

Maturity Status of New Promising Sugarcane Genotypes and Evaluation for Gur Quality

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Received on 18.8.2003

ABSTRACT

Sugarcane varietal identification programme through zonal yield trials was being carried out at BSRI farm to identify early maturing clones and suitable for gur manufacture. Six elite clones developed at BSRI along with one standard Isd 28 were tested during 2001-2002 and 2002-2003 to study their performance based on two plant crops data. Only one clone I 8-95 was found superior over all other clones on the basis of recoverable sucrose and reducing sugars content at an early stage of maturity. The study revealed that I 8-95 has given higher recovery and lower reducing sugars content than other clones in early part of crushing season from September to October. Jaggery (gur) made from the same clones were evaluated on the basis of physio-chemical properties and visual observations. The clone I 22-95 has shown excellent quality with attractive golden yellow colour, highly crystalline and sweeter in taste closely followed by I 8-95. Jaggery (gur) made from I 22-95 had good quality and rest of the clones were of medium quality.

Key words : Gur manufacture, sucrose, reducing sugars, maturity, jaggery, crystalline.

INTRODUCTION

Recovery of sugar is dependent on several factors viz. variety, climate, physiological maturity and mill efficiency. Among the factors, variety occupies the prime place in influencing sugar yield (Singh and Singh, 2000). In sugarcane, normally an inverse relationship exists between cane yield and sucrose content, high tonnage varieties having lower sugar potential and vice versa. Generally, high yielding varieties play an important role in increasing the productivity of sugarcane (Singh *et al.*, 2001). But still there is a need of more number of early maturing high sugared clones having high tonnage, good ratooning ability and disease resistance to meet the challenges for improving sugar recovery especially during the beginning of crushing season. Sugar recoveries are usually low at the start of the season because of immaturity of cane, as part of the cane is still at vegetative phase and again at the end of the season with onset of summer, because of over-maturities and the consequent inversion of sugar. Quality of cane mainly depends upon the variety from which it is developed. There are wide variations in quality of jaggery prepared from different varieties including chemical composition, colour and deterioration during storage (Patil *et al.*, 1994). The present investigation was undertaken with an objective to screen some new promising of suitable early varieties with high sucrose with noticeable cane yield at early part of crushing and suitable for good quality gur production.

MATERIALS AND METHODS

Five promising clones viz. I 8-95, I 22-94, I 12-95, I 22-95, I 122-95 and a variety Isd 28 (standard) were evaluated for their performance in two successive plant crops (2001-2002, 2002-2003) under ZYT test stages. Two eye-budded setts of each clone and the variety Isd 28 were planted in plots of 10m x 10m size in replications. The cultural operations were applied as per recommendations for plant. The same was maintained for all plots to assess their suitability for gur and as an early maturing potential. The variables examined were Brix, Pol, purity, recoverable sucrose, reducing sugars content, fibre % cane and physio-chemical properties of prepared gur. For analyzing pol and fibre percent cane, one clump from each plot was harvested randomly at monthly intervals from 15 September, 2001 to 15th march, 2003. The juice analysis was carried out at the respective lab by using Chen (1985) procedures and jaggery prepared from juice was analysed for sucrose, colour (transmittance) by following method of Roy (1954) and visually observed. Data on Brix, pol, purity, recoverable sucrose, reducing sugars content, fibre % from individual clone and sucrose, colour (transmittance), visual observations of prepared gur from the same were recorded. Most of these data were graphically presented for discussion. However, visually observing the data on recoverable sucrose, the clones and the variety were divided into two groups viz. Isd 28, I 8-95, I 12-95 and I 22-94, I 22-95, I 112-95 and then recoverable sucrose of the two groups were graphically presented in two separate quadrants to make it clearly understand their trend.

