EXPLORING RATOON POTENTIAL OF VARIOUS SUGARCANE VARIETIES UNDER SOUTHERN PUNJAB CONDITIONS

By

Muhammad Aslam* Naeem Ahmad* Muhammad Naseem** Abdul Rashid Zahid***
* Sugarcane Research Station, Khanpur ** Agronomic Research Station, Farooqabad
*** Sugarcane Research Sub Station, Bahawalpur

ABSTRACT

Seven new promising sugarcane varieties viz., S2002US.312, S2002US.447, S2002US.628, S2003US.114, S2003US.123, S2003US.809 and S2003US.824 were evaluated for their ratoon yield and quality against a commercial cultivar HSF.240 under Southern Punjab conditions during 2011 at Sugarcane Research Station, Khanpur. The variety S2003US.114 on account of good sprouting per plant (2.84), higher 100-cane weight (97.33 kg), reasonably good millable cane count (111.30 thousand ha^{-1}), significantly maximum cane yield of (108.05 t/ha) and comparable CCS% (12.41) against check HSF-240, produced the highest sugar yield of 13.41 t/ha. It was followed by S2003US.824. The promising variety S2003US.114 on the basis of 15.65 and 15.21% more ratoon cane and sugar yield, respectively over control is capable of replacing the check variety and can make gigantic strides in sugarcane production for sweet revolution. A wide scale testing in various agro-ecological zones is, however, invited for regional adaptability.

Keywords: Varieties, Ratoon Potential, commercial cane sugar, millable cane, sugarcane.

INTRODUCTION

Ratooning potential of a sugarcane variety is one of the most desirable cane genotypic characters from farmer's point of view. Only a good ratooner sugarcane variety gains popularity among the farming community. Ratoons are cheaper to grow by about 30-40% due to saving in soaking irrigation, land preparation, cost of seed and sowing operations (Akhtar *et al*, 2003). Ratoon crop occupies 35 to 50 % of the total cane area in Pakistan (Malik and Guman, 2005). Afzal *et al*, 1990 studied the ratoon performance of six sugarcane varieties and reported maximum average cane yield of 75.55 t/ha for CP-43-33. The same variety surpassed in sugar yield. El-Geddawy *et al*, 2002 elucidated that sugarcane variety GIT.54-9 significantly surpassed the other varieties in respect of stalk height, stalk diameter and stalk weight in both ratoon crops. Rafique *et al*, 2005 carried out two years field experiment to investigate ratooning potential of ten sugarcane varieties and concluded that CPF-243 and HSF-240 gave significantly more ratoon yield during both years of study. Bashir *et al*, 2007 undertake a field study on ratooning ability of spring planted sugarcane varieties and observed that maximum cane yield was produced by CPF-237 and HSF-242 of ratoon crop. Jamil *et al*, 2007 evaluated the ratooning behavior of 22 candidate sugarcane varieties under NUYT programme. Findings of the study revealed that promising sugarcane varieties S95HS.185, S97US.183, S96SP.302, CPHS.35, NSG.311 and Malakand-16 were better ratooners. Khan *et al*, 2007 indicated that sugarcane variety S96SP.302 produced significantly maximum ratoon cane yield of 79.39 t/ha against the lowest cane yield of 41.94 t/ha recorded for NSG-311. The higher cane yield was mainly associated with higher number of millable canes, cane height, and cane girth. Therefore, a study was planned in this context to asses the comparative ratooning performance of candidate sugarcane varieties under Southern Punjab conditions. Aslam *et al*, 2011 studied the ratoon performance of thirteen sugarcane varieties and found that CPF.246 on account of high number of sprouting per plant (1.57), significantly higher 100-cane weight (95.67 kg), highest millable cane count (112.69 thousand ha^{-1}), maximum cane yield (107.90 t/ha) and comparable CCS% (12.74) against check SPF-234, produced the highest sugar yield of 13.74 t/ha.

