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Editorial Board M. Asghar Qureshi Chairman Dr. Shahid Afghan Editor-in-Chief Dr. Muhammad Zubair Member Dr. Javed Iqbal Member Dr. Shahid Mahboob Rana Member Dr. Aamir Ali Member MS. Asia Naheed Asst. Editor Published Under the patronage of Shakarganj Sugar Research Institute Subscription Dr. Shahid Afghan, Shakarganj Sugar Research Institute Toba Road, JHANG Ph: +92 47 7652801-5 Ext. 602, 603 Email: shahid.afghan@shakarganj.com.pk Subscription Rate Pakistan Rs.300/- OVERSEAS US\$25/- Recognized by Higher Education Commission Pakistan Cited by Asia Net Pakistan Factiva International ISSN 1028-1193	2 11 16 20	Response of new sugar cane genotypes in southern region of Khyber Pakhtunkhwa Khan Bahadar, Muhammad Rashid and Abdul Quddoos Comparative sugarcane clonal studies at advance nursery selection stage M. Zafar, Shafiq Ahmad, M. Azhar, M. Shahid Bashir, M. Walyat Ali Khan, Fayyaz Ahmad and Abdul Ghaffar Morphological & physiological study of exotic sugarcane clones at advance nursery stage M. Zafar, Shafiq Ahmad, M. Azhar Munir, Abdul Ghaffar, Shahid Bashir, M. Walyat Ali and M.Afzal Sugar Industry Abstracts Shahid Afghan & Pervez Akhtar

Panel of Referees	
Dr. P. Jackson	Principal Scientist, CSIRO, AUSTRALIA
Dr. Benjamin L. Legendre	Interim Director, Audubon Sugar Institute, USA
Dr. Yong-Bao Pan	Research Plant Molecular Geneticist, USDA-ARS, USA
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Dr. Sizuo Matsuoka	Director, Canavialis SA, BRAZIL
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RESPONSE OF NEW SUGAR CANE GENOTYPES IN SOUTHERN REGION OF KHYBER PAKHTUNKHWA

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ABSTRACT

The response of total seventy six new genotypes of sugar cane was studied in fifteen different trials at Agricultural Research Station Serai Naurang (Bannu) during 2006-07 and 2007-08. Variety NSG-555, S98CSSG-557 and Bannu-3 exhibited the highest significant and at par average cane yield of 121.10, 119.90 and 118.18 t ha⁻¹ respectively. Variety S98CSSG-676 responded with maximum sugar recovery of 12.53 % closely followed by MS91CP-623, Bannu-3-having showing 12.34 and 12.17 % of sugar recovery. Variety Bannu-3 showed the highest sugar yield (14.10 t ha⁻¹) followed by S98 CSSG-709 producing average 13.34 and 12.64 t ha⁻¹ of sugar yield.

Key words: Sugar cane varieties, yield, sugar potential.

INTRODUCTION

Sugar cane is now the major cash crop of southern areas of Khyber Pakhtunkhwa due to the existing Sugar Mills in the area. The area under sugar cane is gradually increasing but its local production is still poor and insufficient for smooth running of Sugar Mills. Hence sugar cane is imported from Punjab to the Sugar Mills. There are several limiting factors affecting the sugar cane production. However, major factor is the lack of improved technology.

Farmers usually adopt old, low sugar and susceptible varieties and the farming community maintains no pure/suitable varieties. Khyber Pakhtunkhwa shares 9.5 % area of Sugar cane and 9.7 % with respect to sugar production on National level. In D.I. Khan 65 % area has been occupied by inferior variety CO-1148 and the rest of the area by certain other improved varieties like CP77-400, CPF-240 CP43/33 etc. In Bannu variety Bannu-1 is supplied to growers with limited resources (Anonymous 2005). According to Majid, M.M and Afghan, S the per hectare cane yield is 45.5 t ha⁻¹ with sugar recovery of 8.00 % in Khyber Pakhtunkhwa. The southern parts of the province certainly need early change to replace the old varieties with new better quality and suitable genotypes. To overcome the situation research activities are continuously under process to evaluate new most suitable varieties of sugar cane for this region of the province.

