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*Research Note :*

# EFFECT OF POST HARVEST APPLICATION OF CALCIUM CHLORIDE ON STORAGE LIFE OF MANGO VAR. DUSHEHARI FRUITS

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**ABSTRACT:** An experiment was conducted to assess the effect of post-harvest application of Calcium Chloride on the storage life of mango (*Mangifera indica* L.) var. Dushehari fruits. The fully mature mango fruits were harvested and treated with different concentrations of $CaCl_2$ viz. 0%, 2%, 4%, 6% and 8% and stored for different days viz. 3, 6, 9, and 12 days at room temperature. The results showed that post-harvest application of Calcium Chloride(6%) had proved quite effective in enhancing the shelf life of Dushehari mango fruits up to 12 days at room temperature.

***Keywords:*** *Calcium chloride, Dushehari, mango, post-harvest, storage life.*

Mango (*Mangifera indica* L.), belonging to family Anacardiaceae, is the national fruit of india and rightly known as the "King of fruits" owing to its attractive colour, excellent taste, exotic flavour, exemplary nutritive value and its delicacy for the table of rich as well as food for million of poor people during summer. In India, it is occupying an area of 2312.30 thousand hectare, with an annual production of 15026.70MT (Anon., 2). Owing to lack of information on appropriate post harvest treatments and storage environments, the fruits not only lose their quality but also encounter a substantial post-harvest loss. The research efforts has helped to increase the production of mango fruit but the purpose of obtaining maximum profit will not be served unless the increased production is supplemented with similar efforts to minimize their post-harvest losses which range between 30-40 per cent (Salunkhe and Desai, 12).

Though postharvest quality of a produce after harvest cannot be improved, it is possible to reduce the rate of quality loss. Surface treatments delay physiological decay in fruit tissues, stabilize the fruit surface and prevent degradation that affect the quality of the product (Akhtar *et. al*., 1). Calcium ($Ca^{2+}$) has been extensively reviewed as both an essential element and its potential role in maintaining postharvest quality of fruit and vegetable crops. The role of calcium in stabilizing cellular membranes and delaying senescence in horticultural crops is well known (Poovaiah *et. al*., 10). Pre and postharvest application of calcium may delay senescence in fruits with no detrimental effect on consumer acceptance (Lester and Grusak, 6).

In recent years, significant advances have been made in fruit storage by the use of Calcium Chloride dipping alone or combined with other treatments. Therefore, in present study different concentrations of Calcium chloride salts were used to ascertain their effects on delaying the ripening and eating quality of mango fruits.

The present study was conducted to investigate the effect of post-harvest application of Calcium Chloride on the storage life of mango (*Mangifera indica* L.) var. Dashehari fruits at PAU, Regional Research Station, Gurdaspur during the years 2006-2011. Fully mature green fruits were harvested in the 2nd week of July in the evening and next morning these were cleaned with a cloth. The fruits were treated with 0%, 2%, 4%, 6% and 8%

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**Table 1: Effect of post-harvest application of Calcium Chloride on the storage life of mango (*Mangifera indica* L.) var. Dushehari fruits**

| Treatment $CaCl_2$ (%) | Physiological loss in weight (PLW) % | | | | TSS% | | | | Colour | | | | Acidity% | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Dasy | 3 | 6 | 9 | 12 | 3 | 6 | 9 | 12 | 3 | 6 | 9 | 12 | 3 | 6 | 9 | 12 |
| 0 | 3.92 | 7.67 | 11.41 | 22.49 | 16.40 | 18.30 | 19.30 | 15.20 | 2.70 | 5.00 | - | - | 0.27 | 0.20 | 0.14 | 0.10 |
| 2 | 3.20 | 6.72 | 10.33 | 18.66 | 16.10 | 17.80 | 18.50 | 16.70 | 2.50 | 3.50 | 4.70 | - | 0.26 | 0.25 | 0.16 | 0.13 |
| 4 | 3.15 | 6.40 | 10.17 | 18.51 | 16.10 | 17.70 | 18.10 | 16.60 | 2.00 | 2.50 | 4.50 | - | 0.27 | 0.25 | 0.17 | 0.14 |
| 6* | 2.80 | 4.80 | 8.53 | 15.33 | 15.80 | 17.30 | 18.90 | 17.90 | 2.00 | 2.50 | 3.50 | 4.50 | 0.34 | 0.28 | 0.22 | 0.17 |
| 8 | 2.81 | 4.82 | 8.73 | 15.46 | 15.50 | 17.20 | 18.70 | 17.80 | 2.00 | 2.50 | 3.00 | 4.50 | 0.27 | 0.26 | 0.16 | 0.15 |
| CD (P=0.05) | 0.33 | 0.24 | 1.25 | 0.77 | NS | 0.22 | 0.09 | 0.06 | - | - | - | - | 0.03 | 0.02 | 0.04 | 0.02 |

