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RESEARCH PAPER

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Effect of pre-harvest application of calcium compounds on chemical quality of guava fruits (*Psidium guajava* L.) cv. GWALIOR –27

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● ABSTRACT ●

The higher concentration of calcium nitrate 2% had improved the fruit quality evincing the highest TSS, reducing sugar, non reducing sugar, total sugars, ascorbic acid and pectin content, while recording the lowest titratable acidity in guava fruits. Thus highest level of calcium nitrate clearly improved the quality parameter of guava fruits under this study. Calcium nitrate 1% spray also improved the fruit quality traits in comparison to calcium chloride and control . The highest ascorbic acid and pectin content among all the treatments was recorded with 2% calcium nitrate which signifies positive role of calcium nitrate in improving the fruit quality.

KEY WORDS : Pre-harvest, Calcium compounds, Chemical quality, Guava

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● INTRODUCTION ●

Guava is one of the most important fruit trees grown in India. Comparative low cost of fruit production combined with high nutritive value makes it ideal desert fruit of the common man. In India, guava is cultivated in an area of 1.82 million hectares with annual production of 18.23 million tonnes. It occupies fifth position in terms of area and fourth position in terms of production amongst the fruits of India. (N.H.B. production profile, 2008). Total losses of fruits in India due to inadequate post-harvest handling, transportation and storage are estimated to be 10-15%. In terms of monetary value these losses worth more than Rs. 1200 corers annually. Guava fruits are highly perishable and their shelf life under ambient condition is 2 to 3 days on an average. The fruits of guava should be harvested carefully and brought quickly to packing house. Softening of fruits may be retarded and shelf life increased at ambient temperature by vacuum in filtration of packeted fruits in 10% calcium chloride (Ahlawat *et al.*, 1980). Calcium compounds are reported to have extended the shelf life of many fruits by maintaining their firmness and minimizing respiration rate, proteolysis disease incidence and tissue breakdown and thus reducing the loss in weight (Bramlage *et al.,* 1974 and Sharples and Jhonson, 1977).

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● MATERIALS AND METHODS ●

The experiment was carried out at Department of Horticulture and Food Science Laboratory, Jawaharlal Nehru Krishi Vishwa Vidhyalaya, College of Agriculture Gwalior (M.P) during the year 2002-2004. The experimental site is situated in the north of Madhya Pradesh and this tract enjoys sub-tropical climate with extreme of temperature both in summer (maximum temperature 47^0 C) as well as in winter (minimum 1^0 C). The frost is of rare occurrence but the cold waves are experienced from the middle of December up to end of January. The guava fruits were harvest at jelly making stage of maturity. Neither under ripe, nor over – ripe fruits were selected on the basis of uniformity in maturity, size and shape. The experiment was laidout in the Randomized Block Design with twenty treatments. All the treatments were replicated thrice and 25 fruits served as one unit of treatment in each replication. All the treatments were randomized separately in each replication.

Treatments: T_1- post –harvest dip in distilled water, T_2- 2.0% $CaCl_2$ post –harvest dip, T_3- 2.0% $Ca(NO_3)_2$ post – harvest dip, T_4- 500 ppm bavistin post – harvest dip, T_5- 1.0% $CaCl_2$ pre-harvest spray, T_6- 1.0% $CaCl_2$ pre-harvest spray and 2.0% $CaCl_2$ post – harvest dip, T_7- 1.0% $CaCl_2$ pre- harvest and 2.0% $Ca(NO_3)_2$ post-harvest dip, T_8- 1.0% $CaCl_2$ pre-harvest spray and 500

ppm bavistin post – harvest dip, T_9- 2.0% $CaCl_2$ pre-harvest spray, T_{10}- 2.0% $CaCl_2$ pre- harvest spray and 2.0% $CaCl_2$ post harvest dip, T_{11}- 2.0% $CaCl_2$ pre – harvest spray and 2.0% Ca $(NO_3)_2$ post harvest dip, T_{12}- 2.0% $CaCl_2$ pre-harvest spray and 500 ppm bavistin post harvest dip, T_{13}- 1.0% $Ca(NO_3)_2$ pre harvest spray, T_{14}- 1.0% $Ca(NO_3)_2$ pre- harvest spray and 2.0% $CaCl_2$ post-harvest dip, T_{15}- 1.0% $Ca(NO_3)_2$ pre – harvest spray and 2.0% Ca $(NO_3)_2$ post harvest dip, T_{16}- 1.0% $Ca(NO_3)_2$ pre- harvest spray and 500 ppm bavistin post – harvest dip, T_{17}- 2.0 % $Ca(NO_3)_2$ pre-harvest spray, T_{18}- 2.0% $Ca(NO_3)_2$ pre-harvest spray and 2.0% $CaCl_2$ post – harvest dip, T_{19}- 2.0% $Ca(NO_3)_2$ pre- harvest spray and 2.0 % $Ca(NO_3)_2$ post-harvest dip, T_{20}- 2.0% $Ca(NO_3)_2$ pre harvest spray and 500 ppm bavistin post-harvest dip.

