



STORAGE STABILITY OF PERSIMMON FRUITS (*Diospyros Kaki*) STORED IN DIFFERENT PACKAGING MATERIALS

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ABSTRACT

An experiment was conducted to evaluate the storage stability of persimmon (*Diospyros kaki*) fruits in different packaging materials, at NWFP Agricultural University, Peshawar. Evaluation was made for changes in chemical characteristics of the fruit during three storage intervals packaged in seven different packaging materials. pH, TSS (⁰brix), acidity percentage and moisture percentage were determined at five days interval after storage for three intervals. pH was non-significantly affected during storage intervals, while TSS was recorded to be increased. Acidity percentage was first increased and then decreased during storage. Fruits packaged in rice paper showed considerable decrease in pH, TSS (⁰brix) and acidity percentage while an increase was observed for moisture content. However, the effect of other packaging materials was almost non-significant on the tested parameters during our study.

Keywords: fruit, persimmon, storage, stability, packaging, material.

INTRODUCTION

Persimmon (*Diospyros kaki*) is an important fruit crop, cultivated in Chakwal, Hazara and Malakand division. The area under cultivation during 2002-03 was 2833 ha with 29940 tonnes production (Anonymous, 2002-03). The nutritional assessment of the fruit had shown it to be a good source of ascorbic acid, minerals, fibers and carotenoides (Charlotte, 1959).

Storage of fruits is critical in fruit industry to avoid economic losses. The post harvest life of persimmon fruit is very short due to its perishable nature. Considerable post losses have been reported to occur during its handling and storage. Several undesirable changes take place during storage. Excessive weight loss has been reported due to transpiration which can adversely affect the quality of the fruit through deformation (Ben-Yehoshua *et al.*, 1979). Turk (1992) has studied physico-chemical characteristics of persimmons and reported that TSS, total sugar and vitamin C content decreased during storage. Invert sugar decreased initially during storage and then increased. Similarly, carotene content of fruits increased during storage. Respiration showed a typical climacteric pattern. Firmness of all fruits decreased during storage with fruits losing their marketable quality after 40–60 days. The physicochemical characteristics of fruits stored in perforated wooden boxes lined with tissue paper, wax paper and polyethylene were reported to be maintained best in polyethylene film whereas other living material did not check shriveling to excessive weight loss (Farooqi *et al.*, 1975). Polyethylene film packaging has been reported to greatly reduced fruit weight loss under uncontrolled room conditions (Golomb *et al.*, 1984 and Purvis, 1984). Similarly, packaging storage maintained good organoleptic properties of pear stored in a modified atmosphere (Kolev, 1977). A similar effect was observed for other physico-chemical properties like ascorbic acid and citric acid contents (Ahmed, 1979).

Thus critical evaluation of different packaging materials for storage stability of fruits is crucial to avoid post harvest losses. The present study was thus made to assess the effectiveness of various packaging materials on physico-chemical characteristics stability of persimmon to identify the most appropriate packaging material for storage of persimmon fruits.

MATERIALS AND METHODS

Unripe fruits of persimmon were purchased from local fruit market of Peshawar. Evaluation for physico-chemical properties was carried out in the laboratory of Food science and Technology, NWFP Agricultural University Peshawar. Fruits were washed with water to remove dust particles and to reduce the microbial load from the surface. Fresh fruits were tested for their pH, TSS (⁰brix), acidity percentage and moisture percentage and were packaged and stored for a period of 15 days. Packaging was made using six different packaging materials i.e., wax paper, news paper, cephalin, polyethylene, colored paper and rice paper along with no packaging as control. These fruits were assessed three times with an interval of 5 days, for their pH, TSS (⁰brix), acidity percentage and moisture percentage. Data on these parameters was taken in triplicate and was analyzed using ANOVA technique appropriate for Completely Randomized Design.

pH of the samples was measured by Sargent Welch pH meter according to instruction manual of the apparatus (Bekhmen, 1984). Total soluble solids (TSS) were determined by recommended method of AOAC (1980) using hand refractometer at room temperature by placing pulp drop on absolutely dry refractometer and readings were taken directly. Acidity percentage was determined by standard titration method as described by AOAC (1980). Moisture content was determined by



modification of vacuum oven method (AOAC, 1980) using the following formula:

$$\text{Moisture content (\%)} = \frac{X - Y}{X} \times 100$$

Where,

X = Weight of sample before drying

Y = Weight of sample after drying)

RESULTS AND DISCUSSION

pH

The effect of different packaging materials on pattern of changes in pH of persimmon fruits during storage is shown in Figure-1. The pH of the persimmon fruits during storage decreased over time interval. However, the difference was statistically negligible. It reduced from initial pH of 5.7 to 3.66. Maximum decrease (2.04) was observed for fruits packaged in rice paper while least for those packaged in wax paper (0.44). The pH of

fruits stored in polyethylene first decreased but then increased once again. These results are in agreement with the previous results of Hussain *et al.*, (2004) who also reported negligible difference in pH for fruits during storage.

