Research Paper | *The Asian Journal of Horticulture,* (June, 2010) Vol. 5 No. 1 : 93-95

Pre-harvest spray of different sources of calcium to improve the bio chemical qualities of sapota fruits (*Manilkara achras* (Mill) Fosberg) cv. KALIPATTI

R.R. BHALERAO, **B.R. PARMAR**, B.V. PADHIAR AND P.P. BHALERAO

Accepted : *March, 2010*

See end of the article for authors' affiliations

Correspondence to:

B.R. PARMAR
Department of Horticulture, N.M. College of Agriculture, Navsari Agricultural University, NAVSARI (M.S.) INDIA

ABSTRACT

Among the all pre-harvest treatments, non-reducing sugar, total sugar was observed significantly maximum on all days of storage in pre-harvest treatment of calcium chloride 1.0 per cent. While reducing sugar was observed maximum in pre-harvest treatment calcium nitrate 0.5 per cent. Considering to the acidity and ascorbic acid it was found at par to all pre-harvest treatments during the storage period.

Key words : Sapata, Sugar, Pre-harvest treatment, Calcium chloride

India is considered to be the largest producer of sapota in the world. Sapota was introduced from Mexico to Asian countries like India, Srilanka, Indonesia and Myanmar etc. It reported that for the first time the sapota cultivation was started during 1898 in a village called Golwad in Maharashtra. The several varieties are grown in India, of which Kalipatti is one of the most popular and commercially important variety grown in Maharashtra, Karnataka and Gujarat states. South Gujarat is a horticultural belt which Kalipatti variety is grown on large area. However, sapota is highly perishable, the post harvest life is very short. Being a climacteric fruit, sapota ripens within 4 to 7 days after harvest and soon after full ripened stage, rapid bio-chemical changes reduced the shelf life. To increase the shelf life through pre-harvest treatment is considered one of the major attempts in sapota cultivation. The effect of pre-harvest treatments on post-harvest life of sapota fruit was studied by several workers with promising results. However, under South Gujarat agro-climatic conditions of moderate to high temperature and relative humidity (RH), different pre-harvest treatments of calcium was carried out to study on post harvest life of sapota fruits cv. KALIPATTI.

MATERIALS AND METHODS

A field experiment was conducted on sapota at the Regional Horticultural Research Station, ASPEE College of Horticulture and Forestry Navsari Agricultural University, Navsari in Randomized Block Design with three replications. An aqueous spray was done on uniform sapota trees with different sources of calcium *viz.*, calcium chloride ($CaCl_2$), calcium sulphate ($CaSO_4$) and calcium nitrate ($Ca(NO_3)_2$) at 0.5, 1.0 and 1.5 per cent levels of each substance before 21 days of expected harvest. The fruits were harvested at proper maturity stage and subjected to bio-chemical analysis in the Pomology Laboratory (PG) of ASPEE College of Horticulture and Forestry Navsari Agricultural University, Navsari, during the year 2007.

RESULTS AND DISCUSSION

The results obtained from the present investigation as well as relevant discussion have been summarised under following heads:

Total soluble solids (%) :

TSS content increased initially and was peak on 6th day of storage in all the treatments and control except $CaCl_2$ @ 0.5 and 1.5 % treatments, and later on declined upto end of storage. The maximum TSS was retained in fruits treated with $CaCl_2$ 1% treatment (24.70%). The increase in TSS during storage was due to the breakdown of complex polymers in to simple substances by hydrolytic enzymes, which at later storage period got utilized during respiration. Similar findings have been reported by Gupta *et al.* (1987), Saran *et al.* (2004) and Siddiqui *et al.* (1989) in ber.

Total sugar (%) :

There were gradual increases in total sugar up to 6th day of storage with pre-harvest spray of different calcium sources except $CaCl_2$ 1.5% increased upto 9th day (Table 1). While, calcium chloride ($CaCl_2$) 1.0 per cent showed most significant result (9.52%) closely followed by $CaCl_2$

0.5% with 9.10% total sugar and remained at par. Total sugar were found to increase in calcium chloride treated fruits might be due to slowly conversion to sugar on storage. Lakshmana and Reddy (1999) and Aradhya *et al.* (2006) in sapota found the similar trend and confined the present investigation.

