

Identification of Sugarcane Clones Tolerant to Post Harvest Deterioration

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ABSTRACT

Promising sugarcane clones 2006A 102, 2001A 63, 2007A 161, 2007A 223, 2001A 70, 2001A 109, 2007A 64, 2006A 81, 2006A 22, 2006A 130, 2006A 107 and Co 6907 (C) were studied for juice quality parameters at different months of crop age (12th and 13th months) and at different intervals of harvest at Regional Agricultural Research Station, Anakapalle, during 2013 – 14 and 2014 – 15. Decline in per cent juice sucrose was observed high at 13th months (March) of crop age in all varieties and its rate of decline was low in 2001A 63, 2006A 22, 2007A 109, 2007A 223 and 2006A 22. Reduction in per cent sucrose was noticed high in 13th month (March) of crop age. Per cent reducing sugars were high at 72 hours after cane harvest. All the tested varieties loss their cane weight at 72 hours after cane harvest but their rate of loss was low in sugarcane clones 2001A 63, 2007A 223, 2001A 70 and 2006A 22. Based on per cent juice sucrose reducing sugars, Dextran (ppm), and cane weight loss at different months of crop age and at different intervals of crushing after harvest. Sugarcane clones 2001A 63, 2007A 223, 2001A 70 and 2006A 22 were found to be competitively more tolerant to post harvest deterioration.

Key words: Cane quality deterioration, sucrose per cent, Reducing sugars, Dextran (ppm).

INTRODUCTION

Post harvest deterioration in sugar cane occurs mainly delay in crushing of the harvested canes. Post harvest deterioration is highly influenced by several factors viz., variety, moisture content of cane, condition of the cane, time lag between harvesting to milling, moisture content of cane, condition of the cane, time lag between harvesting to milling, moisture content of cane, condition of the cane, maturity status of the crop and weather conditions (temperature, humidity and rainfall). Apart from losses in cane weight and sucrose percent in juice, deteriorated cane adds

to reduced juice extraction and causes problem in clarification and filtration. The deterioration in the juice quality is much faster when the cane are cut into number of bits (Solomon et al., 2003).

Deterioration in the harvest cane is caused by enzymatic, chemical and microbial agents. The enzyme invertase in the cane is activated after harvest particularly under higher atmospheric temperatures, which in turn converts sucrose into invert sugars leading to reduction in juice purity. Bacterial also enter through the cut ends and reduce juice quality by producing dextrans.

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Sugarcane varieties play a vital role in retaining recoverable sugar due to their differences in susceptibility to post harvest deterioration (Uppal et al., 2000 & Singh, Solomon, 2003 & Mukunda Rao et al., 2010). Therefore, identification of clones tolerant to post harvest deterioration is needed to devise scientific supply and crushing schedule with minimal loss of recoverable sugar.

MATERIALS AND METHODS

Ten promising sugarcane clones were grown in a RBD with four replications during 2013-14 and 2014-15 at Regional Agricultural Research Station, Anakapalle. The recommended package of practices viz., spacing and cultural practices were adopted in raising the crop. Ten canes were sampled for juice quality analysis with four replicated samples in each genotype at 12th and 13th months age of crop. Juice quality was carried out for sucrose and reducing sugars at 12 hours interval starting from cane harvesting to 72 hours after harvest. Sucrose and reducing sugars in juice were determined adopting methods described by Chen and Chou (1993). Dextran content in juice was estimated by haze method.

RESULTS AND DISCUSSIONS

Distinct differences were observed among the clones for percent sucrose and reducing sugars in 12th and 13th months of crop age and also to each interval of crushing after harvest of cane to 72 hours after harvest at 12 hours interval. Pooled data of 2013 and 2014 are presented in table 1.

Percent sucrose in juice:

Table 1: Cane quality deterioration in different sugarcane clones at 72 hours after harvest in February and March months

| Cane / Clone | Per cent reduction in sucrose per cent over 72 hah | Per cent reducing sugars at 72 hah | Dextran (ppm) over 72 hah | Per cent reduction in cane weight over 72 hah |
|-----------------|--|------------------------------------|---------------------------|---|
| February | | | | |
| 2006A 102 | 24.47 | 1.32 | 205 | 4.05 |
| 2001A 63 | 5.87 | 0.34 | 173 | 3.82 |
| 2007A 161 | 3.23 | 0.38 | 170 | 4.13 |
| Co 6907 (C) | 2.26 | 0.39 | 146 | 4.66 |
| 2007A 223 | 7.75 | 0.35 | 403 | 3.23 |
| 2001A 70 | 4.38 | 0.37 | 576 | 1.57 |
| 2007A 109 | 2.74 | 0.49 | 251 | 2.95 |

Sugarcane clones 2001A 63, 2001A 70, 2007A 64, 2007A 161, 2007A 109 and 2006A 22 recorded higher percent juice sucrose at all months of crop age (12th and 13th months) compared to other clones. The sucrose declined at 72 hours after harvest but the decline was low in 2001A 63, 2007A 161, 2007A 109, 2007A 64 and 2006A 22.

