

Effect of cane burning on quality of juice

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ABSTRACT

A comparative trial was conducted at Sugarcane Research Institute to study the effect of burning on the quality of Sugarcane. Burning affected reducing sugar of cane which increased with the increase of time (days). Significant quality deterioration observed after 3 days in burnt cut cane, while in burnt standing cane after 4 days of burning. No significant difference was observed in sucrose concentration upto 6th day of burning.

INTRODUCTION

Detrashing during harvest involves a huge number of labourers and increases production cost. In countries like Australia, Hawaii etc. where labour is costly cane is burnt prior to harvest and crushed without delay (Parthasarathy, 1972). In Louisiana, burning is the standard means of detrashing of cane during harvest (Davidson, 1962). It is suspected by the mill management that burning deteriorates cane juice quality. The suspected sugar loss, if any, due to burning may be minimized if the time gap between harvesting and milling is reduced. In the mechanized countries, quick harvesting, transport and crushing facilities help to minimize this time gap and thus reduce sugar loss. In Bangladesh, harvesting is done manually, transport system is poor and mills are rather old and thus take several days from harvesting to milling. Though burning is a sound detrashing practice to reduce labour cost no report is available on such work in Bangladesh. Therefore, an experiment was set up to study the effects of burning on the cane juice quality.

MATERIALS AND METHODS

A trial was conducted in a randomized complete block design with 3 replications. In commercially grown variety ISD-16 was selected from Sugarcane Research Institute farm and used for the present investigation. The analysis was carried out on days 0,1,2,3,4 and 5 taking the day of burning cane as '0' day. The trial comprised of the following treatments .

A. Control i.e. unburnt standing cane. Only 15 randomly selected stalks were harvested and grouped into 3 bundles on the days on which chemical analysis was carried out.

B. Burnt standing i.e. canes burnt and left in the field. Fifteen randomly selected stalks were harvested and grouped into 3 bundles on the days on which chemical analysis was done.

C. Burnt cut i.e. canes were burnt and harvested immediately after burning. Ninety randomly selected stalks were harvested and grouped into 18 bundles, each bundle containing 5 stalks.

Approximately $\frac{2}{3}$ of 0.2 hectare of the selected cane plot were burnt and rest $\frac{1}{3}$ rd area left fresh for the control treatment. From the burnt canes 90 number of canes were randomly selected and cut and made 18 bundles for treatment C. All 18 bundles of canes for treatment C were weighed and tagged datewise on '0' day and except 3 bundles for '0' day analysis, they were stacked in the field. Stacked bundles were subsequently reweighed on the day of chemical analysis for sucrose concentration in order to determine the weight loss during the intervening time. For both the treatments A and B, randomly selected 15 stalks were freshly cut and made 3 bundles (replicates) each containing 5 stalks on the days on which chemical analysis was carried out. In addition to chemical analysis sufficient composite juice was collected from all samples of all treatments in order to determine reducing sugar content.

RESULTS AND DISCUSSION

There was no significant difference in sucrose concentration among the burnt standing, burnt cut and control cane. Slightly higher concentration of sucrose was found in burnt cut cane perhaps due to the evapotranspiration by burning. The deterioration in sucrose concentration was found significant on day 5 (table 1). Present finding agrees with the report of several authors. (Calma, 1941; Young, 1962; Samuels and Cayere, 1967; Wood, 1973). In burnt cut cane, Wood (1973) found no loss in sucrose concentration upto 4 days after harvest. According to Young (1962) there was an apparent loss of sucrose in burnt standing cane and an increase in cut cane. He explained that the sucrose concentration declined in burnt standing cane due to moisture uptake by the undamaged roots as evapotranspiration rates were now less than normal.

In Philippines, Calma (1941) showed greater sugar losses for burnt standing cane than for cut cane. Samuels and Cayere (1967) reported most of the sugar loss occurred after the 3rd day. Actual recoverable sugar might be present a little higher than the figure found in burnt standing cane due to dilution effect of moisture uptake by the undamaged roots.

Significantly lower purity percent was found in burnt cut cane than either control or burnt standing cane. There was no significant difference between control and burnt standing cane. Purity percent in burnt cut cane was found significantly lower on day 5 (Table 1). The result coincided with the reports of Wood (1973) and Wood *et. al.* (1972), who reported higher juice purity for a longer period in burnt standing cane than in the burnt cut cane. Turner and Rojas (1962) found reduction in apparent purity % cane in burnt cut cane. Significantly higher reducing sugar was obtained in burnt cut cane on day 3, while in burnt standing cane that was higher on day 5. In both burnt cane

Table 1. Effect of burning on purity % cane, sucrose concentration and reducing sugar % cane.