MATERIALS AND METHODS

The field experiment was conducted under irrigated conditions during spring season to evaluate the ratoon potential of elite sugarcane varieties during 2011-2012 at Sugarcane Research Station, Khanpur. The experiment was started during 2011 when the spring planted crop was harvested in the first week of February and kept as ratoon. The verities included in the study were S2002US.312, S2002US.447, S2002US.628, S2003US.114, S2003US.123, S2003US.809, S2003US.824 and HSF.240. The experiment was laid out in Randomized Complete Block Design with three replications. The sugarcane genotypes were sown by dry method in 120cm apart trenches with a net plot of size 3.6 × 10 m using a seed rate of 75000 double budded sets per hectare. The ratoon crop was fertilized at the rate of 218-146-146 kg NPK per hectare, respectively. After harvesting the plant crop, uneven stubbles were cut manually with the help of hand chopper. Then interculture was given to control

weeds, loosen the soil to help root development and thus facilitate sprouting. Afterwards, whole of P, K and 1/3 of N was applied to the crop followed by irrigation. The remaining 2/3 N was given in two equal splits, 1/3rd at completing sprouts (60 days after harvesting of plant crop) and 1/3rd during the second fortnight of May when crop was earthed up. Meanwhile data on number of sprouts per plant were recorded. The data on cane density, weight, yield and quality were recorded at the harvest during the last week of December, 2011. The data thus recorded were analyzed using Analysis of variance technique and least significance difference test was applied to compare the treatment means (Steel and Torrie, 1984).

RESULTS AND DISCUSSIONS

Number of sprouts per plant

The sprouting of underground buds plays a pivotal role in the establishment of an economical ratoon sugarcane crop. Climatic conditions, soil moisture and vigor of plant crop play a very important role in determining the sprouting of stubbles. It is evident from the data given in table-1 that there were significant differences in the number of sprouts per plant produced by different sugarcane varieties under study. Sugarcane genome S2003US.123 produced the highest number of sprouts per plant (2.93). It was, however, matchingly followed by S2003US.114, S2003US.824, HSF.240 and S2003US.809. These differences in the number of sprouts per plant may be attributed to the varied inherent ratooning potential of the varieties (Rafique *et al*. 2005).

Cane Weight

The individual cane weight is a very important yield contributing character which directly affects the final yield. The data presented in the table-1 show significant differences in the 100-cane weight given by different genomes. Promising sugarcane variety S2003US.824, produced the heaviest canes (99.00 kg per 100 canes). It was, however, matchingly followed by S2003US.114 and S2003US.123. The lowest 100-cane weight of 76.67kg was recorded for S2002US.312 preceded by S2002US.447. These differences in the stalk weight may be attributed to the varied genetic potential of tested sugarcane clones. Aslam *et al*, 2011 have also recorded the varied cane weight for different sugarcane varieties.

Cane Density

Adequate number of potentially heavy millable canes ensures high yield. The establishment of millable canes is a direct reflection of stubble sprouts in ratoon crop of sugarcane if tiller mortality remains the same. The data compiled in table-1 depict that the standard variety HSF.240 produced more number of millable canes against all other varieties under investigation (115.09 thousand ha^{-1}). It was followed by S2003US.809 and S2003US.114 however the differences were non significant. The thinnest stand of 96.39 thousand cane stalks was recorded for S2002US.628 which was non-significantly preceded by S2003US.123. The differential behavior of sugarcane genotypes though non significant for the production of variable number of millable canes may be attributed to the varying inherent potential of different genetic make ups to exploit environmental resources.

Stripped Cane Yield

Economically high cane yield is the ultimate goal of every grower which is the function of the well coordinated inter-play of genetic constitution and the environment to which it is exposed. Different yield attributes like number of millable canes, cane height, cane girth and thus per cane weight have direct bearing in the final stripped cane yield per unit area. The data embodied in the table -1 indicated that the tested strains differed substantially in final cane yield. The promising sugarcane variety S2003US.114 gave significantly highest ratoon cane yield of 108.05 t/ha. It was matchingly followed by S2003US.824 with a final tonnage of 101.30 per hectare. Afzal *et al*.1990, EL-Geddaway *et al*. 2002, Rafique *et al*. 2005, Bashir *et al*., 2007, Jamil *et al*., 2007 and Aslam *et al*, 2011 have also reported the varied tonnage of ratoon stripped canes for different genotypes.

