CHAPTER I
INTRODUCTION

1.1. Background

The main objective of food packaging is to maintain the quality and safety of food products from the process of storage, transportation, to the hands of consumers and to extend their shelf life by avoiding conditions such as microorganisms, contamination, UV-light, oxygen, and moisture. The four basic packaging materials used are paper and cardboard, plastic, glass, and metal. Among these packaging materials, plastics have been used extensively during the 20th century, due to their low cost, flexibility, practicality, and outstanding physicochemical properties. However, this causes serious problems in the environment because plastic is very difficult to decompose in the environment after use.

The solution to solve this problem is to replace conventional plastic base materials with easily degradable materials, which are called biodegradable plastics (bioplastics). Bioplastics are plastics that come from renewable biomass sources, such as vegetable fats and oils, corn flour or microbiota, etc. Biodegradable bioplastics can break down in anaerobic or aerobic environments. Bioplastic raw materials include starch, cellulose, biopolymers and various other materials. In this meaning, plastic is a film or thin layer that is strong but flexible and friendly to the environment [1].

The example of biodegradable material is polyvinyl alcohol (PVA). PVA is a type of synthetic polymer that can be degraded by the environment for quite a long time. To increase the biodegradability, PVA must be mixed with environmentally friendly materials such as fiber which functions as reinforcement. However, PVA has low tensile properties, high water absorption capability (high hydrophilicity), and low UV light inhibition ability [2]. One of the promising eco-friendly fiber with good antimicrobial & antifungal activity can be found from the gambier plant. Gambier which is the result of extraction from the leaves of the Gambier plant, has polyphenolic compounds in the form of catechins which are

useful as antioxidants and antimicrobials. Catechins in gambier contain as much as 7-33% and is attributable to the high UV light absorption [3].

Another thing that is also one of the criteria for good food packaging is flexibility and resistance to UV rays. Based on the previous research, to increase the flexibility, glycerol is used as plasticizer. Glycerol can reduce the stiffness of the material, so that the material is more easily deformed and be able to accept greater deformation. Glycerol can increase the elongation, but decrease the tensile strength [4]. For the UV rays, glycerol can also increase the UV-light barrier and lower the transmittance values [5].

Therefore, this research needs to be carried out as a development of environmentally friendly plastics (bioplastics) that have high flexibility and are able to block UV rays. Generally, this research is addressed to study the effect of adding glycerol into PVA/Uncaria gambir biocomposite film which has been adapted to the American Society for Testing and Materials (ASTM).

1.2. Problem Statement

Based on the information of the **Subchapter 1.1**, the problem is how to obtain high tensile behaviuors and UV-rays protection by adding glycerol to PVA/Gambier biocomposite film.

1.3. Research Objective

The objective of this research is to obtain the high tensile behaviors and UV-rays protection by adding glycerol to PVA/Gambier biocomposite film.

1.4. Benefit

The advantage of this research is :

1. To expand the use of polyvinyl alcohol/uncaria gambier as the commercial biodegradable plastic.
2. To solve the environmental plastic waste problem.

3. As a reference for an antibacterial and antioxidant with better tensile behaviours of PVA film product.

1.5. Research Scope

The research scopes of this study are as follows :

1. The gambier used in this research is the production of Biota Sumatera Laboratory at Andalas University, Padang, West Sumatera.
2. The polyvinyl alcohol used in this research is from Sigma Aldrich with 99+% hydrolyzed.
3. The glycerol used in this research is from Fisher Scientific (Germany) with ≥99% assay analytical reagent grade.
4. The film obtained is assumed/considered as a homogeneous film.
5. The sample film for tensile test is using ASTM D638-14 Type 5.
6. The sample film for Transmittance UV testing is using ASTM D1003-00.

1.6. Report Outline

This study consists of five parts which is chapter I is the Introduction, consists of topic selection background, research objective, benefit, research scope, and report outline. Chapter II is Literature Review, which explains various supporting theories related to the final project to be carried out, starting from preparing materials to getting samples for testing. Chapter III is Methodology, which explains the process of the research working, starts from tool and materials preparation until getting samples that will be tested later. Chapter IV is the results and discussions. This chapter consists of the results of the tested sample and the discussion of the results. Chapter V is the conclusion of the tested sample and the suggestion for the next researches.