MATERIALS AND METHODS

The performance of total seventy six promising genotypes of Sugar cane was studied in fifteen different trials at Agricultural Research Station Serai Naurang (Bannu) during 2006-07 and 2007-08. All the trials were conducted in RCB design with three replications in net plot size of 3.0 x 5.0 m with rows 75 cm apart. Recommended doses of NP @ 150-56 kg were applied to the trials at appropriate stages. Phosphatic fertilizers were applied at the time of seedbeds preparation. To control the common weeds, weedicide Gazapex Combi was applied @5.6 kg/ha during the month of February in the trials. Necessary insecticide (Carbofuran Granules) was applied @12 kg ha⁻¹ in two equal doses with 25-30 days interval in the month of May-June. Nitrogenous fertilizers were applied in two uniform doses in the above

Duration / interval. All the cultural practices were uniformly adopted in the trials at proper stages. Observations were thoroughly collected on all major parameters. Data on cane yield was analyzed statistically through computer package M-STATC.

RESULT AND DISCUSSION

Cane yield

It is evident from table-8 that variety NSG-555 responded with the highest significant cane yield of 121.1 t ha⁻¹ closely followed by varieties S99CSSG-557, Bannu-3 showing at par average cane yield of 119.90 and 118.18 t ha⁻¹ respectively (table-10 & 14). Similar results were reported by Rasool *et al.*, 2007 and found, SPF-213 with higher cane yield of 76.0 t ha⁻¹. Soomro *et al.*, 2007 also recorded HoTh-2109 with maximum cane yield of 148.33 t ha⁻¹. Anonymous 2007 found, LRK-2004 with the highest cane yield of 186.21 t ha⁻¹.

Sugar percentage

According to the data in table-3, variety S98CSSG-676 exhibited the maximum sugar recovery of 12.53 % closely followed by varieties MS91CP-623, Bannu-3 possessing the next higher recovery of 12.34 and 12.17 % respectively (table-1&8). Other scientists also quoted similar findings. According to Rasool *et al.*, 2007 variety Bannu-1 responded with higher sugar recovery of 11.47 %. Soomro *et al.*, 2007 found HoTh-2109 with highest CSS of 14.61 %. Similarly, MS91CP-623 was reported with average sugar recovery (11.41 %) by Anonymous 2006. Anonymous 2007 also found variety S98CSSG-567 with the highest CSS of 15.6 %.

Sugar yield

According to the data mentioned in table-10 variety Bannu-3 produced the maximum sugar yield of 14.10 t ha⁻¹ followed by varieties NSG-555, S98CSSG-709 showing average sugar yield of 13.34 and 12.64 t ha⁻¹ respectively (table-8). These findings are analogous with Anonymous 2006, who found, S98CSSG-557 with the highest sugar yield of 15.0 t ha⁻¹. Jamil. M and Majid. M.A, 2007 also recorded maximum sugar yield of 14.00 t ha⁻¹ for S95HS-185. Bahader *et al.*, 2005 concluded variety Bannu-3 with average sugar yield of 8.5 to 10.00 t ha⁻¹. Anonymous 2004 reported CP87-1628 with average sugar yield of 13.19 t ha⁻¹.

Table-1 Varietal trial-Early season (Plant Crop 2006-2007)

Sr. No.	Variety	Cane yield Mt ha ⁻¹	Recovery %	Sugar yield Mt ha ⁻¹
1	S-96-SP-1058	71.96	10.82	7.79
2	S-88-US-479	84.21	10.09	8.50
3	MS-91-CP-586	95.65	11.81	11.30
4	S-78-US-421	83.56	11.90	9.94
5	CP-89/846	77.76	11.66	9.07
6	Bannu-3	68.09	12.17	8.29
7	CP-88/1165	64.24	11.23	7.21
8	S-87-US-1819	72.93	11.60	8.46
9	S-96-SP-571	76.79	9.38	7.20
10	S-97-US-128	70.53	10.14	7.15
11	Naurang-98	66.11	9.25	6.11
12	CP-85/1491	70.65	10.68	7.55
13	MS-91-CP-90	65.70	11.10	7.29
14	S-87-US-1327	68.76	8.43	5.80
15	CPHS-35	97.57	9.18	8.96
16	CPF-236	58.12	9.58	5.57