Sugar Yield

The underlined goal of all efforts made by a Breeder or an Agronomist is the attainment of higher tonnage of crystal sugar which is actually produced in the field and collected in the factory. It is evident from the data given in table-1 that all the varieties / promising clones under study behaved differently from one another for the production of sugar yield. The highest sugar yield of 13.41 t/ha was produced by the promising clone S2003US.114, closely followed by S2003US.824. The least amount of white sugar (9.71 t/ha) was recorded for S2002US.628. This differential behavior of sugarcane varieties / strains to produce sugar yield may be attributed to the variability in their genetic constitution to exploit environment. Rafique *et al*. 2005, Bashir *et al*., 2007 and Aslam *et al*, 2011 have also received varied sugar yield for different genotypes.

Table-1 Ratoon performance of sugarcane varieties under Southern Punjab conditions

Sr. No.	Variety	Sprouts Plant^{-1}	100-cane Weight (Kg)	Cane density 000/ha	Cane yield (t/ha)	CCS %	Sugar yield (t/ha)
1	S2002US.312	1.46c	76.67b	105.46	79.44d	13.11	10.41
2	S2002US.447	1.72c	80.33b	101.11	81.20cd	12.21	9.91
3	S2002US.628	2.16b	82.00b	96.39	78.52d	12.37	9.71
4	S2003US.114	2.84a	97.33a	111.30	108.05a	12.41	13.41
5	S2003US.123	2.93a	89.67ab	99.91	89.26bc	12.65	11.29
6	S2003US.809	2.63a	81.33b	114.17	92.69b	12.44	11.53
7	S2003US.824	2.79a	99.00a	108.43	101.30a	12.37	12.53
8	HSF.240	2.65a	81.67b	115.09	93.43b	12.46	11.64
LSD 0.05		0.35	14.98	N.S	8.48	---	---

Values with different letter(s) differ significantly (P=0.05)

REFERENCES

1. Afzal, M., S. Bashir and R.M.A. Khan. 1990. Influence of harvesting dates on ratoon cane crop. Pak. Sugar J., 4(4):23-25.
2. Akhtar, M., M. Ashraf and M.E.Akhtar.2003.Sugarcane yield gap analysis: Future options for Pakistan. Sci. Tech. & Develop I: 38-48.
3. Aslam,M.,M.Tauseef,A.R.Zahid and M.J.Anwar.2011.Ratoon performance of sugarcane Varieties under southern Punjab conditions. Pak. Sugar J., 26(4):21-24.
4. Bashir, S., A .A. Chattha, M. Afzal, J. Iqbal and M.Z.Khan.2007.Studies on the ratooning ability of different sugarcane varieties of different harvesting dates. Proc. 42nd Ann. Con. Pak. Soci. Sug. Tech. 27-28 Aug. PP.170-182.
5. El-Geddawy, I. H., D. G. Darweish, A. A. El-Sherbiny, E. Eldin and A.El-Hady.2002. Effect of row spacing and number of buds/seed sett on growth characters of ratoon crops for some sugarcane varieties. Pak. Sugar J., 17(3):7-14.
6. Jamil, M., S. Afghan, M. A. Majid and A.Rasool.2007.Ratooning performance of sugarcane varieties. Pak. Sugar J., 22(3):38-47.
7. Khan, N., G. Rasool, M. A. Aunjam, K. Masood and A. Bakhsh.2007. Ratoonability of different sugarcane candidate varieties under agro-ecological conditions of D.I.Khan. Proc. 42nd Ann.Con.Pak.Soci.Sug.Tech.27-28 Aug.PP.103-9.
8. Malik,K.B. and M.A.Gurmani.2005.Cane production guide.My choice printing press, Hyderabad.PP.55.
9. Rafique,M.,A.A.Chattha,A.Jabbar,G.M.Wains,M.U.Chattha,M.Yasin and M.A.Munir. 2005. Proc. 40th Ann.Con.Pak.Soci.Sug.Tech.5-7 Sept..PP.195-202.
10. Steel,R.G.D.and J.H.Torrie.1984. Principles and procedures of Statistics. 2nd Ed.,Mc. Graw Hill Book Co., Inc., Tokyo,PP.107-09.