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Comparative Growth, Yield and Juice Quality of Different Sugarcane Cultivars

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Abstract: The sugarcane genotypes differed significantly with respect to yield, yield components and juice quality. Maximum stripped-cane yield of 102.13 t ha^{-1} was obtained from CP-77-400 followed by CPF-235 against significantly the lowest stripped-cane yield was obtained from CoJ-84 producing cane yield of 41.85 t ha^{-1}. The highest sucrose content in cane-juice was recorded in SPSG-26 which was statistically at par with SPF-234, CP-77-400 and CPF-235. On the contrary, CoJ-84 gave significantly the lowest sucrose content in cane-juice. The harvest index was the highest for SPSG-26 which was at par with CPF 235. While, the lowest harvest index was given by SPF-234 which in turn, was statistically equal to that of CoJ-84.

Key words: Pakistan, sugarcane, yield, variety and juice quality

Introduction

In Pakistan, sugarcane grown on an area of 1056.2 thousand hectares with total annual production of 53104.2 thousand tones of cane, giving an average of 50.3 tones of canes ha^{-1} (Anonymous, 1998) which is very low as compared to the genetic yield potential of domestic cane cultivars. But the use of high yielding varieties plays a remarkable role (Ahmad, 1988). Adoption of improved varieties not only increases the cane tonnage ha^{-1} but also increases the sugar production. Since yield potential of varieties in hand is deteriorating day by day due to segregation, susceptibility to diseases and insects, admixture and change in edaphic and climatic environment, it is highly essential to select the varieties with high yield potential and wide range of adaptability (Malik, 1990).

Consequently, the present study was designed to compare the yield potential of some new promising cultivars of sugarcane with the recommended ones under the agro-ecological conditions of Faisalabad.

Materials and Methods

The experiment was conducted at the Agronomic Research Area, University of Agriculture, Faisalabad during year 1998-99. The cane genotypes viz. CP-77-400, CPF-233, SPF-234, CoJ-84 and SPSG-26 which were planted in the last week of February, 1998 and harvested in 3rd week of February, 1999. The layout design was randomized complete block design (RCBD) with four replications and net plot size was 3.6 m x 7.5 m. In 90 cm spaced double-row strips with 30-cm space between the rows in a strip. Double budded setts were placed end to end in furrows. The plant crop was fertilized @ 150-100-100 kg NPK ha^{-1} in the form of urea, SSP and SOP respectively. The whole of Phosphorus and Potash and 1/3 of Nitrogen was applied at sowing time, while the remaining 2/3 Nitrogen was applied in two equal splits, i.e. during last week of March and first week of May. The crop was kept free of weeds by hoeing twice, while earthing up was done before the onset of monsoon. In all 16 irrigation of 10-cm each were given to mature the crop.

Observations on number of millable canes (m^{-2}) cane length, weight per cane, stripped-cane yield, sucrose content in cane-juice, commercial cane sugar and harvest index were recorded by using the standard procedures. Harvest index (HI) was calculated by using the following formula.

$$\text{Harvest Index (\%)} = \frac{\text{Economic yield}}{\text{Biological yield}} \times 100$$

Sucrose content in cane juice was calculated using the Schmitz's table as described by Spencer and Meade (1963). The C.C.S% was calculated by using the following formula.

C.C.S. % = 3a/2 {1-(5+c)/100} -b/2 {1-(3+C)/100}

Where C.C.S = Commercial cane sugar, a = Pol reading, b = Corrected brix reading and C = Fibre reading

The data obtained were subjected to the Fisher's analysis of variance (ANOVA) and treatment means were compared by using the L.S.D test at 0.05% P (Steel and Torrie, 1984).

Results and Discussion

Significantly higher number of millable canes (m^{-2}) was recorded in case of SPSG-26 followed by CP-77-400 which was statistically at par with CPF-235. While, significantly minimum number of millable canes (m^{-2}) was recorded for SPF-234 which was also at par with cane genotype CoJ-84. These differences in number of millable canes (m^{-2}) were attributed to the variable inherent tillering potential of the cultivars.

