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## **TITLE:**

PREPARATION OF STARCH BASED BIOPLASTICS FROM LOCAL TAPIOCA  
WITH PLASTICIZER AND FILLER

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## ABSTRACT

Plastic is significantly applied in a variety of industries, including packaging, construction, electronics, aircraft, and transportation. However, plastic trash has become a significant environmental concern and can contribute to pollution. use bioplastics in place of synthetic plastic derived from petrochemical sources. Bioplastics have various advantages over conventional plastics, including a lower carbon footprint, increased energy efficiency, increased biodegradability, and increased flexibility. Starch is a viable substitute for conventional polymers among the available materials. This is because it is abundant in nature, inexpensive, non-toxic, renewable, biocompatible, and suitable for making films. In this research, a starch-based bioplastic was made using the casting method from local tapioca (*Manihot esculenta* Crantz), glycerol, and sorbitol as plasticizers, and wood dust powder as filler. The optimum condition for synthesizing starch-based bioplastics with the minimum moisture content were then determined using a three-level Box-Behnken Design (BBD) as the Design of Experiment (DOE). Starch, plasticizer, and filler were significant study parameters. The prepared bioplastic was placed in distilled water for 24 hours and weighed to determine the percentage water absorption. Using Design Expert Software, the statistical analysis was carried out. Starch-based bioplastics also possess many possibilities for application as biodegradable polymers, which will help to protect the environment.

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# CHAPTER ONE

## BACKGROUND

### 1.1 Introduction

A polymer that is created into a consumer enterprise from a natural source or renewable resource is known as a bioplastic. Bioplastic defines as biodegradable plastics, or plastics that may or may not degrade but are made from biological components or renewable feedstock (Atiwesh et al., 2021). Given the correct circumstances, some bioplastics can be composted or biodegraded. Biochemical processes can naturally recycle bioplastics manufactured from renewable resources, reducing the need for fossil fuels, and preserving the environment. Bioplastics are therefore environmentally friendly, generally biodegradable, and biocompatible. In many industrial applications today, including food packaging, agriculture, composting bags, and hygiene, bioplastics have become essential. Additionally, bioplastics are utilised in biological, structural, electrical, and other consumer goods. With the demand for plastic usage increasing globally, a lot of research is being done to investigate green materials and novel processing techniques (Ashter, 2016).

### 1.2 Literature Review

#### 1.2.1 Starch

Starch is a natural polymer that is frequently present in the roots, stalks, seeds, and staple crops of numerous plants. In general, potatoes, wheat, maize, and cassava are the main sources of native starch. Numerous plants produce starch as a source of stored energy since it is a renewable, natural, and biodegradable polymer. The most common form of starch has a concentric crystalline multiresolution form, which enables the production of novel nanomaterials including (1) starch nanocrystals produced by acid hydrolysis of amorphous domains from crystalline granules, and (2) starch NPs made from gelatinized starch (Nasrollahzadeh et al., 2019). Starch-based plastics have demonstrated significant prospects, particularly as more countries implemented legislation outlawing single-use, conventional plastics. There are various benefits of starch. As contrasted to synthetic plastics, the main advantage of starch-based plastics