

Quantitative Estimate of Some Morphological Characters in Sugarcane

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ABSTRACT

Quantitative estimates on variability, heritability, coefficient of variation and expected genetic gain were obtained for seven morphological characters viz., height, girth, number of nodes/stalk, single-stalk weight, number of millable canes/stool, millable canes/plot and cane yield/plot. A significant variation was recorded for all the characters included in this study. Broad sense heritability was maximum for cane yield/plot (97.0%) followed by number of nodes/stalk (94.8%) and millable canes/plot (94.2%) and was the lowest for girth (70.0%). The highest genetic gain was obtained for cane yield/plot (58.4%) followed by the number of millable canes/stool (38.2%), single stalk weight (37.7%) and millable canes/plot (37.4%). For the selection of high yielding genotypes attention should be paid to single stalk weight and number of millable canes/stool.

INTRODUCTION

Sugarcane is a highly heterozygous and cross pollinated crop with wide range of variability between clones. Genetic variability is the essence of selection in breeding programme. The quantitative estimates on the nature and extent of genetic variability for different characters help the breeder for making selection of the best and most suitable genotypes. The high heritability and genetic gain provides a basis for improving the efficiency of hybridization by means of simple selection. A high heritable character forms the basis of selection, also a main components of complex characters like cane yield. Limited reports (Balasundaram and Bhagalakshi, 1978 and Punia and Hooda, 1982) are available on these aspects in sugarcane. The present study was carried out to know the nature and extent of genetic advance of some important parameters contributing to the cane yield of sugarcane.

MATERIALS AND METHODS

The experimental materials for the present study consisted of five genotypes of sugarcane including one standard. The materials were grown in a randomized block design with four replications at the experimental farm of the Sugarcane Research and Training Institute, Ishurdi, Pabna during crop year 1982-83. The size of each plot

was 6 mx10m but the data were collected from 4mx10m. All the normal cultural practices were followed during the cropping season. Data were recorded for seven characters viz., height, girth, number of nodes/stalk, single-stalk weight, number of millable canes/stool, millable canes/plot and cane yield/plot and analysed statistically. Component of variances, heritability, coefficient of variability and expected genetic gain under selection were calculated on the basis of the procedure outlined by Skinner (1972).

RESULTS AND DISCUSSION

The analysis of variances showed significant variability among the genotypic characters included in this study. The range of variation, mean, phenotypic, genotypic and environmental components of variation are presented in Table 1. Each character showed a wide range of variation except for girth and single stalk weight where a narrow range was observed. The estimated genotypic and phenotypic variances for most of the characters showed small differences. But the characters millable canes/plot and cane yield/plot showed comparatively larger differences indicating a greater environmental influences for the expression of these characters. Phenotypic, genotypic and environmental coefficient of variability, heritability % and genetic advance expressed in percentage of mean are shown in Table 2. Highest phenotypic and genotypic coefficient of variability was observed for

Table 1. Range, mean & components of variation for seven characters in sugarcane.

Characters	Range	Mean	Phenotypic variation	Genotypic variation	Environmental variation
Height (cm)	180.8-217.3	203.3	440.2	347.5	52.7
Girth (cm)	2.1-2.3	2.9	0.2	0.1	0.1
Number of nodes/stalk.	21.3-25.6	23.6	8.7	8.3	0.4
single stalk weight (kg)	0.4-0.8	0.6	0.2	0.1	0.1
Number of millable cane/stool	4.8-7.9	6.0	1.5	1.4	0.1
Millable canes/plot*	250.5-386.5	315.1	3693.7	3477.9	215.8
Cane yield/plot* (kg).	135.9-256.7	190.7	3105.4	3012.0	93.4

*Plot size:4mx10m.

cane yield/plot followed by single-stalk weight, number of millable canes/stool, and millable canes/plot, and lowest for girth showing that cane thickness is a less variable character. A sufficient amount of variability for morphological attributes was also reported in sugarcane by Brown (1965), Hooda *et al.* (1979) and Khairwal and Babu (1976). Highest environmental coefficient of variability was obtained for single stalk weight and lowest for girth.

Heritability estimates in broad sense were found to be high for all the characters but it ranged from 97.0% for cane yield/plot to 70.0% for girth. Maximum heritability was recorded for cane yield/plot (97.0%) followed by number of nodes/stalk (94.8%) and millable canes/plot (94.2%). The highest genetic advance was estimated to be 58.4% for cane yield/plot followed by number of millable

Table 2. Phenotypic (Pcv), Genotypic (Gev) and environmental coefficient of variation (ECV), heritability % (H%), genetic advance (GA) and genetic advance as percentage of mean (GA %).

Characters	PCV	GCV	ECV	H (%)	GA	GA (%)
Height (cm)	10.3	9.7	3.6	88.0	38.0	18.7
Girth (cm)	4.6	3.9	2.5	70.0	0.14	6.7
Number of nodes/stalk.	12.5	12.2	2.7	94.8	5.8	24.5
single stalk weight (kg)	20.9	19.6	7.4	87.5	0.2	37.7
Number of millable cane/stool.	20.8	19.6	6.9	89.1	2.3	38.2
Millable canes/plot*	19.3	18.7	4.7	94.2	117.9	37.4
Cane yield/plot* (kg).	29.2	28.8	5.1	97.0	111.3	58.4

*Plot size:4mx10m.

canes/stool (38.2%), single stalk weight, (37.7%) and millable canes/plot (37.4%) indicating that there exists a good scope for improvement of these characters through selection. The low levels of genetic advance for height and number of nodes/stalk and girth indicates little scope for improvement through selection; however, the genetic coefficient of variation alone is not sufficient to determine the amount of variation that is heritable. The heritable portion of variation can be found from heritability estimates and genetic gain (Swarup and Chuagale, 1962). A high genetic gain accompanied with high heritability was obtained for cane yield/plot indicating the importance of additive gene effects. For the selection of high yielding

genotypes of sugarcane adequate attention should be given on single stalk weight and number of millable canes/stool.

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