Reducing sugar (%) :

The data of Table 1 revealed that reducing sugar increased upto 6th day of storage after treatment of calcium sources except $CaCl_2$ 1.5 per cent. The maximum concentration of the reducing sugar was recorded in the fruits treated with calcium nitrate ($Ca(NO_3)_2$) 0.5 per cent. The increase of sugar content by calcium application could be due to the less utilization of sugar in respiration and conversion of starch in to sugar, while the subsequent decline was perhaps due to consumption of sugar for respiration during storage. The present observation is in conformity with the results reported by Gupta *et al.* (1987) and Saran *et al.* (2004), in ber, Jayachandran *et al.* (2005) in guava.

Non-reducing sugar (%) :

Non reducing sugar content increased upto 9th day of storage which later on declined upto 12th day in all treatments (Table 2). At 12th day of storage period the maximum non reducing sugar was observed in fruits treated with calcium chloride ($CaCl_2$) 1.0 per cent (3.68%). However, it was at par with $CaSO_4$ 0.5%, $CaSO_4$ 1.5%, ($Ca(NO_3)_2$) 1.5% and $CaCl_2$ 0.5% recording

Table 1 : Effect of pre-harvest spray of different calcium sources on total soluble solids (TSS) (%), total sugar content (%) and reducing sugar (%) of sapota fruits cv. KALIPATTI

Treatments	Total soluble solids (%)				Total sugar (%)				Reducing sugar (%)			
	Days after harvesting											
	3rd	6th	9th	12th	3rd	6th	9th	12th	3rd	6th	9th	12th
$Ca(NO_3)_2$ 0.5 %	20.60	23.10	19.30	17.34	7.50	9.50	9.11	8.76	5.83	6.85	6.40	6.16
$Ca(NO_3)_2$ 1.0 %	21.35	23.85	21.50	18.55	7.45	9.96	9.35	8.92	5.59	6.71	5.30	5.68
$Ca(NO_3)_2$ 1.5 %	18.95	21.45	20.40	19.01	7.40	9.70	9.20	8.60	5.64	6.50	4.30	5.07
$CaSO_4$ 0.5 %	21.65	24.15	21.65	19.75	7.00	9.75	9.00	8.60	5.20	5.92	4.50	4.94
$CaSO_4$ 1.0 %	20.80	23.30	21.92	19.95	7.10	9.60	9.10	8.45	4.80	6.06	4.40	5.14
$CaSO_4$ 1.5 %	20.90	23.40	21.45	19.68	7.20	9.70	8.90	8.50	5.00	6.05	3.90	4.86
$CaCl_2$ 0.5 %	16.64	19.15	22.20	21.50	7.40	10.01	9.55	9.10	5.40	6.41	5.32	5.64
$CaCl_2$ 1.0 %	22.20	24.70	23.95	21.90	7.69	10.12	9.82	9.52	5.27	6.27	5.95	5.84
$CaCl_2$ 1.5 %	17.90	20.40	23.20	21.30	7.50	9.25	9.44	8.99	5.29	5.50	5.78	6.12
Control	17.60	20.10	19.43	0.00	6.50	8.55	8.55	0.00	4.89	6.05	3.34	0.00
S.E..±	1.19	0.83	0.79	0.76	0.19	0.22	0.19	0.16	0.15	0.18	0.16	0.20
C.D. (P=0.05)	3.54	2.62	2.36	2.26	0.57	0.65	0.56	0.48	0.45	0.53	0.48	0.60

Table 2 : Effect of pre-harvest spray of different calcium sources on non-reducing sugar (%), acidity (%) and ascorbic acid (mg/100g pulp) of sapota fruits cv. KALIPATTI

