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Effect of Post Harvest Treatments on Shelf life and quality of (*Syzygium cuminii* Skeels) Cv. Local

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ABSTRACT

The present experiment was conducted at Department of Horticulture, Junagadh during 2015 to determine the effect of post harvest treatments on shelf life and quality of jamun (*Syzygium cuminii* Skeels.) cv. Local. Six post-harvest treatments were given as T_1-GA_3@ 50 mg/l, T_2-GA_3@ 100 mg/l, T_3-$CaCl_2$@ 1 %, T_4-$CaCl_2$@ 1.5 %, T_5-$Ca(NO_3)_2$ @ 1.5 % and T_6-Control (water). The fruits treated with $CaCl_2$@ 1.5 % significantly reduced physiological loss in weight, spoilage loss and late days to shrivelling initiation, maximum firmness and marketable fruits.

INTRODUCTION

The Jamun (*Syzygium cuminii* Skeels) belonging to family myrtaceae is a nutritious fruit with a variety of uses. It is one of the most hardy fruit crops and can easily be grown in neglected and marshy areas, where other fruits plants cannot be grown successfully. The fruit is good source of iron, sugars, minerals, protein, and carbohydrate etc. Fully ripened fruits are eaten as fresh fruit, and can be processed into beverages like jelly, jam, squash, wine, vinegar, and pickles. A little quantity of jamun fruit's syrup is much useful for curing the diarrhoea. Small jamun fruits, which are not suitable for table use, can be used in the beverage industry as they contained a high amount of acidity, tannins and anthocyanins (Anon 1986).Jamun seeds contain alkaloids like jambosin and glycoside, which reduce the diastatic conversion of starch into sugars. Fruits are used in the treatment of diabetes. Oral administration of an aqueous jamun seed extract for 6 weeks caused significant decreases in lipids, thiobarbituric acid reactive substances and increased catalase and superoxide dismutase in the brain of diabetic rats. Leaf extract of jamun reduces the radiation induced DNA damage in the cultured human peripheral blood lymphocytes. (Prince et al. 2003).

Jamun fruits are highly perishable, ripen fast during summer and become un-consumable very soon. The abundant supply of jamun fruits in the market from the majority of orchard takes place in a short span which causes glut in the market thereby, causing reduction in price. This leads to loss in returns to orchardist. Various plant growth regulators and chemicals have been used to delay ripening, reduce losses to improve and maintain color and quality by slowing down the metabolic activities of fruit which ultimately leads to an increased shelf life and maintain the quality marketability of the fruit for a longer period. The main objective was to study the effect of different treatments on shelf life extension and quality of jamun (*Syzygium cuminii* Skeels) Cv. Local

MATERIALS AND METHODS

Mature fruits with uniform size and shape were selected. The experiment was conducted

during the year 2015 with C.R.D. The experiment consist of six treatments. *i.e.* T_1-GA_3@ 50 mg/l, T_2-GA_3@ 100 mg/l, T_3-$CaCl_2$@ 1 %, T_4-$CaCl_2$@ 1.5 %, T_5-$Ca(NO_3)_2$ @ 1.5 % and T_6-Control (water). The fruits were dipped for 10 minutes. Treated fruits were packed without wrapping in Corrugated Fibre Board (CFB) Boxes and stored in the laboratory at room temperature. For determination of loss in weight and spoiled fruits % for fruits from each treatment were marked. 1st, 2nd, 3rd and 4th day of storage for jamun, loss in weight was expressed on percentage basis (on the basis of original weight of fruits).

$$\text{Per cent loss in weight} = \frac{\text{Initial weight–Final weight}}{\text{Initial weight}} \times 100$$

$$\text{Spoilage (\%)} = \frac{\text{Number of rotten fruits}}{\text{Total number of fruits}} \times 100$$

Shriveling initiation (Days) each fruits was thoroughly scrutinized for any visible symptoms of wrinkling and considered as days taken for shriveling. Firmness (kg cm^{-2}) was measured three times by penetrometer and made average value and expressed as kilogram per centimeter square (kg cm^{-2}). Marketable fruit (%) was marketed were counted and expressed as marketable fruit percentage over the total number of fruits at a certain days of interval.

RESULTS AND DISCUSSION

Physiological loss in weight (%)

The physiological loss in weight of guava is influenced by variouspost-harvest treatmentsand were recorded in percentage on1st, 2nd, 3rd and 4th day after storage are presented in Table 1.

