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Path analysis in interspecific and intergeneric hybrids of sugarcane

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Abstract

The genotypic correlation and path analysis of cane yield and its contributing characters were analyzed in eighteen hybrids along with its nine parents (Six lines, three testers). The cause and effect relationship indicated maximum direct effect of cane yield per plot with single cane weight and cane thickness. The indirect effect of cane yield per plot with cane thickness followed by cane length. Therefore these traits may be used in the selection for yield in sugarcane.

Keywords: Path analysis, *Saccharum officinarum* L.

Introduction

Sugarcane is one of the most important crops in the world. Sugarcane yield is a complex character, controlled by polygenes. Therefore, selection made on the basis of its phenotypic expression alone are likely to be misleading. Path coefficient is an excellent means of studying direct and indirect effects of interrelated components of a complex trait (Kang *et al.*, 1989) [5]. Path coefficient analysis measures the direct influence of one variable on another. Plant breeders generally, select for only a few traits and it is very important to know the effects of traits on other important characters as well. Therefore, this experiment was conducted to study the relations of certain morphological characters with sugarcane yield.

Materials and Methods

Six lines namely *Saccharum officinarum* L cv. Badila (L₁), COC 671 (L₂), COC 85061 (L₃), COC 92061 (L₄), CO86032 (L₅) and COG 93076 (L₆) and three testers namely *Saccharum spontaneum* (T₁), *Erianthus arundinaceus* (T₂) and *Miscanthus sacchariflorus* (T₃) were crossed in L × T fashion and obtained eighteen hybrid. All the parents and its hybrids (each) were raised in a randomized block design with two replications in a plot size of 5 rows × 5 M length and 0.8 M. The recommended agronomic practices were followed. They were evaluated for six characters including cane yield and its attributing characters viz., cane length, internode length, number of milable cane, cane thickness, single cane weight, cane yield per plot. The genotypic correlations among the characters were estimated as per method suggested by Goulden (1952) and path coefficient analysis was worked by the method suggested by Dewey and Lu (1959) [1].

Results and Discussion

Partitioning of the correlation coefficient into direct and indirect effects revealed that cane yield per plot as the dependent variable and five yield components as independent variables has brought out the high and positive contribution of cane weight and cane thickness. These two characters were also positively and significantly correlated with cane yield at the genotypic level. The cane length and internode length had insignificant correlation with cane yield per plot and had a path coefficient value of 0.09. Cane thickness was significant and positive correlation with cane weight and had an indirect effect and path coefficient value of 0.16. Also cane thickness was significant and positive correlation with cane length and had indirect effect and low path coefficient value of 0.11. Similar results were obtained by Hooda *et al.* (1979) [3], Sahi *et al.* (1975) [6], Hapase and Rapale (1999) [2] and Kamat and Singh (2002) [4]. Hence in a population of similar nature, simultaneous selection for cane weight and cane thickness which are the components of cane yield would provide adequate beneficial results. selection on cane thickness and single cane weight to increase cane yield in sugarcane.

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Table 1: Direct and indirect effects of components on cane yield per plot

	Cane length	Internode length	Cane thickness	Cane weight	Number of millable canes per plot	Total
Cane length	0.09	0.06	0.05	0.01	0.04	0.25
Internode length	-0.06	0.09	0.02	0.05	-0.05	0.05
Cane thickness	0.11	-0.04	0.20	0.16	-0.05	0.38
Cane weight	0.09	-0.43	0.66	0.82	-0.41	0.73
Number of millable canes per plot	0.06	0.09	-0.04	-0.08	0.16	0.19

$R^2 = 0.98$

Residual = 0.15

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