



## EFFECT OF DIFFERENT PACKAGINGS ON QUALITY OF PEACHES DURING STORAGE

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**ABSTRACT:** Physiochemical and enzymatic changes in the peach fruits packed in corrugated cardboard boxes of 2 kg and 4 Kg and traditional wooden boxes of 4 Kg and 8 Kg were studied during cold storage (0-2°C with 85-90 per cent R.H.). The CFB boxes was proved very effective in reducing spoilage, physiological loss in weight (PLW) and maintaining acidity, total phenols content and pectin methyl estrase (PME) activity during storage. There was an increase (p 0.05) in spoilage, PLW, TSS, reducing sugars and PME activity and decrease (p 0.05) in acidity and total phenols content during storage. The fruits packed in 2 kg CFB boxes were best in terms of quality parameters followed by 4 kg CFB boxes. Results revealed that peach fruits packed in 2 kg CFB boxes can be stored for three weeks in cold storage (0-2°C, 85-90% RH) with acceptable edible quality of fruits and can be substituted for wooden boxes due to its demonstrated benefits.

**Keywords :** Peach, packaging, quality, storage.

Peaches are climacteric fruits with short post harvest life due to its high moisture content and relatively high metabolic activity during post harvest phase. It has a shelf life of 3-5 days under ordinary conditions of storage (Tonini and Tura, 19). Major quality indices for peach include colour, size, firmness and freedom from defects and decay (Kader and Mitchell, 5; Lill *et al.*, 6 and Mitchell *et al.*, 11). Mechanical damage is one of the major causes of the quality loss of peach fruit, therefore, proper packaging is demanded for better protection and shelf life extension while keeping the product in optimal storage conditions. Cold storage is widely used to reduce respiration rate, ethylene production and extend the shelf life of fruits. The packaging and storage environment greatly affect the postharvest storage life and quality of fruits (Malakou and Nanos, 9 and Wijewardane and Guleria, 20). So the aim of present study was to detect the comparative effect of two different packagings in maintaining the fruit quality of 'Earli Grande' peaches during cold storage.

### MATERIALS AND METHODS

The peach fruits (cv. Earli Grande) of uniform size and ripening were harvested and pre-cooled to remove field heat. The fruits were air dried and

packed in corrugated fibre board (CFB) containers/boxes of 2 kg ( 5 ply; 30cm x 20.5cm x 11cm size ) and 4 kg(5 ply; 30cm x 20.5cm x 22 cm size); wooden boxes of 4 kg ( 34.5cm x 19cm x 15.5cm) and 8 kg ( 48cm x 19cm x 18.5cm). Fruits were placed in 3 or 4 layers after placing paper strip at base and newspaper sheets on the sides of the boxes. Each layer of fruits was separated with paper strips. Packed fruits were kept in cold storage at temperature of 0-2°C with 85-90 per cent relative humidity. The physico-chemical changes in the fruits were assessed weekly for 3 weeks of storage. The physiological loss in weight of fruits, spoilage, TSS, acidity, total sugar content, total phenols, reducing sugars and pectin methyl esterase activity were recorded. The spoilage percentage of fruit was calculated on number basis by counting the fruits from each box that had spoiled during storage. The physiological loss in weight (PLW) of the fruit was calculated on initial weight basis and expressed in per cent. TSS were recorded with the help of a hand refractometer (Erma Japan) with correction at 20°C. The acidity, reducing sugars, total sugars and total phenols (AOAC, 1) and pectin methyl esterase (PME) (Mahadevan and Sridhar, 7) were estimated. Analysis of variance (ANOVA) and the test of mean comparison according to critical difference (CD) were applied. Significance level was accepted

at  $p < 0.05$ . The data of 3 replications was analyzed statistically by Factorial analysis in a randomized block design using CPCS1 software as a statistical analysis tool (Cheema and Singh, 2).

## RESULTS AND DISCUSSION

**Spoilage:** Fruits packed in 2 kg CFB boxes showed lower ( $p < 0.05$ ) spoilage than wooden boxes (Fig. 1). Maximum spoilage was observed in fruits packed in 8 Kg wooden boxes followed by 4 Kg wooden boxes. Lesser bruising and proper ventilation in CFB boxes as compared to wooden boxes may have resulted in least spoilage. Big size boxes resulted in high intensity of bruising as more fruits may have come in contact with each other. Sharma and Singh (16) also reported lesser spoilage in apples packed in CFB boxes as compared to wooden boxes. The increase in spoilage with the advancement of storage period may be attributed to progressive decrease in fruit firmness due to hydrolysis of metabolites when the fruits were stored for a longer period. The present findings are also in agreement with those of Saini *et al.* (15).

