GENOTYPIC PERFORMANCE OF PRESOWN SUGARCANE UNDER SOUTHERN PUNJAB CONDITIONS

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ABSTRACT

The studies on the relative production potential of ten sugarcane clones were carried out at sugarcane research station, Khanpur during the year 2012 under hot dry conditions of southern Punjab. The varieties included in the trail were S2006SP.18, S2006SP.25, S2006SP.30, S2006US.321, S2006US.469, S2006US.640, S2006US.641, S2006US.658, S2006US.832 and CPF.247 (Check).The new promising sugarcane variety S2006US.658 with better germination (53.55%), average tillering (1.50 per plant), good 100-cane weight (101.67 Kg), the highest millable cane count (107.04 thousand per hectare), maximum cane yield (108.70 t/ha) and better CCS (12.50%) superseded the tested clones in sugar production (13.58 t/ha). It was followed by the check variety CPF.247.Hence the new variety S2006US.658 with 5.76 and 6.01 % more cane and sugar yield, respectively over control is capable of replacing the check variety. A wide scale testing in various agro-ecological zones is however invited for regional adoptability.

Keywords: Sugarcane, Varieties, CCS, Millable Canes, Cane Yield.

INTRODUCTION

Sugarcane varieties play a pivotal role in determining cane and sugar yield whereas cultural practices and climatic factor help to explore their inherent biological potential. Sugarcane varieties deteriorate after some period due to change in environmental conditions from year to year or evolution of new breeds of pathogens. Therefore, a regular release of fresh varieties in the field is essential to sustain economic crop yields. For this purpose a new sugarcane clone SPF-234 was compared by Aslam et al., 1998 with BL.4. The former variety on account of better germination and tillering coupled with better cane weight and sufficient stalk density out yielded all the tested varieties by producing an average stripped cane yield of 139.43 t/ha and mean sugar yield of 14.06 t/ha. Munir et al., 2009 conducted a field trail and harvested significantly different cane yield of tested varieties. The varieties S2002US.637 and

S2002US.698 gave higher yields of 109 and 105.5 t/ha against the standard CPF.243 and SPF.245 which produced 103 and 98 t/ha. A maximum sugar recovery of 12.99% was recorded for S2002US.698. Afghan et al., 2010 studied the performance of new sugarcane varieties against the standard SPSG.26 and reported that NSG.311 gave significantly high cane yield of 126 t/ha for both plant and ratoon while sugar recovery of 10.45 % and 10.60% for plant and ratoon against standard check which gave a cane yield of 80 and 74 t/ha for plant and ratoon respectively. The top yielder produced the maximum sugar yield (13 t/ ha) followed by S96SP.302 (11 t/ha).Nadeem et al., 2010 studied the performance of 16 spring planted sugarcane clones including HSF.240 and SPF.213 as standard. They declared S2001US.104 as superior variety of maximum cane yield of 106.60 t/ha whereas the highest sugar yield of 13.01 t/ha was recorded for S2006US.50. Unar et al ., 2010 studied the comparative performance of 9 promising sugarcane genotypes with Thatta.10.The cane yield data revealed that HOTH-348 remained at the top with average cane yield of 121.22 t/ha followed by HOTH-2109 and HOTH-349.The genotype HOTH-349 surpassed in CCS%(13.89). Bashar et al., 2011 conducted a comparative study with six sugarcane varieties and reported that variety ISD.32 produced significantly high cane yield (72.39t/ha) followed by ISD.35(64.00 t/ha) and ISD.33 (57.40 t/ha) primarily due to high number of millable canes per hectare.Gujjar et al ., 2011 obtained maximum average cane yield of 150,131 and 130 t/ha from sugarcane varieties NSG.555,S97US.102 and HOTH-326, respectively. In quality analysis CP.80-1827 remained on the top by producing CCS of 15.30% followed by CP89-1945 and CP82-1172 with mean CSS of 14.73 and 14.59%, respectively while the check Thatta-10 produced an average CCS of 14.49%. Nadeem et al., 2011 compared quantitative and qualitative performance of sugarcane varieties. They recorded the highest cane yield of 119.50 t/ha from promising sugarcane variety S2001US.375 due to highest millable canes, better tiller formation and comparable germination. It was followed by S2001US.129 and S2001US.395.The top yielder surpassed the tested genotypes in sugar yield by producing 12.79 t/ha. Islam et al., 2013 studied the relative performance of 10 sugarcane varieties under water logged stress conditions and concluded that genotype I-231-03 out yielded all the strains in cane and sugar yield and juice quality. Keeping in view the importance of varietal role in sugarcane production the present study was undertaken to evaluate the performance of ten promising sugarcane varieties under hot dry climatic conditions of southern Punjab.

