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Short communication

Enhancing keeping quality of fruits in mango cv. Langra

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Mango (*Mangifera indica* L.) like most of the other fruits is seasonal and perishable in nature. It is subjected to spoilage due to glut during peak harvesting season and rapid ripening process. Therefore, its immediate marketing and utilization is necessary. In order to have good returns and to avoid market glut, it becomes essential to store the fruits for phased selling. The main objective of storage of fruits is to check the rate of respiration, transpiration and microbial infection.

Plant growth regulators, certain chemicals and wax emulsions have been used for short term storage of fruits. Wax emulsion acts as barrier for transpiration from fruits and gaseous exchange between fruits and outside atmosphere (Shivarama Reddy and Thimmaraju, 11); Shaikh *et al*., 10). Khader *et al*. (6), and Khader (4) have reported that treatment of mango fruits with gibberellic acid reduces weight loss, ascorbic acid degradation and delays ripening during their storage. Similarly, use of calcium compounds to extend the storage life of fruits by minimizing weight loss, reduction in rate of respiration, transpiration and rotting percentage has been reported by Singh (13), and Singh *et al*. (14). The present investigation was therefore undertaken to compare the effect of wax emulsion, calcium nitrate and gibberellic acid on the keeping quality of mango cv. Langra.

Fresh and mature mango fruits of 'Langra' variety were washed in tap water, air-dried and treated with Benguard (0.05%) to control the fungal infection. Fruits were then dipped for 2 min. in aqueous solutions of wax emulsion (6%), calcium nitrate (1%), GA_3 (200 ppm) and water (control). Treated fruits were air-dried and 7 uniform size fruits were packed in polyethylene bags (size: 45 cm × 20 cm; thickness: 200 gauge) with 3 per cent area under perforations. The packed fruits were then stored under ambient conditions. During storage, the average maximum and minimum temperature was 36.15 and 27.08°C, respectively. While the average relative humidity as recorded was 53.8 per cent. One bag was kept as one unit, which was replicated 3 times for recording the observations of physiological loss in weight (PLW), rotting, TSS, acidity, total sugars and vitamin 'C' content, at 5 day intervals.

For determination of PLW, the initial weight of fruit was recorded prior to storage and subsequently at 5 day interval. The reduction in weight was expressed on percentage basis. For determination of spoilage, the number of spoiled fruits that cannot be marketed were counted and expressed on percentage over the total number of fruits at 5 day interval. For bio- chemical analysis, a representative sample was taken from each unit by cutting a slice of mesocarp and homogenizing it in a blender. Total soluble solids (TSS) was measured by Abbe's refractometer and expressed in percentage at 20°C. The acidity and ascorbic acid content of the sample was determined by titrometric method as described by Ranganna (7). The total sugars content was determined by colorimetric method using Anthrone reagent (Sadasivam and Manickam, 8). The fresh fruits were also analyzed for physic- chemical parameters before storing them.

The physiological loss in weight is mainly due to loss of moisture by transpiration and decomposition of carbohydrates due to ripening of these fruits. The PLW and spoilage were found to be minimum in fruits treated with wax emulsion (6%) followed by one per cent calcium nitrate (Figs. 1 & 2). Surface coating of wax emulsion partially close the stomatal openings and lenticels thereby reduces the rates of transpiration and respiration. The treatment with wax emulsion also reduces the microbial infection thus delay PLW and spoilage. The similar findings have also been reported in sapota (Sarkar *et al*., 9) and pineapple (Das and Medhi, 1).

It is also evident from the Table 2 that TSS and the total sugars of the fruits increased with the advancement of storage period, irrespective of treatments. This is possibly due to the hydrolysis of polysaccharides in to sugars and concentration of juice due to moisture loss. Similar findings have also been reported by Joshi and Roy (9) in 'Alphonso' mango. Among the treatments, six per cent wax emulsion remarkably improved the retention of original TSS and sugars over control and other treatments. It may be due to lowered rate of respiration, delayed ripening and consequently lower enzymatic breakdown of starch into sugars (Garg *et al*., 3).

