CHAPTER I
INTRODUCTION

1.1 Background

Over the past two decades, strawberries have been one of fruits that experienced the highest production demand in the world. In the U.S.A strawberries is the fifth highest consumed fruit besides bananas, apples, oranges, and grapes. According to FAOSTAT (2011) the production of strawberries is increasing up to 38% from the world’s total production from 2001 to 2010.

The increasing demand of strawberry, according to Shin et al. (2008) and Catalfo et al. (2009) is because of the flavor and its delicacy, the high visual appearance, and also due to high content of phenolic compounds that exist in the fruit. However, strawberries are highly perishable because the thin tender skin that easily get broken, making them vulnerable to crushing and bruising and susceptible to mechanical injury, water loss, and physical deterioration. Its structure also makes them vulnerable to spoilage and fungal attack.

Snowdon (1990) stated that one of the main problems in strawberry shelf life is the disease infection, such as from grey mold that caused by Botrytis cinerea that happen due to the skin structure of strawberry itself and temperature fluctuation. The other important factor, which greatly affects strawberry shelf life is the water loss because it resulted in reduced turgor pressure inside the cells that leads to symptoms such as wilting, flaccidity, limpness and loss of juiciness. According to Cavaco et al., (2015) edible coating can prolong the
shelf life of strawberry because it can reduce water loss, physical deterioration, and also reduce the spoilage and fungal attack.

Edible coatings have received attention in these recent years because of their advantages including the usage as edible packaging materials that can be consumed and minimize the use of synthetic films that leads to reduction of environmental pollution, reduces complexity, and improves the recyclability of packaging materials. Edible coating is a thin layer of material that can be consumed and provides a barrier to moisture, oxygen, and solute movement for the coated food. According to Donhowe and Fennema (1993), materials used for the preparation of edible coating can be classified into three categories, including: hydrocolloids (such as proteins, polysaccharides, and alginate), lipids (such as fatty acids, acyglycerol, waxes), and composites.

The source of hydrocolloid used in edible coating can be from a wide variety edible component such as jackfruit seed. According to Singh et al., (1991), jackfruit seeds are rich in starch that makes it becomes a great source of polysaccharides as one of the component used in edible coating. According to Elana (2014) and Steven (2014), edible coating made from jackfruit seed starch with addition of plasticizer and/or fatty acid can prolong the shelf life of strawberry up to 2 to 3 times with a range of storage shelf life of 27-30 days.

Bustillos et al. (2011) also stated that the addition of additives into edible coatings increases the effectiveness, such as essential oil and their constituents with antimicrobial and antioxidant activities show a great potential. Baiea et al. (2015) studied shown that lemon grass and peppermint oil shows a great potential to be added in edible coating since it can inhibit many microbes and
fungal attack. According to (Ferreira et al., 2013) lemongrass and peppermint are the examples of essentials oil that can inhibit grey mold (*Botrytis cinerea*), the major fungal disease in strawberry. Thus it makes lemongrass and peppermint become great source to be added in edible coating to prolong the shelf life of strawberry.

According to Elana (2014) and Steven (2014), edible coating made from jackfruit seed starch with addition of plasticizer and/or fatty acid can prolong the shelf life of strawberry, but without the addition of natural antimicrobial. Therefore, their base formulation may be improved in extending shelf life by addition of natural antimicrobial. The incorporation of natural antimicrobial from lemon grass and peppermint oil into base formulation (Elana 2014) was hoped to extend the shelf life of strawberry.

### 1.2 Research Problem

Edible coating prepared from jackfruit seed starch mixed with plasticizer and/or fatty acid agent have been proved to prolong the shelf life of strawberry in range of storage shelf life of 27-30 days (Elana, 2014; Steven, 2014). The base formulation, even though is not added with natural antimicrobial agent extended the shelf life of strawberry to 2 to 3 times. However, if natural antimicrobial agent is added, it is still unknown if the shelf life can be extended more. It is interesting to know whether the addition of natural antimicrobial will extend the shelf life of strawberry. Therefore, this research will be conducted using natural antimicrobial (essential oil), which are peppermint or lemongrass.
oil that added to base formulation (Elana, 2014) and investigate their effect toward shelf life and characteristic of strawberry fruit.

1.3 Objectives

1.3.1 General Objective

The general objective of this research was to investigate characteristics of edible films made from jackfruit seed starch, plasticizer, and fatty acid (base formulation) and the addition of peppermint or lemongrass oil and its utilization as edible coating with natural antimicrobials to prolong shelf life of strawberry.

1.3.2 Specific Objectives

The specific objectives of this research were:

1. To produce starch from jackfruit seed and analyze its yield and chemical characteristics.

2. To determine the effect of edible film from base formulation (jackfruit seed starch, plasticizer, fatty acid) and peppermint or lemongrass oil on tensile strength, elongation, thickness, and water vapor transmission rate.

3. To determine the effect of edible coating made from base formulation and peppermint oil or lemongrass oil on shelf life and quality changes of strawberry.