Treatment (T_4) $CaCl_2$ @ 1.5 % recorded significantly the lowest physiological loss in weight (6.08, 11.54, 18.04 and 22.32 %) on1st, 2nd, 3rd and 4th day of storage respectively. which was at par with T_3 (18.29 %) on 3rd day. The maximum physiological loss in weight was recorded in treatment (T_6) i.e. control(11.23, 17.12, 26.35 and 34.65 %). at 1st, 2nd, 3rd and 4th day of storage, respectively.

Spoilage loss (%)

The mean data on per cent spoilage loss as influenced by various post-harvest treatments were recorded at 1st, 2nd, 3rd and 4th day after storage are presented in Table 2.

Treatment (T_4) $CaCl_2$ 1.5% recorded significantly the lowest spoilage loss (3.85, 6.34, 24.65 and 34.85 %) at 1st, 2nd, 3rd and 4th day after storage, respectively. which was at par with T_3 (25.06 %) on 3rd day. Control (T_6) recorded the maximum per cent spoilage loss (9.86, 11.50, 37.26 and 47.18 %) at 1st, 2nd, 3rd and 4th day after storage, respectively.

Days to shriveling initiation (Days)

The mean data on days to shriveling initiation as influenced by various post-harvest treatments were recorded at 1st, 2nd, 3rd and 4th day after storage are presented in Table 3.

Table 1. Effect of post-harvest treatments on physiological loss (%) in weight during storage of jamun i.e. (*Syzygium cuminii* Skeels) Cv. Local

Treatments	Physiological loss in weight (%)			
	1st Day	2nd Day	3rd Day	4th Day
T_1- GA_3@ 50 mg/l	8.34	15.86	25.13	30.85
T_2-GA_3@ 100 mg/l	7.64	12.93	22.63	27.96
T_3- $CaCl_2$@1 %	6.53	11.83	18.29	22.83
T_4- $CaCl_2$@ 1.5 %	6.08	11.54	18.04	22.32
T_5- $Ca(NO_3)_2$ @1.5 %	7.91	12.32	20.74	24.71
T_6- Control(Water treatment)	11.23	17.12	26.35	34.65
S.Em. (±)	0.08	0.09	0.22	0.27
C. D. at 5%	0.24	0.28	0.67	0.81
C. V. %	2.03	1.40	2.08	2.01

Table 2. Effect of post-harvest treatments on spoilage loss (%) during storage of jamun (*Syzygium cuminii* Skeels) Cv. Local

Treatments	Spoilageloss (%)			
	1st Day	2nd Day	3rd Day	4th Day
T_1- GA_3@ 50 mg/l	6.93	11.02	36.58	45.76
T_2-GA_3@ 100 mg/l	6.02	10.62	26.06	37.59
T_3- $CaCl_2$@1 %	4.84	9.14	25.06	36.19
T_4- $CaCl_2$@ 1.5 %	3.85	6.34	24.65	34.85
T_5- $Ca(NO_3)_2$ @1.5 %	5.51	9.78	26.05	38.12
T_6- Control(Water treatment)	9.86	11.50	37.26	47.18
S.Em. (±)	0.14	0.16	0.31	0.31
C. D. at 5 %	0.44	0.49	0.93	0.94
C. V. %	4.84	3.45	2.15	1.59

Table 3. Effect of post-harvest treatments on days to shriveling initiation (Days) during storage of jamun (*Syzygium cuminii* Skeels) Cv. Local

Treatments	Days to shrivelinginitiation (Days)
T_1- GA_3@ 50 mg/l	1.50
T_2-GA_3@ 100 mg/l	2.25
T_3- $CaCl_2$@1 %	2.75
T_4- $CaCl_2$@ 1.5 %	3.25
T_5- $Ca(NO_3)_2$ @1.5 %	2.65
T_6- Control(Water treatment)	1.00
S.Em. (±)	0.10
C. D. at 5 %	0.31
C. V. %	9.56

The data pertaining to days to shriveling initiation (Days) at 1st, 2nd, 3rd and 4th day after storage were observed and found significantly influenced by various post harvest treatments. Treatment T_4 ($CaCl_2$ 1.5 %) recorded significantly the late shriveling initiation (3.25 days) after storage compared to rest of the treatments. Control (T_6) recorded early shriveling initiation (1.00 day) after storage.