Reducing sugars:

Progressive increase in percent reducing sugars in general was observed with the time lag between harvest and crushing in all the clones. Percent reducing sugars were found low in 2001A 63, 2007A 161, 2007A 109 and 2007A 64 at all months of crop age harvest but the rate of increase in the reducing sugars was high in March month indicating higher cane quality deterioration.

Dextran (ppm):

Dextran content in juice increased progressively in general in all the sugarcane clones tested with the time lag between harvest and crushing in all the clones at 13th month of crop age. Sugarcane clones 2001A 63, 2007A 223 and 2007A 109 recorded less content of dextran over 72 hours after cane harvest indicating their tolerance to post harvest deterioration.

Cane weight:

Deterioration in cane quality after cane harvest was marked by reduction in cane weight in two months of harvest (12th and 13th months of age crop) and at all intervals of crushing of cane. The percent reduction cane weight was low in 2001A 63, 2007A 223, 2001A 70 and 2007A 109 indicating less deterioration in cane quality.

| | | | | |
|--------------|-------|------|------|-------|
| 2007A 64 | 2.25 | 0.41 | 334 | 5.07 |
| 2006A 81 | 15.07 | 1.21 | 261 | 4.38 |
| 2006A 22 | 6.28 | 1.78 | 288 | 4.64 |
| 2006A 130 | 5.29 | 1.92 | 355 | 7.52 |
| 2006A 107 | 8.11 | 1.61 | 198 | 3.92 |
| March | | | | |
| 2006A 102 | 10.12 | 6.66 | 233 | 4.16 |
| 2001A 63 | 29.88 | 2.50 | 399 | 1.03 |
| 2007A 161 | 4.25 | 1.61 | 174 | 8.67 |
| Co 6907 (C) | 4.83 | 1.25 | 147 | 8.84 |
| 2007A 223 | 11.89 | 1.72 | 357 | 7.43 |
| 2001A 70 | 10.83 | 3.12 | 818 | 7.38 |
| 2007A 109 | 23.71 | 3.33 | 334 | 8.0 |
| 2007A 64 | 26.61 | 3.13 | 1768 | 13.47 |
| 2006A 81 | 10.45 | 1.04 | 2882 | 7.52 |
| 2006A 22 | 6.14 | 1.19 | 870 | 1.79 |
| 2006A 130 | 21.84 | 1.56 | 452 | 7.29 |
| 2006A 107 | 27.87 | 1.42 | 466 | 8.24 |

* Juice analysis carried out for mean of four replications in a sample.

CONCLUSIONS

Based on percent juice sucrose, Cane weight loss, Dextran (ppm) and reducing sugars at different months of crop age and at different intervals of crushing after harvest, 2001A 63, 2007A 223, 2001A 70, 2007A 109 and 2006A 22 were found to be comparatively tolerant to post harvest cane quality deterioration over other clones tested.

REFERENCES

Chen, J. C. P., & Chou, C. C. (1993). Cane Sugar Hand Book. Join Wiley and Sons Inc. New Yank.

Mukunda Rao, C. H., Raja Rajeswari, V., Naidu, N.V., & Ramakrishna Rao, S. (2010). Study on post harvest deterioration in sugarcane. Paper presented in proceedings of 24th R&D sugarcane workers meet held at ANGRAU, Hyderabad on 17-18th July, 2010. PP: 61-64.

Solomon, S., Sahi, H. N., Suman, A., Gaur, A., Deb, S., & Singh, I. (2001). A survey of post harvest biological losses in Indian Sugar Factories: an emerging challenge. Proc. 24th ISSCT. PP: 380-381.

Singh, I., & Solomon, S. (2003). Post harvest quality loss of sugarcane genotypes under sub-tropical climate. Deterioration of whole stalk and bullets. *Sugar Tech.* 5(4), 850288.

Uppal, S. K., Sharma, S., & Sidhu, G. S. (2000). Repsonse of sugarcane genotypes to post harvest deterioration under natural field conditions exposed to sun vs shade. *Crop Research.* 19(1), 13-1.