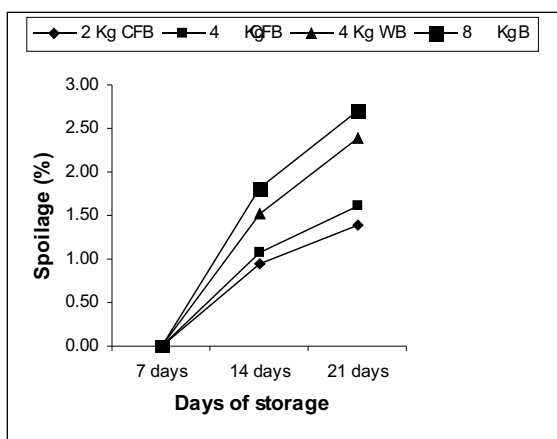
**Physiological loss in weight:** The PLW was observed 5.83% in 2 kg CFB boxes during 3 weeks of storage and was lowest compared to other packaging. The fruits packed in wooden boxes of 8 kg recorded maximum PLW. The lesser loss in weight of fruits packed in CFB boxes may be attributed to the build up of higher humidity conditions inside the boxes resulting in lesser loss of net weight of fruits. Wooden boxes showed maximum loss due to moisture absorption by the timber from the fruits and subsequent loss of this moisture to the atmosphere. Similar findings were reported for apple by Sidhu *et al.* (17) and Thakur and Lal (18). The loss in weight during the storage was significant regardless of packaging. An increase in PLW in all packaging with period of storage was obvious as the different physiological process, like transpiration and respiration, continued in fruits even after harvest.

**Total Soluble Solids:** The fruits packed in wooden boxes showed their superiority ( $p < 0.05$ )

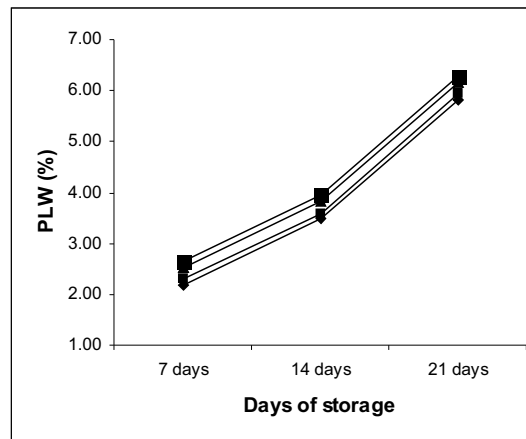
over the fruits packed in CFB boxes. Fruits packed in 8 kg and 4 kg wooden boxes had higher TSS of 13.72% during 3 weeks of storage. The higher TSS content in fruits packed in wooden boxes in comparison to CFB boxes may be ascribed to the increases in PLW, increased metabolic activities and partly by hydrolysis of starch, which resulted in disappearance of starch, associated with the increase in TSS. The increase in TSS with the advancement in storage period may probably be due to starch gets hydrolyzed into mono and disaccharides which in turn may lead to an increase in total soluble solids (Mohsen, 12).

**Acidity:** The acidity of fruits packed in CFB boxes and wooden boxes ranged from 0.54 to 0.59 during 3 weeks of storage, recorded higher ( $p < 0.05$ ) in CFB boxes (Fig. 1). Relatively low decrease in acid content of fruits under better packing in CFB boxes might affected slower rate of ethylene production. Maximum decrease in acidity of fruits packed in wooden boxes may be ascribed to increased respiration rate and more utilization of acids in bio-chemical activities leading to depletion of organic acids. Meena *et al.* (10) in ber have reported the similar results that the fruits packed in CFB boxes maintained higher acidity. Acid content of the fruits decrease with an increase in storage interval. Reduction in acidity during storage might be due to the increased catabolism of organic acids present in fruit through the process of respiration. The results of the present study were in accordance with the earlier findings of Dris and Blanke (3).