Variable	Time (days) Treatments	0	1	2	3	4	5	Mean
Purity percent cane.	Unburnt standing	89.18 cd*	89.30 cd	87.81 cd	91.05 d	90.19 cd	88.41 cd	89.32 b
	Burnt standing	90.11 cd	90.78 d	90.76 d	90.21 cd	89.31 cd	88.96 cd	90.02 b
	Burnt cut cane	90.45 cd	89.65 cd	87.92 cd	86.80 bc	83.89 ab	81.48 a	86.70 a
	Mean	89.91 c	89.91 c	88.83 bc	89.35 bc	87.80 ab	86.28 a	—
Sucrose Concentration	Unburnt standing	11.15 abcde	10.89 abcd	10.68 abc	11.70 de	11.42 bcde	10.65 ab	11.08 a
	Burnt standing	11.84 c	11.14 abcde	11.47 bcde	11.25 abcde	10.81 abcd	10.32 a	11.14 a
	Burnt cut cane	11.72 de	11.47 bcde	11.61 cde	11.38 bcde	10.82 abcd	10.40 a	11.23 a
	Mean	11.57 c	11.17 bc	11.25 bc	11.44 bc	11.02 b	10.46 a	—
Reducing sugar percent cane.	Unburnt standing	0.28 a	0.28 a	0.29 a	0.30 a	0.30 a	0.34 a	0.30 a
	Burnt standing	0.26 a	0.27 a	0.30 a	0.40 a	0.42 a	0.67 a	0.39 a
	Burnt cut cane	0.28 a	0.32 a	0.46 ab	0.94 c	1.34 d	2.97 e	1.05 b
	Mean	0.27 a	0.29 a	0.35 a	0.55 b	0.69 c	1.33 d	—

* Means followed by the same letter are not significantly different at the 5% level of probability, as determined by the Duncan New multiple Range test.

reducing sugar increased with the increase in time (days) (Table-1). Bose *et al.*, (1974) found increase in reducing sugar with the increase in time in unburnt cut cane. Results, however, differed from the findings of Wood *et al* (1972), who noticed higher reducing sugar in unburnt cane. In burnt cut cane, rapid weight loss was obtained on day 3 of harvest (Fig. 1). Increased weight loss was found in burnt cut cane than burnt standing cane (Young, 1962 ; Wood *et al.*, 1972).

In burnt cut cane purity was found significantly lower, reducing sugar showed significantly higher result and no significant difference was observed in sucrose concentration. Reducing sugar was found significantly higher on day 3, sucrose concentration and purity percent on day 5. Sucrose concentration was found slightly higher perhaps due to evaporation effect of burning of cane. Actually there was no sucrose accumulation except the loss of water. Besides, in respect of purity and sucrose concentration, it was

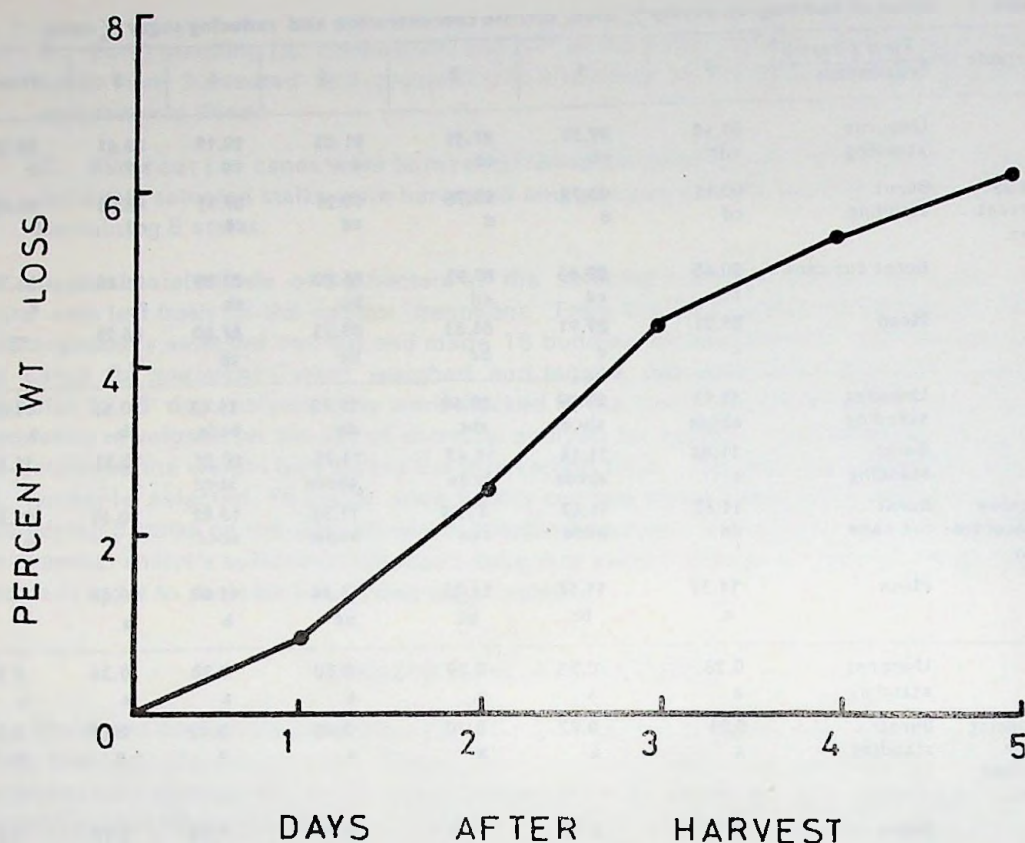


Figure. 1. Cumulative percent weight loss of burnt cut cane due to staleness.

found that deterioration started on day 3. Similarly in burnt standing cane there was no change of purity upto day 5, no significant difference in sucrose concentration and reducing sugar upto day 4 after burning. From the above experimental results it is assumed that in burnt cut cane significant quality deterioration started after 3 days of burning, while in burnt standing cane after 4 days of burning. This indicates that crushing of cane within 3 days after burning may not cause any significant loss of sugar.

ACKNOWLEDGEMENT

The authors take the opportunity to express their gratitude to Dr. M. Shahjahan, Director, SRI and Dr. M. A. Hamid Miah, Principal Cane Entomologist, SRI for their constructive suggestion and critical reading of the manuscript.

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