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Unidirectional and Alternate Pathway Impacts of Yield Components on Grain Yield of Guar (*Cyamopsis tetragonoloba* L.)

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Abstract: Correlation and path analysis conducted in ten genotypes of Guar revealed that grain yield was positively and significantly correlated with branches and pods per plant. Association between plant height, 100 grain weight and grain yield was also positive but non-significant. Path coefficient analysis showed that pods per plant had maximum positive direct effect on grain yield. It was followed by 100 grain weight and branches per plant. Plant height had negative direct effect on grain yield. Pods per plant, 100 grain weight and branches per plant were the most important determinants of grain yield.

Key words: *Cyamopsis tetragonoloba L,* Genotypes, Branches, Pods, Grain weight, Yield, Statistical analysis, Pakistan.

Introduction

Guar (*Cyamopsis tetragonoloba* L.) is an important leguminous crop of Pakistan with low productivity. The main reason for its low production is non-availability of desirable, widely adopted genotypes with high yield potential.

Correlation and path coefficient provide realistic basis for the allocation of weightage to each of the contributing components in deciding upon a suitable selection criteria for the genetic improvement of complex character like yield, but information on this aspect is scanty in guar, a study was conducted to judge the direct and indirect effects of various quantitative traits on its grain yield.

Seed yield was positively correlated with height, number of branches per plant, pods per plant and 100 seed weight. Number of branches per plant and pods per plant were negatively correlated with 100 seed weight. Path analysis indicated that grain yield of guar was most effected by number of branches per plant, pods per plant and 100 seed weight (Bhardwaj *et al.*, 1981). Number of pods per plant and 100 seed weight were the two main components of seed yield as indicated through correlation analysis in guar (Sidhu *et al.*, 1982; Seiler and Stafford, 1985).

Plant height, branches per plant and pods per plant were positively correlated with yield. Path coefficient analysis indicated that pods per plant had the greatest direct effect on yield (Sohoo and Bhardwaj, 1985). The studies revealed that number of pods per plant and 100 seed weight were the most important determinants of seed yield (Henry *et al.*, 1986; Singh *et al.*, 1988).

Materials and Methods

The experimental material consisted of ten genotypes of diverse origin. These genotypes were grown in a Randomized Complete Black design with four replications during kharif 1988 in the experimental field at Agricultural Research Station, Bahawalpur. Each plot consisted of five meter long four rows with 45 cm row to row distance. Seed was drilled in rows and after germination plant spacing at 10 cm apart was maintained. All the other cultural practices were followed as usual.

At maturity ten competitive plants were randomly selected from each plot for recording various parameters. Data on branches per plant, plant height, pods per plant, 100 grain weight and grain yield per plant were recorded. The mean values of each genotype were used to calculate correlation at genotype and phenotypic levels. Path coefficient were worked out according to the method of Dewey and Lu (1959), taking seed yield as dependent character. Phenotypic and genotype correlations were computed as suggested by Kwon and Torrie (1964). The significance of correlation coefficients was tested using the Retable given by Snedecor and Cochran (1956).

Results and Discussion

Analysis of variance for yield and its components for ten varieties, of guar revealed that the difference among the genotypes were highly significant in all the characters (Table 1). The correlation coefficients highlight the pattern of association among yield components and depicting how yield as a complex character is analyzed. Phenotypic and genotype correlations for all possible combinations are presented in Table 2. In each instance, there was a close agreement between phenotypic and genotype coefficients indicating low environmental effects.

Branches per plant showed positive correlations with pods per plant and grain yield per plant where as it had negative correlations with plant height and 100 grain weight. Correlations between plant height, pods per plant, 100 grain weight and grain yield per plant were positive.

Number of pods per plant showed negative correlation with 100 grain weight and positive with grain yield per plant. Similarly the correlation between 100 grain weight and grain yield was also positive. Number of branches per plant were positively and significantly correlated with pods per plant and grain yield per plant and negatively correlated with plant height. It indicates that selection for more branches per plant will reduce the plant height and increase grain yield upto a certain extent. Similar results had already been reported by Bhardwaj *et al.* (1981) and Sohoo and Bhardwaj (1985).

Genotypic correlation between branches per plant, plant height, pods per plant and 100 grain weight with grain yield were further partitioned into direct and indirect effects using path coefficient techniques to determine the relative importance of these traits towards yield (Table 3).