RESULTS AND DISCUSSION

The genotypes tested were found different in recoverable sucrose, reducing sugars and in fibre content. The early maturing potential varieties were identified on the basis of initial higher recovery and lower reducing sugars content. The trend of change in sucrose content of two clones I 8-95 and I 12-95 along with the standard was found quadratic in nature and creating peaks on January and February (Fig. 1a). But the rest on the average showed linearly increasing trend. The change was though increasing, but not appreciable after first fortnight of February. However, after February, although the clones I 22-94 and I 122-95 were decreasing and I 22-95 was increasing, but it were negligible (Fig. 1b). Similar trend of results were reported by Kakde (1971).

In case reducing sugars content of all the clones and the variety, similar but opposite trend was observed. Only the clone I 12-95 slowly decreasing from the beginning, created a trough on mid February and I 22-95 was sharply decreasing from October through March. However, the rest clones showed though decreasing trend from the beginning but quite slow and remained constant after January (Fig. 2).

From the stated two figures it was observed that the clone I 8-95 showed the highest recovery and lowest reducing sugars content among the tested clones in the initial stage. Due to this quality, the clone I 8-95 being an early maturing cultivar, initially recording 7.87% recoverable sucrose in September showed the highest recoverable sucrose (11.39%) in January. However, the clone I 22-95 showing continuously increasing sucrose content and decreasing reducing sugars content from October through March was considered late maturing and the clones viz. I 22-94, I 12-95 and I 122-95 were considered mid maturing.

Since juiciness of a variety depends on its fibre content, higher fibre content leads

to higher baggasse production and pol losses in baggasse (Islam, 1984). Among the tested clones, minimum fibre content was observed in I 22-95 (15.40%) followed by I 12-95 (16.73%) and I 8-95 (17.58%). The clone I 22-94 showing maximum fibre content (18.69%) followed by I 122-95 (18.64%) exceeded the standard variety Isd 28 (Fig. 3).

The highest gur recovery was recorded from the clones I 22-94 and I 8-95 (10.5%) with lowest reducing sugars content (7.06% and 6.13%) and moisture content (6.77% and 7.33%) followed by I 22-95 (10.4%) (Fig. 4a). I 8-95 had the highest sucrose (77.59) closely followed by I 22-94 (76.82%).

The highest colour transmittance value was obtained from the clone I 22-95 (76%) followed by I 112-95 (75%) and I 8-95 (72%) (Fig. 4b). On the basis of visual observations and chemical analyses, the jaggery of I 122-95 was rated excellent in quality, while that of I 8-95, I 22-94 as very good, I 22-95 good and I 12-95 poor respectively.

