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Short Communciations

Genetic Variability, Correlation and Path Coefficient Analysis in Pigeonpea

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Sixteen divergent pigeonpea (*Cajanus cajan* L. Mill–sp.) genotypes were obtained from different sources and panted in *kharif* 1977-78. The experiment was laid in a randomised block design with four replications and recommended cultivation practices were followed. Five random plants were selected from each cultivar in every replication for recording the observations like number of pods per plant, length of (pod em), seeds per pod, test weight and grain yield per plant (gm). In the present findings, efforts have been concentrated to estimate the heritability, genetic coefficient of variation and genetic advance. Inter-relationship among yield and yield attributing characters (Al-Jibuori *et al.*, 1958) and their direct and indirect effects were also computed to ascertain the effectiveness of each of the casual factor as per the method described by Dewey and Lu (1959).

It was observed (Table 1) for all traits that the components of phenotypic variance were higher than the genotypic variance, confirming the role of environment in the genetic make up of the experimental material. Maximum heritability was observed for test weight (91.76) followed by seeds per pod (90.41). The lowest heritability was observed for yield per plant (22.37) which confirms the genetic complexion of this trait. The utility of heritability in broad sense increases when it is used in conjunction with genetic coefficient of variation and genetic advance as it includes the additive and epistatic gene effects. Genetic coefficient of variation indicated that a great amount of genetic variability was prevailing in all traits and minimum in pod length. The expected genetic advance expressed as per cent of mean ranged from 13.86 (length of pod) to 32.62 (number of pods per plant.)

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TABLE 1

General mean, variance components, genetic coefficient of variation, heritability and expected genetic advance expressed as percentage of mean in pigeonpea.

Character	*Mean*	*Variance components*		*GCV* %	*H* %	*Genetic advance as % of mean*
		Genotypic	*Phenotypic*			
Grain yield per plant (gm)	17.16	12.09	54.03	10.23	22.37	19.72
Length of pod (cm)	3.60	0.08	0.11	7.05	72.72	13.86
Number of pods per plant	59.30	111.70	140.46	17.82	79.53	32.62
Test weight (gm)	8.30	1.73	1.88	15.84	91.76	31.31
Seeds per pod	3.60	0.18	0.20	11.88	90.41	23.26

GCV=Genetic coefficient of variation; H=Heritability

However, there was no linear relationship between heritability and genetic advance. In general, high heritability accompanied high genetic advance and therefore, it is quite likely that additive gene effects is governing the expression of these traits and thus, phenotypic selection may prove helpful for an advancement in these traits. Here, it may be mentioned that characters like number of pods per plant, test weight and seeds per pod are largely governed by additive genes and can be adopted accordingly in an effective selection procedure.

Maximum coheritability between yield and test weight (8.6000) presents that selection through test weight will have an inherent effect on yield per plant. Coheritability (Table 2) with yield per plant was observed with number of pods per plant (1.2810) and seeds per pod (1.2539) indicating that selection for independent trait will have a positive impact on dependent trait. Negative coheritability was depicted by pod length with test weight, seeds per pod and test weight with seeds per pod and grain yield with length of pod suggesting that the inheritance of one character is hardly affecting the inheritance of the other. It is, therefore, suggested that the selection for number of pods per plant, test weight and seeds per pod may have a direct supportive influence on yield which is in agreement with the idea derived from the estimates of heritability and genetic advance.

Genotypic correlation provide a measure of genotypic association among different characters and also helps in identifying the traits which have little or no importance in selection programme. It can be observed (Table 2) that the values of genotypic correlations were higher than the phenotypic

TABLE 2

Coheritability, genotypic and phenotypic correlation coefficients among five characters in pigeonpea.

Character		*Length of pod*	*Number of pods per plant*	*Test weight*	*Seeds per pod*
Grain yield per plant	CH	–1.8644	1.2810	8.6000	1.2539
	G	–0.2237	0.7382**	0.0460	0.2655
	P	–0.0484	0.2430	0.0025	0.0951
Length of pod	CH		0.9663	–1.1228	–0.9960
	G		0.5580	–0.1720	0.2091
	P		0.4392	–0.1253	0.1700
Number of pods per plant	CH			1.0304	0.9819
	G			–0.1535	0.6514**
	P			–0.1274	0.5616*
Test weight	CH				–1.0034
	G				–0.5146*
	P				–0.4670

CH= Coheritability; G= Genotypic correlation coefficients;
P= Phenotypic correlation coefficients; * and ** Significant at 5% and 1% probability level.

correlations among all the combinations which could be due to masking or modifying effects of the environment. Yield per plant was found positively correlated with seeds per pod and test weight but non-significant whereas, high significant with number of pods per plant (0.7382). Singh and Mehndiratta (1969) have also reported similar relationship in cowpea. From the correlation studies, number of pods per plant appeared to be of significant importance towards the relationship with the grain yield per plant.

Path coefficient analysis provides an effective means of untangling direct as well as indirect causes of association. It permits a critical examination of specific forces acting to produce a given correlation and measures the relative importance of each of the causal factor. Strong positive direct effect on yield was exhibited (Table 3) by number of pods per plant (1.3227) indicating its maximum contribution towards yield. Other three characters have shown negative direct effect. Length of pod and seeds per pod have

TABLE 3

Direct and indirect effects of four characters on grain yield in pigeonpea.

Character	*Effect via*			
	Length of pod	*Number of pods per plant*	*Test weight*	*Seeds per pod*
Length of pod	<u>–0.4152</u>	0.7380	0.0198	–0.1198
Number of pods per plant	–0.2317	<u>1.3227</u>	0.0177	–0.3705
Test weight	–0.0714	–0.2050	<u>–0.1151</u>	0.2927
Seeds per pod	–0.0868	0.8616	0.0594	<u>–0.5687</u>

Figures underlined denotes the direct effect.
Residual factor = 0.5224.

shown indirect positive effect on yield via number of pods per plant. Length of pod has shown positive indirect effect via number of pods per plant and test weight but negative via seeds per pod only whereas, test weight has shown positive indirect effect through seeds per pod only. From the path coefficient analysis also it is evident that number of pods per plant should be given due emphasis in selection programme of pigeonpea.

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