959).

Correlation coefficients presented in table 1 were highly significant in most of the cases and in general genotypic correlations were higher than their corresponding phenotypic correlations. Grain yield was significantly and positively associated with number of pods per plant, number of primary branches, plant height, length of secondary branch, 100 seed weight, days to flower and pod length. The trait number of pods per plant was significantly and positively correlated with all the traits except pod length and number of seeds per pod at genotypic and phenotypic levels. Similar was the trend between 100 seed weight and other characters. Plant height was having positive and significant association with number of primary branches, length of secondary branch pod length, days to maturity and days to flowering. The correlation between days to flower and maturity was substantial and positive. Thus most of the characters were noted to have influence on one another and yield, which is in accordance of Bainiwal and Jatasra (1983) Bhongle and Raut (1987) and Patil *et al.* (1989).

Path analysis (Table 2) revealed positive direct effects of all the traits which had significant association with seed yield except of days to flower and pod length, whose direct effects were negative. The highest direct and indirect positive effect was of pods per plant, where as plant height, number of primary

TABLE 1

Genotypic (G) and phenotypic (P) correlations among ten characters of pigeonpea.

Characters		*Number of pods plant*	*Number of seeds pod*	*100 seed weight (g)*	*Plant height (cm)*	*Number of primary branches plant*	*Length of secondary branches plant (cm)*	*Pod length (cm)*	*Days to flower*	*Days to maturity*
Grain yield plant (g)	G	0.819**	0.013	0.571**	0.702**	0.736**	0.698**	0.245*	0.472**	0.185
	P	0.748**	0.044	0.572**	0.682**	0.679**	0.614**	0.229	0.401**	0.137
Number of pods per plant	G		-0.045	0.577**	0.659**	0.658**	0.611**	0.180	0.515**	0.318**
	P		-0.025	0.519**	0.593**	0.531**	0.484**	0.114	0.435**	0.244**
Number of seeds pod	G			0.170	-0.140	0.109	-0.061	0.280*	-0.090	0.102
	P			0.157	-0.055	0.118	-0.004	0.255*	-0.025	0.092
100 seed weight	G				0.380**	0.513**	0.468**	0.194	0.416**	0.259*
	P				0.367**	0.447**	0.400**	0.171	0.351**	0.210
Plant height	G					0.682**	0.844**	0.425**	0.623**	0.450**
	P					0.598**	0.723**	0.382**	0.510**	0.330**
Number of primary branches/ plant	G						0.621**	0.254*	0.505**	0.077
	P						0.540**	0.232	0.408**	0.049
Length of secondary branches/ plant	G							0.275*	0.649**	0.277*
	P							0.244*	0.466**	0.213
Pod length	G								0.124	0.088
	P								0.077	0.066
Days to flower	G									0.494**
	P									0.421**

* Significant at P = 0.05

** Significant at P = 0.01

TABLE 2

Direct and indirect effects of nine causal variables on seed yield of pigeonpea.

Characters	Direct effect	INDIRECT EFFECTS									Correlation with yield
		Number of pods/ plant	Number of seeds/ pod	100 seed weight (g)	Plant height (cm)	Number of primary branches/ plant	Length of secondary branch (cm)	Pod length (cm)	Days to flower	Days to maturity	
Number of pods/plant	0.5021	—	-0.0026	0.0613	0.1455	0.1028	0.0071	-0.0078	-0.0414	-0.0384	0.8186**
Number of seeds/pod	0.0584	-0.0227	—	0.0181	-0.0309	0.0170	-0.0097	-0.0117	-0.0071	-0.0123	0.0133
100 seed weight	0.1062	0.2898	0.0098	—	0.0839	0.0800	0.0744	-0.0081	-0.0334	-0.0312	0.5714**
Plant heigth	0.2209	0.3307	-0.0082	0.0404	—	0.1064	0.1304	-0.0178	-0.0501	-0.0543	0.7020**
Number of primary branches/plant	0.1561	0.3306	0.0064	0.0544	0.1504	—	0.0987	-0.0106	-0.0406	-0.0093	0.7361**
Length of secondary branch	0.1589	0.3069	-0.0036	0.0497	0.1862	0.0970	—	-0.0115	-0.0522	-0.0334	0.6980**
Pod length	-0.0419	0.0932	0.0163	0.0206	0.0938	0.0396	0.0438	—	-0.0100	-0.0106	0.2448*
Days to flowering	-0.0804	0.2584	-0.0053	0.0441	0.1376	0.0789	0.1032	-0.0053	—	-0.0593	0.4716**
Days to maturity	-0.1206	0.1598	0.0059	0.0276	0.0995	0.0120	0.0440	-0.0037	-0.0398	—	0.1847

Residual effect + 0.4669

*Significant at 5%

** Significant at 1%

branches, length of secondary branch and test weight had the indirect effects through number of pods per plant which was much higher than their individual direct effects. Pod length, days to flower and maturity which had negative direct impact on yield, influenced it considerably positively through pods per plant and plant height. The greater importance of pods per plant along with plant height, test weight and number of branches have also been reported by Sidhu *et al.* (1985), Patel *et al.* (1988) and Patil *et al.* (1989). These characters had strong association with yield and have contributed considerably towards it directly and indirectly. Selection for improving yield through these traits in positive direction and through days to flower and maturity in negative direction will be fruitful in pigeonpea.

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