

Kannika Rimkeeree 2012: Effect of Cultivar and Ripening Stage on the Quality and Microstructure of Frozen Mangoes (*Mangifera indica* L.). Master of Science (Food Science), Major Field: Food Science, Department of Food Science and Technology. Thesis Advisor: Associate Professor Sanguansri Charoenrein, Ph.D. 121 pages.

The objective of this study was to investigate the physicochemical and microstructural changes during mango ripening and the effect of cultivar and ripening stage on the quality and microstructure of frozen mangoes. Three mango cultivars (Maha Chanok, Nam Dok Mai, and Chok Anan) at different stage of ripening were observed. The ripening stage was categorized into six stages, which were based on the color index of mango peel color. The color of mango fruits changes noticeably from green to yellow-orange in all cultivars. A significant decrease in firmness was accompanied by a decrease in alcohol-insoluble residues and an increase in water-soluble pectin content throughout the ripening stages. The microstructure which was examined with light microscope revealed that during ripening of all cultivars, parenchyma cells became irregular in shape and loss of cell-to-cell contact. Maha Chanok and Chok Anan were found to exhibit smaller cell sizes and more compact cells as well as a greater firmness than Nam Dok Mai. Transmission electron micrographs illustrated that the cell walls of all cultivars were found to be intact at the stage 3, whereas the middle lamella was found to dissolve at ripening stage 5. Three mango cultivars with three different ripening stages were frozen in a cryogenic freezer. After freezing and thawing, the mangoes at ripening stage 3 exhibited the highest firmness value, highest firmness sensory scores, lowest drip loss and lowest water-soluble pectin. The microstructure study using light and transmission electron microscopy showed that all frozen-thawed mangoes exhibited a swelling and folding of cell wall due to freezing damage. The cell walls at the ripening stage 3 of Nam Dok Mai and Chok Anan cultivars appeared less damaged than in the other stages, while severe cell wall damage was found in the ripening stage 5. Frozen samples of Nam Dok Mai at all ripening stages appeared to have more cell wall damages than Maha Chanok and Chok Anan samples. These damages correlated with the extremely high drip loss of frozen-thawed Nam Dok Mai. It is clear that the loss in firmness of mango tissues after freezing and thawing are due to the changes in middle lamella, cell walls and cell wall composition. The use of Maha Chanok and Chok Anan mangoes at the ripening stage 3 is recommended, to preserve the cell wall damages and a loss in firmness, which occur during the freezing process.

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Thesis Advisor's signature