I J T A
© Serials Publications
National Academy of Agricultural Science (NAAS) Rating : 3.03

Studies on post – harvest deterioration in promising sugarcane clones

Sujatha T. and Jhansi K.

Abstract: *Seven promising pre-released sugarcane clones 2006 V 41, 44, 46, 48, 51, 71 and 87 were studied for juice quality parameters upto 96 hours after harvesting with 24 hours interval at Sugarcane Research Station, Vuyyuru . Decline in percent juice sucrose from 2.94 to 23.59 percent depending up on the clone. Less reduction was recorded in 2006 V 41, 44 and 2006 V51. As the time advances after harvesting to crushing the brix was increased in all the clones. Maximum increase was recorded in 2006 V48. Electrical conductivity of the juice also increased from harvesting to 96 hours after harvesting in all the clones maximum increase was recorded in 2006 V 71 and less increase was recorded in 2006 V 41 and 2006 V 51. Less 4 cane weight reduction was recorded in 2006 V 41, 44, 48 and 51. Titrable acidity index was less in case of 2006 V 41, 2006 V 51 and 2006 V 44 Dextran formation 96 hours after harvesting was less in the clones 2006 V 51 and 2006 V 41. By observing all the parameters the clones 2006 V 41, 2006 V 51 and 2006 V 44 were found tolerant to post harvest deterioration.*

Keywords: *Deterioration, TAI (Titrable acidity index), Dextran, Sucrose per cent.*

INTRODUCTION

Post harvest deterioration of canes occurs mainly due to delay in crushing of the harvested canes. The delay could be either in transporting or may even be in the yard. 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, maturity status of the crop, weather conditions (temperature, humidity and rainfall). Apart from losses in cane weight and sucrose percent in juice, deteriorated cane adds to reduced juice extraction, there will be problem of clarification and filtration. The rate of deterioration and loss in sucrose percent is very high when the time lag exceeds '48' hours after harvest. The deterioration of the juice quality is much faster when the canes are cut into number of bits (Soloman *et al*. 2000).

The deterioration of harvested cane is primarily a biochemical process followed by bacteria invasion through the cut ends of stalk. The time lag between harvesting and milling is therefore of crucial importance to achieve maximum sugar recovery. Sugarcane variety play a pivotal role in sugar recovery depending upon the climate and management practices followed. The time lag after harvest and the externaltemperature determines the rate of sucrose loss through inversion, dextrin formation and respiration. The reduction in cane weight and sucrose percent are important indicators of cane deterioration. It range from 1.5 to 2.3% for every 24 hours storage after harvest and may go up to 25% during hot season. The loss in juice sucrose was not very significant during first '48' hours of harvest through 0.1 to 0.2 units drop ;in recovery was observed for every '24' hours of delay. Rapid deterioration and fall in quality was observed from 72 hours onwards (SBI, 1981). There is considerable varietal differences in post harvest deterioration. Immature or over mature cane deteriorates faster than fully mature cane in hot weather. Green cane is less susceptible to post harvest deterioration compared to burnt cane. A sharp increase in the activity of acid and neutral invertase after '12' hours is noticed with a corresponding rise in the level or reducing sugars. The CCS drop after this period is quite significant which results in low sucrose recovery.

Sugarcane varieties play a vital role in retaining recoverable sugar due to their differences in susceptibility to post harvest deterioration (Uppal *et al*., 2000 and Singh & Solomon, 2003 and Mukund 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.

* Sugarcane Research Station, Vuyyuru, Krishna district Andhra Pradesh

MATERIALS AND METHODS

Seven sugarcane clones were studied in post-harvest deterioration experiment with three replications in radamisied block design. Each clone was planted in six rows of eight meters length with a spacing 80 cm between rows. Fertilizer dose of 168 kg N + 75 kg P_2O_5 + 100 kg K_2O / ha was applied. Juice quality parameters were recorded from 0 hours to 96 hours after harvesting for every 24 hours. Loss in 4 cane weight was recorded from 0 to 96 hours after harvesting before each crushing. Juice sucrose per cent and Brix were recorded with Sucrolyzer cum Refractometer Dextran content in juice was estimated by haze method.

RESULTS AND DISCUSSIONS

Distinct differences were observed among theclones for juice quality parameters at each crushingwith 24 hours interval up to 96 hours afterharvesting and presented in Table 1 and 2.