Table-2 Varietal trial-Early season (2nd Ratoon crop 2006-2007)

Sr. No.	Variety	Cane yield Mt ha ⁻¹	Recovery %	Sugar yield Mt ha ⁻¹
1	S-96-SP-1058	57.37	8.05	5.42
2	S-88-US-479	79.33	9.69	7.68
3	MS-91-CP-586	97.64	10.19	9.95
4	S-78-US-421	78.23	10.81	8.45
5	CP-89/846	66.36	9.69	6.43
6	Bannu-3	84.25	11.20	9.44
7	CP-88/1165	69.54	10.55	7.33
8	S-87-US-1819	64.95	10.47	6.80
9	S-96-SP-571	77.70	9.38	7.29
10	S-97-US-128	83.22	8.51	7.08
11	Naurang-98	75.52	9.22	6.96
12	CP-85/1491	94.09	10.68	10.05
13	MS-91-CP-90	89.64	8.92	8.00
14	S-87-US-1327	104.40	9.34	9.75
15	CPHS-35	82.03	11.12	9.12
16	CPF-236	87.48	10.42	9.11

Table-3 Varietal trial- mid season (Ratoon crop 2006-07)

Sr. No.	Variety	Cane yield Mt ha ⁻¹	Recovery %	Sugar yield Mt ha ⁻¹
1	Bannu-1	73.26	10.67	7.82
2	Bannu Green	58.74	11.05	6.49
3	S-90-SP-889	65.73	9.09	5.97
4	MS-92-CP-727	73.72	11.10	8.18
5	NSG-555	84.22	10.70	9.01
6	S-96-SP-302	100.19	10.44	10.46
7	HSF-242	74.43	10.26	7.64
8	S-98-CSSG-676	76.12	12.53	9.54
9	S-94-HS-87	79.0	10.97	10.86
10	S-96-SP-28	83.07	9.98	8.29
11	S-92-SP-57	71.20	10.15	7.23
12	S-84-I-351	72.25	10.75	7.77
13	S-98-SP-341	64.10	9.19	5.89
14	SPHS-2	68.97	10.71	7.36
15	SPSG-394	82.00	10.17	8.34
16	S-86-US-1025	70.64	8.57	6.05

Table-4 Varietal trial mid season (Plant crop 2006-07)

Sr. No.	Variety	Cane yield Mt ha ⁻¹	Recovery %	Sugar yield Mt ha ⁻¹
1	Bannu-1	66.34	10.54	7.0
2	Bannu Green	66.65	10.92	7.28
3	S-90-SP-889	64.42	8.51	5.48
4	MS-92-CP-727	55.14	9.80	5.40
5	NSG-555	76.37	10.51	8.03
6	S-96-SP-302	96.62	9.35	9.03
7	HSF-242	60.33	9.74	5.88
8	S-98-CSSG-676	100.11	10.34	10.35
9	S-94-HS-87	60.48	10.14	6.13
10	S-96-SP-28	81.00	8.18	6.63
11	S-92-SP-57	75.35	9.16	6.90
12	S-84-I-351	69.52	9.70	6.74
13	S-98-SP-341	92.08	8.72	8.03
14	SPHS-2	73.63	7.75	5.71
15	SPSG-394	56.26	7.76	4.37
16	S-86-US-1025	65.70	10.37	6.81

Table-5 Varietal trial- late season (Plant crop 2006-07)

Sr. No.	Variety	Cane yield Mt ha ⁻¹	Recovery %	Sugar yield Mt ha ⁻¹
1	ROC-10	108.7	6.05	6.58
2	S-98-CSSG-557	90.74	10.46	9.49
3	MS-92-CP-716	90.13	7.48	6.74
4	MS-92-CP-717	88.49	8.86	7.84
5	SPF-238	94.12	8.47	7.97
6	CPF-237	95.45	9.27	8.85
7	TCP-3110	93.18	8.39	8.07
8	S-94-HS-229	83.68	9.68	8.07
9	COJ-84	94.00	9.86	9.27
10	S-98-CSSG-668	76.85	10.69	8.65
11	Thata-8	90.73	10.02	9.09
12	MT-70-611	64.11	10.82	6.94
13	HSF-240	70.08	10.15	7.11
14	NIA-98	79.87	8.63	6.89
15	CPF-240	77.31	10.60	8.19
16	HS-12	68.95	10.67	7.36

