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Path Analysis in Red Gram (*Cajanus cajan* (L.) Millsp)

Correlations of agronomic and morphological characters with yield in different crops have been reported by several workers. Although these estimates are helpful in determining the components of a complex trait like yield, they do not always provide a clear picture of the relative importance of direct and indirect influence of each of the componnet characters towards this trait. Path analysis developed by Wright (1921, 1923) which is a standardised partial regression analysis appears to be helpful in partitioning the correlation coefficents into direct and indirect eftects. This technique has recently been employed by Singh and Malhotra (1970) in *mung* bean, Singh and Mehndiratta (1970) in Cowpea, Singh and Singh (1969) in field pea for assessing the importance of various yield components.

Twenty one diverse genotypes of red gram were grown in a randomised block design with three replications at the Experimental Station, Coimbatore during 1968. Observations were recorded on five plants selected at random for plant height, number of branches, clusters and pods per plant, days to first flowering and seed yield. The mean values of the characters were subjected to statistical analysis and the estimates of phenotypic and genotypic correlations were obtained. The path coefficient analysis was done according to Dewey and Lu (1959), using genotypic correlations to assess the direct and indirect influences of different variable on seed yield.

Phenotypic and genotypic correlations for all possible combinations were worked out and reportad (Veeraswamy *et al.*, 1973).

The correlations were analysed further by the path coefficieht technique for partitioning correlation coefficients into direct effects (unidirectional pathways) and indirect effects through alternate pathways. Seed yield was considered as a resultant variable and others as causal variables.

Estimates of direct effect path coefficients and indirect effect path coefficients are presented in Table 1.

It will be seen from the above that seed yield is the result of five characters and a residual variable, X. The five variables are related *inter se* and each one influences the seed yield both by direct and indirect contribution through the other four variables with which it is connected.

TABLE 1. Path coefficient analysis of genotypic correlations of five characters with yield in red gram

Correlated characters	Direct effect and indirect effect *via*					Genotypic correlation with seed yield
	Plant height	Number of branches	No. of clusters	No. of pods	No. of days to first flowering	
Plant height	*0.191*	0.695	0.079	0.074	-0.512	0.528
Number of branches	0.165	*0.805*	0.108	0.094	-0.521	0.652
Number of clusters	0.129	0.744	*0.117*	0.046	-0.341	0.697
Number of pods	0.151	0.802	0.058	*0.095*	-0.410	0.696
No. of days to first flowering	0.169	0.725	0.069	0.067	*-0.578*	0.453

(Figures in li italic letters denote the direct effacts)

Yield Vs plant height: The direct effect of plant height on seed yield was moderately low and positive. However, a strong positive influence on yield was registered indirectly by the trait through the number of branches. The indirect effect *via* number of days to first flowering was also equally high but negative. The indirect effect *via* number of clusters and pods per plant were positive but almost negligible. The total correlation coefficient between yield and plant height was largely a reflection of positive and negative indirect effects through the number of brauches and number of days to first flowering respectively.

Yield Vs number of branches per plant: The yield and number of branches were positively correlated. It resulted from a high positive direct effect of the number of branches on yield. The indirect effect of the number of branches on yield *via* plant hight, number of clusters and pods were positive and low. However, the direct effect of the number of branches on yield was diluted to some extant by a moderately high but negative indirect influence of the number of branches on yield through the number of the days to flowerieg.

Yield Vs number of clusters per plants: The number of clusters which gave a significant correlation coefficient with seed yield, produced a negligible direct effect, but an appreciable and positive indirect effect *via* the number of branches. This influence was also counterbalanced to some extent by the moderate and negative indirect value, *via* the number of days to flowering.

Yield Vs number of Pods per plant: The number of pods which gave a significant correlation coefficiant with seed yield, produced a negligible

direct, effect but quite an appreciable and positive indirect effect *via* the number of branches. However this influence was counter balanced to certain extant by the negative indirect value *via* the number of days to flowering.

Yield Vs number of days to first flowering: The number of days to first flowering a moderate negative and direct effect on the yield. This clearly indicates that early initiation of flowering has greater direct influence on yiled than late initiation. Probably this offers scope for the need to repattern the red gram varieties which should possess high genetic association of this trait (i.e., early flowering) with high yield potentials. The indirect effect on yield by the number of days to first flowering *via* the number of branches considerable.

The overall picture revealed that the mumber of branches produced the maxium influence both directly and indirectly on the seed yield. The number of days to first flowering had a direct negative influence on the yield. This study also had shown that the number of cluster and pods per plant did not have much direct influence on the seed yield though they exert an indirect influence through the number of branches.

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