PERCENT SUCROSE IN JUICE

Highest percent juice sucrose was recorded with less reduction even after 96 hours after having in 2006 V41, 44 and 51 among the clones tested. Maximum reduction in per cent juice sucrose in 2006 V 46 (23.54%) followed by 2006 V 48 (14.70%)

BRIX

Increase in Brix in all the clones from 0 to 96 hours after harvesting. It is due to loss in water content by evaporation. More increase in Brix in the clones 2006 V44 and 2006 V 71. Less increase in case of 2006 V 48 and 51.

EC

Electrical conductivity of the juice also increased in all the clones from 0 to 96 hours after harvesting. Less increase in EC was recorded in 2006 V 41 and 2006 V 51. Maximum increase in the clone 2006 V 71followed by 2006 V 87.

CANE WEIGHT

Deterioration in cane quality by loss in cane weight at each crushing 0 hours to 96 hours. The per cent reduction in cane weight was low in 2006 V 41, 44, 48 and 51 indicating less deterioration in cane quality.

TAI

Lesser the TAI (Titrable acidity index) lesser the deterioration. Low TAI was recorded in 2006 V 41, 51 and 44 at 96 hours after harvesting indicating low deterioration in these clones when compared to other clones tested.

Table 1
Post harvest deterioration in promising sugarcane clones

		4 cane weight (kg)			*EC*		
Sno	*Clones*	*0 hrs*	*96 hrs*	*% reduction*	*0 hrs*	*96 hrs*	*%Increase*
1	2006 V 41	4.233	4.100	3.14	1.54	1.70	11.03
2	2006 V 44	5.466	5.233	4.26	1.63	2.20	34.96
3	2006 V 46	3.66	3.300	9.83	1.65	2.20	33.33
4	2006 V 48	3.866	3.666	5.173	1.60	2.00	25.00
5	2006 V 51	3.800	3.600	5.263	1.56	1.90	17.89
6	2006 V 71	3.360	3.000	10.71	1.13	2.25	99.11
	2006 V 87	4.866	4.300	11.553	1.54	2.16	40.25

Table 2
Post harvest deterioration in promising sugarcane clones

		Brix			*% Juice Sucrose*			*TAI*	
Sno	*Clones*	*0 hrs*	*96 hrs*	*%increase*	*0 hrs*	*96 hrs*	*% Reduction*	*96 hrs after harvesting*	*Dextran 96 hrs after harvesting OD*
1	2006 V 41	22.41	24.27	8.29	21.38	20.75	2.94	11.66	0.217
2	2006 V 44	20.76	23.04	10.98	19.40	18.48	4.74	15.86	0.220
3	2006 V 46	20.26	21.52	6.21	18.44	14.09	23.59	20.34	0.302
4	2006 V 48	20.84	21.46	2.97	19.47	16.60	14.70	19.44	0.290
5	2006 V 51	21.26	22.48	5.73	20.14	18.68	7.24	15.74	0.193
6	2006 V 71	20.59	22.79	10.68	18.92	16.08	13.1	20.15	0.284
	2006 V 87	20.32	21.59	6.24	18.68	16.89	9.58	16.06	0.155

DEXTRAN

Lower the OD of Dextran lower the dextran in PPm. High dextram formation indicates the high deterioration. The clones having low dextan formation are 2006 V 51, 41 and 44 and they are tolerant to post – harvest deterioration when compared to other clones tested.

CONCLUSIONS

By observing percent juice sucrose reduction, cane weight loss, TAI, Dextran formation at each interval of crushing the clones 2006 V 4i, 2006 V 51 and 2006 V 44 were found tolerant to post harvest deterioration over other clones tested.

REFERENCE

Mukunda Rao. Ch, Raja Rajeswari V , Naidu N.V; and Ramakrishna Rao S. (2010), Study on post harvest deterioration in sugarcane. Paper presented in proceedings of 24th R&D sugarcane workers meet held at Acharya N. G. Ranga Agricultural University Hyderabad on 17-18th July, 2010 PP: 61-64.

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

Singh I and Solomon S (2003), Pot 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. and Sidhu G.S (2000), Response of sugarcane genotypes to post harvest deterioration under natural field conditions exposed to sun vs shade. Crop Research 199(1): 13-1.

Mukunda Rao Ch, Prasada Rao K proceedings of and Ankaiah R 2015 study on post harvest cane quality deterioration in sugarcane published in SISSTA- Sugar Journal 2015 45th Annual Convention on 24-25th July 2015 held at Bengaluru PP 84-86.