

Correlation and Path Coefficient Analysis of Yield Components in Sugarcane

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ABSTRACT

Correlation and path coefficient were studied in sugarcane to determine the extent of importance of different yield contributing characters. Correlation coefficient showed significant positive association of single stalk weight, number of millable canes and stalk height with cane yield. Single stalk weight exhibited strong positive correlation with cane height and thickness and negative correlation with number of millable canes. Significant negative association was observed between number of millable canes and stalk thickness. (Path coefficient analysis revealed that number of millable canes had the highest direct effect on cane yield.)

INTRODUCTION

Yield, a complex quantitative character, is greatly influenced by many yield contributing factors as well as environment. So information on the degree of association between yield and components as indicated by the correlation coefficient, has always been a helpful basis for selection of suitable plant type under a breeding programme. Path coefficient measures the direct influence of one component upon another and permits the separation of correlation coefficient into components of direct and indirect effects (Dewey and Lu, 1959). So this type of analysis of quantitative characters would result in the improvement of crop potential. The present investigation was, therefore, designed to determine the correlations between yield and yield components and to determine the direct and Indirect effects of yeild components on cane yield.

MATERIALS AND METHODS

The materials consisted of 20 released and unreleased sugarcane (*Saccharum officinarum*) cultivars grown in a randomized block design with four replications at the experimental field of Sugarcane Research and Training Institute, Ishurdi,

Pabna. All the normal cultivation practices were adopted for the experiment. At maturity data were collected on single stalk weight, number of millable canes per plot, stalk length, stalk thickness and millable cane yield. The yield and number of millable stalks were estimated by harvesting, counting and weighing all the canes from four middle rows. Stalk length, stalk thickness and single stalk weight were estimated from a random sample of 10 stalks per strain. Correlation coefficient at genotypic and phenotypic level were worked out as per formula of Al-Jibouri *et al.* (1958). Path coefficient were analysed following the formula of Dewey and Lu (1959).

RESULTS AND DISCUSSION

There is a more or less general agreement between genotypic and phenotypic correlation coefficient in our present investigation (Table 1). The results revealed that yield of cane is significantly and positively correlated with number of millable canes and stalk height. Similar results were obtained by Balasundaram and Bhagyalakshmi (1978) and Khairwal and Babu (1975). Single stalk weight was found to correlate with cane yield positively but significantly at genotypic level only. Stalk height and thickness exhibited high positive correlations with single stalk weight. Significant and negative correlation was observed between single stalk-weight and number of millable canes. Similar results were obtained by Balasundaram and Bhagyalakshmi (1978). Singh *et al.* (1981) reported only strong positive correlation between weight of single stalk and stalk thickness. Number of millable canes in the present study showed negative significant association with stalk thickness. This result is in agreement with the findings of Balasundaram and Bhagyalakshmi (1978).

Table 1. Phenotypic (ph) and Genotypic (G) correlation coefficient among different characters in sugarcane.

Characters	Single stalk weight	No. of millable canes	Stalk height	Stalk thickness
Cane yield	Ph 0.4233	0.5555*	0.5027*	0.1391
	G 0.4401*	0.5015*	0.5379*	0.2161
Single stalk weight	Ph	-0.4444*	0.7011**	0.6814**
	G	-0.5321*	0.8437**	0.7692**
No. of millable canes	Ph		-0.1246	-0.5163*
	G		-0.2091	-0.5572*
Stalk height	Ph			0.2223
	G			0.2679

** Significant at 1% level of probability

* Significant at 5% level of probability

An insignificant positive correlation at both phenotypic and genotypic level was found between stalk height and its thickness. Singh *et. al.* (1981) also reported similar correlation between these two characters.

Table 2. Path coefficient analysis of cane yield Vs four yield components in sugarcane.

Combination	Path coefficient
Single stalk weight Vs cane yield	
Direct effect	-0.0884
Indirect effect via number of millable canes	-0.5027
Indirect effect via stalk height	0.5387
Indirect effect via stalk thickness	0.4925
Total	0.4401
Number of millable canes Vs cane weight	
Direct effect	0.9448
Indirect effect via single stalk weight	0.0470
Indirect effect via stalk height	-0.1335
Indirect effect via stalk thickness	-0.3568
Total	0.5015
Stalk height Vs cane yield	
Direct effect	0.6385
Indirect effect via single stalk weight	-0.0746
Indirect effect via number of millable canes	-0.1975
Indirect effect via stalk thickness	0.1715
Total	0.5379
Stalk thickness Vs cane yield	
Direct effect	0.6403
Indirect effect via single stalk weight	-0.0688
Indirect effect via number of millable canes	-0.5265
Indirect effect via stalk height	0.1711
Total	0.2169

The results of path coefficient analysis (Table 2) showed that number of millable canes had the strongest direct effect on cane yield and which was found to be followed by stalk thickness and stalk height. Khairwal and Babu (1975) also reported strongest direct effect of number of millable canes, considerable direct effect of stalk thickness and negligible effect of stalk height on cane yield. In the present study direct effect of single stalk weight on cane yield was observed to be negative and negligible which differs from the results reported by the above investigators but it was found to contribute to yield through indirect effect of

stalk thickness and height. Table 2 showed that stalk thickness had a good direct effect on cane yield but finally failed to contribute to cane yield considerably as the indirect effect of millable cane via cane thickness was noticeably negative. This resulted from the significant negative correlation (Table 1) between stalk thickness and number of millable canes.

So it is evident that number of millable canes played an important role as a yield component. Stalk thickness and stalk height also found to be important not only with direct effect but also these two components helped single stalk weight to contribute to yield considerably.

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