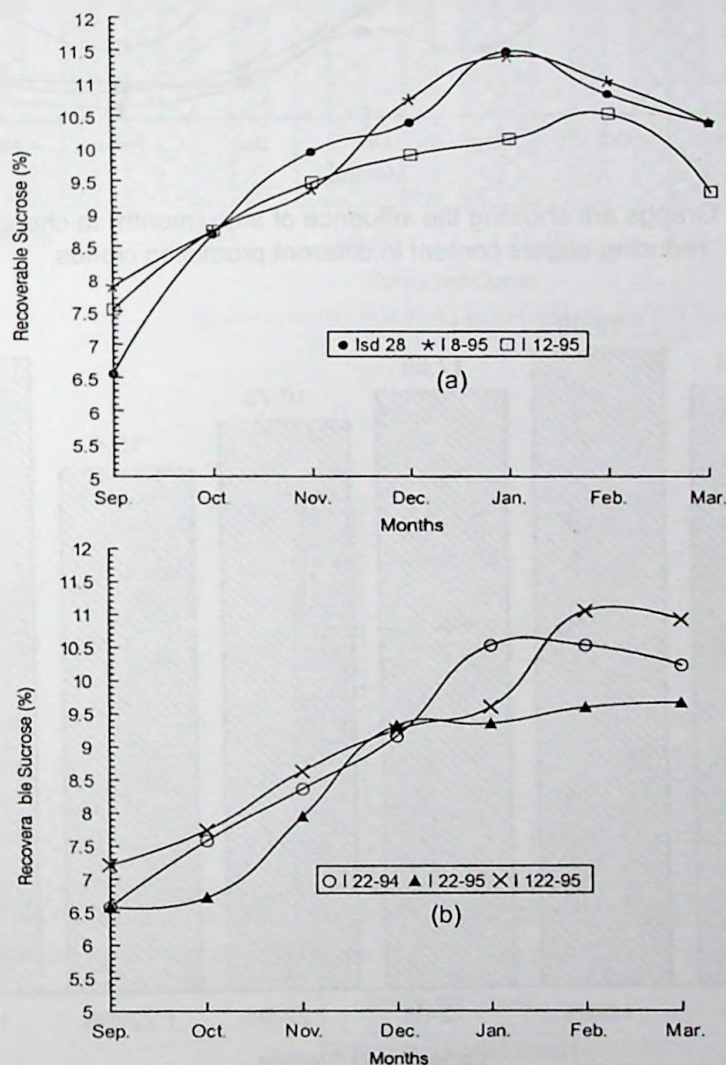


Figure 1. Graphs on recoverable sucrose by time (month) are showing maturity stages of different promising clones.

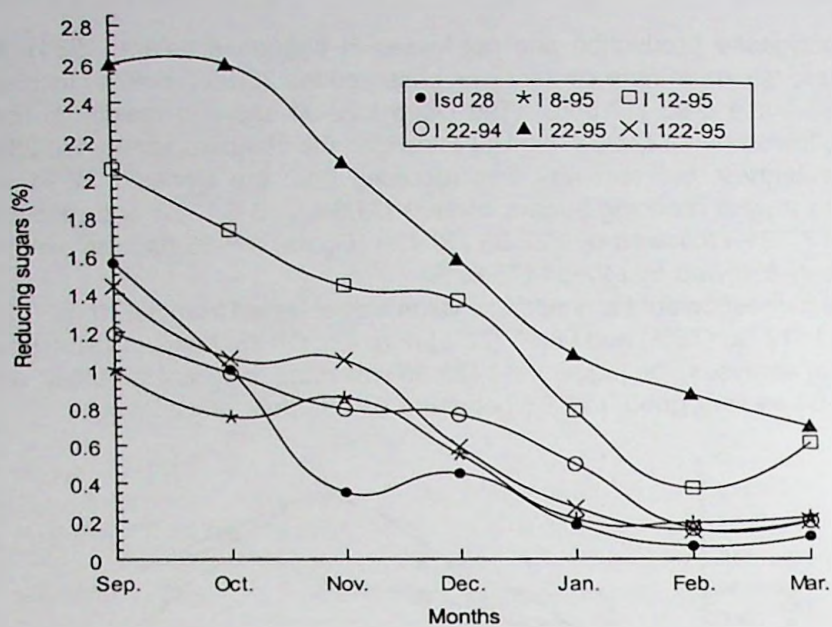


Figure 2. Graphs are showing the influence of time (month) to change reducing sugars content in different promising clones.

