STUDIES ON THE PERFORMANCE OF SOME SUGARCANE GENOTYPES AT FAISALABAD

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ABSTRACT

The study reported here in was under taken with the major objective to compare the performance of sugarcane genotypes under agro climatic conditions of Faisalabad during crop season of 2004-05. Statistically significant variation among all genotypes was observed as the maximum values of germination (60.35%), tillers per plant (2.15) and number of millable canes (104.60 000t/ha) were produced by S2001-US-750, S2001-US-345 and S2001-US-129 respectively as compare to the approved commercial standard early maturing HSF-240 and medium and late maturing SPF-213. Similarly S2001-US-375 stood first with respect to cane yield (119.50 t/ha) and sugar yield (12.79 t/ha) among all the genotypes.

Keywords: Sugarcane, genotypes, cane yield, sugar yield, CCS.

INTRODUCTION

Sugarcane is playing a pivotal role in national economics as major source of sugar production. It also generates employment and by products for industrial sector. That is why sugar industry is second to textile in Pakistan which is primarily based on the mercy of sugarcane cultivation (Bahadar *et al.,* 2002). But the area under cane cultivation as well as its production has been decreased by 6.12% and 5.5% respectively in 2005-06 as compare to 2004-05 (GOP, 2006). This is because the yield potential of varieties deteriorates with the course of time due to disease susceptibility, segregation, change in edaphic and climate. So it is essential to select the varieties with high yield potential and a wide range of adoptability (Malik, 1990). Similarly cane yield and juice quality depend upon several qualitatively inherited characters which themselves are also influenced by environment. Among various technologies for increasing cane yield, variety is the pivotal and main ingredient in sugar production. Thus adoption of high yielding varieties with better quality attributes in the cheapest technology which can be adopted by the growers (Kamat and Singh, 2001). The research work conducted during the past few years regarding varietal evolution in being reviewed in the next lines.

Twenty six new canal point (CP) clones were studied by Glaz *et al.,* (1991) during two consecutive crop seasons 1989-91 at two different locations including sandy and muck soils. They separated four promising new cloens: CP85-1382, CP85-1308, CP85-1342 and CP70-1133 on the basis of their high yield. Sukkchain and Saini (1998) evaluated the performance of eight cane cultivars under water logged and high water table conditions and separated only one superior cultivar CoS8118 due to higher cane yield and commercial cane sugar. Similarly Domaingue *et al.,* (1998) released two varieties (early and mid season harvest) namely M96/82 and R573 for cultivation in low areas of Mauritius. M96/82 was recommended for low altitude and low rainfall regions while R573 for humid and sub humid regions. Saxena *et al.,* (1982) found that new clone CoS776 performed better for tillering, cane formation, juice quality and ratooning as compare to CO1158 but it produced insignificant differences for

cane yield. Fasihi (1981) reported about dislikeness of BL-4 by farmers because of its high inputs requirement and difficulty in crushing with local crushers.

This experiment was conducted for the evaluation of qualitative and quantitative characteristics of sugarcane genotypes under agro climatic conditions of Faisalabad.

MATERIALS AND METHODS

A one year study was conducted during the crop season 2004-05 at Sugarcane Research Institute, Faisalabad. The experimental site was laid out in randomized complete block design in which each treatment was replicated thrice with a net plot size 4m x 9.6m. The following genotypes were included as experimental treatments:

1. S2001-US-129
2. S2001-US-274
3. S2001-US-345
4. S2001-US-375
5. S2001-US-393
6. S2001-US-395
7. S2001-US-400
8. S2001-US-423
9. S2001-US-538
10. S2001-US-576
11. S2001-US-725
12. S2001-US-750
13. S2001-US-985
14. S2001-US-999
15. SPF-213
16. HSF-240

The crop was sown in March 2004 and harvested during the same month of next year. All the agronomic and cultural practices were applied as and when considered necessary during the course of study. The data of different yield contributing parameters (number of millable canes, cane yield and sugar yield) were determined at harvest while germination and tillering data at 45 and 90 days after sowing. CCS was calculated monthly by the procedure described in laboratory manual (Anonymous, 1970) from compound samples analysis after every thirty days from Oct. to April so its statistical analysis was impossible. However the remaining data were analyzed statistically as mentioned by Steel and Torrie (1980) at probability 5% to compare their means.

RESULTS AND DISCUSSION

The results pertaining to different studied characters along with their statistical interpretation packed in table are discussed in the lines to follow.

Germination

It is the most critical physiological stage in the life cycle of a plant as without germination there is no plant. It should be sufficient to yield an optimum crop stand. A glance at the data

given in table revealed that four genotypes S2001-US-129, S2001-US-395, S2001-US-725 and S2001-US-750 were statistically at par with SPF-213. Similarly when these genotypes were compared with second standard HSF-240, seven genotypes namely S2001-US-750, S2001-US-395, S2001-US-129, S2001-US-725, S2001-US-423, S2001-US-375 and S2001-US-985 produced higher germinants as 60.35%, 55.39%, 54.77%, 54.15%, 42.88%, 42.75% and 42.38% respectively. These results are also in conformity with those reported by Singh and Tyagi (1995).

