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Short Communication

Effect of polythene packaging on the shelf life of mango fruits

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The effects of polythene packaging and washing were observed on fresh green unbruised wholesome mango fruits. Skin colour, weight changes, titratable acidity and the percentage of fruit that were spoiled were monitored. The samples were treated in four different ways: (i) washed and packaged in perforated polythene bags, (ii) unwashed and packaged, (iii) washed and unpackaged and (iv) the unwashed and unpackaged control. They were all placed in the fruit shed at an average ambient temperature of 31°C and pressure 70 mm/Hg. Packaging has weight loss reduction effect (by 22% in washed mangos, by 30% in the unwashed) while washing increased weight loss by 19% in the packaged mangos, but not significantly increased (7%) in unpackaged mangoes at p=0.05. The weight loss and spoilage were reduced by packaging.

Key words: *Mangifera indica*, perforated polythene bags, shelf life, spoilage, packaging.

INTRODUCTION

Mango (*Mangifera indica*), is one of the most important and widely cultivated fruits of the tropical world. It is a seasonal fruit believed to have originated in the sub-Himalayan plains of Indian subcontinent. Botanically, this exotic fruit belongs to the family of Anacardiaceae, which also includes numerous species of tropical fruiting trees in the flowering plants such as cashew, pistachio...etc (Whitmore,1975; Marchand, 1869). The fleshy fruit is eaten ripe or used green for pickles and other dishes and is a rich source of Vitamins A, C and D. Mangoes also contains essential vitamins and dietary minerals such as vitamins A, B, B6, C, E and K and essential nutrients such as potassium, copper and 17 amino acids in good levels. In India reported that there are over 100 varieties of mangoes, in different sizes, shapes and colours (Saleh and El-Ansari, 1975; Singh et al., 2004). Mango peel and pulp contain other phytonutrients, such as the pigment antioxidants – polyphenols and carotenoids – and omega-3 and -6 polyunsaturated fatty acids. The mango fruit is a large, fleshy drupe, containing an edible mesocarp of varying thickness. The mesocarp is resinous and highly variable with respect to shape, size, colour, presence of fibre and flavour. The mango fruit is climacteric, and increased ethylene production occurs during ripening (Mitra and Baldwin, 1997).

Mango peel contains pigments that may have antioxidant properties, including carotenoids, such as the provitamin A compound, beta-carotene, lutein and alpha-carotene, polyphenols such as quercetin, kaempferol, gallic acid, caffeic acid, catechins and tannins. People have tried various methods to extend mango shelf life or reduce post harvest losses, like irradiation (Bayers and Thomas, 1979), processing into jam (Subramanjam et al., 1975). Investigated the effect of a fungicidal wax coating on Badami (Alphonso) mangoes. The study was made of fruits dipped in aqueous solutions of fungicidal wax emulsion containing 1.7, 2.2 and 2.7% solids and 5% ortho-phenyl-phenol, and stored at 79 to 86°F and R.H. 55 to 87%. The physiological loss in weight was found to decrease with increasing quantities of solids in the wax emulsion. At the end of 20 days storage, the percentage wastage due to disease was significantly lower in wax emulsion with 2.7% solids. These treatments increased the shelf-life in non-refrigerated storage about 50% and drying into chips in order to improve the shelf-life (Thomas, 1986). Cold storage and application of skin coatings to control the ripening processes and reduce aging and water loss have been investigated in mango in India in the past two decades, to develop efficient storage practices. According to Gandhi (1955) fully mature

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Table 1. Mean weights of stored Mango fruits given four different treatments.

Day	Average weight of stored mango fruits (g)			
	WP	WUP	UWP	UWUP
0	187.7±27.0	181.6±16.9	173.2±29.0	181.2±14.5
1	182.8±26.6	173.3±16.0	169.5±27.9	175.0±14.8
5	178.0±26.1	165.4±15.3	164.2±27.3	168.4±14.4
6	174.5±26.7	164.8±18.5	162.1±27.2	165.5±14.3
Percent weight loss on day 6 (%)	7	9.3	6.4	8.7

Alphonso mangoes could be stored at 45 to 48°F for seven weeks but below this temperature range, the fruit is injured resulting in failure to ripen properly when shifted to room temperature. Fruits kept in perforated polyethylene bags ripened very steadily at low temperature but unpackaged mangoes suffered badly from immediate rotting on removal from cold storage, due probably to chilling injury (Sundararaj et al., 2006). Several varieties, found otherwise quite suitable for cold storage showed chilling injury at 40 to 45°F. According to Singh (1990) different varieties showed a variation in the critical temperature which lies between 40 to 45°F and wastage due to chilling may be avoided by keeping the fruits above this range.