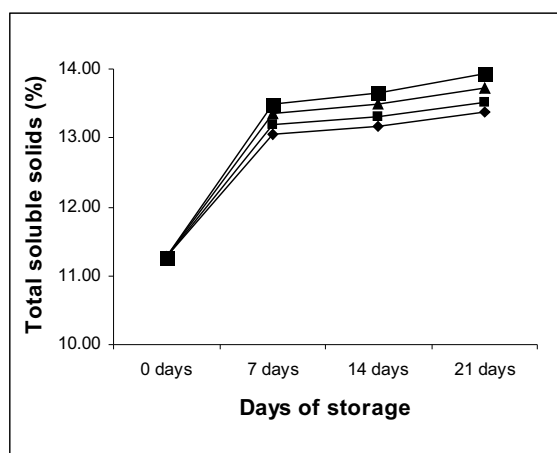
**Total sugars content:** The total sugars content of fruits packed in wooden boxes was higher ( $p < 0.05$ ) than the fruits packed in CFB boxes. Fruits packed in 8 kg wooden boxes recorded the total sugars content of 9.91% after 3 weeks of storage. The improved sugar contents of fruits in wooden boxes might be result of rapid loss of moisture and fast hydrolysis of starch and other polysaccharides to soluble form of sugars. The lower levels of total sugars in CFB boxes had also been reported earlier in ber by Radder *et al.* (14). There was also an increase in total sugars content



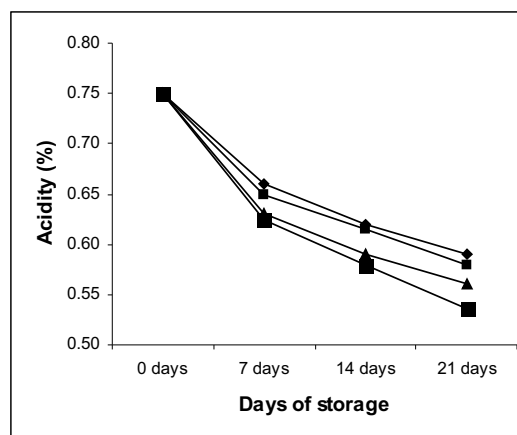
CD: T=0.014, S=0.038, TXS=0.077



CD: T=0.034, S=0.018, TXS=NS



CD: T=0.042, S=0.035, TXS=0.071



CD: T=0.008, S=0.005, TXS=0.011

Fig. 1. Changes in quality parameters of peach fruit packed in 2kg CFB, 4Kg CFB, 4Kg Wooden boxes and 8Kg Wooden box during cold storage at 0-2°C, 85-90% RH for 3 weeks (n = 3) in Spoilage (%), PLW (physiological loss in weight), Total soluble solids (%) and acidity (%). (T-treatment, S-storage, CD = Significant at P 0.05)

with the increase in storage interval. However, within different type of boxes influence of their sizes was at par. The packaging material exerted a significant influence on the total sugars of peach fruits during storage.

**Total phenol content:** Total phenol content was higher (0.22%) in fruits packed in 2 kg CFB boxes and 4 kg CFB boxes during 3 weeks of storage (Fig. 2). The total phenol content were significantly lower in 8 kg wooden boxes which might be a result of increased polyphenol oxidase

activity in wooden boxes as compared to CFB boxes. There was a decrease in total phenol content of peach fruits with increase in storage periods. The total phenol content decline with advancement of storage and this loss of astringency is probably connected with increased polymerization of tannins. The results are in agreement with the findings of Mahajan (8) in apples.

**Reducing sugars:** The fruits packed in 2 kg CFB boxes recorded significantly lower reducing sugars of 6.92% after 3 weeks of storage whereas

