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Character Association Analysis in Soybean (*Glycine max* (L) Merrill)

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ABSTRACT

In a study on correlation with 30 F_2 populations of soybean, seed yield was observed to be positively associated with the number of pods, nodes and branches and height of plant. Path coefficient analysis showed that the number of pods per plant was the major factor contributing to yield followed by 100-seed weight and number of nodes. As such, due emphasis should be laid primarily on these traits in a programme of selection for improvement seed yield in soybean.

INTRODUCTION

A knowledge of the inter-relationships between yield determining characters and their association with seed yield is of paramount importance in a programme of crop improvement especially with regard to enhancement of yield. Correlation studies have been made in soybean varieties in India by Ram Nath Kaw and Menon (1972), Sengupta and Kataria (1971), Bhatt, Sandhu and Amar Singh (1968), Lal and Haque (1971) and Rohewal and Kopper (1973). But attempts to study the correlations in segregating populations have been meagre. In the present study, estimates of phenotypic and genotypic correlations and also path coefficients were made in F_2 progenies of soybean and the results are presented below.

MATERIALS AND METHODS

The material consisted of 30 F_2 populations involving 13 parents of diverse origin. The F_2 families were grown in a randomised block design with three replications. Observations were recorded in five randomly selected plants for six characters. Estimates of correlation coefficients were computed all variables in all possible combinations (Al-Jibouri, Miller and Robinson, 1958). Path analysis as suggested by Dewey and Lu (1959) was done to study the nature of casual system of the six variables studied.

RESULTS AND DISCUSSION

Correlation Coefficients: The phenotypic and genotypic correlation coefficients are presented in Table 1.

The seed yield had strong association with plant height, number of primary branches, number of nodes and pods per plant. No association was evident between 100-seed weight and yield. However, Hanway (1956) and Weber and Moorthy (1952) observed positive correlation of seed weight with yield. But for these, the

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TABLE 1. Genotypic and phenotypic correlations in soybean

Characters	Number of primary branches	Number of nodes	Number of pods	100-seed weight	Seed yield
Plant height	0.798**	0.684**	0.631**	−0.273	0.632**
	0.736**	0.661**	0.521**	−0.432*	0.615**
Number of primary branches		0.823**	0.596**	−0.452**	0.551**
		0.812**	0.589**	−0.431**	0.523**
Number of nodes			0.732**	−0.504**	0.671**
			0.687**	−0.371*	0.632**
Number of pods				−0.392*	0.801**
				−0.412*	0.794**
100-seed weight					0.090
					0.095

The values in top row represent genotypic correlations.

* Significant at P = 0.05 level,

** Significant at P = 0.01 level.

results presented in this paper are in confirmity with those of the earlier workers (Kwon and Torrie, 1964; Johnson, Robinson and Comstock, 1955.

Path coefficient analysis : Path coefficient analysis was used to determine the direct and indirect effects of the five variables on seed yield (Table 2.)

TABLE 2. Path Coefficients

Character	Plant height	Number of primary branches	Number of nodes	Number of pods	100-seed weight	Correlation with seed yield
Plant height	(0.0667)	0.0235	0.2752	0.4286	−0.1615	0.6325
Number of primary branches	0.0532	(0.0296)	0.3312	0.4048	−0.2673	0.5515
Number of nodes	0.0456	0.0244	(0.4024)	0.4972	−0.2981	0.6714
Number of pods	0.0421	0.0176	0.2946	(0.6792)	−0.2318	0.8016
100-seed weight	−0.0182	−0.0134	−0.2028	−0.2662	(0.5914)	0.0907

Residual factors - 0.2715

Figures in parenthesis indicate path coefficients and the indirect effects.

It is noted that the number of pods per plant had the greatest direct effect on yield than any of the other associated variables. Studies by Lal and Haque (1971), Kaw and Menon (1972) in soybean, Singh and Singh (1973) in mung bean have also indicated the importance of number of pods per plant for seed yield. The path coefficients were also high for 100-seed weight and number of nodes per plant. Seed weight has exhibited a low genotypic correlation coefficient in the present study but on partitioning, the direct effect of this character was positive and high. Lal and Haque (1971), Rohewal and Kopper (1973) in Soybean, Chandel *et al*, (1973), Singh and Malhotra (1970), Singh and Singh (1973) in mung bean and Singh and Singh (1969) in field pea obtained higher direct effect of seed weight on seed yield. But Kaw and Menon (1972) observed different results. The present study has indicated that the number of pods per plant, 100-seed weight and number of nodes per plant may serve as measurable components of yield in soybean.

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