Methods of extending shelf life of mango fruits such as irradiation, waxing, processing into jam and drying into chips, are expensive and may not be readily available to local farmers. Mangoes are readily available in Nigeria during the harvest seasons, however since cold-storage for preserving quality is potentially problematic, growers are forced to resort to 'distress sales'. Continued postharvest losses are evident in markets, stores and dumpsites. There is a need to develop cheap and commonly available technology for extending the shelf life of these produce at least to manage the movement in the market chains and control the losses. This work studied the storability of mango as influenced by washing and packaging in perforated polythene bags.

METHODOLOGY

Mango fruits (Alphonso variety) were bought from a popular fruit market in Ibadan, Nigeria and were given four different treatments. Wholesome fresh matured fruits were respectively shared into 4 sub lots, each consisting of 10 fruits, marked 1- 10. The 4 sub lots were given different treatments for storage, namely: Treatment A, samples were washed in distilled water and packaged in polythene bags (WP). Treatment B, samples were hand washed in bowls and air dried to remove surface moisture but not packaged in polythene bags (WUP). Treatment C samples were left unwashed and packaged in polythene bags (UWP), while the fourth treatment was left unwashed and unpackaged (UWUP) serving as the control.

Each of the treatment was placed in perforated cartons and kept in a fruit shed at ambient (31°C, 70% r.h.). All treatments were weighed on day 0, 1, 5, and 6, of storage and changes in weight were computed. The amount of decay was assessed after storage on the basis of aggregate percentages of surface areas visibly infected by Anthracnose and cannot be consumed any longer. Percentage green skin areas were rated as : matured green (90 to 100% green),breaker (80 to 90% green), quarter ripe (70 to 80% green), half ripe (45 to 65%) and full ripe (less than 40% green).

RESULTS AND DISCUSSION

The washing effect increased the weight loss of unpackaged and packaged mangoes by (9.3 and 8.7%) respectively but were not significantly different at p=0.05 (Table 1). Visible deterioration of the mangoes was observed as rotting of fruits. Generally the weight of mangoes decreased with storage time irrespective of treatment which is attributable to continued catabolism at the ambient storage. Therefore washing will be an unnecessary expense for farmers who will be supplying a packing house. This implies that if one must package mango, one may not wash if aesthetics is not a factor. Packaging of mangoes reduced weight loss for Washed mangoes (WP) compared with Unpacked-Washed mango (WUP). The percentage weight loss in Washed-Packaged mangoes (WP) is 7% while that of Washed-Unpackaged (WUP) is 9.3%. Mango fruits possess natural waxes. This must have been removed by washing. Packaging helped to reduce weight loss of Washed mango fruits. Therefore, if mango fruits will be washed it should be packaged to limit weight loss in storage. The weight loss in the unwashed and unpackaged (UWUP) treatment was 8.7% compared with the washed unpackaged (WUP) 9.3%. Unwashed-unpacked mango had reduced weight loss in storage and this was attributable to the natural waxes on the fruits. Therefore, if mango will be Unpackaged it should be left unwashed. The percentage weight loss in Unwashed-packaged (UWP) mango is 6.4% while that of Unwashed-Unpacked (UWUP) is 8.4%. Packaging will reduce weight loss in unwashed mangoes if there are no facilities to wash. Both natural wax and packaging will helped to reduce weight loss (Tables 1 and 2).

Conclusion

Packaging mango fruits in polythene bags can extend the shelf life of the fruits and thereby minimise losses.

Table 2. Storage qualities of the mango fruits in four different treatments at the end of 7th day.

Quality	WP	WUP	UWP	UWUP
Titratable acidity	0.76±0.29	0.36± 0.04	0.87±0.41	0.66±0.13
Colour (green) (%)	20	40	60	30
Rottenness (%)	80	60	30	70

WP - Washed-packaged; WUP - washed-unpackaged; UWP - unwashed-packaged; UWUP-unwashed-unpackaged.

Future work should be tried with larger number of samples possibly this will reveal the significance.

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