

**BIODEGRADABILITY STUDY ON THE
BIOPLASTIC DERIVED FROM BANANA PEEL
FRUIT WASTE WITH VARIOUS RIPENING STAGES**

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ABSTRACT

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Bioplastic is currently being used to replace synthetic plastic utilized in food packaging. Bioplastic can be derived from a bio-based product such as banana peel which has a high biodegradation rate. In order to produce bioplastic which can be degraded easily by different types of soil and a good ripening stage must be chosen. The objectives of this research are to evaluate the effect of different types of soil and soil burial time on biodegradability of the films and to analyze the physical appearance of bioplastic derived from various banana ripening stages due to biodegradation process. In this research, bioplastics from the unripe, ripe and overripe peel of *Musa acuminata* x *balbisiana* (ABB) cv. Awak and *Musa acuminata* (AAA) cv. Berangan were used to analyze the biodegradation rate by means of weight loss. A biodegradability study of the bioplastic produced was conducted and a few variables such as different types of soil which are garden soil with loam (GL) and garden soil with loamy sand (GLS) and soil burial time were evaluated in depth. Moreover, the bioplastic films before and after buried in soil were also analyzed by sensory test and microscopic test. This research shows bioplastic from ripe peel has the highest weight loss (0.0834 g) compared to unripe peel (0.1446 g) and overripe peel (0.2526 g) when buried in GLS due to the increased sugar content in the ripe peel that promotes microbial activity as well as high moisture content and fine texture of the soil. The cross-view of bioplastic film also shows there is a biodegradation process occurred where the microstructure of the bioplastic film is irregular after being buried in the soil.

TABLE OF CONTENTS

	Page
ACKNOWLEDGEMENT	i
TABLE OF CONTENTS	ii
LIST OF TABLES	iv
LIST OF FIGURES	v
LIST OF SYMBOLS	vii
LIST OF ABBREVIATIONS	viii
ABSTRACT	ix
ABSTRAK	x
CHAPTER 1 INTRODUCTION	
1.1 Background of study	1
1.2 Problem statement	2
1.3 Research question	3
1.4 Significance of study	4
1.5 Objectives of study	4
1.6 Scope and limitation of study	5
CHAPTER 2 LITERATURE REVIEW	
2.1 What is plastic	6
2.1.1 Synthetic plastic	7
2.1.2 Biodegradable plastic	8
2.1.2.1 Bio-based plastic	9
2.2 Fruit waste	10
2.2.1 Definition of fruit waste	10
2.2.2 Type of fruit waste	11
2.3.3 Fruit waste from banana	12
2.3 Banana peel	13
2.3.1 Banana peel in bioplastic production	14
2.4 Biodegradability study	15
2.4.1 Factor that contributes to the biodegradation process	17
2.4.1.1 pH	18
2.4.1.2 Temperature	19
2.4.1.3 Type of soil	21
2.4.1.4 Moisture content of the soil	24

CHAPTER 1

INTRODUCTION

1.1 Background of study

For the past few years, plastics are widely used in every sector of the industry for instance food packaging, textile, electric and electronic industries. According to Hubbe et al. (2020), the most extensively used plastics are meltable and hydrophobic synthetic polymers produced from petroleum. Polyethylene, polypropylene, polyamides, and polyesters are among them. In addition, plastics are known for their lightweight, low-cost, and long-lasting qualities (Arikan & Bilgen, 2019). Recent development has led researchers to produce bioplastics created from natural polymeric components such as starch, vegetable oil, cellulose, and lignin, as well as animal-derived compounds like proteins and lipids (Nandiyanto et al., 2020). Recently, people are starting to recognize and use bioplastics as awareness to save the earth and avoid plastic pollution in the land and aquatic environment.