Abstract

Studies on development of packaging for frozen mangosteen consisting of 2 types of products e.g. whole-rind and half-rind mangosteen, and 5 types of retail packages e.g. LDPE bag, PS foam tray wrapped with LLDPE stretch film, PS foam tray wrapped with PVC stretch film, PVC box and PS box were carried out. It was found that the half-rind frozen mangosteen was more highly significant ($P < 0.01$) accepted than the whole-rind frozen mangosteen and the frozen mangosteen packed in each retial package was no significantly different in acceptability.

The results from chemical analysis of fresh mangosteen and frozen mangosteen showed very similar components, such as, moisture content 77.9-79.3%, pH 3.26-3.31, total soluble solid 18.5-19.6 °brix, total acidity as citric acid, reducing sugar and total sugar 0.70-0.77%, 4.2-4.6% and 15.8-17.4%, respectively. The ratio of total soluble solid and total acidity were 25.0-26.7 and of total sugar and total acidity were 21.1-23.4. After freezing the ascorbic acid content was decreased from 2.6 to 2.0-2.3 mg./100 g. flesh segment. In this experiment, there were about 17-24% of spoiled or unsuitable mangosteens as based on the total weight of purchased raw material. The physical characteristics of whole-rind frozen mangosteen were comparable to fresh mangosteen and contained about 25-30% of edible portion. The half-rind frozen mangosteen obtained white flesh of 40-47% of edible portion comparing to the packed weight.

Freezing of whole-rind mangosteen until the central temperature of the fruit reach -18 °C using contact plate freezer at the temperature of -40 °C took about 141 minutes which more than the time for freezing the half-rind mangosteen about 20 minutes.

Studies on storage stability of frozen mangosteen at -20 °C for 3 months showed that sensory evaluation of every types of frozen mangosteen tended to decrease while the storage time increased but the quality was still acceptable, except frozen mangosteen packed in PS foam tray wrapped with PVC stretch film which found that the quality of the product was not accepted after 2 months storage. Chemical compositions of frozen mangosteen were very slightly changed during storage, the same as microbiological quality showing the total plate count of 12 x 2800 CFU/g.flesh which was considered to meet standard of frozen fruit. The physical characteristics of frozen mangosteen showed a slightly decrease in gloss and freshness during storage.

In development of packaging for frozen mangosteen, it is necessary to analyse some properties of retail packages such as thickness, oxygen transmission rate and water vapor transmission rate, benefit to selection of suitable packaging. The studies indicated that PS foam tray wrapped with LLDPE stretch film was the most suitable for the whole-rind frozen mangosteen dued to the optimum water vapor transmission rate related to the thickness of the film. For half-rind frozen mangosteen, it was found that PS foam tray wrapped with PVC stretch film was more suitable than the other packages since this product performed a little transpiration

rate, therefore the water vapor could penetrate well and the appearance of the film remain unchanged.

Estimation of the cost of frozen mangosteen showed that whole-rind mangosteen obtained higher cost of freezing than the half-rind sample because of longer period of freezing. The cost of retail packages were compared and showed that PS box obtained a maximum cost, followed by PVC box, PS foam tray wrapped with PVC stretch film, PS foam tray wrapped with LLDPE stretch film and LDPE bag, respectively.