EFFECT OF CANE LODGING AND RAT DAMAGE ON CANE QUALITY AND DETERIORATION AFTER HARVEST

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ABSTRACT

Lodging markedly lowered cane juice quality, but rat damage resulted in the most drastic decrease in juice quality. The theoretical sugar yield of the lodged cane was reduced by 17.2% compared to 56.4% with lodged rat-damage cane. Lodged and lodged rat-damaged cane deteriorated at the same rate with elapse of time after cutting.

INTRODUCTION

Cane lodging usually occurs in the high tonnage producing areas under the conditions of free irrigation and narrow spacing. As high as 25% of the area planted to cane may tend to lodge. The lodged cane is usually subjected to rat damage resulting to losses in both cane weight and sugar content.

Published information about sucrose losses in cane due to lodging are meager. Nelson et al.3 reported that lodging of sugarcane might be a serious problem considering that the method of determining cane susceptibility to that source of loss is difficult. In studying the lodged cane problem in Australia, Scotney7 suggested that the low sugar content of lodged cane could be due to lack of exposure to sunshine during the earlier months of the year, and concluded that selection of lodging resistant varieties was the only solution to the problem.

Lodging of cane usually increases the problem of rat damage. Lindsey1 in Hawaii reported that rat damages sugar cane by eating a portion of stalk internodes, usually in the zone between the ground and the top of the mat formed by the lodged cane. Stalks damaged by rats are not usually completely cut and have a portion of the rind still intact. Such injuries may either kill the stalk or severely reduce sugar content due to souring organisms which enter the injured cane. In the Philippines, Porquez and Ledesma4 reported that the degree of stalk rat-damage varied from 11.08% to 24.27% with an average of 15.30%, while the accompanying sugar losses ranged between 2.20% and 9.62% with a mean of 5.08%. The same authors estimated the sugar loss per hectare by 0.133 to 0.857 ton. Teshima8 estimated the amount of rat-damaged cane and the corresponding sugar loss in Hawaii by 19.24% and 3.58% respectively.

Thus study was carried out to investigate lodging of sugarcane and
damage of lodged stalks by rats as a possible cause of sucrose losses.

MATERIALS AND METHODS

Erect and lodge cane plots of the first ratoon crop of variety NCo 310 grown under similar conditions were compared. The effect of damaging lodged cane by rats was also studied. The selected samples were lodged in August and were tested during the next December and January and then at ten-days intervals until March. At each date of analysis two samples of 25 stalks each were secured for each treatment and prepared for analysis according to the procedure described by Sayed. Sampling for the deterioration study of both erect and lodged cane was also patterned after Sayed.

The primary juice of the cane samples was extracted by an electric pilot mill (Sabir), screened and mixed thoroughly. One-liter sample of the juice was taken in glass cylinder for juice analysis.

Juice analysis

After 15-20 minutes settling time the juice samples were analyzed for gravity brix, apparent sucrose and reducing sugars. Then the juice and cane quality parameters, apparent purity, glucose ratio, apparent sucrose percent cane and theoretical sugar yield were calculated by the method described by Meade.

RESULTS AND DISCUSSION

Figure 1 shows the apparent brix, sucrose, purity and glucose ratio of the erect, lodged and lodged-rat damaged canes as a mean of 94 observations taken at intervals throughout the maturity phase and the first part of the milling season from the end of December till the middle of March. The erect cane exhibited the highest brix, sucrose, purity and lowest glucose, ratio followed by the lodged cane, while the lodged rat-damage cane showed the most drastic decrease in brix, sucrose, purity and the highest increase in glucose ratio.

These data indicate that cane lodging resulted in 2.79, 3.04 and 2.8 degrees in brix, sucrose and purity respectively, while glucose ratio increased by 0.4 degree. In the lodged rat-damaged cane these unfavorable changes amounted to 8.18, 9.77 and 18.6 degree drop in brix, sucrose and purity respectively while the glucose ratio increased by 9.4 points. The lower quality of the lodge cane may be attributed to lack of exposure to sunshine during the earlier stages of maturity phase as suggested by Scotney, which might result in lower rate of photosynthesis. Moreover, the rat injuries may either kill the stalk or severely reduce sugar content due to souring organisms which enter the injured cane as reported by Lindsey. This reasons added to the above mentioned effect on cane lodging itself may stand for the inferior quality recorded for the lodged rat-damaged cane.
FIGURE 1. Juice quality of erect, lodged and lodged rat-damage cane.

FIGURE 2. Average sugar percent cane and theoretical sugar yield in erect lodged rat-damaged cane.
FIGURE 3. Changes in juice quality parameters with elapse of the time after harvest.

Data in Fig. 2 show the effects of lodging and rat damage of cane on sugar percent cane and theoretical sugar yield. It can be seen that cane lodging only resulted in a loss of 2.17 and 2.38 points in sugar percent cane and theoretical sugar yield respectively, while in the lodged rat-damaged-cane these losses amounted to 7.61 and 7.81. It could be stated that the percent loss in the theoretical sugar yield was 17.2 in the lodged cane compared to 56.4 in the lodged highly rat damage cane.

Porquez and Lodesma\textsuperscript{4} reported an average loss of 5.08 % of sugar per hectare when the average of stalk rate damage was 15.30%, whereas Teshima\textsuperscript{8} estimated the amount of rat-damage cane and the corresponding sugar loss at 19.24% and 3.58% respectively.

Figures 3 and 4 compare the changes in the juice and cane quality parameters in both kinds of cane with elapse of time after harvest up to five days. It is quite clear that the rate of deterioration as indicated by the changes in...
FIGURE 4. Changes in sugar percent cane and theoretical sugar yield with elapse of time after harvest.

The various indices with time elapsed seemed to be more or less the same in both erect and lodged cane. The only apparent exception was the change in the glucose ratio with the elapse of time after harvesting. The rate of increase in the glucose ratio in the lodge cane was higher than that in the erect cane. This may be due to the increase in sucrose inversion during the growth of lateral buds on the stalks of lodged cane.

The calculated over-all loss in theoretical sugar yield due to lodging
and rat damage from about 5 million tons of cane annually milled in Egypt was estimated at 14.615 tons of sugar if 10% of the cane milled was lodged and one percent of the lodged cane was damaged by rats.

REFERENCES


EFECTO DE ENCAMADO DE CAÑA Y DAÑO POR RATAS SOBRE CALIDAD DE CAÑA Y DETERIORO DESPUÉS DE COSECHAR

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RESUMEN

Al encamarse la caña se deprime la calidad de su jugo, pero el daño por ratas dió como resultado una merma más drástica en la calidad del jugo. El rendimiento teórico de azúcar de la caña encamada fue reducido 17.2 por ciento comparado con 56.4 para caña encamada y dañada por ratas. Tanto la caña encamada como la encamada y dañada por ratas se deterioró a la misma tasa después de ser cortada.