Table-6 Varietal trial promising (Plant crop 2006-07)

Sr. No.	Variety	Cane yield Mt ha ⁻¹	Recovery %	Sugar yield Mt ha ⁻¹
1	MS-93-CP-223	61.43	11.32	6.95
2	S-98-CSSG-1144	64.69	9.26	5.99
3	S-98-CSSG-1944	78.21	9.43	7.37
4	MS-91-CP-611	93.25	9.92	9.25
5	CPHS-35	73.69	9.52	7.02
6	MS-91-CP-814	99.27	10.12	10.05
7	S-98-SP-108	92.75	9.16	8.5
8	NSG-555	84.55	9.37	7.93
9	S-98-CSSG-668	99.76	10.04	10.2
10	S-98-CSSG-676	82.72	10.67	8.82
11	ROC-10	73.2	6.93	5.07
12	HSF-40	73.4	9.47	6.95
13	S-97-US-214	87.72	9.62	8.44
14	S-97-US-141	75.46	10.65	8.04
15	MS-94-CP-90	79.76	9.94	7.93

Table-7 Varietal trial promising (Plant crop 2006-07)

Sr. No.	Variety	Cane yield Mt ha ⁻¹	Recovery %	Sugar yield Mt ha ⁻¹
1	MS-91-CP-180	90.97	7.71	7.01
2	S-96-SP-1218	88.55	7.16	6.34
3	MS-91-CP-1135	75.47	9.26	7.0
4	S-96-SP-574	66.16	10.12	6.70
5	MS-91-CP-503	59.58	9.52	5.67
6	MS-91-CP-571	60.28	10.55	6.36
7	Thatta-34	78.2	10.6	8.29
8	Q-88	56.34	9.59	5.40
9	CP-85/1308	83.62	10.83	9.06
10	MS-91-CP-332	69.25	10.25	7.10
11	S-98-CSSG-676	112.62	9.40	10.59
12	SPF-234	94.22	10.81	10.19
13	MS-91-CP-814	108.78	9.85	10.71
14	MS-94-L-127	82.11	10.34	8.49
15	MS-92-CP-611	106.36	9.98	10.61
16	MS-94-CP-90	60.27	9.51	5.73

Table-8 Varietal trial promising (Ratoon crop 2006-07)

Sr. No.	Variety	Cane yield Mt ha ⁻¹	Recovery %	Sugar yield Mt ha ⁻¹
1	S-98-CSSG-1144	44.31	10.24	4.54
2	S-98-SP-108	97.82	8.01	7.84
3	HSF-240	81.93	10.19	8.35
4	S-97-US-214	45.98	10.48	4.82
5	S-98-CSSG-1944	60.48	8.35	5.05
6	CPHS-35	101.15	10.19	10.31
7	SPF-234	75.24	11.56	8.70
8	S-98-CSSG-709	110.35	11.45	12.64
9	S-98-CSSG-612	90.22	10.41	9.38
10	S-98-CSSG-2086	45.97	10.30	4.61
11	ROC-10	102.79	10.51	10.8
12	MS-91-CP-814	100.31	10.52	10.55
13	MS-94-L-127	98.66	11.49	11.34
14	MS-91-CP-623	78.58	12.34	9.70
15	MS-91-CP-611	103.69	10.54	10.93
16	MS-94-CP-90	90.29	10.99	9.92
17	MS-91-CP-288	74.33	11.75	8.73
18	MS-93-CP-223	78.57	10.96	8.61
19	S-97-US-141	76.74	10.09	7.74
20	S-98-CSSG-668	56.83	11.34	6.50
21	S-98-CSSG-676	83.86	12.01	10.7
22	NSG-555	121.10	11.05	13.34

Table-9 Varietal trial-Early season (2nd Ratoon crop 2007-08)

