

MODIFIED ATMOSPHERE STORAGE AND OSMO-AIR DEHYDRATION  
OF MANGO (CV. KARUTHACOLOMBAN)

By

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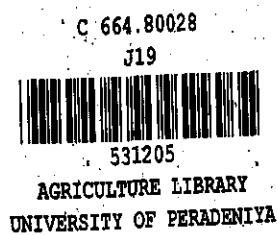
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## ABSTRACT

Post-harvest loss of mango in Sri Lanka is about 40-60 %. The perishable nature of the fruit, poor post-harvest handling and diseases have limited the export volume of mango. This study was conducted to develop a modified atmosphere packaging (MAP) system and a snack product by osmo-air dehydration of mango cv. Karuthacolomban.

Mature mango were sealed in 0.05 mm and 0.075 mm low density polyethylene (LDPE) packages and stored at 13 °C and 94 % RH. The effect of potassium permanganate impregnated bricks and granular activated charcoal as ethylene and carbon dioxide scavengers, respectively, were tested on modifying the in-package atmosphere. The in-package concentrations of oxygen, carbon dioxide and ethylene were measured during storage. Percentage weight loss, changes in flesh firmness, titratable acidity (TA), pH and total soluble solid (TSS) during storage were also determined. Based on the in-package gaseous composition and changes in physico-chemical properties, the optimum storage period was determined. The fruits were allowed to ripen under ambient conditions after termination of storage, and physico-chemical properties of the ripe fruit were determined. The MA stored mango with scavengers had significantly ( $p < 0.05$ ) lower in-package carbon dioxide and ethylene concentrations and significantly ( $p < 0.05$ ) higher oxygen concentration than those stored without scavengers. The percentage loss in weight and firmness were minimum in the fruits packaged with scavengers. Post-harvest life of 'Karuthacolomban' mango can be extended up to 16 days by packaging in 0.05 mm LDPE and storing at 13 °C

and 94 % RH. Storage life was extended further up to 21 days by using ethylene and carbon dioxide scavengers. Physico-chemical properties of ripe mango after MA storage were not significantly different from those of control. Thus, 'Karuthacolomban' mango can be stored in 0.05 mm LDPE packages of 1:1 surface to weight ratio ( $\text{cm}^2\text{g}^{-1}$ ) with ethylene and carbon dioxide scavengers at 13 °C and 94 % RH for 21 days.

Ripe mango slices (6 x 2 x 1 cm) were immersed in 45 °Brix sugar solution with 500 ppm potassium metabisulphite, 500 ppm citric acid and different concentrations of sodium bicarbonate and calcium chloride. After immersing in the 45 °Brix solution for 24 hrs, the excess sugar solution was drained and fruit pieces were rinsed for 1-2 minutes with water. The fruit pieces were dried in a cabinet air-drier at 70 °C at a flow rate of 1800 cm/min. Residual moisture content during drying was determined hourly and drying curve was constructed. Based on the moisture content, the drying time was decided as 10 hrs and the best treatment was determined based on the colour, texture and the water activity of the product. Changes in moisture, total ash, crude fiber and crude fat during drying and residual KMS were determined. The acceptability of the product was tested using 30 consumer panelists and a nine-point Hedonic scale. Suitability of aluminium foil laminated with low density polyethylene (Al/LDPE) and oriented polypropylene laminated with cast polypropylene (OPP/OPP) as packaging materials and vacuum and normal packing as mode of packaging were tested. In addition, the product was stored at 27 and 37 °C for 3 months and shelf-life of the product under different conditions was determined based on the water activity. The water activity of the vacuum packaged product in Al/LDPE was significantly

( $p < 0.05$ ) lower than the products stored under other conditions. Total ash, crude fiber and crude fat of the dehydrated product were not significantly different from the control. Water activity of the product was significantly ( $p < 0.05$ ) low and the TSS was significantly ( $p < 0.05$ ) high after osmo-air dehydration. The residual sulphur dioxide was 47 ppm after one month of storage 27 °C. Immersing 'Karuthacolomban' mango strips (6 x 2 x 1cm) in 45 °Brix solution containing 500 ppm potassium metabisulphite, 500 ppm citric acid, 0.1% sodium bicarbonate and 0.1 % calcium chloride for 24 hrs followed by drying at 70 °C for 10 hours at an air flow rate of 1800 cm/min reduced the water activity from 0.84 to 0.52 and resulted in a shelf stable product which can be stored at 27 °C for 3 months in OPP/ CPP, 12 and 15 months in Al/LDPE packages under normal and vacuum conditions, respectively.