PERFORMANCE OF DIFFERENT MEDIUM AND LATE MATURING SUGARCANE STRAINS DURING SELECTION PROCESS

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ABSTRACT

A research experiment was carried out to evaluate six qualitative and quantitative traits (germination, tillering, number of millable canes, cane yield, CCS and sugar yield) of twelve medium and late maturing sugarcane strains against a medium and late maturing standard strain SPF-213. Statistically significant differences were recorded in all strains. The maximum germination (65.07%) and cane count (82.29 000/ha) were recorded in S2002-US-619 while highest cane yield (94.17 t/ha) and sugar yield (10.82 t/ha) were noticed in CP85-1491. Similarly maximum tillers per plant (2.47) and CCS (11.70%) were observed in CPHS-35 and S2002-US-327 respectively. All the remaining strains showed lower values than these recorded observations.

Keywords: ***Sugarcane, strains, cane yield, sugar yield, CCS***

INTRODUCTION

The importance of sugarcane (*Saccharum officinarum L.*,) in the agrarian economics of the world need no emphasis because of its higher value as a cash crop, a major source of sugar and basic raw material for various agro based industries. Similarly sugar industry ranks second to the textile industry and enjoys a key position in the world's economics (Jamro *et al.,* 2000). The major cane producing countries of the world like Brazil, India, China, and Thailand have higher cane production 420121, 232320, 87600 and 49572 thousand tons respectively as compare to Pakistan, which is 47244 thousand tons (GOP, 2006). The varieties play an important role in lower cane production scenario. There may be several reasons of low cane yield with respect to varieties because sugarcane varieties deteriorate after a certain period of time due to evolution of new breeds of pathogens and change in environment from year to year. Therefore a constant flow of fresh improved varieties is essential (Aslam *et al.,* 1998). In the same way, acceptability of a newly released variety depends on its yield performance. Similarly the performance of promising clones depends upon the agro-ecological conditions as a promising variety may not perform good in all agro-ecological zones due to variation of agro climatic factors (Bashar and Paul, 2005). Thus role of varieties in increasing cane yield and production can never be neglected. The studies conducted by researchers related to this topic are being presented in reviewed form in coming lines.

Khan *et al.,* (1995) evolved a cane variety Co. 84212 from the Co1148 x Co775 having cane length (2-2.3m), cane thickness (2-2.3cm), number of millable cane (85-123 000/ha), sucrose (16-17%), purity (88-91%) and sugar recovery (11.5-12.8%) at 9-10 months of maturity. Similarly Chang (1995) released cane variety ROC 21 from cross of 70-3792 x F163 for red highland soil in central Taiwan and it was resistant to leaf blight, common rust, downy mildew, smut, orange rust, leaf scorch and mosaic. Domaingue and Ricaud (1995) discussed and recommended climatic regions for different cane varieties as MI55/80 and R575 for humid and sub humid areas, M554/79 for super humid zone and M1176/77 and M261/78 for

dry, non irrigated areas. Similarly, Ramirez-Oli-veraz *et al.,* (1978) studied fifty cane varieties and released five promising varieties namely PR61-902, CR52-43, PR1140, BR1140 and CP52-43 due to their better growth and juice quality while PR61-92 produced maximum cane yield in the reported study. In the same way, Naeem *et al.,* (1996) investigated the decline in biological potential of ten sugarcane genotypes in which CoL-54 maintained its biological potential by producing maximum cane yield while CoL-29 showed maximum decline.

The present study was, therefore, initiated to evaluate and compare the relative performance of some newly introduced sugarcane strains during varietal selection programme.

MATERIALS AND METHODS

The study reported here was made at Sugarcane Research Institute, Ayub Agricultural Research Institute, Faisalabad during the crop season 2005-06. The treatments comprising of thirteen medium and late maturing strains viz;

1. CP-85-1491
2. CPHS-35
3. S96-SP-1215
4. S98-SP-108
5. S2000-US-50
6. S2002-US-92
7. S2002-US-750
8. S2002-US-116
9. S2002-US-327
10. S2002-US-334
11. S2002-US-619
12. SPF-245
13. SPF-213 (std.)

The crop was sown@70, 000 DBS/ha and fertilized@168-112-112 Kgs/ha NPK in March 2005 and harvested in the same month of 2006. Similarly the plant protection measures as weeding, hoeing, earthing up and irrigation were applied according to crop condition and requirement. The data recorded during the entire course of study were comprised of the following yield and quality parameters.

a) Germination
b) Tillers per plant
c) Number of millable canes
d) Cane yield
e) CCS
f) Sugar yield

Among these parameters data on germination and tillering were recorded after 45 and 90 days of sowing while all other data parameters except CCS were recorded at harvest. However, CCS% was determined fortnightly from October to April according to the procedures described in uniform methods of chemical control of Pakistan cane sugar factories (Anonymous, 1977). The remaining data were subjected to statistical analysis to analyse the superiority of means using LSD at 5% probability levels for testing significance of differences as described by Steel and Torrie (1980).