Treatments	Non-reducing sugar (%)				Acidity (%)				Ascorbic acid (mg/100g pulp)			
	Days after harvesting											
	3rd	6th	9th	12th	3rd	6th	9th	12th	3rd	6th	9th	12th
$Ca(NO_3)_2$ 0.5 %	1.67	2.65	2.71	2.60	0.17	0.08	0.05	0.013	10.34	7.38	3.92	1.03
$Ca(NO_3)_2$ 1.0 %	1.86	3.25	4.05	3.24	0.16	0.09	0.04	0.014	10.12	7.36	3.89	1.04
$Ca(NO_3)_2$ 1.5 %	1.76	3.20	4.90	3.53	0.18	0.08	0.04	0.011	10.15	7.24	3.87	1.05
$CaSO_4$ 0.5 %	1.80	3.83	4.50	3.66	0.17	0.08	0.04	0.014	10.1	7.24	3.88	1.02
$CaSO_4$ 1.0 %	2.10	3.54	4.70	3.31	0.15	0.08	0.05	0.014	10.52	7.26	3.97	1.02
$CaSO_4$ 1.5 %	2.20	3.65	5.00	3.64	0.17	0.07	0.04	0.013	10.44	7.49	3.88	1.02
$CaCl_2$ 0.5 %	2.00	3.60	4.23	3.46	0.17	0.08	0.04	0.013	10.52	7.27	3.95	1.02
$CaCl_2$ 1.0 %	2.42	3.85	4.87	3.68	0.17	0.07	0.04	0.030	10.18	7.44	3.94	1.04
$CaCl_2$ 1.5 %	2.21	3.75	3.66	2.87	0.16	0.08	0.04	0.012	10.31	7.43	3.8	1.02
Control	1.61	2.50	4.21	0.00	0.17	0.08	0.05	0.00	10.18	7.35	3.92	0.00
S.E.±	0.08	0.10	0.10	0.09	0.016	0.007	0.005	0.003	0.59	0.39	0.21	0.21
C.D.(P=0.05)	0.24	0.25	0.31	0.27	NS	NS	NS	NS	NS	NS	NS	NS

NS = Non significant

3.66, 3.64, 3.53 and 3.46 per cent, respectively. The increase in non reducing sugar during storage was due to the conversion of starch into sugar. While, decrease in sugar is might be due to consumption of sugar for respiration during storage. Similar result on non reducing sugar percentage by pre-harvest spray of calcium chloride ($CaCl_2$) was also reported by Roychoudhury *et al.* (1992) in litchi.

Acidity (%) :

In the present study (Table 2), none of the chemical significantly influenced on acidity of sapota fruits. Nevertheless, acidity showed decrease during storage period, the decline in acidity may be due to conversion of acid to sugar. Similar result on acidity was also reported by Gupta *et al.* (1987) in ber and Jayachandran *et al.* (2005) in guava.

Ascorbic acid (mg/100g of pulp) :

The ascorbic acid content showed constant decrease during storage period from 3rd to 12th day of storage, however, all the treatments exerted non-significant result (Table 2). The decline in ascorbic content of sapota fruits during ripening might be due to oxidation of ascorbic acid by enzymatic activity. Similar result on ascorbic acid was also reported by Dhillon *et al.* (1985) in grape cv. ANAB-E-SHAHI.

Authors' affiliations:
R.R. BHALERAO, B.V. PADHIAR AND P.P. BHALERAO, ASPEE College of Horticulture and Forestry, Navsari Agricultural University, NAVSARI (GUJARAT) INDIA

REFERENCES

Dhillon, B.S., Ladania, M.S., Bhullar, J.S. and Randhawa, J.S. (1985). Effect of plant regulators on the storage of Anab-e-Shahi grapes. *Indian J. Hort.,* **42** (1-2): 8-23.

Gupta, O.P., Siddiqui, S. and Chauhan, K.S. (1987). Evaluation of various calcium compounds for increasing the shelf life of ber. *Indian J. Agric. Res.,* **21**(2): 65-70.

Jayachandran, K.S., Srihari, D. and Reddy, Y.N. (2005). Pre-harvest spray of different sources of calcium to improve the shelf life of guava. *Indian J. Hort.,* **62**(1): 68-70.

Lakshmana and Reddy, T.V. (1999).Effect of pre-harvest foliar application of calcium on the post harvest behavior of sapota cv. KALIPATTI FRUITS. *South Indian Hort*., **47**(1-6): 147-148.

Roychoudhury, R., Kabir, J., Dutta Ray, S.K. and Dhua, R.S. (1992). Effect of calcium on fruit quality of litchi. *Indian J. Hort.,* **49** (1): 27-30.

Saran, P.L., Lal, G., Jat, R.J. and Singh, R.V. (2004). Effect of pre-harvest foliar application of different chemicals on shelf life and quality of Ber (*Zizyphus mauritiana* Lamk) cv. GOLA. *Haryana J. Hort. Sci.,* **33** (1-2) : 71-73.

Siddiqui, S., Gupta, O.P. and Yamdagni, R. (1989) Effect of pre-harvest spray of chemicals on the shelf life of ber (*Zizyphus maritina* L.) fruit cv. UMRAN. *Haryana J. Hort. Sci*., **18** (3-4): 177-183.

****