

## Path - Coefficient study in Maize Grain Yield with Yield Attributes

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Bio-metric observations recorded in the field trial conducted at the Agricultural College and Research Institute, Madurai to study the effect of plant density and mode of nitrogen application on Deccan hybrid maize were subjected to a path coefficient analysis to study the cause and effect of the yield attributes on the grain yield. The three yield attributes viz., grain number per cob, length of cob and 1000 grain weight exhibited positive and highly significant correlation with grain yield. Of these 1000 grain weight had the maximum direct effect while the length of cob, the grain number per cob had their influence on the yield through 1000 grain weight.

Grain yield of maize is influenced by various components like grain number per cob, length of cob, grain weight per cob, 1000 grain weight etc. These yield attributes are interrelated. With a view to evaluate the relative influence of yield attributes on yield correlation and path-coefficient analyses were used. Path-coefficient analysis allows to separate the direct effect and their indirect effect through other attributes by apportioning the correlation coefficients (Wright, 1921). In this paper the results of correlation coefficients and path coefficient analysis for three yield attributes on grain yield are presented.

### MATERIALS AND METHODS

A field experiment was conducted on Deccan hybrid maize at the Agricultural College and Research Institute, Madurai during kharif 1975 in a split plot design with four replications consisted of three population density of

88,888, 66,666 and 53,333/ha in the main plot and five methods of nitrogen application in the sub-plot as follows

Methods	N kg/ha.			
	Basal	Kneehigh	Tasseling	Total
M <sub>1</sub>	—	—	—	—
M <sub>2</sub>	60(S)	15(F)	15(F)	90
M <sub>3</sub>	60(S)	15(F)	30(S)	105
M <sub>4</sub>	60(S)	20(S)	15(F)	105
m <sub>5</sub>	60(S)	30(S)	30(S)	120

S = Soil                      F = Foliar

Simple correlation between grain yield and the all yield attributes were estimated as suggested by Snedecor and Cochran (1967). Since the simple correlation between grain yield and the three yield attributes namely 1) grain number per cob 2) length of cob and 3) 1000 grain weight were very high, they were utilized for path analysis. These correlation coefficients were then partitioned into direct effect or undirec-

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Table I. Total correlation coefficient between agronomic characters and yield

Character	Length of cob	1000 grain weight	Grain yield
1. Grain number per cob	0.9678**	0.9361**	0.8529**
2. Length of cob	—	0.9702**	0.8866**
3. 1000 grain weight	—	—	0.9058**

\*\* Significant at 1% level.

tional pathways by the method of path coefficient analysis. The path coefficients were worked out by the simultaneous solution of the equations for three variables as given by Dewey and Lu (1959).

## RESULTS AND DISCUSSION

All the correlation coefficients were found significant at one per cent level indicating the existence of a strong relationship between yield and other yield attributes namely grain number per cob, length of cob and 1000 grains weight (Table I). The  $R^2$  value of 0.9354 in the present study indicates that 93.54 per cent of the variation in the grain yield could be accounted for by the three yield attributes taken in-

to consideration. This indicates a strong inherent association between the yield attributes studied. The positive correlation coefficients between the yield attributes considered with grain yield indicate that an increase in any one of them would increase the grain yield.

The path analysis indicated (Table II) that the grain yield was very much influenced by 1000 grain weight and to a lesser degree by length of cob on direct effect. The influence of grain number per cob on yield is mostly through the 1000 grain weight and to a feeble extent through length of the cob. But the grain number per cob produced a negative direct effect on

Table II. Path coefficient analysis showing direct and indirect effects of three agronomic characters

Character	Effects via			Agronomic character correlation with yield
	Grain number per cob	Length of cob	1000 grain weight	
Grain number per cob	-0.0459	+0.1729	+0.7259	+0.8529
Length of cob	-0.0444	+0.1787	+0.7523	+0.8866
1000 grain weight	-0.0429	+0.1732	+0.7755	+0.9058

yield. The positive correlation with yield observed, was mostly due to the positive indirect effect via 1000 grain weight which counter balanced the negative direct effect of grain number per cob.

In the case of length of cob, its indirect contribution through 1000 grain weight was much higher, which was adversely affected through the grain number per cob due to its negative indirect effect. The length of cob had a positive direct effect on yield which was feeble. The positive correlation between yield and length of cob was mainly due to its indirect effect through 1000 grain weight. The strength of association of length of cob with yield was considerably increased by the indirect effect through 1000 grain weight and reduced by the indirect negative effect of grain number per cob.

The correlation between yield and 1000 grain weight was positive and high. This is chiefly due to its positive direct effect. The direct effects of the 1000 grain weight through length of cob was feeble. The direct negative

effect through grain number per cob however, was found to decrease its strength of association with yield

Of all the yield attributes, 1000 grain weight has a significant role to play because of the direct influence on yield and also its indirect influence through length of cob. It is evident that due to the strong direct effect of 1000 grain weight, and the indirect of other two attributes through 1000 grain weight on grain yield appeared to be the barriers to increase the grain yield.

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