CHAPTER I
INTRODUCTION

1.1 Background

Lesser yam (*Dioscorea esculenta* L. Burkill), is one of many types of yam that can be used as alternative food and mainly grows in tropical countries such as Indonesia. Lesser yam has been consumed by Indonesian people as the alternative source of staple food because it has high carbohydrate content. According to Kumar (2007), carbohydrates are the major component of lesser yam and mostly in the form of amylopectin, which consists about 80% of dry matter weight.

Lesser yam has been widely consumed in the form of unprocessed and processed. Unprocessed forms include boiled yam, pounded yam, mashed yam, fried yam, roasted yam, and baked yam. But lesser yam can also be consumed in the processed forms such as yam flour, flakes and chips (Onwueme and Charles, 1994). Lesser yam starch can also be used as starch-based for edible coating or film. According to Putera (2013), application of edible coating using 4.5% lesser yam starch, and 2% glycerol as plasticizer can prolong the shelf life of strawberry until 26 days in refrigeration temperature storage. Follow up research of Putera (2013) was conducted by Susanto (2014) and the result showed the application of edible coating using 4.5% lesser yam starch added with 2% glycerol as the plasticizer could extend the shelf life of strawberry until 24 days in refrigeration temperature (2-3 °C). Similar research that applied lesser yam starch as edible coating was conducted by Lestari (2014); the application of edible coating using
4.5% lesser yam starch added with 5.5% sorbitol as the plasticizer could extend shelf life of strawberry in refrigeration temperature (4 ºC) until 28 days.

Edible coating can be made with different component such as polysaccharide, lipid and composite. Starch based edible coating need 30% of amylose content for yam starch (Embuscido and Huber, 2009).

Edible coating sometimes needs antimicrobial to prevent the growth of mold, yeast, and bacteria. There are natural and chemical antimicrobial. Lemongrass is one example of natural essential oil that has bioactive compound that can act as antimicrobial agent and it can lower down the growth of some bacteria as well as mold and yeast (Boye, 2015). According to Raybaudi-Massilia, et al (2007), edible coating that added with lemongrass oil 0.3% v/v, will extend the shelf life of strawberry until more than 14 days under 5 ºC. Sodium benzoate also widely used as the antimicrobial in food industry because it can widely found in chemical store and low cost. Sodium benzoate can reduce the number of bacteria also and can act without react with the food component (Batt and Tortorello, 2014).

Strawberry is mainly consumed in Indonesia and can be found mostly in supermarket or traditional market. Strawberries are high perishable food because it has high respiration rate and susceptible for microorganism spoilage. Although it has a high respiration rate, but strawberry doesn’t undergo ripening process after harvesting (Brown, 2015). According to Thompson (2015), in non-climacteric fruit such as strawberry, there is a little change in ethylene even after harvesting process.
Considering the ability to apply lesser yam starch as edible coating added with plasticizer can prolong shelf life of strawberry based on previous studies by Putera (2013), Lestari (2014), and Susanto (2014), and the potency of natural and chemical antimicrobial agent to reduce the microbial growth, this research will be focused on investigation of edible film previously formulated but with the addition of antimicrobials in terms of film characteristics and shelf life extension of strawberry.

1.2 Research Problem

Lesser yam has a high starch content that can be used as the source to make an edible coating as well as the edible film. Strawberry is the type of fruits that high perishable because of the high respiration rate. Edible coating can be used for high perishable food and high respiration rate fruits to prolong the shelf life. Research conducted by Putera (2013), application of edible film using 4.5% lesser yam starch and 2% glycerol as the plasticizer can prolong the shelf life until 26 days. Another research by Susanto (2014), application of edible coating made from lesser yam starch, glycerol as the plasticizer, can prolong the shelf life of strawberry until 24 days under refrigeration temperature. Similar research conducted by Lestari (2014), application of 4.5% of lesser yam starch and 5.5% sorbitol in edible coating for strawberry, can prolong the shelf life of strawberry until 28 days. However, these previous studies have not used antimicrobials in the formulations; therefore, this research will be carried out using some of previous formulation but with the addition of antimicrobials and to see whether there is improvement of shelf life and quality of coated, stored strawberry.
1.3 Objectives

1.3.1 General Objectives

The general objectives of this research were to investigate characteristics of edible film from lesser yam starch added with lemongrass oil or sodium benzoate as antimicrobial agents and its application as edible coating to extend the shelf life of strawberry.

1.3.2 Specific Objectives

The specific objectives of this research were:

1. To isolate starch from lesser yam and analyze yield of starch isolated and the chemical characteristics of lesser yam starch.

2. To determine effect of lesser yam starch-plasticizer and lemongrass oil or sodium benzoate on edible film physical and mechanical characteristics including tensile strength, elongation, thickness, water vapor transmission rate; and choose edible film with suitable physical and mechanical characteristics to be used as edible coating.

3. To determine effect of the selected edible film formulations used for coating on coated strawberry shelf life and characteristics including hardness, weight loss, pH, total sugar, total titratable acidity, total microbes, and sensory evaluation.