

Post Harvest Deterioration Losses in some Commercial Varieties of Sugarcane

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ABSTRACT

An experiment was conducted at Bangladesh Sugarcane Research Institute farm to study the quantitative post harvest losses in three commercial sugarcane varieties viz. Isd 2/54, Isd 16 and Isd 18. Sugarcane stalks were randomly harvested from the same plot and made 21 bundles for each variety and stored for 7 days. Stored cane stalks were analyzed at an interval of 24 h and continued upto 168 h. Data recorded on cane weight, purity, recovery and reducing sugars. Maximum drop in purity (29.4%) and recovery (45.3%) were found in Isd 18, while minimum decline in Isd 16 (15.8%). Gradual losses in cane weight were recorded in all varieties. The rate and extent of deterioration in respect to cane weight, purity, recovery and reducing sugars were found to be varied with time. However, varietal differences were observed in respect to post harvest deterioration losses.

Key words : Post harvest, deterioration, recovery, reducing sugars, sugarcane.

INTRODUCTION

Sugarcane post harvest deterioration losses causes through enzymatic, chemical and microbial processes. The enzyme invertase, which occurs naturally in cane converts sucrose into invert sugars (glucose and fructose). Chemical deterioration includes inversion caused both by acidic conditions and microbial growth. Post harvest quality decline takes place due to harvest operations and subsequent delays in milling. The extent of these losses varies from variety to variety and the harvesting season. Post harvest deterioration losses in sugarcane have been studied and reported elsewhere in the world (Egan, 1968; Destefan, 1975; Perdoma and Roma, 1976; Fesihi *et. al.* 1978; Chen and Chung 1993). In Bangladesh due to poor procurement plan, transport facilities, low milling capacity and inefficient milling performance, harvesting to crushing takes several days and incur serious deterioration losses in cane quality. Kapur and Kanwar (1979) reported the sucrose loss was reduced significantly, when cane heaps covered with trash and sprinkled with water. But much less systematic research have been carried out to determine the losses due to delay in crushing of harvested cane in Bangladesh. Therefore, the present studies were carried out to ascertain post harvest deterioration losses in three commercial sugarcane varieties viz. Isd 2/54, Isd 16 and Isd 18.

MATERIALS AND METHODS

Investigations were conducted at the Bangladesh Sugarcane Research Institute (BSRI) farm with three commercial varieties viz. Isd 2/54, Isd 16 and Isd 18. The sugarcane samples were taken from the same plot. For each variety 210 cane stalks were harvested, thoroughly mixed and divided into 21 bundles of ten canes, and stored in open place under normal condition for 7 days. Sample weight was recorded before storage and each day before crushing for

estimation of moisture losses. In each day of analysis three stored samples (bundles) of each variety were randomly selected and laboratory analysis of cane juice was done at an interval of 24 h and continued upto 168 h to determine the deterioration losses in cane juice quality. Milled juice was analyzed for Brix by Brix hydrometer calibrated at 20°C. Horne's dry lead sub-acetate method was used for sucrose determination using automatic polarimeter. Reducing sugars content was determined by method prescribed in Queensland Laboratory Manual (Anon., 1970).

RESULTS AND DISCUSSION

The results of the present investigation have been shown in the Figures 1 to 4. The loss in cane weight due to stored period is given in the Figure 1. Gradual losses of weight have been recorded in all varieties. It is seen from the Figure 1 that similar cane weight loss was recorded upto 48 h of storage and after 48h relatively higher weight loss was observed in varieties Isd 2/54 and Isd 18 compared to variety Isd 16. Similar loss in cane weight during storage period have been reported elsewhere (Fesihi *et al.* 1978; Tiwana *et al.* 1989; Chen and Chung 1993). Fesihi *et al.*, (1978) reported 18.58% and 25.59% loss in cane weight during eight days storage of two cane varieties. Chen and Chung (1993) reported cane weight loss as a varietal character and stated that by selection of cane, storage weight loss could be minimized. The results obtained on purity drop in different commercial varieties influenced by storage period are shown in the Figure 2. The figure indicates cane juice purity loss was similar in all varieties upto 72 h of storage. It is also seen that purity drop was similar as well as minimum in the varieties Isd 2/54 and Isd 16, while purity drop sharply increased in variety Isd 18 after 72 h of storage. Samuels and Cayere, (1967) observed marked purity decline in harvested wet cane after 72 h of storage. The results on reducing sugars level have been presented in the figure 3. In the present trial varietal difference in respect to reducing sugars level during storage have been observed (Figure 3). No significant change or deterioration on reducing sugars level upto 48 h of storage was recorded in all varieties tested. However, similar as well as higher reducing sugars level was recorded in varieties Isd 16 and Isd 18 compared to variety Isd 2/54 after 48 h of storage. It is also seen from the figure 3 that rate of increase in reducing sugars level was faster in varieties Isd 18 and Isd 16 after 72 h of storage. Much lower and slower increase in reducing sugars level was recorded during 72 h storage period in variety Isd 2/54. Similar findings published elsewhere (Alexander, 1973). The stated that varieties highly resistant to inversion could as well contain characteristically low sucrose level, and high sucrose content varieties might readily be prone to inversion. The results of the trial in respect to sugar recovery percent have been shown in the figure 4. It is seen from figure that lower rate of loss in sugar recovery percent was recorded upto 72 h in all varieties. After 96 h of storage almost no further loss in sugar recovery was recorded in varieties Isd 2/54 and Isd 16 while sharp and continuous recovery loss was recorded in the variety Isd 18 upto 168 h of storage.