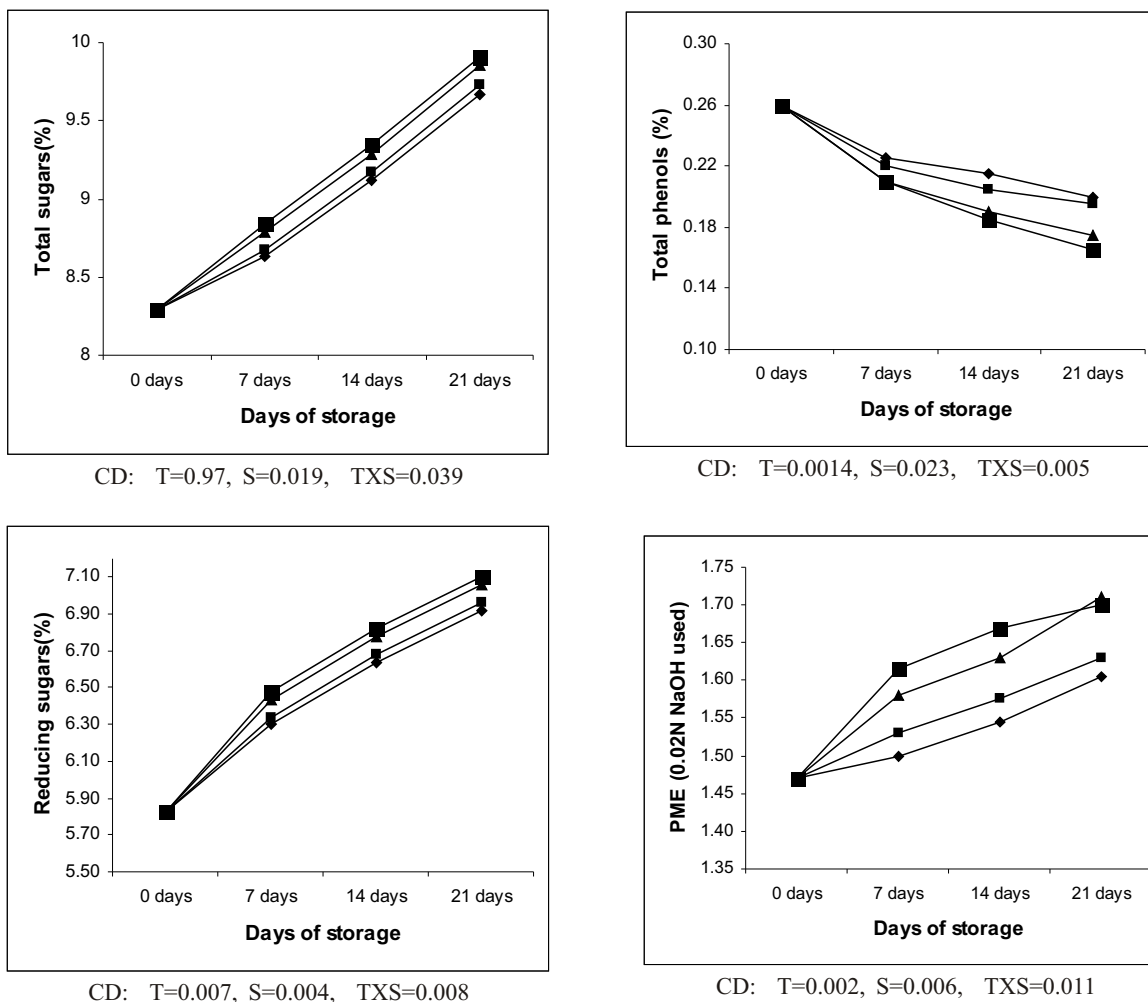


Fig. 2. Changes in quality parameters of peach fruit packed in 2kg CFB, 4Kg CFB, 4Kg Wooden boxes and 8Kg Wooden box during cold storage at 0-2°C, 85-90% RH for 3 weeks (n = 3) Total sugars, Total phenols, Reducing sugars and PME (pectin methyl esterase). (T-treatment, S-storage, CD = Significant at P 0.05)

the fruits packed in 8kg wooden boxes recorded maximum (7.11%) reducing sugar after same storage interval. Higher level of reducing sugars in fruits packed in wooden boxes in comparison to CFB boxes might be due to the more moisture loss and faster rate of metabolic activities in wooden boxes resulting in breakdown of starch into sugars. The constant increase in the reducing sugar with storage is suggestive of the conversion of starch and possibly of other organic acids and amino acids into reducing sugars. Similar changes in reducing

sugar content were also reported by Prasant and Masoodi (13).

**Pectin Methyl Esterase activity:** The type of packaging materials had (p 0.05) influence on the PME activity of peach fruits (Fig. 2). The fruits packed in 2 Kg CFB boxes showed lower PME activity of 1.61 after 3 weeks of storage whereas the fruits packed in 8 Kg wooden boxes recorded maximum PME activity (1.71) after same storage interval. The PME activity increased during storage irrespective of packaging material. An increase in

PME activity during storage was also observed by Gupta *et al.* (4).

### Conclusions

Peach fruits packed in ventilated corrugated fibre board boxes (2 kg) can be stored with acceptable edible quality for three weeks in cold storage at 0-2°C and 85-90% RH and can be substituted for wooden boxes due to its demonstrated benefits.

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