Single spray of calcium compounds was carried out one month before harvesting with the help of foot sprayer using 0.1% teepol as surfactant, (Bhanja and Lenka, 1994). Harvesting of fruits were done one month after the pre-harvest spray of fruit and dipped for 2 minutes in the solution definite concentration of different chemicals. The total soluble solids (T.S.S.) of the fruit Juice was determined by using a Zeis refractormeter (A.O.A.C., 1990). Reducing sugars and total sugars estimated by colorimetric method of Nelson (1944).Ascorbic acid in fruit was estimated by 2,6 – dichloride phenol indophenol visual titration method (A.O.A.C.,1984). The pectin content was estimated with standard analytical procedure, and titratable acidity was estimated by simple acid-alkali titration method (A.O.A.C., 1984).

Table 1 : Effect of pre harvest spray of calcium compounds on total soluble solids and sugars content of fruits at harvesting time (Two year mean)

Treatments	Total soluble solids (TSS%)	Reducing sugars (%)	Non-reducing sugar (%)	Total sugar (%)
T_1	8.79	3.07	3.92	7.00
T_2	8.76	3.10	3.90	7.02
T_3	8.83	3.11	3.86	6.97
T_4	8.69	3.04	3.94	6.98
T_5	8.88	3.23	3.98	7.22
T_6	8.89	3.34	3.91	7.26
T_7	8.93	3.26	4.03	7.30
T_8	8.91	3.31	3.94	7.25
T_9	9.15	3.39	4.10	7.49
T_{10}	9.16	3.41	4.10	7.52
T_{11}	9.14	3.42	4.08	7.50
T_{12}	9.20	3.36	4.18	7.54
T_{13}	9.43	3.46	4.36	7.82
T_{14}	9.44	3.49	4.32	7.83
T_{15}	9.57	3.57	4.39	7.97
T_{16}	9.37	3.51	4.13	7.78
T_{17}	10.04	3.74	4.41	8.15
T_{18}	10.21	3.75	4.42	8.17
T_{19}	10.26	3.81	4.50	8.32
T_{20}	10.10	3.69	4.43	8.12
C.D. (P=0.05)	0.36	0.16	0.15	0.11
S.E. ± (d)	0.18	0.08	0.07	0.05
S.E. ±	0.13	0.05	0.05	0.03

● RESULTS AND DISCUSSION ●

The chemical composition of guava fruits notably improved with the application of calcium nitrate. Total soluble solids, reducing sugar non-reducing sugar, total sugars, titratable acidity ascorbic acid and pectin content exhibited the positive role of calcium nitrate in the quality trails of guava fruits.

Maximum TSS content (10.26%) was noted in T_{19} (2.0%$Ca(NO_3)_2$) followed by 10.21% in T_{18} and the minimum TSS content (8.69%) was noted in T_4 (control). There were no significant differences among T_{19}, T_{18},T_{17}, and T_{20} (Table 1) .

The highest reducing sugar content 3.81% was recorded in T19 (2.0%Ca $(NO_3)_2$, Followed by 3.75% in T_{18} and Lowest in T_4 (control) . There were no significant differences in the treatments T_{19}, T_{18} and T_{17}.Calcium compounds spray significantly influenced the non reducing sugar content of fruit by registering maximum content (4.50%) in treatment T_{19} followed by T_{20} (4.43%) and minimum (3.86%) in T_3 (control). The non reducing sugar contents of T_{19}, T_{20}, T_{18}, T_{17}, T_{15} and T_{13} did not differ significantly from each other.

Maximum total sugar content 8.32% was recorded in T_{19} (2.0% Ca $(NO_3)_2$ followed by 8.17% in T_{18} and Lowest 6.98% in T_3. Similary the total sugar content of T_{18}, T_{17} and T_{20}, also did not differ significantly from each other.

The maximum(0.42%) reduction in acidity (Table 2) was noticed in T_{19} (2.0% Ca $(NO_3)_2$ followed by 0.43% in, T_{18} and 0.45% in T_{17}. Control (T_1) had the maximum acidity 0.70%, while it was lowest 0.42% in T_{19}. Highest reduction in acidity was with 2% Calcium nitrate followed by 1.0% calcium nitrate, 2% calcium chloride and 1% calcium chloride in comparison to control. Application of calcium compounds increased vitamin "C" as ascorbic acid content of guava fruit was significant over control. The maximum ascorbic acid (244.04 mg) was recorded in treatment T_{17} (2% calcium nitrate) followed by T_{19} (243.28mg) , T_{18} (241.57mg) and T_{20} (239.28mg) as against T_4 (174.77 mg) with control .