Bajwa *et al.* (1993) and Malik *et al.* (1996) reported the significant differences among cane cultivars for number of millable canes per unit area.

Most of the cane genotypes under study differed significantly from one another in cane length (Table 1). Cane genotypes CPF-235 produced significantly the longest canes followed by CP-77-400 which was at par with SPSG-26 and SPF-234. Significantly the shortest cane length of 1.29 m was recorded in case of CoJ-84.

There were significant differences in weight per cane of all the cane genotypes (Table 1). The genotype CP-77-400 produced the maximum weight per cane followed by CPF-235. The lowest weight per cane of 0.46 kg was recorded in case of CoJ-84.

The differences in cane weight of different genotypes were due to variable cane length and cane thickness. Punia *et al.* (1983) and Malik *et al.* (1996) who also reported the significant differences in weight per cane for various genotypes of sugarcane.

There were highly significant differences among all the sugarcane genotypes in the respect of stripped-cane yield (Table 1). The genotypes CP-77-400 produced significantly

Table 1: Yield, yield components and juice quality parameters as affected by different sugarcane genotypes

Sugarcane genotype	No. of millable canes (m^{-2})	Cane length (m)	Weight per cane (kg)	Stripped cane yield(t ha^{-1})	Sucrose content in cane-juice (%)	C.C.S (%)	Harvest Index (%
CP-77-400	10.72b	1.94b	0.96a	102.13a	17.25a	13.24a	75.07b
CPF-235	9.92b	2.23a	0.92b	92.87b	17.01a	13.22a	76.13ab
SPF-234	8.16c	1.80b	0.61d	52.50d	17.56a	13.42a	70.38c
CoJ-84	8.94	1.29c	0.46e	41.85e	14.39b	1.71b	70.98c
SPSG-26	11.79	1.89	0.64	79.38C	17.84A	13.18A	77.95A

the highest stripped-cane yield of 102.13 t ha^{-1} followed by CPF-235 producing cane yield of 92.87 t ha^{-1}. Significantly
the minimum stripped-cane yield of 41.85 t ha^{-1} was obtained from CoJ-84. Varied stripped-cane yield of different genotypes was due to variation in response of different yield parameters (number of millable canes, cane length and cane diameter) and their interactive effect on final cane yield. Diversity in production potential of different sugarcane genotypes has also been reported by Hatam and Pazir (1989) Malik *et al.* (1996). But these findings contradicted to those of Saxena *et al.* (1982) who reported non-significant differences in cane yield between two varieties.

It is evident from Table 1 that sucrose content was highly variable in the juice of various cane genotyeps. The highest sucrose content of 17.84% was found in SPSG-26 which was statistically at par with SPF-234, CP-77-400 and CPF-235. The lowest sucrose content in cane-juice was recorded for CoJ-84.

These results are supported by Hatam and Pazir (1989), Bajwa *et al.* (1993) and Malik *et al.* (1996) who reported that different sugarcane cultivars had significant effect on sucrose content in cane-juice.

Table 1 indicated that there were significant differences among the various cane genotypes with respect to C.C.S percent. The maximum C.C.S percent was recorded for SPF-234 which was at par with CP-77-400, CPF-235 and SPSG-26. Similarly, cane genotypes CoJ-84 gave the lowest commercial cane sugar of 10.71%. These results are in accordance with those of Hatam and Malik *et al.* (1996).

Various sugarcane genotypes differed significantly in their harvest indices (Table 1). Maximum harvest index was recorded for SPSG-26 which was at par with CPF-235. While, the lowest harvest index was given by SPF-234 which in turn, was statistically equal to that of CoJ-84. Ahmad *et al.* (1990) Amjad (1992) had substantiated similar results.

CP-77-400 proved to be the best one for harvesting the maximum stripped-cane yield per unit area and is recommended for cultivation under such type of agro-climatic conditions of Faisalabad.

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