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Effect of post harvest treatments on quality of *Jamun* (*Syzygium cuminii* Skeels) fruits during storage

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Abstract : An investigation was carried out at Department of Horticulture, B. A. College of Agriculture, Anand Agricultural University, Anand during month of June, 2009 to see the effect of post harvest treatments on quality of *Jamun* fruits. The *Jamun* fruits were treated with growth regulators GA_3 (50 and 100 ppm), chemical $CaCl_2$ (1.0 and 1.5%) and Paraffin wax along with control and kept in with or without perforated polyethylene bag. The experiment was carried out in Completely Randomized Block Design (Factorial) with twelve treatments and replicated thrice. Among these, treatment of $CaCl_2$ 1.5 per cent with perforated polyethylene bag proved to be the best post harvest treatment than the rest of the treatments. The treatment effectively reduced the physiological loss in weight as well as spoilage loss and thereby useful in maintaining good balance between ascorbic acid and sugar content of fruits during storage. The treatment also showed little change in TSS, pH and acidity content and hence, it can be useful in post harvest management of *Jamun* fruits.

Key words : *Jamun*, GA_3, $CaCl_2$, Paraffin wax, Perforated polyethylene bag

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The *Jamun* (*Syzygium cuminii* Skeels) 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. Fruits are used as an effective medicine against diabetes, heart and liver trouble (Singh, 2001). Leaf extract of *Jamun* reduces the radiation induced DNA damage in the cultured human peripheral blood lymphocytes (Prince *et al.*, 2003). Therefore, the *Jamun* fruits are having high value in terms of therapeutic and nutrition.

The role of plant growth regulators in various physiological processes such as seed germination, flowering, fruiting, seed development, fruit ripening and yield etc. in different crop plants is well established. The plant growth regulators are known to regulate and modify various physiological processes within the plant. Use of gibberallic acid (GA_3) and $CaCl_2$ are effective as a post harvest treatments and used on large scale in a number of fruits. GA_3 acts as antisenescent agent and thereby enhance the shelf-life of fruits. While chemical $CaCl_2$ extends the storage life of fruits by maintaining their firmness and minimizing the rate of respiration, protein breakdown and rotting incidence (Bangerth *et al.*, 1972, Scott and Wills, 1975).

RESEARCH METHODS

The present investigation was carried out at Department of Horticulture, B.A. College of Agriculture, Anand Agricultural University, Anand in Completely Randomized Block Design (Factorial) with three replications during June, 2009. Total twelve treatments consisted of GA_3 (50 and 100 ppm), $CaCl_2$ (1.0 and 1.5 %) and Paraffin wax along with control and kept in with and without perforated polyethylene bag were taken for the studies.

The healthy, undamaged and uniform size fruits were obtained from twenty year old *Jamun* tree cv. PARAS. The treatments of GA_3 and $CaCl_2$ were given by dipping

method (For two minutes).

The fruits were examined every day for physiological loss in weight and spoilage loss, while chemical parameters *viz*., TSS, pH, acidity, ascorbic acid, reducing sugar and non reducing sugar were taken at 1st and 4th day of storage. The data recorded on physiological and biochemical parameters were analyzed statistically using various techniques as described by Snedecor and Cochran (1980).

RESEARCH FINDINGS AND DISCUSSION

The experimental results revealed that the physiological and biochemical attributes were significantly influenced due to application of $CaCl_2$, gibberallic acid and paraffin wax. The application of $CaCl_2$ significantly proved to be best as post-harvest treatment for reduction in physiological loss in weight as well as spoilage loss and thereby useful in maintaining good balance between vitamin C and sugar contents of fruits during storage. Fruits treated with this treatment showed little change in TSS, pH and acidity content as compared to control.

The treatment of $CaCl_2$ 1.5 per cent with perforated polyethylene bag recorded significantly minimum physiological loss in weight (5.48%), spoilage loss (8.97%), TSS (13.95%), acidity (0.52%), reducing sugar (10.96%), non reducing sugar (2.89%) and total sugar (13.98%) over control and it was at par with treatment $CaCl_2$ 1.0 per cent with perforated polyethylene bag (Table 1). This may be due to the role of calcium on limiting respiration, which was attributed to altered membrane permeability (Bangerth *et al.,* 1979). 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. The increase in reducing sugar and total sugar due to calcium treatments was also reported in cherry fruits (Bhat *et al.,* 1997). The less increment in sugar contents during storage by the treated fruits was due to less weight loss that caused less dehydration of the fruits (Khader *et al.,* 1988, Kumar and Nath, 1993 and Dhemre and Wasker, 2003).