Firmness (kg cm^{-2})

The mean data on firmness as influenced by various post-harvest treatments were recorded at 1st, 2nd, 3rd and 4th day after storage are presented in Table 4.

Firmness at 1st, 2nd, 3rd and 4th day after storage was significantly influenced by different post-harvest treatments. Treatment T_4 ($CaCl_2$ 1.5%) recorded significantly, the best firmness (3.95, 2.73, 1.93 and 1.03 kg cm^{-2}) at 1st, 2nd, 3rd and 4th day after storage, respectively, which was at par with T_1 (2.43); T_2(1.73) and T_3 (1.80); T_1 (0.93) and T_3 (0.95) on 2nd, 3rd and 4th day, respectively.

Marketable fruits (%)

The observations were recorded on per cent marketable fruits as influenced by various post harvest treatments and noticed significantly influenced at 1st, 2nd, 3rd and 4th day after storage are presented in Table 5.

Table 4. Effect of post-harvest treatments on firmness ($kgcm^{-2}$) during storage of jamun *(Syzygium cuminii Skeels)* cv. Local

Treatment	Firmness(kg/cm^2)			
	1st Day	2nd Day	3rd Day	4th Day
T_1- GA_3@ 50 mg/l	3.48	2.43	1.70	0.93
T_2-GA_3@ 100 mg/l	3.35	2.18	1.73	0.90
T_3- $CaCl_2$@1 %	3.50	2.33	1.80	0.95
T_4- $CaCl_2$@ 1.5 %	3.95	2.73	1.93	1.03
T_5- $Ca(NO_3)_2$ @1.5 %	3.30	2.28	1.58	0.83
T_6- Control(Water treatment)	2.70	2.10	1.00	0.70
S.Em. (±)	0.12	0.10	0.07	0.03
C. D. at 5%	0.38	0.30	0.22	0.11
C. V. %	7.62	8.78	9.45	8.91

Table 5. Effect of post-harvest treatments on marketable fruits (%) during storage of jamun *(Syzygium cuminii Skeels)* Cv. Local

Treatments	Marketable fruits (%)			
	1st Day	2nd Day	3rd Day	4th Day
T_1- GA_3@ 50 mg/l	89.50	84.75	59.25	48.75
T_2-GA_3@ 100 mg/l	90.25	85.50	69.75	59.50
T_3- $CaCl_2$@1 %	92.25	85.75	69.50	60.75
T_4- $CaCl_2$@ 1.5 %	94.75	90.00	70.25	63.25
T_5- $Ca(NO_3)_2$ @1.5 %	92.00	86.75	68.25	59.25
T_6- Control(Water treatment)	86.50	80.25	58.75	50.25
S.Em. (±)	0.50	0.66	0.45	0.42
C. D. at 5%	1.49	1.98	1.34	1.25
C. V. %	1.11	1.56	1.37	1.48

Treatment T_4 ($CaCl_2$ 1.5%) recorded significantly the maximum marketable fruits (94.75, 90.00, 70.25 and 63.25 %) at 1st, 2nd, 3rd and 4th day after storage, respectively as compare to rest of the post harvest treatments, which was at par with T_2 (69.75) and T_3 (69.50) on 3rd day. Control (T_6) recorded the minimum marketable fruits (86.50, 80.25, 58.75 and 50.25 %) at 1st, 2nd, 3rd and 4th day after storage, respectively.

DISCUSSIONS

Treatment T_4 ($CaCl_2$ 1.5 %) recorded significantly the lowest physiological loss in weight (6.08 %, 11.54 %, 18.04 % and 22.32 %) at 1st, 2nd, 3rd and 4th day after storage respectively as compared to rest of the post harvest treatments. This might be due to the role of calcium on limiting respiration, which was attributed to altered membrane permeability (Bangerth 1979) in grape. Bangerth et al. (1972) stated that calcium could have reduced the endogenous substrate catabolism during respiration by limiting the diffusion of substrate from the vacuole to the cytoplasm and favoured the uptake of sorbitol, thus disallowing its involvement in reactions related to internal breakdown in apple.