In the present studies. Path coefficient analysis showed that pods per plant had maximum positive and direct effect on yield (1.043) followed by 100 grain weight (0.185). Therefore by increasing pods per plant and 100 grain weight, the yield can be increased. Several other workers reported similar findings Bhardwaj *et al.* (1981), Sohoo and Bhardwaj (1985), Henry *et al.* (1986) and Singh *et al.* (1988). Branches per plant had also positive direct effect on grain yield.

Plant height had negative direct effect on grain yield. It was however positively correlated with grain yield contributed mainly through pods per plant. Direct effect of branches per plant was lesser than genetic correlation with yield become it was counterbalanced by indirect positive effect via pods per plant.

Table 1: Mean squares for analysis of variance for yield and other characters in Guar (*Cyamoosic tetragonoloba* L.)

	D.F.	Branches per plant	Plant Height (cm)	Pods per plant.	100 grain weight(g)	Grain yield per plant(g)
Replications	3	0.45	92.06	673.66	0.01	15.99
Varieties	9	1.88*	1157.98*	3157.82*	0.36*	743.39*
Errors	27	0.81	138.82	829.37	0.02	10.19

* = Significant at % level

Table 2: Genotypic and phenotypic correlation coefficients among five characters in Guar (*Cyamopsis tetragonoloba* L.)

Character		Branches per plant	Plant height (cm)	Pods per plant	100 grain weight (g)	Grain yield per plant
Branches per plant	rG	1.00	-0.308	0.553*	-0.080	0.594*
	rP		-0.211	0.446	-0.035	0.466
Plant height (cm)	rG		1.000	0.178	0.016	0.092
	rP			0.218	-0.009	0.109
Pods per plant	rG			1.00	-0.164	0.997*
	rP				-0.170	0.954
100 grain weight(g)	rG				1.00	0.013
	rP					0.008
Grain yield per plant(g)	rG					1.000
	rP					

* = Significant at 1 % level.

Table 3: Direct and indirect effects of different characters on grain yield in Guar (*Cymopsis tetragonoloba* L.)

Character	Branches per plant	Plant height (cm)	Pods per Plant	100 grain weight(g)	Genotype Correlations with grain yield
Branches per plant	(0.002)	0.030	0.577	-0.015	0.594*
Plant height (cm)	-0.001	(-0.096)	0.186	0.003	0.092
Pods per plant	0.001	-0.017	(1.043)	-0.030	0.997*
100 grain weight(g)	0.001	-0.002	-0.171	(0.185)	0.013

* = Significant at 1% level. Note: Parenthesis denotes direct effect.

Direct effect of pods per plant was higher than genetic correlation with yield because it was counterbalanced by indirect negative effects via plant height and 100 grain weight. In case of plant height only indirect effect via branches per plant was negative. However in case of 100 grain weight indirect effects via plant height and pods per plant were negative. These results clearly demonstrate that path coefficient analysis is more meaningful than estimation of simple correlation.

The results obtained from the experiment indicated that for high yield potential, selection should be based on a plant type having more branches, pods per plant and possessing bold seed in pods.

References

Bhardwaj, R.P., M.L. Hathur and R. Hathur, 1981. Interrelationship among yield and yield component in grain varieties of *Cyamopsis tetragonoloba* L. Madras Agric. J., 68: 594-598.

Dewey, D.R. and K.H. Lu, 1959. A correlation and path-coefficient analysis of components of crested wheatgrass seed production. Agron. J., 51: 515-518.

Henry, A., H.S. Daulay and G.B.S.R. Krishna, 1986. Coefficient analysis and genetic diversity in clusterbean. Madras Agric. J., 73: 11-16.

Kwon, S.H. and J.H. Torrie, 1964. Heritability of and interrelationships among traits of two soybean populations. Crop Sci., 4: 196-198.

Seiler, G.J. and R.E. Stafford, 1985. Factor analysis of components of yield in Guar. Crop Sci., 25: 905-908.

Sidhu, A.A., M.L. Pandita, S.K. Arora and R.N. Vashistha, 1982. Studies of genetic variability and correlation coefficient in clusterbean. Haryana Agric. Univ. J. Res., 12: 225-230.

Singh, K., C.R. Hazra and A. Kumar, 1988. Correlation and path coefficient analysis in clusterbean *Cyamopsis tetragonoloba* L. Allals Agric. Res., 9: 43-46.

Snedecor, G.W. and W.G. Cochran, 1956. Statistical Methods. 6th Edn., The Iowa State University Press, Ames, USA., pp: 173-174.

Sohoo, M.S. and B.L. Bhardwaj, 1985. Path coefficient analysis of seed yield in clusterbean. Crop Improvement, 12: 85-86.