It is seen from results of the present investigation that although reducing sugars level was recorded higher in variety Isd 16 but the recovery percent loss was found to be minimum due to lower level of purity drop (Figure 2) during storage period. The recovery loss after 72 h of storage in the variety Isd 18 was found be very much consistent with the losses recorded in respect of reducing sugars level of purity percent. It may be, therefore, concluded that post harvest deterioration losses in sugarcane is possibly influenced by varietal characters, crushing season and /or maturity status of sugarcane stalks.

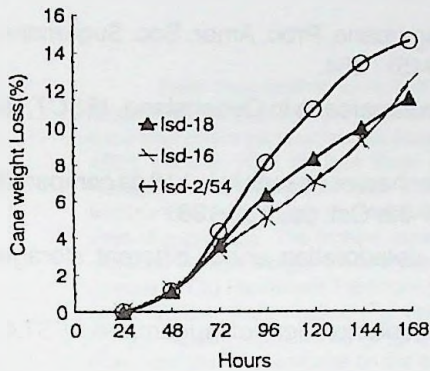


Figure 1. Effects of staleness on cane weight losses.

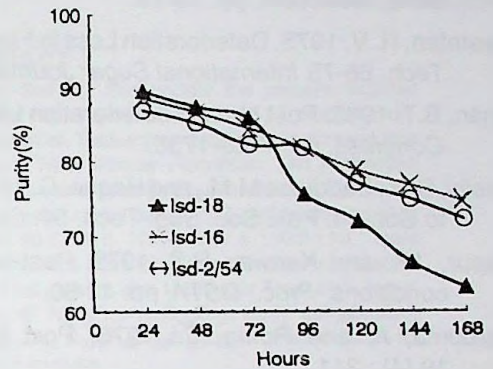


Figure 2. Effects of post harvest storage of cane on juice purity.

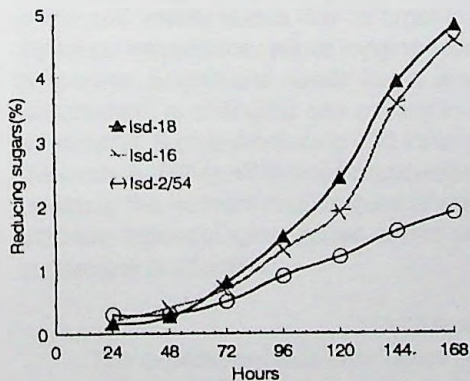


Figure 3. Effects of post harvest storage on reducing sugars.

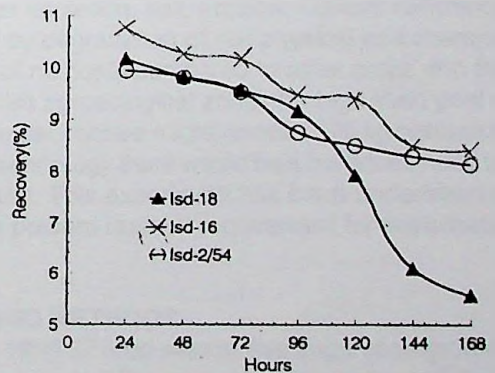


Figure 4. Effects of post harvest storage of cane on sugar recovery.

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