Calcium chloride solution by dipping for 10 minutes. In control (0%) treatment, the fruits were immersed in fresh water for 10 minutes. The fruits were stored for ripening at room temperature in wooden boxes lined and covered with newspaper. The data were recorded on physiological loss in weight (PLW) %, TSS%, acidity % and colour. The percent physiological loss in weight (PLW) of fruit was calculated on initial weight basis and expressed in per cent. The total soluble solids (TSS) of the fruit juice were determined using hand refracto-meter and expressed as per cent TSS after making the temperature correction at 20° C. The titrable acidity of the fruits was determined with standard method suggested by A.O.A.C.(3). The different Colour Scale were used to judge the colour of the fruits viz.1-Dark green, 2-Light green, 3-Green with yellow, 4-Yellow with green and 5-Yellow /over ripe. The data was analysed statistically with Completely Randomized Block Design (Singh *et. al.,*15).

**Physiological Loss in Weight ( PLW) :** The per cent PLW, in general, increased with the advancement in storage period rather slowly in the beginning but at a faster place as the storage period advanced (Table 1). During different storage interval periods, Calcium chloride (6%) treated fruits showed lowest weight loss, which ranged between 2.8 to 15.33% from 3 days to 12 days, respectively as compared to control where PLW ranged between 3.92 to 22.49 per cent during the same intervals. These results are similar to the results reported by Gangwar *et al.* (4) in aonla and Mahajan *et. al*. (7) in guava. Calcium application has been reported to be effective in terms of membrane functionality and integrity maintenance with lower losses of phospholipids and proteins and reduced ion leakage which could be responsible for the lower weight loss in plums (Lester and Grusak, 6). Favourable effects of Calcium chloride in reducing the PLW has also been reported in mango (Mootoo, 19).

**Total Soluble Solids (TSS):** The data revealed that in Calcium chloride treatments, the TSS content of mango fruits increased slowly and steadily up to 9 weeks of storage and thereafter declined gradually (Table 1). The fruits treated with Calcium chloride at 6% registered maximum TSS content (17.9%) up to two weeks of storage and this treatment was found to be significantly better as compared to other treatments. However, the second best treatment was found to be 8% calcium chloride. The control fruits recorded the lowest TSS content (15.20%). The increase in TSS during storage may possibly be due to hydrolysis of starch into sugars as on complete hydrolysis of starch no further increase occurs and subsequently a decline in these parameters is predictable as they along with other organic acids are primary substrate for respiration (Wills *et. al*., 15). The TSS increased upto 9 days of storage and gradually declined thereafter as compared to control fruits and gradual

decline thereafter, indicating the possible role of calcium in delaying metabolic activity of fruits during storage (Sam and Conway, 13). The results are in agreement with the findings of Kumar *et al.*, (5) and Mahajan *et. al*. (7) in guava.

**Acidity** : The acidity of mango fruits experienced a linear decline during storage period (Table 1). However, the loss of acidity during storage was more rapid and faster in control ,whereas it was gradual in case of Calcium chloride treated fruits. The lowest acid content (0.10%) was noticed in control, whereas the highest mean acid content (0.17%) was observed in the fruits treated with Calcium chloride @ 6% treatment. The decrease in titrable acids during ripening and storage may be attributed to an increase in malic enzyme and pyruvate decarboxylation reaction during climacteric period (Rhodes *et. al.,*11). The fruits treated with Calcium chloride maintained higher acidity during storage probably due to delay in ripening process (Mahmud *et. al*., 8). Colour development of the fruit gradual increases as per colour scale with the storage. These findings are in accordance with findings of Kumar *et al.* (5) and Mahajan *et. al*. (7) in guava.

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