COMPARATIVE SUGARCANE CLONAL STUDIES AT ADVANCE NURSERY SELECTION STAGE

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ABSTRACT

Comparative performance of 251 clones against standard variety CP77-400 was conducted in a non-replicated trial, having net plot size measuring 2.4 x 5 m. Keeping in view the desirable characters, 133 clones were selected and promoted to preliminary varietal trial while 47% clones were rejected due to undesirable characters. In general 2.39%, 5.58%, 11.15%, 4.78%, 2.78%, 5.58%, 5.18%, 2.79% and 6.77% clones were rejected because of poor growth, pithiness, low brix, aerial roots, cracks, sprouts, disease susceptibility, insect pest infestation and lodging, respectively.

Key words: clone, standard variety, trial, nursery, desirable character, pithiness, brix.

INTRODUCTION

Sugarcane is an important cash crop of Pakistan (Ahmad *et al.,* 19991, Rehman *et aI*., 1992), which plays an important role in economic uplift of farmers. Moreover feeding of Ever expanding sugar industry totally depends upon cane cultivation. However, the National average yield is about 50 tones/ha, which is far below the existing potential (Ann. 2004). Adapting the improved package of production technology and growing high , yielding cane varieties can enhance the yield (Heinz 1987). Development of new sugar cane varieties is not feasible in Pakistan because of intricate flowering of the plant and Non-availability of sugar cane breeding facility and acclimatization (Javed *et al*., 2001).

The introduction in general form is the base line for the cane agronomist in Pakistan to develop new varieties. The variety improvement in sugar cane is equally important for the breeders and growers point of view, Potential of new genotypes is be tested in local environment of over various locations for different years before deciding the release as a new cultivars in particular region (Basfor and Cooper 1998, Pollock 1975, Ruschell 1977. Taj *et al.,* 1982, Kang and millers 1984, Milligan *et al.,* 1990, Khan 1981 and Khan *et al.,* 2000). The clonal selection at the pre-commercial stages help in identification of improved Genotypes for commercial production of sugar cane (Claz *et al.,* 2000) All the stages in Varietal selection programme are important but establishment of good nursery is of prime importance because evolution of a durable and dependable variety can be expected if it expands from a good nursery. Study was conducted under the agro climatic condition of Faisalabad.

MATERIALS AND METHODS

In advance nursery selection, 251 clones having 81 parent crosses of USA origin received from Nursery-I were tested in a non replicated double row trial having the net plot size 5X 2.4 m during 2004. These clones were compared with standard variety CP77-400 keeping in view the desirable character such as growth vigour, frost resistance, erectness, pithiness, resistance to lodging, hairiness, cracks, aerial roots, tillering, sprouts. Disease susceptibility, insect pest infestation damage by sunburn and brix %. The brix reading was recorded by hand refractometer.

After comparing the quantitative and qualitative characters of all clones with standard Variety, 133 clones were promoted to preliminary varietal trial, while 118 clones (47%) were rejected due to undesirable characters. The committee of experts made the selection in the field.

RESULTS AND DISCUSSION

The results of the performance of clones under evaluation of varietals selection performance are given in table-2 and 1 significant clones (133) were selected as given in the table-1 and clones which fell under the categories of unrequited characters of sugarcane plant are given in the table-2. In table-1 (20) parent gave highest selection %age of 100 followed by parent CP84-98 X CP84-1274 and parent CP78-2114 X CP92-P3.

These exhibit 85.71% and 83.33% selection for promotion to advance nursery. So the selection remained 53% that is 133 clones and rejection was 47% that is 118 clones.

Parameters studied in experiment are discussed as under.

1. Growth performance: In good agronomic practices the growth performance is a character that affect the yield of cane crop. Growth habits, erectness, internodal length, girth of cane, length of cane and stooling depends upon genetic make up which may be detected by the over all performance of clone. So 6 clones (2.39%) were rejected on the basis of poor growth.

2. Pithiness: Hollow stem of cane is negative character, leads to lodging and disease infestation and lowers the cane quality. In the trial 14 clones (5.58%) were rejected due to pithiness.

3. Brix %age: It is the percentage by weight of sucrose in pure sugar solution (Meade 1964). It was recorded by hand refractometer. Higher brix %age will result in higher sugar recovery and vice versa. In this context 28 clones (11.15%) were rejected due to low brix %age.

4. Aerial roots: These are secondary roots which spoil the quality of the cane as well as lowers the growth speed and deteriorate the crop stand 12 clones (4.78%) were found carrier of bad character so were rejected.

