

Arpassorn Sirijariyawat 2012: Effects of Calcium Chloride on the Qualities of Frozen Fruits. Doctor of Philosophy (Food Science), Major Field: Food Science, Department of Food Science and Technology. Thesis Advisor: Associate Professor Sanguansri Charoenrein, Ph.D. 115 pages.

In the first experiment, the effect of the freezing process on the freezing characteristics of apple, mango, cantaloupe, and pineapple cubes were investigated. The results confirmed the negative correlation between the freezing point and total soluble solids content of fruit samples. Mango had the highest total soluble solids content and the lowest freezing point, while pineapple showed the highest freezing rate. In the second experiment, the roles of calcium on the physico-chemical properties of frozen fruits were studied by immersing fruit sample cubes in a 1% calcium chloride solution before frozen at -40°C. The presence of calcium in these fruits did not significantly affect the microstructure and total pectin content both before and after the freezing and thawing process, whereas it caused a decrease in the water soluble pectin content of all fresh and frozen-thawed fruits except for pineapple. For the fresh fruit, calcium significantly increased the firmness of cantaloupe and mango. However, subsequent to freezing and thawing, only the frozen-thawed calcium treated mango had a significantly higher firmness and lower drip loss than the untreated samples. The firmness scores of the fruits tested by trained panelists corresponded with the results from the instrument measurements and the panelists did not detect the bitterness of calcium chloride in the frozen-thawed samples. In the third experiment, the effect of pectin methylesterase and calcium infusion on the improvement of the texture of both fresh and frozen-thawed mango cubes was investigated. The weight gain, moisture content, calcium content, and pectin methylesterase activity of the mango samples were greater at relatively high vacuum levels (10 kPa). The fresh samples infused with pectin methylesterase and calcium at 10 kPa had significantly higher firmness than that of the fresh control mango. For the frozen-thawed mangoes, the samples infused with both pectin methylesterase and calcium at 50 kPa and at atmospheric pressure were found to be of superior texture and microstructure in comparison with the control frozen-thawed samples.

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Student's signature

Thesis Advisor's signature