# CHAPTER I

# INTRODUCTION

## 1.1 Background

The availability of feedstocks that is more abundant from year to year increased the production of renewable material from renewable feedstocks. It was indicated in 2004, 2010, 2020, and 2030 about 5 %, 12 %, 18 %, and 25 % respectively [1]. In order to solve the environment and sustainability issues, the development of biocomposites was improved from renewable materials, particularly in polymer science field. These biocomposites can be easily disposed or composted without harming the environment [2,3].

Thermoplastic starch (TPS) is one of alternative from the agricultural resource that can replace petroleum-derived plastics due to the low production cost, biodegradable and renewable material [4].

Starch as a natural polymer, it has low price, thermoplastic behavior, availability, biodegradable, recyclable and renewable. These properties make the starch as one of the most promising materials [5]. Starch that contains natural polysaccharide can be found in several plant resource, such as roots (sweet potatoes, tapioca), tubers (potatoes), stems (sago palm), cereal grains (corn, rice, wheat, barley, oats, sorghum), and legume seeds (peas and beans) [6].

Sweet potatoes is one of starch source that contains of starch, cellulose, hemicelluloses, pectin and sugar. It contains 800-900 g/kg of carbohydrate content and 130-480 g/kg of dry matter content. Beside, sweet potatoes is easy to get, especially in Indonesia and the potential source of starch to make bioplastic [7].

The production of eggshell by manufacturing plants and food processing as a wasted material reachs several tons per day [8]. Most eggshell is sent to the landfill at a high management cost without further processing. Therefore, it is economical to use eggshell waste for transforming biomaterials into commercial products and creating new values from these waste materials. The generalized eggshell structure, which varies widely among species, is a protein lined with mineral crystals, usually of a calcium compound such as calcium carbonate. These

characteristics qualify ES is a good candidate for bulk quantity, inexpensive, lightweight and low load-bearing composite applications, such as the automotive industry, trucks, homes, offices, and factories. Although there have been several attempts to use eggshell components for different applications, its chemical composition and availability make eggshell a potential source of filler in polymer composites [9,10,11].

## 1.2 Objectives

1. To obtain the optimum tensile strength of biocomposites
2. To observe the microstructure of biocomposites using scanning electron microscope (SEM)
3. To analyse the functional groups of biocomposites.
4. To know the effect of eggshell on water absorption of biocomposites.

## 1.3 Benefits

1. Be obtained a degradable biocomposite.
2. Be a reference for the research in biocomposite.

## 1.4 Problem Limitation and Assumptions

1. Purple sweet potatoes as the matrix for biocomposite.
2. Using 1 %, 2 %, and 3 % eggshell powder as a filler of purple sweet potatoes starch.
3. Tensile strength, FTIR and water absorption testing as the testing for specimen.
4. SEM (Scanning Electrone Microscope) is used to check the microstructure of specimen.

## 1.5 Writing Systematical

Generally, systematical of writing consists of four parts as follow:

1. CHAPTER I INTRODUCTION

   It explains about background, goals, benefits, problem scopes, and systematical of writing of the report.

2. CHAPTER II LITERATURE REVIEW

   It concerns about theory related to research that will be conducted.

3. CHAPTER III METHODOLOGY

   It contains tools, materials, and the procedure that will be conducted in the research.

4. CHAPTER IV DATA AND ANALYSIS

   It contains the analyse of tensile strength, scanning electrone microscope, FTIR, and Water Absorption testing.

5. CHAPTER V CONCLUSIONS AND RECOMMENDATIONS

   It contains the conclusions and recommendations.

6. REFERENCES

   References in research and report writing.