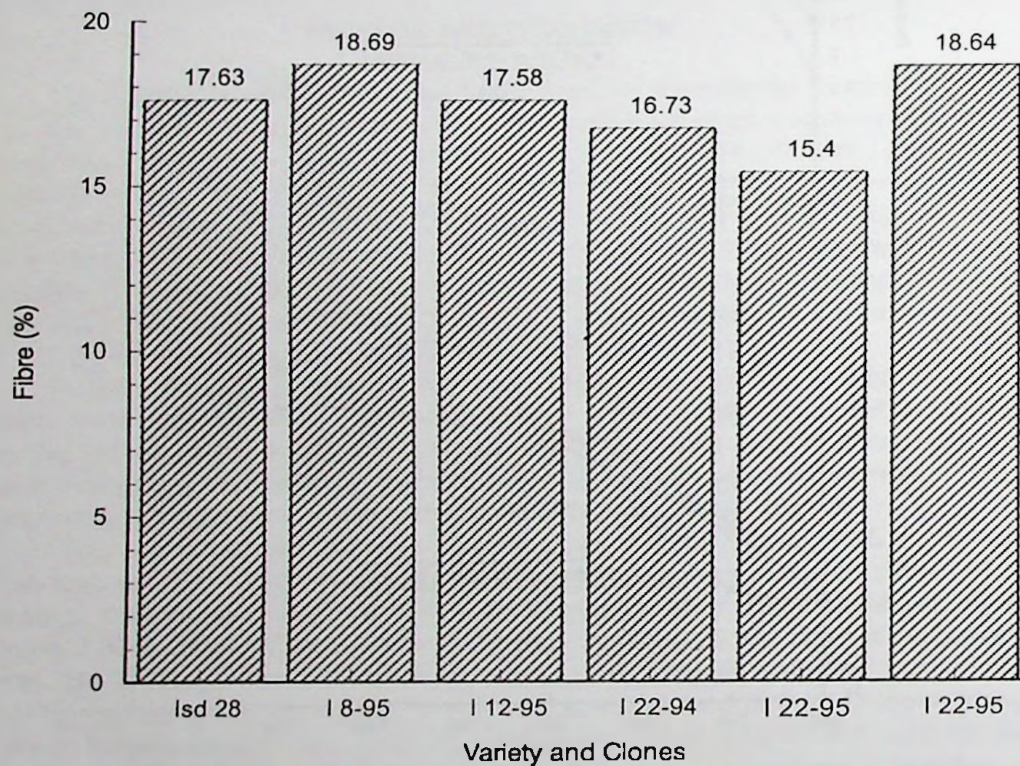


Figure 3. Vertical bars are showing fibre status of different promising clones.