5. Cracks: These are the cracks on stem of the cane plant. These deteriorate the cane quality as well as tissues due to enhancement of the transpiration rate (Dillewijn 1952) and make s susceptible plant to the disease attack 7 clones (2.79%) showed this undesirable character and were rejected.

6. Sprouts: These are the buds sprouting which adversely affect the quality of the cane and germination of the new crop is lowered if sets are affected by sprouting. These characters appeared in 14 clones (5.58%) and theses were rejected in this trial.

7. Disease infestation: Only 13 clones (5.18%) were rejected due to severe attack of different diseases in this trial.

8. Insect/ Pest: Insect pest attack was observed on 7 clones (2.788%) and these were rejected.

9. Lodging: Lodging exerts harmful effects on sugar yield (Borden 1942). Spoils the cane quality, brix% age and growth of the sugar cane crop. So 17 clones 6.773% showed lower resistance for lodging and hence were rejected.

Table- 1 Character wise rejection of clones of sugarcane

Sr. No.	Character/Factor	N0.of Clones/ S2001-US…	Total	Rejection %
1.	Poor Growth	215, 253, 324, 510, 583, 664	6	2.39
2.	Pittiness	52, 141, 143, 203, 207, 231, 291, 273, 264, 461, 493, 588, 627, 732	14	5.577
3.	Low Brix %age	10, 16, 34, 85, 112, 173, 152, 197, 202, 213, 227, 245, 260, 270, 323, 345, 364, 369, 404, 421, 445, 464, 504, 531, 536, 574, 610, 744	28	11.155
4.	Aerial Routs	40, 84, 363, 370, 389, 448, 547, 549, 556, 571,573, 579	12	4.78
5.	Cracks	35, 156, 259, 267, 564, 717, 721	7	2.788
6.	Sprouts	91, 99, 328, 252, 256, 342, 426, 442, 490, 577, 582, 469, 740, 766	14	5.577
7.	Disease susceptibility	121, 148, 171, 262, 284, 422, 431, 480, 566, 567, 570, 601, 771,	13	5.179
8.	Insect Pest infestation	17, 206, 416, 467, 562, 650, 710	7	2.788
9.	Lodging	68, 106, 164, 178, 198, 210, 211, 230, 236, 276, 296, 458, 471, 483, 551, 568, 588	17	6.773
	Total		118	47%

Table-2 Study on the quantitative and qualitative characters of nursery II

Sr. No.	Total clones	Parentage	Clone Promoted	Clone S-2002-US……	Clone rejected	Brix Range	Selection (% age)
1	1	CP87-1018 X CP85-1491	0	-	1	20	0
2	2	CP89-1289XCP85-1432	0	-	2	18-18.5	0
3	4	CP85-1207XCP86-454	1	36	3	14.5-18.5	25
4	1	CP87-1018 X CP851491	1	44	0	20	100
5	1	CP89-1289 X CP85-1432	0	-	1	16	0
6	2	CP85-1207 X CP86-454	1	55	1	17-20.5	50
7	14	CP78-1628 X CP87-1733	8	87, 89, 90, 92, 102, 105, 109, 114	6	15-20	57
8	11	CP88-1561 X CP85-1491	7	116, 118, 120, 120, 133, 134, 140, 145	4	13-21	63.63
9	3	CP88-2043 X CP85-1491	1	155	2	18-20	33.33
10	1	CP87-1226 X CP85-1432	1	162	0	18	100
11	2	CP87-1628 X CP72-1210	1	168	1	14.5-16	50
12	2	CP88-1836 X CP84-1714	0	-	2	13-17	0
13	2	CP84-1322 X CP84-1491	1	177	1	18-20	50
14	1	CP86-1427 X CP84-1827	1	184	0	18	100
15	13	CP84-1185 SP79-5362	3	204, 212, 217	10	13-20.5	23.07
16	10	CP88-2030 X CP86-1663	5	224, 225, 226, 234, 237	5	13-20	50
17	1	CP84-1185 X CP78-1628	0	-	1	17	0
18	5	CP81-1238 X CP86-1747	2	249, 254	3	9-19	40
19	2	CP85-1491 X CP72-1210	0	-	2	18-19	0
20	2	CP97-1773 X CP86-1664	0	-	2	16-22	0
21	1	92-MISC	0	-	1	20	0
22	15	CL75-0853 X CP86-1180	7	271, 287, 298, 299, 301, 312, 317	8	13-23	46.66
23	2	CL75-0853 X CP86-1180	2	327, 334	0	20-21	100
24	4	CP89-879 X CP70-956	2	341, 343	2	18-21	50
25	1	HOCP44-828 X HOCP92-631	1	358	0	22	100
26	1	HO94-856 X HOCP92-631	1	359	0	20.5	100
27	2	US96-6 X HOCP93-775	0	-	2	16-18	0
28	1	HOCP93-750 X CP97-614	1	368	0	22	100
29	3	HOCP93-746 X 97-P12	1	371	2	17-17	33.3
30	1	CP90-997 X CP90-956	1	373	0	18.5	100

