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**TITLE: PREPARATION OF STARCH-BASED  
BIOPLASTIC FROM LOCAL SWEET POTATO  
WITH PLASTICIZER AND FILLER**

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## ABSTRACT

Plastic is widely used in many purposes such as packaging, building and construction, electronics, aerospace, and transportation. However, plastic waste can cause pollution and has emerged a major environmental concern. The use of bioplastics as an alternative to synthetic plastic from petrochemical sources. In comparison to conventional plastics, bioplastics provide several benefits, including a smaller carbon footprint, more energy efficiency, greater biodegradability, and greater adaptability. Among the options, starch is a great replacement for synthetic polymers. This is due to its abundance in nature, low cost, lack of toxicity, renewable nature, biocompatibility, and ability to create films. In this study, starch-based bioplastic was prepared from sweet potato (*Ipomoea Batatas* L.Lam) with glycerol and sorbitol as plasticizer and wood dust as filler using casting method. Then, the optimal conditions for preparing starch-based bioplastics with minimum percentage water adsorption were established using a three-level Box-Behnken design (BBD) as the design of experiment (DOE). The important parameters used for this study were starch, plasticizer, and filler. For determination of percentage water absorption, the prepared bioplastic was leave in distilled water for 24 hours and weighted. The statistical analysis was conducted using Design Expert software. Based on the obtained response surface linear model, percentage absorption of water is depending on amount of starch, plasticizer, and filler. The response surface method was proved to be useful to obtain optimum conditions in preparing starch-based bioplastic. In addition, there is a lot of potential for the use of starch-based materials in the production of bioplastics, which is something that will help safeguard the environment.

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# CHAPTER ONE

## BACKGROUND

### 1.1 Introduction

Plastics are a diverse group of synthetic or semi-synthetic materials with polymers as their primary constituent. Plastic is widely used in many industry such as packaging, building and construction, electronics, aerospace and transportation. From that we know that plastic is quite important in the industry even it is important in our daily life because we can see that our household is from plastic such as shampoo and toiletry bottles. Although it is impossible to determine the precise amount of plastic waste created, it is thought that 70% of the plastic manufactured is thrown away rather than recycled. In 2020, over 350 million tones of plastic materials were produced; around 240 million tones of that amount—or 70%—was generated as plastic waste. The main contributions to the global manufacturing of plastics are PP, PVC, and HDPE. Similar to this, PP and PE make up a sizable amount of plastic waste (Miller, J. N. ,2005).

Plastic materials are robust and long-lasting. These materials cannot degrade when used normally. Plastic waste can contaminate our environment for a long time since plastic materials can survive on our globe. Under typical environmental circumstances, plastic materials take thousands of years to decompose (Miller, J. N. ,2005). Plastic can cause environmental pollution, decreasing the population of aquatic life and fills up our landfills due to their sluggish pace of breakdown in natural habitats (Kolli, G., 2022, March). To avoid this plastic production continuing to harm our planet there is an option to overcome this which is the production of bioplastic.

Bioplastic is the new development to produce plastic that is eco-friendly. Bioplastics are polymers created from renewable materials that can be recycled naturally through biological processes. This helps to cut down on the consumption of fossil fuels and protects the environment (Rudin, A., & Choi, P. , 2013). Today, in many industry that apply bioplastic in order to overcome the pollution such as food packaging, composting bags and eco-friendly straw. Bioplastic can be made from natural resources such as corn starch, potato starch and banana peel. Starch is one of those biopolymers that would be desired to produce bioplastics since it is not only cheap but also