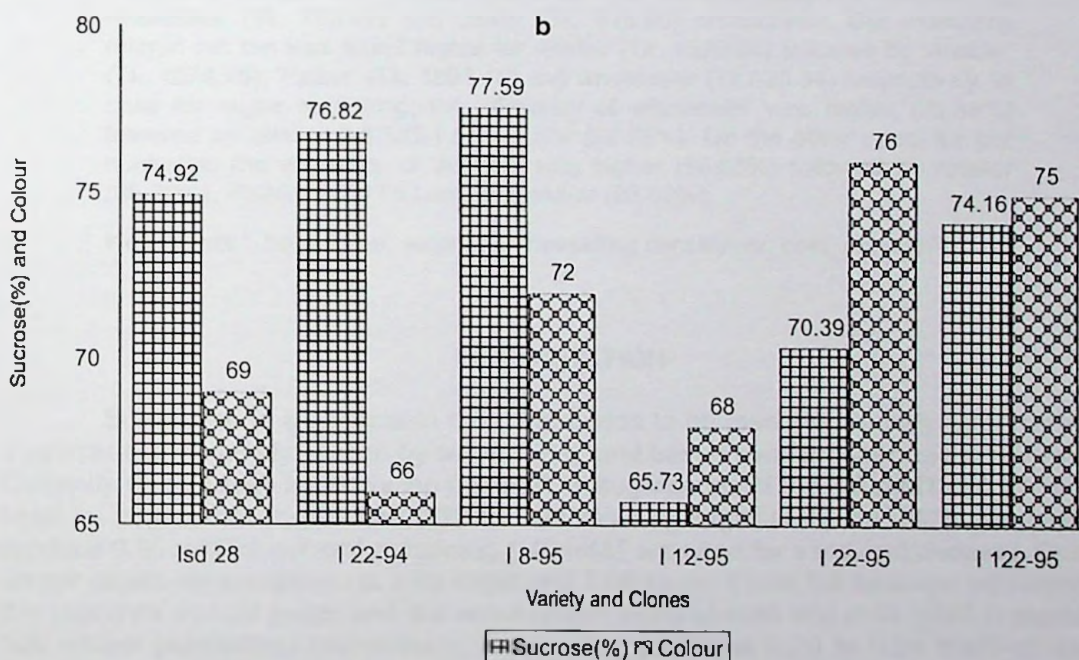
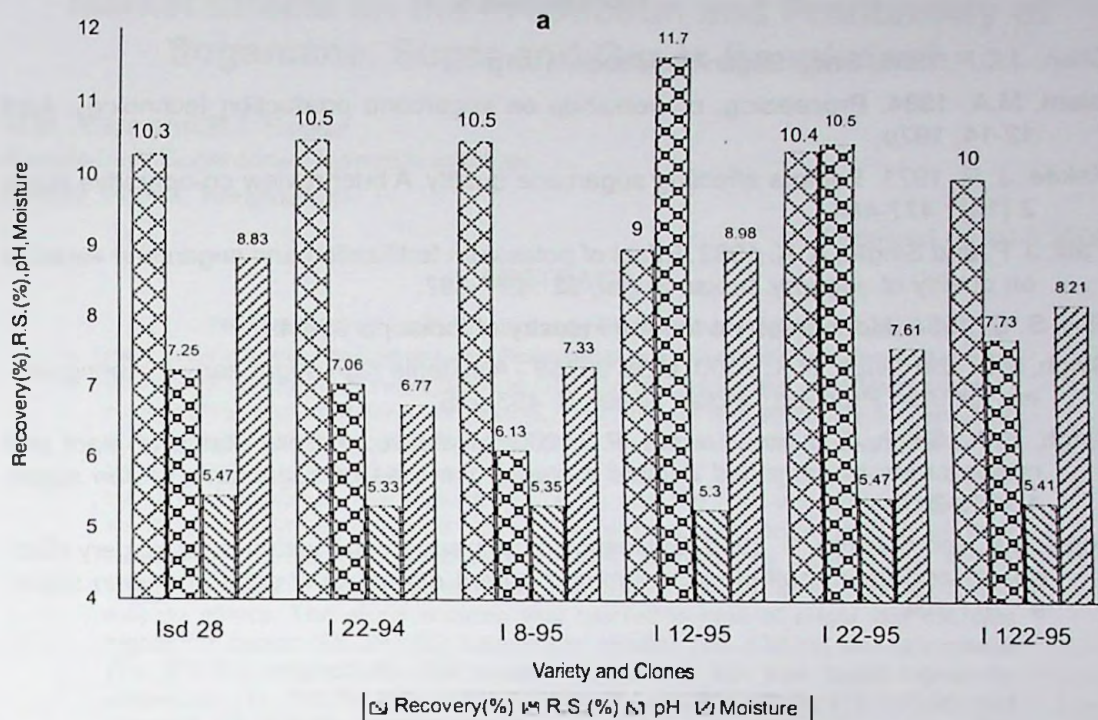


Figure 4ab. Vertical bars are showing different quality parameter status from visual observation and chemical analysis of gur in different promising clones.

REFERENCES

- Chen, J.C.P. 1985. Cane Sugar Handbook. 1111p.
- Islam, M.A. 1984. Proceeding, of workshop on sugarcane production technology. April 12-14, 197p.
- Kakde, J. R. 1971. Factors affecting sugarcane quality. A brief review co-operative sugar **2 (10)** : 477-484.
- Patil, J. P. and Singte, A. K. 1982. Effect of potassium fertilization and sugarcane varieties on quality of jaggery. *Indian Sugar*, **32** : 277-397.
- Roy, S. C. 1954. Monograph on the gur industry of India. pp 55-64.
- Singh, S.B. and Singh, R.K. 2000. COS 96268 - A suitable high sugar early maturing variety for Uttar Pradesh. *Indian Sugar*, **8**: 493-496.
- Singh, S.B.; Singh, B.D. and Verma, P.C. 2001. Relative maturity status of plant and ratoon crops of early and midlate maturing varieties of sugarcane. *Indian sugar*, **4** : 243-247.
- Uppal, S.K. and Sharma, S. 1999. Evaluation of new sugarcane varieties for jaggery (Gur) quality and their shelf life in airtight containers during rainy season. *Indian sugar*, **9** : 701-704.