CHAPTER I

INTRODUCTION

1.1 Background

Dragon fruit (*Hylocereus polyrhizus*) is one of many fruit varieties in Indonesia. It has a unique and exotic look. Besides that, dragon fruit also has a sweet taste, fragrant aroma and crunchy texture that is preferable to society. Dragon fruit has a good nutritional value, it contains high amount of vitamin, mineral, and fiber (Paull and Duarte, 2012). It is also a good source of antioxidants and phenolic compounds and can be used as a natural food colorant. Dragon fruit is still considered a rare fruit in Indonesia. However, the consumption of this exotic fruit has been increasing over the year (Siddiq, 2012).

Dragon fruit peel weighs around 22% of the total fruit, it is usually disposed as a waste and not widely used (Anal, 2017). Dragon fruit peel powder contains a high amount of antioxidants, high dietary fiber, high swelling and oil-holding capacity and high glucose retention. It contains pectin around 10.8% that can be used as a thickening or stabilizing agent (Rodrigues, *et al.*, 2018; Yati, *et al.*, 2017; Zaidel, *et al.,* 2017). According to Megawati and Ulinuha (2015), the pectin extracted from dragon fruit peel can be utilized as an edible film or edible coating.

Edible coating is a substance applied to the exterior of a food product so that it is fit for consumption. Edible coating is mostly used for fruits and vegetables to reduce moisture loss, softening and increase the appearance and shelf life of food

product. The main ingredient of edible coatings or films are polymers, such as protein, lipid, resins and polysaccharides (Baldwin, *et al.*, 2011). The utilization of edible coating may replace the use of plastic coatings that can be resulted in less waste and pollution (Bourtoom, 2008).

Pectin is a polysaccharide that can be found in plant cell wall. It is a polymer chain composed of 1,4-linked α-D-galacturonic acid. Pectin is used as an edible coating due to its excellent barrier to oxygen, aroma preservation, barrier to oil and good mechanical properties (Valdes, *et al.*, 2015). Another composition of edible coating is starch. High amylose starch is desirable to produce a flexible, oxygen impermeable, oil resistant and water soluble film (Shit and Shah, 2014). Cassava starch is commonly used in edible coating because it is cheaper compared to other starch and has a better pulling force (Rosida, *et al.,* 2018). Pectin will produce a stiff and brittle edible films, therefore, the addition of cassava starch is to reduce the brittleness of pectin and increase the properties of the film produced (Grumezescu and Holban, 2018).

Fresh-cut fruits are used to supply hotels, restaurants, catering services and other institutions. The consumption of fresh-cut apples (*Malus sylvestris*) are increasing due to many advantages, such as reduction of manpower for food preparation, reduced system to handle waste and short time delivery. Fresh-cut apples also preferable to society because it can save time on food preparation and more convenient (Martin-Belloso and Fortuny, 2010). However, fresh-cut apples with minimal processing will undergo changes during storage such as browning reaction (Rai and Bai, 2017). According to Gomez-Lopez (2012), application of

edible coating can be used to retard browning reaction, reduce weight loss and maintain hardness in fresh-cut apples. Storage in lower temperature can also extend the storage time of fresh-cut apples by reducing their respiration and metabolic rates (Rai and Bai, 2017). Therefore, the application of edible coating using dragon fruit pectin was expected to extend the storage time of fresh-cut apples in different storage condition, i.e. room temperature and refrigeration temperature.

1.2 Research Problem

Dragon fruit is an exotic fruit with many health benefits and can be used for a wide variety of functions. However, it was still considered as a rare fruit to Indonesian society. The increasing consumption of dragon fruit also increases the waste produced which is the dragon fruit peel. Dragon fruit pectin can be used for edible coating production to coat food product such as fresh-cut apples and extend its storage time. Optimum starch concentration was also needed to produce edible film with desired characteristics. However, the dragon fruit pectin has never been utilized as an edible coating. Therefore, this study was conducted to utilize dragon fruit pectin in edible coating making and to determine the optimum cassava starch and pectin obtained from dragon fruit peel concentration to produce an edible coating.

Fresh-cut apples consumption is increasing due to its convenience and consistent quality. However, the deterioration of fresh-cut apples with minimal processing results in changes due to water loss, respiration, cut-surface browning and microbiological spoilage. Therefore, edible coating using pectin from dragon fruit peel was expected to maintain the quality of fresh-cut apples during storage.

1.3 Objectives

1.3.1 General Objectives

The general objective of this research was to utilize dragon fruit pectin in the making of edible coating to extend the storage time of fresh-cut apples in different storage condition.

1.3.2 Specific Objectives

The specific objectives of this research were:

1. To prepare and characterize dragon fruit peel powder and pectin.
2. To determine effect of dragon fruit peel pectin and cassava starch concentration on characteristics of edible film produced; and to select edible film with the most suitable characteristics.
3. To determine effect of edible coating application on characteristics of fresh-cut apples stored in different condition.