Treatment T_4 ($CaCl_2$ 1.5%) recorded significantly the lowest spoilage loss (3.85 %, 6.34 %, 24.65 % and 34.85 %) at 1st, 2nd, 3rd and 4th day after storage as compared to rest of the post harvest treatments. The reduction in fruit spoilage with the application of calcium may possibly be due to its effect on firmness of fruit tissue by

retarding rate of respiration and preventing cellular disintegration by maintaining synthesis, which leads to delayed senescence reported by Singh et al. (1993). The results obtained in present study are supported by the findings of several researchers, Chundawat et al. (1976) in guava and Scott and Wills (1975) in apples.

Treatment T_4 ($CaCl_2$ @ 1.5%) recorded significantly the late days to shriveling initiation (3.25 days) after storage as compared to rest of the post harvest treatments because of additional contributory strength of cell wall. Irrespective of in vivo calcium content of tissue cell wall, substantially increased concentration might have provided additional strength facilitating delayed degradation followed by increased permeability of cell wall. The net result of such type of intermediary modified structural features of cell wall might have suppressed the metabolic activities in the rind portion and rest of the constituent morphological parts of whole fruit (Santosh et al. 2002) in mango. Similar findings were reported by Singh et al. (2000) in litchi.

Treatment T_4 ($CaCl_2$@ 1.5%) recorded significantly the highest firmness (3.95, 2.73, 1.93 and 1.03 $kgcm^{-2}$) at 1^{st}, 2^{nd}, 3^{rd} and 4^{th} day after storage respectively as compared to rest of the post-harvest treatments. Decrease in fruit firmness during storage is presumably due to change in cell wall polysaccharides. Similar results were obtained by Kalra and Tandon (1984) in mango.

Treatment T_4($CaCl_2$ 1.5%) recorded significantly the maximum marketable fruits (94.75 %, 90.00 %, 70.25 % and 63.25 %) at 1^{st}, 2^{nd}, 3^{rd} and 4^{th} day after storage respectively as compared to rest of the post harvest treatments. This might be due to the unsealing of lenticels that are responsible for higher rate of transpiration and respiration, which are subjected to the physiological activities. This finding was in line with Haribabu et al. (1990) in custard apple.

CONCLUSION

It is concluded that post-harvest treatment of jamun fruits with $CaCl_2$ @1.5 % significantly reduced physiological loss in weight, spoilage loss and late days to shrivelling initiation, maximum firmness and marketable fruits.

REFERENCES

Anonymous 1986 Research Highlight, 1985, ICAR, New Delhi. 27p.

Bangerth F, Dilley DR and Dewey DH 1979 Effect of post harvest calcium treatment on storage behaviour of grape cv. Perlette. *J Res Haryana Agric Uni. Hissar* 10(2):204-206.

Bangerth F, Dilley DR and Dewey DH 1972 Effect of post-harvest calcium treatments on internal breakdown and respiration of apple fruits. *J Amer Soc Hort Sci* 87: 679-682.

Chaundawat BS, Singh J P, Kainsa RL and Gupta OP 1976. Post harvest studies on guava fruits- I, Effect of packing and storage period on quality of the fruits. *Haryana J. Hort. Sci.*,5 (3-4): 130-136.

Haribabu K, Zaheeruddin MD and Prasad PK 1990 Studies on post harvest storage of custard apple fruits (*Annona squamosa* L.). *Acta Hort*. 269: 299.

Kalra SK and Tandon DK 1984 Regulation of ripening of mango cv. Mallika. *Indian J. Hort.*, 40(3-4): 155-159.

Prince PSM, Kamalakkanan N and Menon VP 2003 *Syzygium cuminii* Skeels. Seed extract reduce tissue damage in diabetic rat brain. *J Anthropology* 84:205-209.

Santosh AF, Silva SM, Mendonca RMN, Alves RE and Martins LP 2002 Storage of mango fruits Cv. Rosa treated with $CaCl_2$ after harvested different maturity stages. *Proc. of VII International mango symposium*, Brazil.Pp. 80-85.

Scott KJ and Wills RBH1975 Post harvest application of calcium as a control of storage break down of apples. *Hort Sci* 10: 75-76.

Singh BP, Tandon DK and Kalra SK1993 Changes in post-harvest quality of mangoes affected by pre-harvest application of calcium salts. *Scientia Horti* 54: 211-219.

Singh JN, Pinki Acharyya and Singh BB2000 Effect on GA_3 and plant extracts on storage behavior of mango *(Mangifera indica L.)* Cv. Langara. *Haryana J Hort Sci* 29(3-4): 199-200.