At the end of the storage period maximum retention of acidity was found in the fruits treated with wax emulsion and GA_3 (200 ppm). This could possibly

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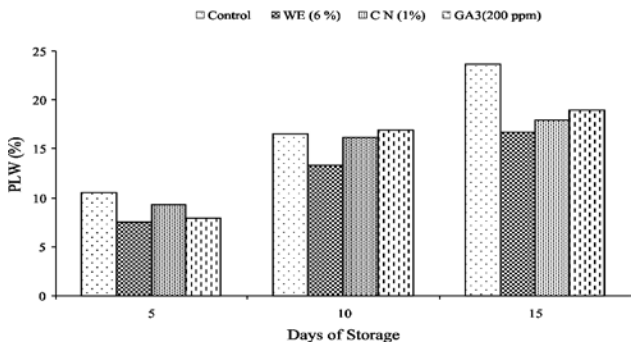

Fig. 1. Effect of post-harvest treatments on PLW (%) of mango fruits cv. Langra.

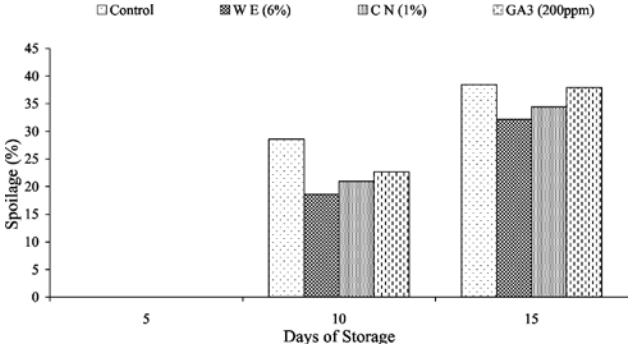

Fig. 2. Effect of post-harvest treatments on spoilage (%) of mango fruits cv. Langra.

Table 1. Physico-chemical characteristics of Langra mango fruits before storage.

Characteristics	Value
PLW (%)	0.0
Rotting (%)	0.0
TSS (%)	13.75
Acidity (%)	0.30
Ascorbic acid (mg/ 100 g pulp)	131.10
Total sugars (%)	11.58

be due to delayed climacteric peak, respiration and ripening. Similar findings have been reported in sapota (Sarkar *et al*., 9), and mango (Khader, 5).

With respect to vitamin 'C', it is clear from the Table-2 that it decreased with the advancement of storage period, irrespective of treatments. The data also reveals that the retention of vitamin 'C' was significantly higher throughout the storage period in the treated fruits as compared to untreated ones, except on 5th day. However, at the end of storage period maximum vitamin 'C' was found in the fruits treated with 1 per cent calcium nitrate. This could possibly be due to retardation of oxidation process and consequent slow rate of conversion of L-ascorbic acid in to dehydroascorbic acid. Similar observations have been recorded in guava (Singh, 13) and peach (Singh *et al*., 14).

From the above discussion it might be concluded that wax emulsion, calcium nitrate and gibberellic acid could successfully be employed in enhancing the shelf life of mango fruits cv. Langra for a few days.

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Table 2. Effect of post-harvest treatments on the bio-chemical changes during storage in mango cv. Langra.

Treatment	Days of storage											
	5				10				15			
	TSS (%)	Acidity (%)	Ascorbic acid (mg/ 100 g)	Total sugars (%)	TSS (%)	Acidity (%)	Ascorbic acid (mg/ 100 g)	Total sugars (%)	TSS (%)	Acidity (%)	Ascorbic acid (mg/ 100 g)	Total sugars (%)
Control	17.40	0.20	100.76	12.71	19.16	0.14	48.37	13.99	22.94	0.10	32.23	16.75
WE (6%)	17.26	0.25	103.70	12.43	18.63	0.18	55.54	13.59	21.84	0.13	38.15	15.95
CN (1%)	17.32	0.24	103.86	12.67	19.07	0.16	57.34	13.92	22.55	0.12	39.72	16.46
GA_3 (200 ppm)	17.35	0.26	104.22	12.46	18.82	0.17	55.15	13.13	22.43	0.13	37.68	16.40
CD at 5%	0.11	NS	NS	0.11	0.08	0.029	2.92	0.14	0.25	0.01	2.45	0.26

W E = Wax emulsion, CN = Calcium nitrate, NS = Non significant

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