Tillers per plant

It is the most critical factor that determines the overall crop stand and ultimately effects the cane yield. Tillering also fulfills deficiencies in germination. A perusal of tillering data in table showed that differences in tillering among various genotypes were significant. Nine genotypes, while comparing with medium and late maturing standard SPF-213, revealed higher number of tillers per plant. These genotypes along with tillering data were S2001-US-345 (2.15), S2001-US-375 (1.88), S2001-US-999 (1.74), S2001-US-129 (1.64), S2001-US-400 (1.53), S2001-US-985 (1.41), S2001-US-395 (1.38), S2001-US-393 (1.31) and S2001-US-576 (1.28) respectively. When these fourteen genotypes were compared with early maturing standard HSF-240, six produced higher or equal tillers per plant to it. These results coincide with those reported by Afghan *et al.,* (1994).

Number of millable canes

This parameter shows the collective interaction of germination, tillering along with resistance against insect pests and disease attack. It has the direct effect on cane yield as shown in the table. As far as the number of millable canes are concerned, five genotypes i.e. S2001-US-129 (104.60 000/ha), S2001-US-375 (104 000/ha), S2001-US-999 (103.65 000/ha), S2001-US-395 (100 000/ha) and S2001-US-985 (97.14 000/ha) crossed standard SPF-213 (92.36 000/ha) by recording more cane count than it. The four genotypes (S2001-US-129, S2001-US-375, S2001-US-999, S2001-US-395) showed higher cane count than the second standard HSF-240 (99.56 000/ha) .Nuss (1992) noticed the similar observations.

Cane yield

Cane yield is the outcome of all yield components. A perusal of data indicated that when fourteen genotypes were compared with standard SPF-213, five genotypes S2001-US-375, S2001-US-129, S2001-US-395, S2001-US-999 and S2001-US-985 gave higher yields as 119.50, 113.40, 111.60, 106.96 and 102 t/ha respectively. The similar observations were recorded when these genotypes were compared with HSF-240. The lowest cane yield (59.29 t/ha) given by S2001-US-345. A similar trend was found by Ismail (1992).

CCS

The real cane varietal quality is judged by its CCS%. The data presented in table has indicated variable CCS% for all genotypes. All the genotypes exhibited variable CCS% in which all the genotypes showed higher value of CCS% when compared with SPF-213 (9.80%). But when these genotypes compared with HSF-240 (11.58%), then three of them i.e. S2001-US-750, S2001-US-400 and S2001-US-538 crossed it by exhibiting 11.99%, 11.93% and 11.84% CCS% respectively. Verma *et al.,* (1997) advocated the same facts.

Sugar yield

It is the function of stripped cane yield and corresponding commercial cane sugar. The data table showed that all genotypes varied significantly from each other with respect to sugar yield in which five genotypes showed higher sugar yields as S2001-US-375 (12.79 t/ha),

S2001-US-395 (12.31 t/ha), S2001-US-129 (11.93 t/ha), S2001-US-985 (11.69 t/ha) and S2001-US-999 (11.63 t/ha) as compare to early maturing standard HSF-240. Similarly four genotypes in addition to these five (S2001-US-400, S2001-US-393, S2001-US-538, S2001-US-750) crossed late maturing standard SPF-213 (8.93 t/ha) by yielding sugar (10.69, 9.87, 9.60, 9.22 t/ha). Variable sugar yield for different genotypes on the same pattern was also claimed by Hasabanis *et al.,* (1991).

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Table: Yield and quality performance of various sugarcane genotypes at Faisalabad

Sr. No.	Genotypes	Germination (%)	Tillers per plant	Number of millable canes (000/ha)	Cane yield (t/ha)	CCS (%)	Sugar yield (t/ha)
1.	S2001-US-129	54.77a	1.64bcd	104.60a	113.40ab	10.52	11.93abc
2.	S2001-US-274	36.43bc	0.77gh	65.11fg	61.55h	11.42	7.03i
3.	S2001-US-345	22.18d	2.15a	56.51h	59.29h	11.18	6.63i
4.	S2001-US-375	42.75b	1.88ab	104a	119.50a	10.70	12.79a
5.	S2001-US-393	35.94bc	1.31cdef	82.99e	89.24ef	11.06	9.87ef
6.	S2001-US-395	55.39a	1.38cdef	100ab	111.60ab	11.03	12.31ab
7.	S2001-US-400	39.53bc	1.53bcde	88.71de	89.58ef	11.93	10.69de
8.	S2001-US-423	42.88b	1.03fgh	59.2gh	79.17g	10.72	8.49h
9.	S2001-US-538	30.98c	0.80gh	83.59e	81.07fg	11.84	9.60fg
10.	S2001-US-576	35.57bc	1.28def	61.11gh	63.80h	9.98	6.37i
11.	S2001-US-725	54.15a	0.63h	70.92f	80.20g	10.93	8.78gh
12.	S2001-US-750	60.35a	1.08fg	90.63cdf	76.91g	11.99	9.22fgh
13.	S2001-US-985	42.38b	1.41cdef	97.14abc	102.00cd	11.46	11.69bcd
14.	S2001-US-999	38.91bc	1.74abc	103.65a	106.96bc	10.87	11.63bcd
15.	SPF-213 (std)	57.99a	1.19efg	92.36bcd	91.18e	9.80	8.93fgh
16.	HSF-240 (std)	39.90b	1.41cdef	99.56ab	95.92de	11.58	11.11cd
	LSD at 5%	8.672	0.4348	7.718	9.442	-	1.063

Std. = Standard
LSD = Least Significant Difference