UNIVERSITI TEKNOLOGI MARA
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TITLE:

Characterization Of Bioplastic Derived From Corn Starch And Its Degradation In Soil

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AUTHOR'S DECLARATION

I hereby declare that this report is the resof my own work except for quotations and summaries which have been duly acknowledged. First of all, a million thank you to my supervisor for lending her hands to help me to get through this project. I apologize for any wrong doing. A gigantic thank you so much for being patient with me.

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ABSTRACT

The widespread usage of petroleum-based plastics has raised environmental concerns, necessitating the development of sustainable and biodegradable substitutes. Because cornstarch is abundant, renewable, and biodegradable, it has become a promising raw material for the production of bioplastics. However, the performance and suitability of cornstarch-based bioplastics for practical applications remain largely dependent on their properties. An important consideration when evaluating the sustainability and environmental impact of bioplastics as substitutes for traditional plastics is how they break down in soil. Thus, the purpose of this study is to use a variety of testing techniques (soaking in water, water absorption, moisture absorption, and solubility test) to describe the characteristics of commercial bioplastic made from cornstarch. FTIR spectroscopy was used to identify the functional group for bioplastic made from cornstarch in soils. The reclaimed sample soils from UITM Cawangan Terengganu, Campus Kuala Terengganu (KT), and the natural sample soils are from Al-Mukhtafi Billah Shah (AMBS) and have been exposed to plastic contamination for a while. The material's swelling and softening are evident in the results, which also reveal partial disintegration after four weeks of soaking in water. The percentages of moisture and water absorption are 3.04% and 17.45%, respectively. The bioplastic does not dissolve in water, according to the results of the solubility test, but it does interact more with alcohol-based solvents and alkaline solutions when tested at two different temperatures (room temperature and high temperature, 60°C to 75°C). These findings are consistent with those of earlier studies. According to the FTIR spectrum, the presence of starch-based bioplastic in the soil samples is indicated by peaks at the range of 3200-3600/cm, 1640-1740/cm, 1000-1200/cm, and O-H stretching, C=O stretching (carbonyl groups), C-O-C stretching, and O-H bending, respectively. To sum up, this study will add important information about the viability and environmental impact of bioplastics made from cornstarch. To ascertain whether the presence of bioplastic can impact the quality of the soil, more research must be done.

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BACKGROUND

1.1 Introduction

Plastics are now an important part of countless businesses and applications, having completely transformed the modern world. Conventional plastics are synthetic polymers that are mostly derived from petrochemical feedstocks. They are defined by their durability, adaptability, and light weight. Since they can be folded into a variety of shapes and forms, they are widely used in a variety of industries, including construction, packaging, healthcare, and the automotive sector.

However, one of the biggest worldwide issues in terms of environmental concern is the waste from plastic bags. Specifically, this is due to their inability to biodegrade and their ability to endure for hundreds of years in ecosystems. Conventional plastic bags worsen the issue of landfill overflow and contribute to pollution and endangering wild species. There is an urgent need for sustainable alternatives because, according to a published report, just 9% of the 8.3 billion metric tons of plastic manufactured since the 1950s has been recycled.

As an environmentally responsible solution to these problems, bioplastic bags have surfaced. Half of the 26 million tonnes of plastic post-consumer waste that are predicted to be produced by 2050 will be dumped into the environment, creating a persistent waste management issue. Under certain environmental circumstances, these bags are made to decompose quickly into natural components including water, carbon dioxide, and biomass. Bioplastic bags lower the environmental impact and lessen dependency on fossil fuels because they are made from renewable resources like cornstarch. Finally, bioplastics present a viable way to lessen the long-term effects of plastic waste on the environment.

1.2 Literature Review

1.2.1 Types of Bioplastics

Sustainable substitutes for conventional plastics are bioplastics, which are made