Sr. No.	Variety	Cane yield Mt ha ⁻¹	Recovery %	Sugar yield Mt ha ⁻¹
1	S-96-SP-1058	84.22	11.29	9.50
2	S-88-US-479	55.24	10.20	5.63
3	MS-91-CP-586	59.06	10.30	6.08
4	S-78-US-421	77.46	10.34	8.00
5	CP-89/846	101.85	10.88	11.08
6	Bannu-3	118.18	11.93	14.10
7	CP-88/1165	111.14	10.69	11.88
8	S-87-US-1819	69.75	10.96	7.64
9	S-96-SP-571	75.61	9.75	7.37
10	S-97-US-128	65.64	9.33	6.12
11	Naurang-98	109.31	10.30	11.26
12	CP-85/1491	67.80	10.31	7.00
13	MS-91-CP-90	86.45	9.27	8.01
14	S-87-US-1327	94.80	9.26	8.78
15	CPHS-35	103.42	9.13	9.44
16	CPF-236	59.77	10.53	6.29

Table-10 Varietal trial-mid season (Ratoon crop 2007-08)

Sr. No.	Variety	Cane yield Mt ha ⁻¹	Recovery %	Sugar yield Mt ha ⁻¹
1	Bannu-1	50.71	9.44	4.78
2	Bannu Green	71.70	10.24	5.29
3	S-90-SP-889	60.18	8.80	5.29
4	MS-92-CP-727	73.06	9.58	6.99
5	NSG-555	81.93	10.08	8.25
6	S-96-SP-302	57.57	10.04	5.78
7	HSF-242	75.12	9.93	7.45
8	S-98-CSSG-676	43.05	10.58	4.55
9	S-94-HS-87	58.95	10.43	6.14
10	S-96-SP-228	84.25	8.91	7.50
11	S-92-SP-57	63.33	9.57	6.06
12	S-84-I-351	50.75	9.98	5.06
13	S-98-SP-341	82.86	9.15	7.58
14	SPHS-2	67.57	9.55	6.45
15	SPSG-394	56.61	9.14	5.17
16	S-86-US-1025	57.90	9.26	5.36

Table-11 Varietal trial late season (plant crop 2007-08)

Sr. No.	Variety	Cane yield Mt ha ⁻¹	Recovery %	Sugar yield Mt ha ⁻¹
1	S-98-CSSG-557	76.39	10.73	8.20
2	MS-92-CP-717	70.78	9.76	6.51
3	MS-94-HS-229	76.85	9.37	7.20
4	COJ-84	83.82	8.99	7.53
5	S-98-CSSG-1144	47.17	9.57	4.32
6	NIA-98	55.41	7.54	4.18
7	S-98-CSSG-668	60.9	10.4	6.33
8	TCP-3110	68.61	9.21	6.32
9	S-97-US-214	48.43	9.82	4.77
10	ROC-10	64.05	7.65	4.90

Table-12 Varietal trial late season (Ratoon crop 2007-08)

Sr. No.	Variety	Cane yield Mt ha ⁻¹	Recovery %	Sugar yield Mt ha ⁻¹
1	ROC-10	74.69	6.54	4.88
2	S-98-CSSG-557	119.90	10.33	12.38
3	MS-92-CP-716	73.79	8.27	6.10
4	MS-92-CP-717	67.44	9.73	6.56
5	SPF-238	108.65	8.94	9.71
6	CPF-237	52.04	10.77	5.49
7	TCP-3110	52.95	9.65	5.10
8	S-94-HS-229	58.87	9.91	5.83
9	COJ-84	100.94	7.87	7.94
10	S-98-CSSG-668	64.73	9.70	6.28
11	Thata-8	103.66	6.95	7.20
12	MT-70611	66.09	9.49	6.27
13	HSF-240	76.50	9.56	7.31
14	NIA-98	55.47	8.93	4.95
15	CPF-240	60.52	9.28	5.61
16	HS-12	110.18	10.21	11.25

Table-13 Varietal trial promising (Ratoon crop 2007-08)

