

# ADAPTABILITY STUDY OF EXOTIC SUGARCANE CLONES UNDER FAISALABAD AGRO-CLIMATIC CONDITIONS

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## ABSTRACT

To evaluate 186 clones at primary Nursery stage (Phase-I) 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, 45 clones having desirable brix % growth and other quantitative characters were selected and were promoted to Advance Nursery trial while 141 clones were rejected due to undesirable characters. However, 1021%, 11.29%, 9.67%, 6.45%, 5.37%, 5.91%, 9.13%, 4.83%, 3.76%, 5.37% and 4.30% clones were rejected, due to poor growth, pithiness, low brix %age, aerial roots, cracks sprouts disease susceptibility, insect/pest infestation, hairiness lodging and short 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 notional 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-I) 186 clones having 10 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, during 2008. 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, 45 clones (23.65%) were promoted to Advance Nursery trials while 141 clones (76.34%) 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. Significant 44 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 crosses gave 75% selection and remained at top of the selection. One parent cross showed 55.55% selection for promotion to Advance Nursery trial. So the selection remained 23.65% that is 45 clones and rejection was 76.34% that is 141 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 17 clones 10.21% were rejected on the basis of poor growth.

### 2. Pithiness

Hollow stem of cane plant due to dead tissues is a negative character which leads to lodging and disease infestation and lowers the cane quality. In this trial 21 clones (11.29%) 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 these context 18 clones 9.67% 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, 12 clones (6.45%) 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. 10 clones (5.37%) showed this weak character and were rejected.

**6. Sprouts**

Due to bud sprouting, which adversely affect the quality of the cane and germination of the new crop is lowered, this character appeared in 11 clones (5.91%) and these were rejected in this trial.

**7. DISEASE INFESTATION**

Only 17 clones (9.13%) were rejected due to the infestation by different diseases in this trial. So these 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 7 clones (3.76%) 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 contexts 10 clones (5.37%) were rejected.

**11. NODAL PROBLEM**

8 Clones 4.30% were rejected due to shorter internodes.

**Table-I Parentage – wise selection**

S. No	Parentage	Total clone	Clone Selected	Clones Rejected	Brix Age %	Selected %
1.	S95-NSG-45	69	18	51	4-18.5	26.08
2.	HSF-240	9	5	4	14-19	55.55
3.	S96-SP228	2	0	2	13-17	0
4.	BF-129	17	8	9	9-16	47.05
5.	ROC-1X795-2954	27	10	17	11-20	37.03
6.	Q179XVMC71-39	11	1	10	9.5-16	9.09
7.	KQ91-2616XMQ79-41030	3	0	3	9-14.5	0
8.	86A-3526X79S-2954	4	0	4	11-14.6	0
9.	79N465XKQ 87-8075	3	0	3	12-16.8	0
10.	KQ97-6460XN-14	4	3	38	5.2-14.5	75
	<b>Total</b>	186	45	141		

**Table-II Character wise rejection**

Sr. No.	Factor	No .of clones S2008SP	Total clones	Rejection %
1.	Growth	45, 46, 50, 81, 92, 94, 103, 108, 110, 112, 129, 136, 142, 146, 149, 152, 157, 166, 183	19	10.21
2.	Pithiness	10, 19, 26, 44, 47, 53, 61, 66, 89, 100, 128, 130, 135, 137, 147, 148, 153, 165, 169, 174, 181	21	11.29
3.	Brix	11, 17, 48, 49, 60, 93, 105, 122, 145, 150, 154, 160, 167, 170, 167, 173, 175, 178	18	9.67
4.	Aerial roots	8, 13, 64, 71, 123, 164, 132, 139, 155, 168, 172, 185	12	6.45
5.	Cracks	21,25,37,38,41,54,85,140,151,163	10	5.37
6.	Sprouts	6,7,9,14,22,39,72,106,121,156,182	11	5.91
7.	Disease infestation	4, 5, 16, 23, 28, 34, 43, 55, 59, 77, 91, 120, 131, 159, 162, 171, 186	17	9.13
8.	Insect/pest susceptibility	12, 33, 36, 40, 52, 78, 113, 119, 141	9	4.83
9.	Hairiness	35,57,63,125,138,144,126	7	3.76
10.	Lodging	18, 20, 42, 79, 88, 101, 107, 134, 143, 179	10	5.37
11.	Nodal Length	80, 82, 104, 109, 127, 133, 158, 177	8	4.30

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