



SHORT COMMUNICATIONS

Variability in Sugarcane Under Rainfed Condition

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Fifteen sugarcane varieties of early and mid late maturity group were taken to study variability for quantitative, biochemical and juice quality characters under rainfed condition. Quantitative characters like germination percentage, number of shoots, leaf area index in June, cane height, number of millable canes, single cane weight and cane yield recorded moderate to high coefficient of variation, heritability and genetic advance. Among biochemical parameters proline content also showed high values of coefficient of variances and heritability. Hence, while selecting varieties tolerant to rainfed condition, these quantitative characters as well as proline content in leaf may be considered. The numerical estimates of genetical parameters for cane diameter, chlorophyll content and sucrose per cent juice were comparatively low.

KEY WORDS : Variability, sugarcane, rainfed condition

The lowest productivity of sugarcane in Bihar in comparison to major sugarcane growing states of sub-tropical India is mainly due to rainfed, waterlogging, salinity and other abiotic stresses. About 70 per cent of cane area of Bihar and other states of North Central Zone do not get assured irrigation which results in less number of tillers, number of millable canes and finally low yield. Therefore, there is need of strengthening the sugarcane breeding with systematic studies in the magnitude and kind of genetic variability to screen rainfed tolerant clones and their use in future breeding programme.

A field experiment involving 15 sugarcane varieties of early and midlate maturity groups were planted in randomized block design replicated thrice at research farm of Sugarcane Research Institute, Pusa (Bihar) during autumn planting season of 1998. The plot size was 6 meters length of 6 rows spaced at 90 cm between the rows. Observation on quantitative traits were on per plot basis. Leaf area index was calculated as per method of Bathla and Sharma (1978). Among biochemical traits, chlorophyll content was determined following method of Anderson and Bordman (1964) while that of proline content by Bates *et al.* (1973). Sucrose per cent juice was determined as per method of Meade and Chen (1977)

and Statistical analyses were done according to standard statistical procedures.

The present study showed the higher value of genotypic and phenotypic coefficient of variation (GCV and PCV) for number of shoots, germination per cent, proline content, cane yield, single cane weight, leaf area index and number of millable canes (Table 1). The closeness among GCV and PCV suggested that a major portion of total variation was due to genetic cause and thus, selection based on phenotypic performance would be important for improvement in these traits. Similar results based on GCV and PCV had also been reported earlier (Singh *et al.*, 1994; Ghosh and Singh, 1996; Kumar and Singh, 1999).

The heritability estimates in broad sense (Table 1) were high for proline content, number of shoots, sucrose per cent juice, germination per cent, number of millable cane, single cane weight and cane yield while moderate to low for leaf area index, cane height, chlorophyll content and cane diameter. High values of heritability had also been reported by Ghosh and Singh (1996) for cane height and tillers, Kumar and Singh (1999) for number of shoots, germination per cent, single cane weight, cane yield, cane height and number of millable canes.

The expected genetic gain at 5 per cent selection intensity was highest for number of shoots followed by

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Table 1 : Nature of variability in sugarcane under rainfed condition

Traits	Range	Mean	Genotypic coefficient of variation	Phenotypic coefficient of variation	Heritability	Genetic advance as % of genetic mean
Germination per cent at 30 days	13.923-39.703	23.904	33.755	34.589	95.4	67.86
Number of shoots per plot at 120 days	176.000-648.667	356.000	45.433	46.141	96.95	92.15
Leaf area index in June	1.689-3.034	2.324	16.236	18.355	78.24	29.58
Cane diameter at 360 days (cm)	1.703-2.400	2.097	7.401	9.583	59.65	11.77
Single cane weight at 360 days (kg)	0.510-0.960	0.688	18.494	19.764	87.56	35.65
Cane height at 360 days (cm)	207.000-289.000	247.444	9.911	11.607	72.91	17.43
Number of millable cane at 360 days (000/ha)	55.860-87.550	70.401	14.750	15.271	93.29	29.35
Cane yield (t/ha)	32.980-66.120	47.985	18.583	20.259	84.14	35.11
Chlorophyll content (mg/g of leaf)	2.070-2.956	2.413	9.531	11.996	63.12	15.60
Proline content (mg/g of leaf)	1.355-3.107	2.380	25.123	25.225	99.19	51.54
Sucrose per cent juice in Nov.	15.020-17.223	15.900	4.721	4.812	96.26	9.54
Sucrose percent juice in Dec.	15.496-17.623	16.451	4.438	4.482	98.05	9.05
Sucrose percent juice in Jan.	16.500-17.866	17.036	2.515	2.547	97.55	5.11

germination per cent, proline content, single cane weight, cane yield, leaf area index and number of millable canes. The rest of the characters showed moderate to low estimates of genetic gain. The genetic advance expressed as per cent of population mean, was highest for number of shoots followed by germination percent and proline content. Similar results were earlier reported by Singh *et al.* (1994) and Ghose and Singh (1996). The genetic parameters for sucrose per cent juice showed comparatively lower values except heritability.

Perusal of present investigation indicate that direct selection based on number of shoots, germination percent, proline content, single cane weight, cane yield and

number of millable cane having high estimates for GCV, heritability coupled with high genetic advance may be utilized in future breeding programme for developing high yielding varieties for rainfed condition.

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