Sr. No.	Variety	Cane yield Mt ha ⁻¹	Recovery %	Sugar yield Mt ha ⁻¹
1	MS-93-CP-223	66.72	11.68	7.79
2	S-98-CSSG-1144	66.92	11.18	7.48
3	S-98-CSSG-1944	71.98	11.19	8.05
4	MS-91-CP-611	75.25	11.22	8.44
5	CPHS-35	45.98	11.68	5.37
6	MS-91-CP-814	83.02	11.04	9.10
7	S-98-SP-108	75.40	11.20	8.44
8	NSG-555	89.29	11.17	9.97
9	S-98-CSSG-668	102.33	10.87	11.12
10	S-98-CSSG-676	60.25	11.11	6.69
11	ROC-10	78.75	7.81	6.15
12	HSF-40	106.04	10.33	10.95
13	S-97-US-214	68.52	10.24	7.02
14	S-97-US-141	84.69	11.01	9.32
15	MS-94-CP-90	82.39	10.78	8.88

Table-14 Varietal trial promising (Plant crop 2007-08)

Sr. No.	Variety	Cane yield Mt ha ⁻¹	Recovery %	Sugar yield Mt ha ⁻¹
1	ROC-10	65.18	6.39	4.16
2	S-98-SP-108	47.96	8.98	4.31
3	NSG-555	22.82	10.49	6.59
4	CPHS-35	67.98	11.85	8.05
5	MS-94-CP-90	70.36	10.91	7.67
6	S-98-CSSG-676	64.26	11.05	7.10
7	Thatta-34	72.27	10.88	7.86
8	S-88-US-479	86.66	9.68	8.39
9	MS-91-CP-586	53.17	11.45	6.09
10	CP-85-1491	58.67	11.27	6.61

Table-15 Varietal trial promising (Ratoon crop 2007-08)

Sr. No.	Variety	Cane yield Mt ha ⁻¹	Recovery %	Sugar yield Mt ha ⁻¹
1	MS-91-CP-180	69.89	11.09	7.68
2	S-96-SP-1218	102.02	8.55	8.72
3	MS-91-CP-1135	80.28	7.02	5.63
4	S-96-SP-574	86.92	9.91	8.61
5	MS-91-CP-503	81.47	10.81	8.8
6	MS-91-CP-571	67.0	10.40	6.97
7	Thatta-34	101.0	10.44	10.54
8	Q-88	59.51	9.65	5.74
9	CP-85-1308	72.95	8.99	6.56
10	MS-91-CP-232	62.25	9.92	6.17
11	S-98-CSSG-676	69.28	11.62	8.05
12	SPF-234	56.58	10.9	6.16
13	MS-91-CP-814	79.2	10.47	8.27
14	MS-94-L-127	82.56	10.2	8.42
15	MS-92-CP-611	71.77	8.61	6.17
16	MS-94-CP-90	74.6	10.2	7.61

REFERENCES

1. Anonymous, 2004. Annual Progress Report of Sugar Crops Research Institute Mardan 2003-2004. 1-88.P.P.6
2. Anonymous, 2005. New Varieties of Sugar Cane for NWFP in Pakistan. Quarterly Publication of SAARC Agricultural Information Centre. SAIC News Letter 15(3) July-Sept: 2005. 1-11, P.P-10
3. Anonymous, 2006. Annual Progress Report of Agricultural Research Station Serai Naurang, Bannu. 2005-06. 1-39. PP.X1
4. Anonymous, 2007. Annual Technical Report of Pakistan Agricultural Research Council 2007. 1-78.P.P-72, 74
5. Jamil, M and M. A. Majid. 2007. Performance of Sugar cane varieties in National Uniform Varietal Yield Trial. Pak: Sugar Journal. 22(1):
6. Majid, M.A and S. Afghan. 2007. Overview of sugar crops situation in Pakistan. Pak: Sugar Journal. 22(4):
7. Rasool, G, Khan. N. Hashim; M. M and N. Khalid. 2007. Comparative study of some promising Sugar cane Genotypes at ARI DI Khan. Pak: Sugar Journal. 22(5):
8. Soomoro, A. F., D. B. Panhwar., G. M. Jenejo and M.A., Hassan 2007. Cane and quality potential of newly developed sugar cane genotypes under agro climatic condition of Thata Sindh. Pak: Sugar Journal. 22(5):