MATERIAL AND METHODS

The present studies regarding the evaluation of ten sugarcane varieties were conducted at the experimental area of Sugarcane Research Station, Khanpur during Kharif 2012. Nine promising sugarcane genotypes namely S2006SP.18 , S2006SP.25, S2006SP.30, S2006US.321, S2006US.469, S2006US.640, S2006US.641, S2006US.658 and S2006US.832 were compared in yield and quality with the standard CPF.247. The experiment was sown on loamy soil during the third week of September, 2011 in trireplicated RCBD arrangement with a net plot size of 3.6 x 10 m and harvested in December, 2012.The test factor was allowed to grow under recommended inputs level. The required agronomic operations were performed as and when required. The germination and tillering data were recorded after 45 and 90 days of sowing while millable cane count, cane weight and yield were recorded at harvest. The juice of cane samples was analysed for brix, pol, purity and CCS was worked out for quality evaluation. Data thus collected during this study was statistically analyzed using Fisher's Analysis of Variance Technique and significant means were compared using Least Significant Difference (LSD) Test at 5% probability level Steel et al., 1997.

RESULTS AND DISCUSSION

The results regarding the studied physiological and chemical parameters along with their statistical interpretation embodied in table 1 are discussed in the coming lines.

Germination

Germination is undeniably the most critical physiological character which directly reflects the final crop stand. It is explicit from the data given in table-1 that average germination of tested genomes ranged from 40.51 to 56.07%. The differences among the genotypic means were significant. The clone S2006SP.18 surpassed the tested varieties with 56.07% germinability. However it was non significantly followed by S2006US.658 and S2006US.321 with mean germination percentage of 53.55 and 53.25, respectively**.** The clone S2006US.641 remained at the bottom with an average germinability of 40.51.These results are in harmony with those elucidated by Aslam et al., 1998 and Nadeem et al., 2011 who have also recorded significant differences among the germination of sugarcane varieties.

Tillers per Plant

Tillering potential of a sugarcane variety is one of the most desirable characters from farmer's point of view. Only a profusely tillering variety gains popularity among the growers community as makes up the deficiencies in germination and helps in attaining proper plant stand. A narrow glance at the data presented in table-1 revealed significant differences among the tested varieties in tiller formation. Highest number of per plant tillers (2.52) has produced by S2006US.832 followed by S2006US.469 and CPF.247.The latter two were, however, at par with each other. The lowest tillering of 1.20 per plant has been observed in S2006SP.18. Aslam et al., 1998 and Nadeem et al., 2011 have also reported varied number of tillers per plant for different sugarcane varieties.

Cane Weight

Stalk weight is an important yield attributing character of sugarcane variety as it directly contributes to final harvest of the crop .The cane weight differences among various varieties were gorgeous enough to reach a level of statistical significance as shown in table- 1. Average hundred cane weight varied from 82.33 to 106.67 Kg. The heaviest canes have been recorded in case of S2006US.321.It was matchingly followed by S2006US.650 and S2006US.469 whose 100 canes weighed 101.67 and 100.33 Kg respectively. The minimum 100 cane weight have been recorded for S2006US.832(82.33 kg).These results are supported by those of Aslam et al., 1998 who reported significant genotypic differences in stalk weights.