RESULTS AND DISCUSSION

Studies on different characteristics of all strains are categorically described as follows:-

Germination
It is the most critical factor which determines the varietal potential to exploit the available resources and ultimately effects cane stand. It is evident from data table that among twelve strains, maximum germination (65.07%) was recorded in S2002-US-619 as compare to the standard SPF-213 (61.27%). It was followed by S98-SP-108 that produced 62.00% germination. While the S2002-US-116 produced the lowest germination (27.81%). The other strains produced germinates between these two limits. This findings are analogous with Verma *et al.,* (1998) who found variable germination for different cane cultivars.

Tillers per plant
Tillering potential of a strain ultimately effects cane yield positively. The perusal of data embodied in table revealed that all strains showed significant differences for tillering. The highest number of tillers per plant (2.47) were observed in CPHS-35 as compare to standard SPF-213 (1.55) while S98-SP-108 produced the lowest number of tillers (0.72). The remaining eleven strains produced tillers between these extremes. Similar reports were reported by Tiwari and Chatterjee (1998).

Number of millable canes
It directly influences cane yield as it is the combined interaction of germination and tillering. No strain succeeded in recording higher number of millable canes as compare to SPF-213 (100.00 000/ha). However S2002-US-619 ranked second by producing 82.29 000/ha millable canes. Similarly the minimum number of canes (57.99 000/ha) were counted in S2002-US-116 and S2002-US-327. This determination is in agreement with those referred by Hapase *et al.,* (1995).

Cane yield
It is the combination of functions like environmental responses and genetic potential of a strain. Variable and significant data were recorded for cane yield. As far as the cane yield is concerned, CP85-1491 yielded the highest tonnage (94.17 t/ha) and it was followed by S2000-US-50 in descending order that produced 92.43 t/ha canes. These two strains crossed standard SPF-213 (80.47 t/ha). The research work carried out by Goswami *et al.,* (1992) are in accordance with the present finding.

CCS%
CCS is the best judgment method of a strain's quality for breeders and millers. It is clear from data table that all strain varied highly for CCS. S2002-US-327 showed maximum commercial cane sugar (11.70%) and it was followed by CP85-1491, S2002-US-750, S2000-US-50, S2000-US-619, S2002-US-334 and S2002-US-92 in descending order by recording, 11.50%, 11.14% , 10.96%, 10.80%, 10.63% and 10.54% CCS as compare to the standard SPF-213 (9.81%). This discussion shows a close conciseness with those of Verma *et al.,* (1998).

Sugar yield
It is the combination of cane weight and corresponding commercial cane sugar. Only three strains produced higher sugar yields as compare to SPF-213 (7.89 t/ha) i.e. CP85-1491 (10.82 t/ha), S2000-US-50 (10.13 t/ha) and SPF-245 (8.84 t/ha). While the remaining nine strains failed to produce higher sugar yield as compare to these. The other strains produced results between these figures. The results are almost same as demonstrated by Sing *et al.,* (1992).

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Table-1 Qualitative and quantitative characteristics of different sugarcane strains during selection process

Sr. No.	Strains	Germination (%)	Tillers/ Plant	Millable canes (000/ha)	Cane yield (t/ha)	CCS (%)	Sugar yield (t/ha)
1.	CP85-1491	59.54b	1.27e	73.96bc	94.17a	11.50	10.82a
2.	CPHS-35	30.38fg	2.47a	60.76cd	52.43def	9.73	5.10fg
3.	S96-SP-1215	48.03cd	1.55cd	62.50cd	58.08bcd	9.58	5.56defg
4.	S98-SP-108	62.00ab	0.72f	79.86b	62.50bc	9.70	6.06de
5.	S2000-US-50	60.20ab	2.02b	61.80cd	92.43a	10.96	10.13a
6.	S2002-US-92	55.26bc	1.66bc	58.68d	39.40g	10.54	4.15h
7.	S2002-US-750	50.85c	0.98ef	70.14bcd	50.00ef	11.14	5.57def
8.	S2002-US-116	27.81fg	1.30cde	57.99d	56.94cde	9.45	5.38efg
9.	S2002-US-327	41.66de	1.14def	57.99d	46.18fg	11.70	5.40efg
10.	S2002-US-334	35.41ef	1.63bc	64.93cd	45.83fg	10.63	4.87gh
11.	S2002-US-619	65.07a	0.86ef	82.29b	65.19b	10.80	7.04c
12.	SPF-245	59.07b	0.83f	70.57c	87.50b	10.10	8.84ab
13.	SPF-213 (std.)	61.27ab	1.55ef	100.00a	80.47b	9.81	7.89b

Std. = Standard