

## SUCROSE ACCUMULATION PATTERN IN CERTAIN SUGARCANE VARIETIES UNDER DELAYED HARVEST

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### ABSTRACT

An investigation was undertaken to study the pattern of sucrose accumulation in five sugarcane varieties especially under delayed harvest. It was evident that maximum sugar accumulation occurred during 12th month irrespective of varieties. In general, the quality declined with advance in age. There was a mean reduction of 3.55% in quality by three months delay in harvest. Among the five varieties studied, sugar sustainability could be seen in Si 86098 which recorded the highest CCS of 10.57% even at the age of 15th month. The present investigation led to the identification of cane clones for sugar sustainability even under delayed harvest. Such clones can be maintained and utilised for its sugar retention as donor.

**KEY WORDS :** Sugarcane, Delayed harvest, Quality decline Commercial Cane Sugar.

Sugarcane (*Saccharum officinarum*, L.) is a crop that has natural sustainability (Rozeff, 1996). Improving sugar productivity per unit area requires cultivation of high sugar cultivars with proper crop management. There is a need to evaluate factors affecting sugar accumulation. Sugar accumulation is largely governed by various enzyme systems namely, UDPG Sucrose synthetase, amylase and invertases (Madan *et al.*, 1991). The single major source for juice quality among *Saccharum* species is the *Saccharum officinarum* and the genes governing juice quality in all the commercial varieties have been derived from this species (Nair and Sreenivasan, 1988). Present day breeding programmes largely centre round the development of higher sugar varieties with high yield and tolerance to major pests and diseases. However, investigations on the development of sugarcane variety which has sustainable sugar accumulation beyond twelve months has not been done. The growers have to retain the crop beyond 12 months for various reasons. Under such situations, the sugar which had already accumulated undergoes inversion and ultimately reflects on quality decline. Hence a study has been undertaken to quantify the loss of quality under delayed harvest. The information generated will be of great use to the breeders.

### MATERIALS AND METHODS

Five sugarcane cultivars viz. CoSi 86071, CoSi 95071, Si 81610, CoC 92061, and Si 86098 were planted at Sugarcane Research Station, Sirugamani

in Randomised Block Design with four replications. Sugarcane setts were planted @ 30,000 two budded setts per acre. Planting was done during last week of March 1996. Plot size was 5 X 0.8 M X 8 rows (32 M<sup>2</sup>).

The soil was of clayey loam with Ph 7.8 and EC 0.38 dSm<sup>-1</sup>. The recommended package of practices were followed. Juice quality analysis was under taken from 9th month (December, 96) onwards till 15th month (June 97).

### RESULTS AND DISCUSSION

The CCS% of five sugarcane cultivars right from 9th to 15th month age are presented (Table-1). The maximum sugar accumulation of 13.44% occurred during 12th month irrespective of varieties. Ramesh and Mahadevaswamy (1996) have also indicated the 12th month growth as optimum for obtaining maximum cane and sugar content. On perusal of data, clearly indicates the decline of CCS beyond 12th month. The sugar starts reducing gradually with advance in age. There was 3.55% mean reduction in quality by three months delay in harvest indicating the severity in quality loss. Harvesting the crop a month later i.e. on 13th month did not significantly encounter any quality loss. A mean reduction of 0.3% was recorded but beyond 13th month the quality deterioration was rapid. Yates (1996 a) found that there was 20% loss in sugar concentration due to mixing of old aged canes with juvenile canes and also harvesting of over aged canes.

Table 1. Commercial cane sugar percent in five sugarcane cultivars in different age of harvest

Varieties	Commercial cane sugar percent at (Months)							Mean with SE
	9th	10th	11th	12th	13th	14th	15th	
CoSi 86071	11.95	12.31	12.40	13.57	13.19	10.42	9.70	11.93+0.53
CoSi 95071	12.85	13.14	13.53	13.68	14.04	11.54	9.98	12.68+0.54
Si 81610	11.94	12.76	12.78	12.95	12.59	10.52	9.64	11.88+0.49
CoC 92061	11.72	12.62	12.88	13.44	13.82	11.14	9.57	12.17+0.56
Si 86098	11.09	11.68	11.95	13.58	12.07	11.35	10.57	11.76+0.36
Mean	11.91	12.50	12.71	13.44	13.14	10.99	9.89	
CD (P:0.05)	0.89	0.77	0.83	0.40	1.19	0.69	0.57	

Among the five cultivars, the highest mean CCS% was obtained in CoSi 95071 right from the 9th month onwards indicating the early sugar accumulation. This variety recorded the highest CCS% of 14.04 at 13th month age which comes down as low as 9.98% at 15th month indicating the rapid deterioration at this period. Sugar sustainability could be clearly seen in CoSi 86098 which recorded the highest CCS of 10.57% even at the age of 15th month. Maximum CCS of 13.58% was obtained in this variety during 12th month. The studies indicated that the quality deterioration beyond 13th month was more rapid. As much as 3.6% deterioration in quality will badly reflect on the reduction in sugar yield.

Sugar accumulation can be of three categories.

1. Varieties which show slow build up of sugar but sustains it,
2. Rapid accumulation and rapid deterioration and
3. Accumulation in a linear manner and a plateau at peak period.

The varied pattern of sugar accumulation is of immense help in breeding programmes. The present study has shown the need for screening large number of genotypes which can be used to select proper parents suitable for delayed harvest. For this, attempts must be made to identify the causes of cane sugar deterioration beyond 12 months and possible management practices to sustain the quality in the already accumulated sugar. Late application of potash, boron and magnesium may prove useful on triggering the sugar synthesising enzymes which may help to build up more sugar especially under over aged and delayed harvest. Yates (1996b) indicated that delaying the

harvesting of mature cane losses about one third of a unit of rendement per one month. From 0.125 units of rendement are lost per one percent of extraneous matter, Robertson *et al.*, (1995) have suggested that there is scope for manipulation through topping, N management and crop age at harvest for obtaining higher sugar yield.

To sum up, the present investigation has led to quantify the loss besides, the differences among the varieties with respect to sugar accumulation and sugar sustenance were found out. The future breeding programmes may be concentrated with selection of varieties or parents which show sustenance of sugar even under over aged situations.

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(Received : November 97 Revised : September 98)