Similarly the treatment of $CaCl_2$ 1.5 per cent with perforated polyethylene bag recorded significantly maximum ascorbic acid (25.33%) as compared to control. During the storage, oxidizing enzymes like ascorbic acid oxidase, peroxidase, catalase and polyphenol oxidase might be decreased in ascorbic acid of the fruits (Singh *et al.,* 2005). The activities of oxidizing enzymes might be reduced due to proper packaging of fruits which resulted in higher level of ascorbic acid content up to last day of storage. This finding is in agreement with those of Singh

Table 1: Effect of post harvest treatments during storage on quality of Jamun (*Syzygium cuminii* Skeels) fruits

Treatments	Physiological loss in weight (%)	Spoilage loss (%)	Total soluble solid (%)	pH	Acidity (%)	Ascorbic acid (%)	Reducing sugar (%)	Non reducing sugar (%)	Total sugar (%)
T_1 - GA_3 : 50 ppm + PP	13.14	14.22	14.43	4.07	0.58	24.59	12.01	3.13	15.00
T_2 -GA_3 : 100 ppm + PP	11.13	12.82	14.08	4.07	0.57	24.90	11.85	2.98	14.77
T_3 - Paraffin wax + PP	10.90	12.33	14.05	4.03	0.55	25.11	11.61	2.94	14.50
T_4 - $CaCl_2$ 1% + PP	10.30	10.45	14.03	4.03	0.53	25.32	11.35	2.91	14.30
T_5 - $CaCl_2$ 1.5% + PP	5.48	8.97	13.95	4.03	0.52	25.33	10.96	2.89	13.98
T_6 - PP (Control)	13.93	16.17	14.62	4.08	0.58	23.77	12.28	3.16	15.43
T_7 - GA_3 : 50 ppm	20.08	25.10	16.72	4.13	0.68	22.53	13.01	3.61	16.72
T_8 - GA_3 100 ppm	17.79	20.32	15.65	4.12	0.67	22.93	12.85	3.56	16.45
T_9 - Paraffin wax	17.53	19.26	15.23	4.12	0.66	23.04	12.58	3.48	16.22
T_{10} - $CaCl_2$ 1%	14.84	18.84	15.17	4.10	0.63	23.46	12.55	3.31	15.93
T_{11} - $CaCl_2$ 1.5%	14.48	17.44	15.10	4.10	0.62	23.77	12.36	3.24	15.73
T_{12}- Control (without any chemical)	22.33	26.16	16.75	4.13	0.70	22.41	13.43	3.69	16.75
C.D. (P- 0.05)									
Days(D)	0.04	0.05	0.05	0.01	0.00	0.08	0.02	0.01	0.03
Treatments(T)	0.08	0.10	0.12	0.03	0.00	0.19	0.06	0.03	0.07
DXT	0.15	0.19	0.17	0.04	0.01	0.27	0.09	0.04	0.10
C.V.%	1.84	1.96	1.91	1.73	1.61	1.98	1.22	2.20	1.13

Note: PP = Perforated Polyethylene bag

et al. (2005), Venkataratnam (1988a,b) and Shivaram Reddy and Thimmaraju (1989) in aonla, pomegranate, fig and mango fruits, respectively. The ascorbic acid content was increased with increase in storage period. At 4th day of storage, maximum ascorbic acid content was recorded in the fruits treated with calcium chloride. It might be due to the application of various PGRs and calcium compounds which retarded the oxidation process and hence the rate of conversion of L-ascorbic acid into dehydro ascorbic is slowed down. These results are in conformity with the findings of Gupta and Mehta (1988) in ber.

From the above findings, it can be concluded that application of $CaCl_2$ at 1.5 per cent as dipping of fruits for 2 minutes can be used for the post harvest storage of *Jamun* fruits.

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