Sr. No.	Total clones	Parentage	Clone Promoted	Clone S-2002-US……	Clone rejected	Brix Range	Selection (% age)
31	2	CP89-831 X CP70-1133	1	388	1	14.5-19	50
32	2	HOCP85-345 X LCP85-384	1	400	1	19	50
33	1	HOCP93-746 X L94-378	1	409	0	16	100
34	1	HOCP94-856 X CP89-837	0	-	1	16.5	0
35	3	HO94-808 X US96-6	1	424	2	17-17.5	33.33
36	2	LCP85-384 X 97-P18	0	-	2	16-17	0
37	1	HOCP93-750 X HOCP92-631	0	-	1	15	0
38	1	HOCP94-836 X HOCP93-750	0	-	1	15	0
39	5	CP 90-956 X CP90-9	4	447, 451, 452, 454	1	15-20	80
40	2	HOCP90-941 X HOCP94-856	1	457	1	16-17.5	50
41	2	US96-1 XLCP86-454	1	460	1	16-17.5	50
42	3	CP89-884XLCP86-454	2	463, 466	1	16.5-18	66.66
43	1	CP89-837 X CP76-331	0	-	1	16.5	0
44	2	HOCP93-746 X US95-1014	1	468	1	14-16	50.00
45	9	CP81-1238 X CP86-1747	6	476, 477, 484, 487, 489, 491	3	14-20	66.66
46	1	US90-1081 X CP85-1491	0	-	1	17.5	0
47	3	N-52-216	3	497, 498, 499	0	16-16.5	100
48	6	CP81-1384 X CP 72-1210	4	502, 506, 511, 512	2	14-18.5	66.66
49	4	CP78-2114 X CP-1210	4	514, 516, 521, 522	0	14-19	100
50	7	CP87-1628 X US90-1090	5	526, 527, 528, 532, 535	2	15-21	17.42
51	6	CP80-1557 X CP 83-0632	4	537, 538, 539, 541	2	13.5-19	66.667
52	2	US90-1070 X CP87-1628	1	554	1	17-18.5	50
53	2	CP83-1432 X CP87-1628	2	558, 559	0	18-19	100
54	1	CP85-1332 X NG 57-134	1	561	0	18	100
55	9	CP78-2114 X CP78-1628	2	563, 569	7	15-19	22.22
56	4	CP81-1238 X CP85	0	-	4	16-19	0
57	2	CP88-1836 X 85-1491	0	-	2	15-18	0
58	1	US90-1084 X CP85-1491	1	585	0	13	100
59	2	US90-1070 X CP87-1628	1	587	1	14.5-17	50
60	1	CL61-620 X CP85-1491	1	591	0	17	100
61	1	CP84-1198 X CP82	0	-	1	12	0
62	7	CP84-98 X CP84-1274	6	607, 609, 614, 619, 623, 624	1	16-20	85.71
63	2	US90-1090 X CP72-1210	1	628	1	16-117	50
64	1	CP88-1561 X CP83-0632	1	632	0	15.5-20	100
65	2	IJ76-2316 X CP80-1827	2	635,636	0	17-20	100
66	1	CP87- X CP86-1633	1	642	0	18	100
67	1	CP88-1196 X CP72-1210	1	645	0	17	100
68	5	CP87-1334 X CP72-2086	3	651,653,656	2	13-18	60
69	6	CP78-2114 X CP92-P3	5	660,661,662,666,667	1	15—18	83033
70	1	US 90-1 X CP89837	0	-	1	18	0
71	1	HOCP93-750 X COP86-454	1	696	0	19.5	100
72	1	HOCP90-941 COCP93-750	0	-	1	16	0
73	1	HOCP90-941 X CP89-837	0	-	1	13	0
74	2	HOCP94-839 X CP99-378	1	723	1	14-18	50
75	3	HO94-808 X HO94-851	2	734,736	1	14-15	66.66
76	1	CP86-1427 X CP78-1628	0	-	1	13	0
77	1	CP81-1302 X CP85-1308	0	-	1	16	0
78	1	CP88-1573 X CP86-1633	1	747	0	13-17	100
79	4	S-277 MURREE	3	750,754,755	1	15-17	25
80	4	COK-31 MURREE	4	759,760,762,763	0	15-17	100
81	6	N-53-216 MURREE	4	765,767,768,769	2	13-18	66.66
Total	251		133		118		
100%			53%		47%		

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