Total soluble solids (⁰Brix)

Total soluble solids were increased significantly during storage after first five days (from 16.5 to 22.91 ⁰brix) but decreased after 10 days for those fruits packaged in color paper and rice paper (Figure-2). Previously, Turk (1992) has reported decrease in TSS of fruits during storage. While Mohla *et al.*, (2000) have reported an increase in TSS for storage intervals. This increase in TSS may be attributed to the packaging of the fruits. The difference for various packaging materials was however, non significant, except for color paper and rice paper, which showed a decrease in TSS after 10 days.

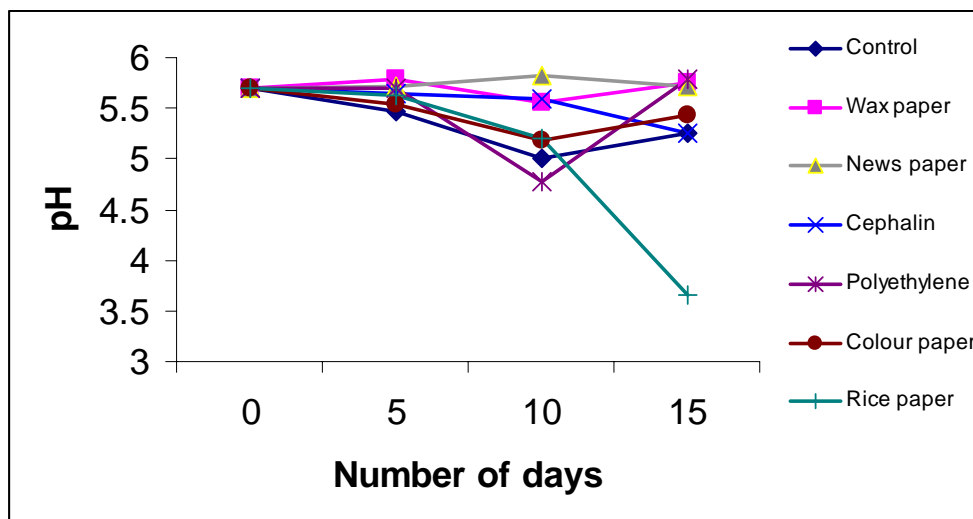


Figure-1. Pattern of changes in pH of persimmon fruits during storage, packaged in different packaging materials.

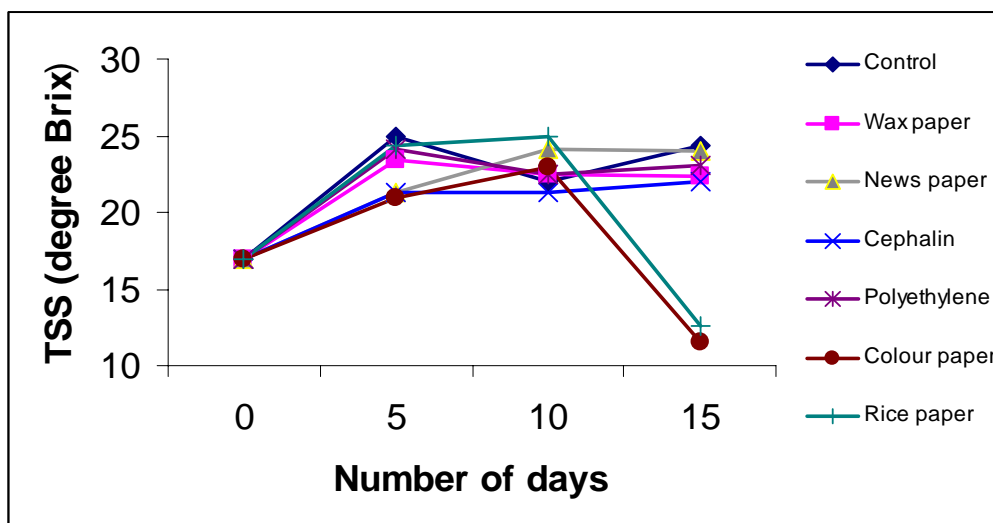


Figure-2. Pattern of changes in TSS (⁰Brix) of persimmon fruits during storage, packaged in different packaging materials.



Acidity Percentage

The pattern of changes in acidity percentage was unique. There was an increase in acidity percentage during first five days of storage for different packaging materials (from 1.7 to 2.08, see Figure-3) except for color paper and control. While it decreased afterward for all packaging materials. This may be due to the degradation of biochemical constituents of the un-ripened fruits during respiration resulting in certain acids, which are then reduced after first five days. Previously, Hussain *et al.* (2004) have also studied total acidity of citrus. They reported a reduction in total acidity of citrus during storage. This may be due to the presence of excessive

amount of citric acid and malic acid, which are degraded during respiration thus decreasing total acidity of the fruit.

