

DEVELOPMENT OF ENZYME INFUSION TECHNOLOGY FOR THE IMPROVEMENT OF FRUITS AND FRUIT PRODUCTS

A. Osman, H.M. Ghazali and R. Abdul Rahman

Faculty of Food Science & Biotechnology
Universiti Putra Malaysia, 43400 UPM, Serdang, Selangor,
Malaysia

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Introduction

Enzyme infusion is defined as the application of enzymes to deliberately and selectively influence both surface and interior tissue characteristics of fruits and vegetables. Included in such a definition would be enzyme treatments designed to alter nutritional value, tissue composition, morphology and texture. It has been shown that infusion of peach halves with pectin methyl esterase and calcium chloride improved firmness. In Malaysia, during the last few years, there are increasing demand for minimally processed (washed, peeled and cut) fresh fruits. They are sold at roadside fruit stalls, chilled display cabinets at shopping centres, supermarkets and hypermarkets, not only as ready to eat fresh fruits but also as ingredients for fruit salads. Technology of preparing these ready-to-eat cut fruits that are able to retain firmness and other organoleptic qualities should be developed. The aim of this project was to determine the effect of vacuum infusion of pectinase and calcium on the firmness of selected tropical fruits.

Materials and Methods

The effect of vacuum infusion of calcium and both pectinase and calcium on the quality of minimally processed honeydew melons and guava during storage were studied. In the first case, fruit wedges of commercial maturity were vacuum infiltrated with 0, 0.5, 1.0, and 1.5% (w/v) calcium lactate solutions under different pressure followed by storage at $7 \pm 1^\circ\text{C}$, 75 – 92% RH. Related physico-chemical and microbial analyses and sensory evaluation were carried out on the fruit wedges at day 0 and every 3–5 day intervals. In the second case, the fruit wedges were first vacuum infiltrated with different concentrations of pectinase prior to dipping in various concentrations of calcium lactate solutions. The effects of different packaging films on the treated fruit wedges were also determined.

Results and Discussion

Results obtained in the present study indicate that dipping honeydew melon wedges in 1% calcium lactate solution under 350 mm Hg pressure followed by wrapping with cling wrap would be the optimum conditions for maintaining the quality of minimally processed honey dew melons (Ida Norbaya, 1997). Results also indicated that dipping honeydew

melons wedges into calcium lactate solutions higher than 1.0% resulted in a negative effect. Types of wrapping films also effect the rate of respiration and ethylene evolution, where honey dew melon wedges wrapped with cling wrap had a lower rate of respiration, compared to those wrapped with low density polyethylene (LDPE) films. Results of a similar study (Ng, 1998) on guava wedges indicated that dipping in 1.5% calcium lactate solution under 410 mm Hg for 1 minute at ambient condition and packed in cling wrap can best prolong the shelf life of the minimally processed product besides maintaining its quality. The guava wedges dipped in 1.5% calcium lactate solution under 410 mm Hg showed a more yellowish colour (higher positive b value of Hunter Lab colour score) on outer surface, giving a better visual quality and was highly preferred by the sensory panellists in terms of colour, texture, flavour and overall acceptability. Guava wedges wrapped in cling wrap as compared to control and other films were able to maintain colour, delay microbial growth and had lower respiration rate and ethylene production. Results of Muhamad Surairi (1998) indicated dipping guava wedges in 1.0% pectinase under reduced pressure of 350mm Hg followed by dipping in 1.5% calcium lactate solution was found to be the optimum condition for maintaining the quality. However, Nor Erimey (1998) reported that infusion of honey dew melon wedges with calcium lactate solution following infusion with pectinase under reduced pressure showed negative effect on its texture.

Conclusions

Shelf life of minimally processed guava could be extended besides maintaining its quality by vacuum infiltration with pectinase and calcium lactate solution. However, with honeydew melons, it gave a negative effect on its texture. Hence, although it has been reported that texture improvement is possible with pectinase prepared with high levels of pectinmethyl esterase and significantly reduces amount of polygalacturonase. Studies are on going to examine various pectinase preparations.

References

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