

POSTHARVEST LOSS REDUCTION OF AVOCADO BY
MODIFIED ATMOSPHERE PACKAGING AND MINIMAL PROCESSING

By

CHAMILANI LALANTHI NIKAPITIYA

Thesis

Submitted in partial fulfilment of the requirements

for the degree of

MASTER OF PHILOSOPHY

in the

POSTGRADUATE INSTITUTE OF AGRICULTURE

of the

UNIVERSITY OF PERADENIYA

SRI LANKA

December, 2001

C 664.80028

N34



531202

AGRICULTURE LIBRARY
UNIVERSITY OF PERADENIYA

531202 /

ABSTRACT

Postharvest storage life of 'Pollock' avocado grown in Sri Lanka is 7-10 days at room temperature. Postharvest losses caused by improper harvesting, transportation, storage methods and diseases limit the export volume of avocado. An attempt was made to develop a modified atmosphere (MA) packaging system and a minimally processed refrigerated product to reduce the postharvest losses of avocado. Mature fruits were packaged in 0.05 and 0.075 mm low density polyethylene (LDPE) and stored at 12 °C and 94 % RH. The effect of potassium permanganate and granular charcoal as scavengers on modifying the in-package atmosphere was tested. The in-package oxygen and carbon dioxide concentrations, percentage weight loss, changes in fruit firmness, visual quality rating (VQR), disease index (DI) and chilling injury (CI) of fruits were determined. The fruits were allowed to ripen under ambient conditions after terminating MA storage and the firmness, total soluble solids (TSS), pulp colour and VQR of the ripened fruits were determined. The carbon dioxide and ethylene concentrations were significantly lower and the oxygen concentration was significantly higher in packages with scavengers than those without scavengers. Minimum changes in percentage weight loss and firmness were observed in samples packaged with scavengers. Packaging the fruits in 0.05 mm LDPE extended the postharvest life of avocado upto 17 days. Inclusion of scavengers further extended the postharvest life by 12 days. Non-significant difference between the fruits ripened after MA storage and the control showed that MA did not alter the ripening process. The VQR, DI and CI of fruits were not affected by MA conditions. Therefore,

'Pollock' avocado could be stored in 0.05 mm LDPE packages of 1:1 surface area to weight ratio ($\text{cm}^2\cdot\text{g}^{-1}$) with scavengers at 12 °C and 94 % RH for 29 days.

Mature 'Booth 7' avocado slices with initial fruit firmness 1.5 ± 0.05 kg/cm were treated with different concentrations of citric acid, ascorbic acid and their combinations. Slices were packaged in 0.05, 0.075 and 0.1 mm LDPE, 0.015 mm linear low density polyethylene (LLDPE) and 0.06 mm LLDPE laminated with nylon (LLDPE/nylon) and stored at 8 °C and 90 % RH. Effect of sodium chloride (NaCl) as a moisture absorber on storage life was tested. Weight loss, moisture absorbed by NaCl, fruit firmness, 'L' value, VQR, BI, off odour, and taste of MA stored slices were determined. Sensory quality of the slices subjected to MA storage was tested. A combination of 1000 ppm citric acid and 200 ppm ascorbic acid was found to be the most effective browning inhibitor. The in-package oxygen concentration was higher and carbon dioxide concentration was lower in 0.05 and 0.075 mm LDPE than those of 0.1 mm LDPE and 0.6 mm LLDPE /nylon. Significantly higher ethanol and acetaldehyde contents and off odour was observed in slices in 0.01 mm LDPE and 0.6 mm LLDPE /nylon than those in 0.05 and 0.075 mm LDPE. Higher BI and VQR values were observed in slices packaged in 0.05 mm LDPE with moisture absorbers than those packaged without moisture absorbers. However, the slices in 0.075 mm LDPE developed unacceptable off odour and flavour from Day 7 onwards. Non significant difference in microbial count, thiobarbituric acid value, pH, ascorbic acid content and sensory attributes between fresh avocado slices and those packaged in 0.05 mm LDPE with moisture absorbers was observed. Therefore, dipping

'Booth 7' avocado slices in 1000 ppm citric acid and 200 ppm ascorbic acid followed by packaging in 0.05 mm LDPE at 1:1 surface area to weight ratio ($\text{cm}^2 \cdot \text{g}^{-1}$) with NaCl as a moisture absorber and storing at 8 °C and 90 % RH can result in a shelf life of 10 days.