Moisture percentage

There was significant effect of packaging on moisture content of fruits during storage. Moisture content has an important impact on weight loss during storage. During our experiment, an increase in moisture content was observed after first five days for fruits packaged in news paper and rice paper, while for remaining packaging materials the change was non-significant. Hussain *et al.*, (2004) have also reported increasing effect of packaging on moisture content.

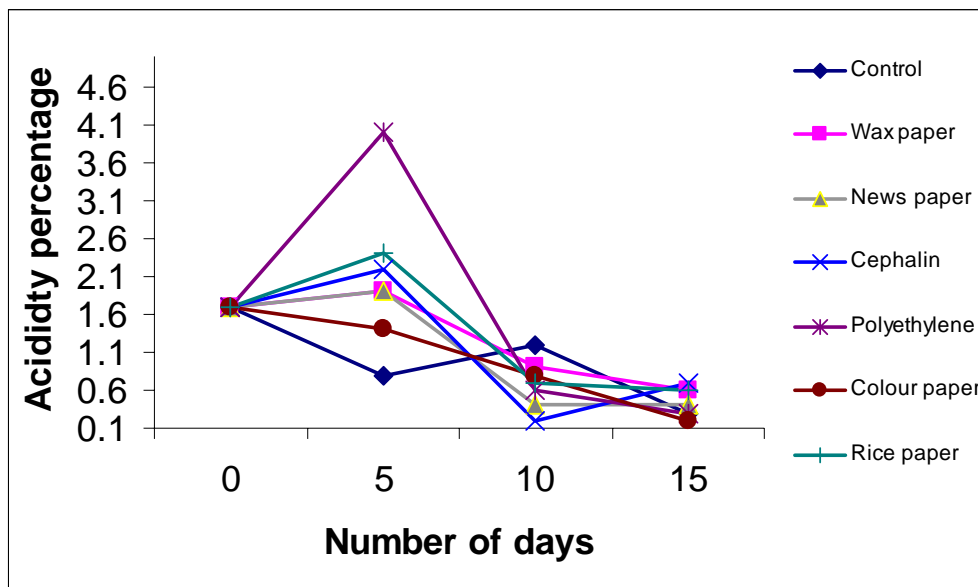


Figure-3. Pattern of changes in acidity percentage of persimmon fruits during storage, packaged in different packaging materials.

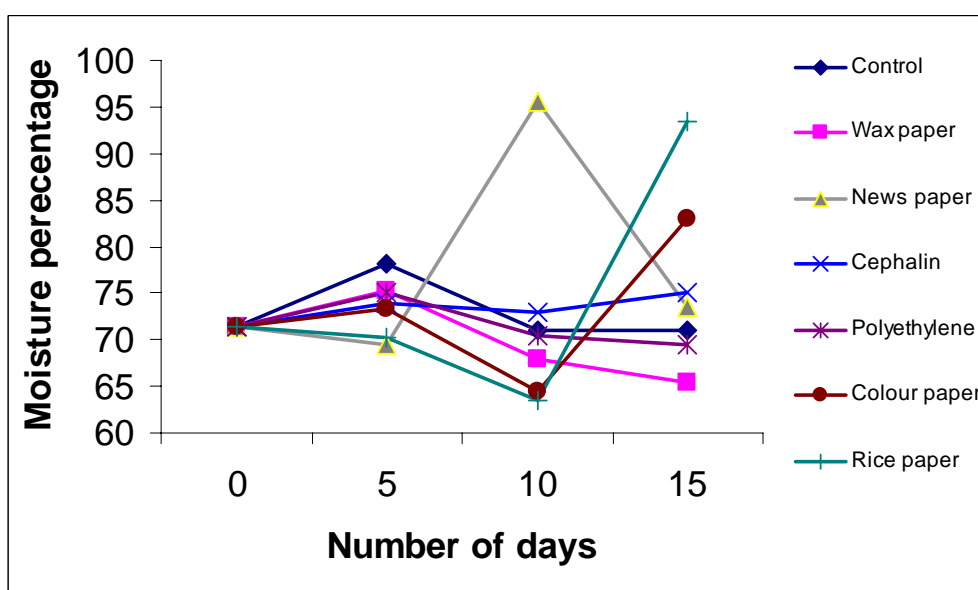


Figure-4. Pattern of changes in Moisture percentage of persimmon fruits during storage, packaged in different packaging materials.



CONCLUSION

The present study shows significant effect of various packaging materials on storability of persimmon fruits. Fruits packaged in rice paper showed considerable decrease in pH, TSS and acidity percentage while an increase was observed for moisture content. The effect of other packaging materials was almost non-significant on the tested parameters during this study as compared with control. Similarly, considerable changes were observed during storage of persimmon fruits over time showing greater degree of variation with time interval.

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