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EFFECT OF EDIBLE COATING ON THE SHELF-LIFE AND QUALITY OF APPLE (*MALUS DEMESTICA* L.) DURING COLD STORAGE

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Abstract

Browning is a major issue for some minimally processed fruits and vegetables, but it may be managed by using films or coatings as anti-browning agents' carriers. Ascorbic acid is the most frequent antioxidant applied on fruits and vegetables. Calcium lactate has been employed as an alternative calcium source in recent years since it does not leave a lingering flavour in the product, inhibits browning, and functions as an acidity regulator. The fundamental function of an edible coating or film is to act as a partial barrier to water vapor and gases by slowing the transmission rate of a given partial pressure difference between internal and exterior atmospheres.
This partial barrier promotes a modified internal environment that is low in oxygen and high in carbon dioxide, inhibits respiration, and decreases transpiration losses. The scientific literature has a wealth of information on the barrier characteristics of edible films. Therefore, the aim of this study was to see how edible coatings affect the shelf-life and quality characteristics of fresh- cut apples treated with ascorbic acid, calcium lactate, and Arabic gum during cold storage at 4 ± 2 ^{0}C.

Evaluating the effect of edible coating on the shelf- life and quality characteristics of fresh-cut apples was done as following: fresh-cut apple samples (*Malus demestica* L.) were coated with 1% ascorbic acid, 1% calcium lactate, and 15% Arabic gum solutions. After that, they were placed in plastic plates and kept at 4 ± 2 ^{0}C for 14 days. Fresh-cut apple weight loss (by electronic balance), pH (pH metre), total soluble solids (by numeral bench refractometer with a range of 0 - 32%), texture (by texture analyzer - Texture Pro CT V1.6), colour (the lightness (L*), redness (a*), and yellowness (b*) of apple samples were measured using a colour reader), sugars (glucose, sucrose, and fructose content of apples was measured by HPLC), and sensory characteristics (by ten-member panel from the Food Science Department, Faculty of Agriculture, Zagazig University, Egypt) were all assessed. Measurements were taken at: 0, 7 and 14 days of cold storage.

During the storage period, the weight loss percentage of all samples fell. At zero day, the weight of the apple samples had not changed. Apple control samples lost the most weight (26%) on the 14th day of storage, whereas apples coated with ascorbic acid + calcium lactate + Arabic gum lost the least weight (6 %). In general, coated samples had the least weight loss over the entire storage time. The pH value rose throughout storage. This increase in pH was most likely driven by metabolic activities and reactions that took place throughout postharvest storing, which sustained to convert acids into sugars. After 14 days of storing, the end pH values of all fruits indicated no significant alterations. In terms of TSS, all treatments' levels increased with storing duration. All covered apples were firmer than the control during the storage period. The samples with the firmest coatings were those with ascorbic acid + calcium lactate + Arabic gum, followed by those with calcium lactate + Arabic gum. Control samples had a hardness of 20.68 N at the finale of the storing period, but those coated by calcium lactate + Arabic gum or ascorbic acid + calcium lactate + Arabic gum had the maximum firmness, 49.96 and 53.61 N, respectively. The colour characteristics of control samples decreased in value L* and rose in a* and b* values with storage time, whereas coated fruits retained the maximum L*, a*, and b* values after 7 and 14 days of cold storage. Concentrations of sucrose, glucose, and fructose in the control samples increased after 14 days of storage, but they decreased in the treated samples. At zero time, all samples were deemed acceptable by the judges. Control sample scores decreased significantly over storage time and were rejected on the 14th day of storage, particularly for colour, texture, and overall acceptability, whereas coated fruits were acceptable for all studied properties.

Coating treatments were identified to preserve fresh-cut apple quality by decreasing weight loss, delaying a rise in total soluble solids, modifying colour, and preserving sensory attributes (colour, flavour, taste, texture and overall acceptability).

Established on overall and sensory quality characteristics, fresh-cut apples seemed to be better conserved with 1% ascorbic acid, 1% calcium lactate, and 15% Arabic gum solutions.

Key words: *Apple, Edible films, Ascorbic acid, Calcium lactate, Arabic gum.*