ASSESSMENT OF POST-HARVEST SPOILAGE OF APRICOTS IN DIFFERENT PACKAGING STRUCTURES

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Abstract: The percentage loss of fruits in a packaging structure is determinant of its efficiency in prolonging the shelf life of fruits. In case of apricots, marketing is done in two types of packaging structures - wooden boxes and cardboard cartons. During the present investigation, an attempt was made to find out the percentage loss and hence, relative efficacy of the two, when it was found that in areas like Jammu (where temperature is very high during apricot marketing season), cardboard cartons are more efficient.

Key words: Apricot, Harvest, Jammu & Kashmir, Uttarakhand.

INTRODUCTION

Apricot (*Prunus armeniaca* L.) is an important deciduous, rosaceous, moderate sized cultivated fruit tree, about 8-12 m tall with a reddish bark, found almost naturalized in the temperate areas at altitudes upto 3000 meters. In India, it is a major fruit crop of the cold arid northern regions, comprising of Himachal Pradesh, hilly areas of Uttarakhand and Jammu and Kashmir. The common varieties found in these regions are 'Halman,' 'Tokpopa', 'Castle', 'Charmagz', 'Sharmagz Kaisha', 'Rakcheykarpo' etc. The average yield of apricot has been estimated to be 0.42, 0.28, and 0.20 tonnes per hectare in Himachal Pradesh, Uttarakhand and Jammu and Kashmir respectively (Ghosh, 2005). In Jammu and Kashmir, apricot grows in Kashmir, Kathua and Udhampur districts, several areas in Rajouri and Poonch districts and drier pockets of northwestern Himalayas in Leh-Ladakh and Kargil .The plant bears yellow to yellowish orange, firm, juicy, nutritionally rich, sweet, pulpy (mesocarp) fruits of drupe type that start ripening from the middle of May and continues till the middle of July. The fruit is round, about 4-5 cm across, pubescent when young, but nearly glabrous at maturity.

Fresh fruits of apricots are nutritionally rich containing sugars, vitamin A and C (ascorbic acid), thiamine, iron, phosphorus, calcium, iodine, proteins and fats with a total calorific value of 50kcal/100gm of fruit. Fresh and dried apricot can be used as protective food that can have tremendous impact on health and quality of life. Apricot fruits, fresh as well as dried, and seed kernels serve as dessert while many apricot products such as apricot jams, jellies, squash, juices etc. are manufactured on commercial scale. Apricots also possess immense medicinal properties. They are anti-inflammatory, anti-diarrhoeal, antipyretic, emetic, and antiseptic besides being used in the treatment of respiratory and digestive ailments. The seeds are tonic and anthelminthic, used in liver troubles, earache, and deafness (Parmar and Kaushal, 1982). Apricots have also been recommended for people suffering from heart blockages, asthma, anaemia and help prevent the formation of gallstones. Oil extracted from its seeds finds considerable use in joint pains and in cosmetics for its softening action on the skin (HT, 2008).

The fruit in Jammu and Kashmir is harvested in summer from May until the end of July when it has attained its characteristic colour, but is still firm enough to withstand transportation. After harvest, the fruits are transported and marketed either in fresh form or they are dried. Marketing of fresh apricots is done in two types of packaging structures-wooden boxes and cardboard cartons. The percentage loss of fruits in two types of packaging structures reflects the efficiency of the packaging structure in determining the shelf-life of the fruits.There, thus, is a need to find out which packaging structure is relatively more efficient and keeping this in view, the present investigation was undertaken.

MATERIALS AND METHODS

Regular, weekly surveys of the wholesale fruit market at Narwal was conducted during the apricot growing and marketing season from May to July 2007. The total number of healthy fruits as well as visibly infected fruits in both wooden and cardboard cartons was recorded and the percent fruit loss in two types of packaging structures was calculated using the formula:

$$\text{Percent loss} = \frac{\text{Total number of fruits in the box} - \text{Number of visibly infected fruits}}{\text{Total number of fruits in the box}} \times 100$$

Table 1. Percentage market loss of apricots in two packaging structures during different months of survey.

	Survey period					
	May		**June**		**July**	
	Wooden boxes	**Cardboard cartons**	**Wooden boxes**	**Cardboard cartons**	**Wooden boxes**	**Cardboard cartons**
1st week	14.38± 0.59*	13.20± 0.73	23.50± 0.51	20.31± 0.87	NA	11.65± 0.24
2nd week	15.96± 0.53	12.73± 0.88	28.79± 1.58	22.69± 1.04	NA	12.68± 0.26
3rd week	15.26± 1.02	14.97± 0.71	27.58± 0.78	22.58± 0.42	NA	14.75± 0.35
4th week	18.64± 0.35	21.53± 0.67	30.33± 0.85	24.25± 0.35	NA	10.23± 0.37
Average percentage loss	**16.06± 0.62**	**15.61± 0.75**	**27.55± 0.93**	**22.45± 0.67**	**NA**	**12.33± 0.31**

Each value denotes the mean ± S.D., n=3
NA – Not available

RESULTS AND DISCUSSION

The survey revealed that during the months of May and June, the fruits were transported and marketed in both wooden boxes and cardboard cartons, whereas in July they were available only in cardboard cartons. Some of the fresh fruits in both the casings showed visible microbial infection and these were confined mostly to the bottom and sidewalls of the containers.

Perusal of the data obtained during the survey and presented in table 1 evidently shows that the percentage loss of apricots was more in the month of June (27.55% ± 0.93 in wooden boxes and 22.45% ± 0.67 in cardboard cartons), followed by May (16.06% ± 0.62 in wooden boxes and 15.61% ± 0.75 in cardboard cartons). In July, the percentage loss was observed to be the minimum (12.33% ± 0.31) as during this month apricots were available in cardboard packaging only. In general, overall 10.23% to 30.33% of the fruit displayed for sale showed the symptoms of microbial infection. High percentage of loss during June may be due to high temperature and relative humidity during this month, which supports the growth and proliferation of majority of spoilage microflora including mesophilic filamentous moulds. Moreover, unhygienic market conditions along with containers used for packaging and marketing of the fruits play a significant role in determining the health of fruit in the market.

The number of infected fruits was more in wooden boxes as compared to cardboard cartons. This spoilage can be attributed to the hardness of wooden boxes due to which even a slight jerk during packing, transporta-tion and marketing leads to bruises and wounds. The injured fruits readily become vulnerable to colonization by the wound pathogens or propagules of the fungi associated with the fruit surface. While fruit with bruises are not isolated from the unbruised ones,thereby promoting cross infections but these bruised fruits are not sold at lower price because of their invaluable almond like kernel.

The results, thereby reveal the relatively more efficacy of cardboard cartons in increasing the shelf-life of apricots in area like Jammu where its marketing season is quite hot. For rainy season,wooden boxes are more suitable as cardboard gets wet easily.Various other researchers have also assessed the percentage loss of other fresh fruits in the market and storage (Agarwala and Sharma, 1968; Gupta and Pathak, 1986; Baiyewu *et. al.*, 2007).

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