

SCREENING OF SUGARCANE GENETIC MATERIAL AT PRIMARY NURSERY STAGE FOR SUGARCANE AGRONOMY

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ABSTRACT

To evaluate 175 clones against standard variety CP-77-400 a non replicated single row trial was laid out having net plot size measuring 5X2.4m. Keeping in view the desirable characters, 64 clones having desirable brix % growth and other quantitative characters were selected and promoted to Advance Nursery trial while 111 clones were rejected due to undesirable characters. However 10.2% ,8.57% ,9.71%, 6.28%, 2.85%, 3.42%, 6.28, 4.57%, 2.85% ,4.00% and 4.57 clones were rejected, due to poor growth, pithiness, low brix %age, aerial roots, cracks, sprouts, disease susceptibility, insect/pest infestation, hairiness lodging and short inter-nodal length respectively.

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

INTRODUCTION

Sugarcane is an important cash crop of Pakistan (Ahmad *et al.*, 1991, Rehman *et al.*, 19992), 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 cane yield is 53.2 tones/ha which is far below the potential of existing cane varieties (Ann.2007).

The yield can be enhanced by adopting the improved package of technology and by growing high yielding varieties (Heinz, 1987). However development of new sugarcane varieties is not feasible in Pakistan because of intricate flowering of the plant and non availability of sugarcane breeding facilities and acclimatization (Javed *et al.*, 2001).

Thus selection in general, forms the base line for the cane agronomist in Pakistan to develop new varieties. The variety improvement in sugarcane is equally important from the breeders and growers point of view. Potential of new genotypes needs to be tested in local environment over various locations for different years before deciding to release as new cultivar in a particular region (Basfor and Cooper 1998, Pollock 1975, Ruschell-1977, Tai *et al.*, 1982, Kanf and millers 1984, Milligan *et al.*, 1990, Khan, 1981 and Khan *et al.*, 2000).

The clonal selection at the pre commercial stages helps in identification of improved genotypes for commercial production of sugarcane (Claz *et al.*, 2000). All the stages in varietal selection programme are important but establishment of a good Nursery is of prime importance, because evolution of durable and dependable variety can be expected if it expands from a good nursery. Keeping in view the importance of the nursery, the present study was conducted under the agro-climatic conditions of Faisalabad.

MATERIALS AND METHODS

In primary nursery phase-II 175 clones having 7 parent crosses of exotic origin received from seedling stage were tested in a non-replicated single row trial (Augmented design) having net plot size 5X2.4m. These clones were compared with standard variety CP-77-400. Keeping in view the desirable characters such as growth vigour, frost resistance, erectness, resistance to lodging, hairiness cracks, aerial roots, tillering, sprouts, disease susceptibility, insect pest infestation, damage by sun burn and brix% age etc.

The brix reading was recorded by hand refractometer. After comparing the quantitative and qualitative character of all clones with standard variety CP-77-400, 46 clones (34.85%) were promoted to Advance Nursery trials while 111 clones (61.81%) were rejected due to undesirable characters. The selection was made by the committee of experts in the field.

RESULTS AND DISCUSSION

The performance of clones under evaluation for varietal selection programme is given in table I and II. The Significant 61 clones were selected as given in table I and clones which fell under the categories of un-required characters of the sugarcane plant are given in table No. II. One parent cross gave 55.55% selection. One parent cross showed 50% selection and two parent crosses exhibited 48% selection for promotion to Advance Nursery trial. So the selection remained 34.85% that is 64 clones and rejection was 63.42% that is 111 clones. Characters studied in the experiment are discussed as under.

1. Growth performance

In good agronomic practices the growth performance is a character that affects the yield of the cane crop. Growth habits, erectness, internodal length, girth of cane and stooling depends upon genetic make up which may be detected by overall performance of the cane. Keeping in view the growth performance 18 clones 10.28% were rejected on the basis of poor growth.

2. Pithiness

Hallow stem of cane plant is negative character which leads to lodging and disease susceptibility and lowers the cane quality. In this trial 15 clones (8.57%) were rejected due to pithiness.

3. Brix %

It is the percentage by weight of sucrose in pure sugar solution (Meade 1964). It was recorded by Hand Refractometer. Higher Brix% results in higher sugar recovery and vice versa. In this context 17 clones 9.71% were rejected due to lower Brix%.

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 11 clones (6.28%) were found carrier of this bad character so were rejected.

5. Cracks

The cracks on stem of the cane plants deteriorate the cane quality as well as tissues due to enhancement of transpiration rate (Dillefwijn 1952) and make plants susceptible to the diseases. 5 clones (2.85%) showed this weak character and were rejected.

6. Sprouts

Due to bud sprouting, which adversely affects the quality of the cane and germination of the new crop is lowered, This character appeared in 6 clones (3.42%) and these were rejected in this trial.

7. Disease infestation

Only 11 clones (6.28%) were rejected due to the infestation by different diseases in this trial. So were rejected.

8. Insect/Pest

Severe insect pest attack was observed on 5 clones (4.57%) and these were rejected.

9. Hairiness

It is an undesired character which makes intercultural practices difficult as well as the harvesting of the crop and 5 clones (2.85%) were rejected due to Hairiness.

10. Lodging

It is a bad character and exerts harmful effect on sugarcane yield (Borden-1942), spoils the cane quality, brix %age and growth of sugarcane crops, In this context 7 clones (4.11%) were rejected.

11. Inter-nodal length problem

Length of internodes and fiber% as well as reduces sugar recovery 8 Clones 4.57% were rejected due to short inter-nodes.

Table-1 Parentage wise selection

Sr. No.	Name	Total Clone	Selected	Rejected	Brix Range	Selection %
1.	M2078/90 x M1246/84	50	24	26	5.5-17	48
2.	M695/69 x M1921/87	66	15	51	6-21	22.72
3.	MQ 83-204 x 86-A 3626	2	0	2	14-15	0
4.	H 60-3802 x 795 X2954	13	3	10	10-17	23.07
5.	M 2597/79 Poly Cross	9	5	4	12-17.5	55.55
6.	M 1246/84 x M 1176/77	2	1	1	11-14	50
7	CP70-1133 x M1551/80	33	16	17	9-20	48.48
	Total	175	64	111	-	-

Table-2 Character – wise rejection

Sr. No.	Factor	No. of clones S-2008 Misc. SP-----	Total Clones	Rejection %
1	Growth	190,193,194,197,234,247,261,269,287,290,308, 324,327, 334,336,343,353,358	18	10.28
2	Pithiness	196,203,204,213,235,256,251,252,257,259,283,296, 359,274,317	15	8.57
3	Brix	209,236,237,254,262,273,276,282,284,285,313,314, 323,338,356,357	17	9.71
4	Aerial Roots	205,241,250,271,291,300,301,302,307,332,348	11	6.28
5	Cracks	199,238,279,288,331	5	2.85
6	Sprouts	188,248,281,286,299,303	6	3.42
7	Disease Infestation	192,232,243,253,260,289,292,306,346,354	11	6.28
8	Insect/Pest susceptibility	191,206,224,294,304,310,349	8	4.57
9	Hairiness	244,258,268,305,326	5	2.85
10	Lodging	230,187,255,280,312,325,329	7	4.00
11	Nodal Length	189,228,240,256,293,309,342	8	4.57

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