Table 2 : Effect of pre harvest spray of calcium compounds on titratable acidity, ascorbic acid and pectin content of fruits at harvesting time. (Two year mean)

Treatments	Titratable acidity (%)	Ascorbic acid content (mg/100g pulp)	Pectin content (%)
T_1	0.70	179.35	0.794
T_2	0.69	178.05	0.768
T_3	0.70	178.01	0.822
T_4	0.69	174.77	0.796
T_5	0.63	204.32	0.880
T_6	0.63	204.88	0.856
T_7	0.62	191.31	0.920
T_8	0.62	198.13	0.885
T_9	0.59	220.55	0.962
T_{10}	0.58	215.65	0.986
T_{11}	0.59	222.39	0.980
T_{12}	0.57	219.40	1.010
T_{13}	0.50	230.92	1.082
T_{14}	0.50	229.35	1.098
T_{15}	0.49	237.91	1.122
T_{16}	0.50	233.20	1.075
T_{17}	0.45	244.04	1.154
T_{18}	0.43	241.57	1.180
T_{19}	0.42	243.28	1.225
T_{20}	0.46	239.70	1.176
C.D. (P=0.05)	0.03	26.45	0.08
S.E $\pm$	0.02	13.29	0.04
S.E $\pm$ (m)	0.01	9.40	0.02

Post harvest spray of calcium nitrate recorded much higher level of pectin content than calcium chloride pre-harvest spray . Maximum pectin content of 1.225% was recorded in T_{19} (2% calcium nitrate) followed by T_{18} and T_{20}. The minimum 0.822% in T_3 followed by T_4 and T_1.

The higher concentration of calcium nitrate 2% recorded improved fruit quality evincing the higher TSS, reducing sugar, non reducing sugar, total sugars, ascorbic acid and pectin content while recording the lowest titratable acidity in guava fruits . Thus highest level of calcium nitrate clearly improved the quality parameters of guava fruits under this study .

Calcium nitrate 1 % spray also improved the fruit quality traits in comparison to calcium chloride and control . The highest ascorbic acid and pectin content among all the treatments was recorded with 2 % calcium nitrate which signified positive role of calcium nitrate in improving the fruit quality.

The acids under the influence of chemicals night have either been fastly converted in to sugars and their derivatives by the reactions involving reversal of glycol tic pathway or might have been used in respiration or both. Increase in vitamin "C" content under calcium nitrate treatments may be due to uninterrupted synthesis of its precursor like glucose -6 phosphate during conversion of starch in to various sugars and low rate of oxidation. Rajput *et al.*(1977), Biswas *et al.* (1988), Brahmachari *et al.* (1997) also emphasized useful role of calcium nitrate in the improvement of fruit quality of guava. Singh *et al.* (1998) reported similar finding in mango.

● LITERATURE CITED ●

Ahlawat, V.P., Yamdagni, R. and Jindal, P.C. (1980). studies on the effect of post – harvest treatments on storage behavior of guava (*Psidium guajava* L.) cv. SARDAR, *Haryana agric. Univ. J. Res.,* 1 (2) : 49-51.

A.O.A.C. (1984). *Official methods of analysis.* Association of official Agriculture chemists. Washington , D.C.

A.O.A.C. (1990). *Official methods of analysis.* Association of official Agriculture chemists. Washington, D.C.

Bhanja, P.K. and Lenka, P.C. (1994). Effect of pre and post harvest on storage life of Sapota fruits cv. OVAL. *Orissa J. Hort.,* **22** (1-2) : 54-57.

Biswas, B.S., Ghosh, S.K., Ghosh, B. and Mitra, S.K. (1988). Effect of growth substances on fruit weight, size and quality of guava cv. L-49. *Indian Agriculturist,* **32** (4) : 245-248.

Brahmachari, V.S., Kumar, Nuresh and Kumar, Rajesh (1997). Effect of foliar feeding of calcium potassium and growth substances on yield and quality of guava (*Psidium guajava* L.). *Haryara J. Hort. Sci.,* **26** (3-4): 169-173.

Bramlage, W.J., Draka, M. and Baker, J.H. (1974). Relationship of calcium content to respiration and post – harvest conditions of apple. *J. American Sci. Hort. Sci.*, **97**: 379-378.

Nelson, N. (1944). A Photometric adoption of the Somogui method for the determination of glucose. *J. Bio. Chem.,* **153** : 375-380.

Rajput, C.B.S., Singh, S.N. and Singh, N.R. (1977). Effect of certain plant growth substance and calcium in guava. *Haryana J. Hort. Sci.*, **6** (3/4) : 117-119.

Sharples, R.O. and Johanson, D.S. (1977). The influence of calcium on senescence change in apple. *Ann. Appl. Biol.*, **85** : 450-453.

Singh, S., Brahmachari, V.S. and Jha, K.K. (1998). Effect of calcium and polythene warping on storage life of mango. *Indian J. Hort.,* **55** (3) 218-222

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