THE PRODUCTION OF BIODEGRADABLE MULCH FILM BY USING BANANA PEEL WASTE AS FILLER AND WASTE COOKING OIL AS PLASTICIZER

IRSALINA MALIKAH BINTI JABRULLAH KHAN

BACHELOR OF SCIENCE (Hons.) APPLIED CHEMISTRY
FACULTY OF APPLIED SCIENCES
UNIVERSITI TEKNOLOGI MARA

AUGUST 2023

This Final Year Project entitled "**The Production f Biodegradable Mulch Film By Using Banana Peel Waste As A Filler And Waste Cooking Oil As Plasticizer"** was submitted by Irsalina Malikah Binti Jabrullah Khan in partial fulfilment of the requirements for the Degree of Bachelor of Science (Hons.) Applied Science, in the Faculty of Applied Sciences, and was approved by

_____

Dr. Nur Nasulhah Binti Kasim
Supervisor
B. Sc. (Hons.) Applied Science
Faculty of Applied Sciences
Universiti Teknologi MARA
02600 Arau
Perlis

_____

Dr. Siti Nurlia Binti Ali
Project Coordinator
B. Sc. (Hons) Applied Chemistry
Faculty of Applied Science
Universiti Teknologi MARA
02600 Arau
Perlis

_____

Dr. Nur Nasulhah Binti Kasim
Head of Programme
B. Sc. (Hons.) Applied Chemistry
Faculty of Applied Sciences
Universiti Teknologi MARA
02600 Arau
Perlis

Date : August 2023

TABLE OF CONTENTS

ABSTRACT

THE PRODUCTION OF BIODEGRADABLE MULCH FILM BY USING BANANA PEEL WASTE AS A FILLER AND WASTE COOKING OIL AS PLASTICIZER

Biodegradable plastic mulches have shown great potential as an alternative to conventional polyethylene plastic film mulches. This study focuses on the preparation, characterization, and biodegradability test of composite films made from polylactic acid (PLA). The films were prepared by dissolving different ratio of PLA pellets and banana peel powder as filler with epoxidized WCO (EWCO) as a plasticizer to produce a uniform film. Fourier Transform Infrared Spectroscopy (FTIR) was used to study the functional groups present in the PLA film. The addition of EWCO and varying amounts of banana peel powder to PLA films resulted in a noticeable decrease in tensile strength compared to the 90% PLA film. It was found that the ratio that has the lowest tensile strength and highest elasticity is 50% PLA and 40% banana peel powder. It has a tensile strength of 0.0244 MPa, tensile modulus at 70.92579 MPa and elongation at break at 51.12% although with maximum used of biomass material. Furthermore, it was shown that the specific type of biomass used as filler has a significant impact not only on the properties of the films mentioned, but also on their biodegradability. The PLA composite films, containing 10%, 20%, 30%, and 40% of banana peel powder showed an enhancement in the biodegradability of PLA in soil. This improvement was observed by analysing the average weight loss of the PLA composites after a month of soil burial experiment. The biodegradability trend of PLA composites films gradually increases as the percentage of banana peel powder increased. Moreover, the addition of banana peel powder and EWCO has resulted in a significant enhancement in the biodegradability of PLA film. This improvement signifies a sustainable and completely biobased alternative to the mulches currently available in the market.