Cane Density

The final cane stand is the interaction of germination, tillering and tiller mortality. The data pertaining to the millable cane stand established by different genomes summarized in table-1 elucidate that the genotypic differences were sufficient enough to reach a level of statistical significance. The variety S2006US.658 remained at the top by producing 107.04 thousand millable canes per hectare matchingly followed by CPF.247 and S2006US.641 which developed final cane stands of 104.07 and 102.59 thousand hectare, respectively. The poor most cane count has been recorded for S2006SP.25 which was preceded by S2006SP.18 and S2006SP.30.The latter two were however at par with each other. Aslam et al., 1998,

Bashar et al., 2011 and Nadeem et al., 2011 had also recorded statistically different final cane stands in their genotypic studies.

Stripped Cane Yield

The ultimate goal of every sugarcane grower is to reach at the maximum attainable cane yield which is a happy blend of genetic potential of variety, the environmental conditions and agronomic practices. Different yield parameters like number of millable canes, cane girth, height and thus per cane weight have a direct bearing on the final cane yield per unit area. The data given in table-1 show the absolute superiority of new promising sugarcane variety S2006US.658 which gave a stripped cane yield of 108.70 t/ha. It was followed by S2006US.321 and CPF.247 with final cane yields of 104.17 and 102.78 t/ha, respectively. The latter two were statistically at par with each other .The lowest cane yielder in the present study was S2006SP.25 which produced 78.61 t/ha. It was preceded by S2006US.640.Measureable yield differences among sugarcane varieties have also been arrived at by Aslam et al., 1998, Afghan et al., 2010, Unar et al ., 2010, Nadeem et al., 2011 and Islam et al., 2013.

Commercial Cane Sugar (CCS)

CCS is the final assessment of actual sugar contents in a genotype and is of prime importance from miller's and breeder's point of view. The CCS of different clones recorded in Table-1 evince that three varieties namely S2006US.469, S2006US.640 and S2006US.658 showed higher than the standard CPF.247.The rest of all the varieties gave lower CCS than the check variety. These differences in CCS may be attributed to their differential genetic make up

Sugar Yield

The basic aim of all the research activities on sugarcane is the attainment of higher sugar yield which is the function of stripped cane yield and corresponding CCS. A narrow glance at the results set out in table.1 depict that only one variety S2006US.658 could cross the check variety CPF.247 in sugar yield by producing 13.58 t/ha against 12.81 t/ha of the check. The higher sugar yield in case of S2006US.658 is due to its maximum cane yield in the present study and a good CCS of 12.50 %. Differences in genotypic sugar yield have also been reported by Aslam et al., 1998, Afghan et al., 2010 and Nadeem et al., 2011.

Table.1 Performance of Autumn sown Sugarcane Varieties Under Southern Punjab conditions

Sr. No	Variety	Germi-nation	Tillers/ Plant	100-Cane Weight (Kg)	Cane Density 000/ha	Cane yield t/ha	CCS %	Sugar Yield t/ha
1	S2006SP.18	56.07a	1.20c	98.33abc	89.63bc	87.50f	12.46	10.90b
2	S2006SP.25	49.11abc	1.31c	93.00bcd	84.72c	78.61h	11.82	9.29b
3	S2006SP.30	46.00bcd	1.50bc	97.67abc	97.69ab	95.37d	10.91	10.46b
4	S2006US.321	53.25ab	1.48bc	106.67a	97.96ab	104.17b	12.21	12.71ab
5	S2006US.469	47.92bcd	1.87b	100.33ab	100.09ab	100.00c	12.59	12.59ab
6	S2006US.640	42.29cd	1.60bc	84.00d	98.98ab	82.69g	12.55	10.37b
7	S2006US.641	40.51d	1.49bc	89.33cd	102.59a	91.48e	11.91	10.89b
8	S2006US.658	53.55ab	1.50bc	101.67ab	107.04a	108.70a	12.50	13.58a
9	S2006US.832	42.82cd	2.52a	82.33d	102.50a	84.17fg	12.03	10.12b
10	CPF.247	45.33cd	1.67bc	99.33abc	104.07a	102.78bc	12.47	12.81ab
LSD		7.84	1.20	10.93	10.94	3.50	N.S	2.17

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