

CHAPTER 1: INTRODUCTION

1.1 Project background

Mangosteen is primarily consumed as fresh fruit, it is known for its common delicacy and as the “Queen of Fruit” in Southeast Asia. As a result of its unique taste and appearance, mangosteen has become a highly demanded fruit for the export commodity from Indonesia. Mangosteen production has expanded all over Indonesia and the primary locations for the plantation would be North Sumatra, West Sumatra, Lampung, West Java, South Sulawesi, West Nusa Tenggara, and Bali provinces (Erlangga, Purwadaria & Firdaus 2009).

According to *Badan Pusat Statistik* (BPS) in 2015 the volume of mangosteen export both in fresh and dried form was 38.18 thousand tons and among other annual fruits, it gave a major contribution to foreign exchange with the values of approximately 17 million USD. In the following year (2016), the volume of mangosteen export decrease to 34.95 thousand tons but still remain to contribute to the highest exchange value of approximately 20 million USD. However, a declined in these export value were found in 2017. The numbers of production volume and exchange value of mangosteen keep fluctuating throughout the years, in the year 2018 recently the export tap to China have been reopened thus it is an opportunity to boost mangosteen export, therefore, it could increase significantly. There are several countries with the highest mangosteen export destination including China (57%), Hongkong (24%), and United Arab Emirates (9%) respectively (Erlangga, Purwadaria & Firdaus 2009).

The high demand of mangosteen leads to the need of quality enhancement through the cultivation field improvement and suitable pre-harvest as well as post-harvest techniques are needed in order to maintain the quality and freshness of mangosteen. A major difficulty that limits the potential of exporting mangosteen is the degradation of fruit’s quality during storage and distribution process. The low quality of mangosteen could impact fruit decline for export purposes,

which lead to the loss for the farmer since the price of mangosteen overseas is approximately 5-8 times higher than the local market place (Suyanti and Setyadit, 2007).

Mangosteen is a climacteric fruit, which makes it prone to several external damages such as temperature, humidity, and light exposure that leads to a short post harvest age, meanwhile the distribution process overseas might take up to 28 days. Thus, the suitable storing condition and treatments are necessary in order to sustain the quality of mangosteen until it reaches consumers. Moreover, countries in Europe for instance, have a strict regulation regarding the overall appearance of mangosteen especially the crown. The color of the crown when it was received by the customers had to be similar to the color at harvesting period or it could be stated that there should be no significant difference. The storage condition and preventive treatments that are usually applied to mangosteen after it was harvested are coatings, packaging, and cold storage.

For fresh fruits and vegetables, edible coating materials are often used as an alternative post harvest preservation method to create a barrier surrounding the surface. One example of edible coating that could be used as a preservative coating material for fruits is chitosan, which is a high molecular weight cationic polysaccharide that is soluble in dilute organic acids (Jiang & Li, 2001). Chitosan is known to have great potential as biodegradable, edible coating and it also exhibits excellent biocompatibility, nontoxicity (Jiang & Li, 2001). The aforementioned benefits support the use of chitosan as a raw material for edible coatings. Previous studies by several researchers showed that coating application of chitosan was shown to improve the storability of some perishable fruits such as strawberry (Ghaouth et al., 1991), tomato (Ghaouth et al., 1992), peach (Li & Yu, 2000), and mango (Kittur et al., 2001). Moreover, chitosan can also be used as a preservative in order to enhance the quality and prolong the shelf life of various fruits such as longan fruit (Jiang & Li, 2001) and papaya (Ali et al., 2011).

Other than coating, packaging also plays an important role in preserving the freshness and quality of mangosteen. The role of packaging for foods is mostly to protect the foods, the same thing also happened for fruits. Packaging will protect the fruits from any physical damages that might

occur during the distribution process. Other than physical damage, the packaging would also protect the fruits from excessive light exposure, fluctuation of temperature and relative humidity. After being harvested, fruits are usually stored in secondary packaging such as a wooden box or wavy cardboard. However, once the fruits are treated and set to be delivered to the markets for consumer, the packaging should be more convenient, for example, fruits would be packed inside a plastic, printed plastic packaging, paper, and styrofoam. In addition to that, one way valve bag can also be used for fruits packaging, it could be the alternative to create modified atmosphere packaging since it will lower the oxygen level and increase carbon dioxide level, thus it will decelerate the respiration process and delay the quality degradation of mangosteen (Sutrisno et al., 2012).

1.2 Objective / Aims

This project aim is to extend the shelf life of mangosteen by effective post harvest techniques and to investigate the effect of combined approach on quality of mangosteen including freshness and appearance, firmness, total titratable acidity, soluble solid content and the weight loss during the storage period.

1.3 Scope of work

In this study, several post harvest treatments were applied to mangosteen including coating with chitosan and using one-way valve bag as the primary packaging. All of the treated mangosteen were stored under two different temperatures (12°C and 17°C) in order to have a comparison regarding which condition could preserve the quality of mangosteen better. It was expected that the aforementioned post harvest treatments would maintain the overall quality of mangosteen as well as extending the shelf life.

1.4 Importance of the research

The findings of this study will contribute to the improvement of post harvest handling techniques for mangosteen, along with the purpose that such techniques will be capable in prolonging the shelf life as well as maintaining the quality and freshness of mangosteen. It is also expected that the

outcomes will be able to enhance the export value of mangosteen since the fruit's quality will be preserved especially during the distribution process.