

UNIVERSITI TEKNOLOGI MARA

**BIODEGRADATION OF
LOW-DENSITY POLYETHYLENE
(LDPE) MIXED WITH POTATO
STARCH BY *Aspergillus niger*,
Rhizopus oryzae AND THEIR
BIOFILM**

NURHIDAYAH BINTI ZAKARIA

Thesis submitted in partial fulfilment
of the requirements for the degree of
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AUTHOR'S DECLARATION

I declare that the work in this thesis was carried out in accordance with the regulations of Universiti Teknologi MARA. It is original and is the results of my own work, unless otherwise indicated or acknowledged as referenced work. This thesis has not been submitted to any other academic institution or non-academic institution for any degree or qualification.

I, hereby, acknowledge that I have been supplied with the Academic Rules and Regulations for Undergraduate, Universiti Teknologi MARA, regulating the conduct of my study and research.

Name of Student : Nurhidayah Binti Zakaria
Student I.D. No. : 2016552257
Programme : Bachelor of Science (Hons.) Biology -
AS201
Faculty : Applied Sciences
Thesis Title : Biodegradation of Low-Density Polyethylene
(LDPE) Mixed with Potato Starch by
Aspergillus niger, *Rhizopus oryzae* and
Their Biofilm

Signature of Student :

Date : July 2019

ABSTRACT

Low-density polyethylene (LDPE) is the most commonly used in plastic packaging such as for grocery bags or plastic wrap. Unfortunately, the rate of polyethylene production and consumption exceeds the rate of disposal. Several methods had been proposed to overcome this problem such as integrating this plastic material with biodegradable elements such as potato starch. However, study in degradation and decomposition of LDPE mixed with potato starch by fungi's biofilm is limited. Thus, the aim of this study is to form biofilm of *Aspergillus niger* and *Rhizopus oryzae* for bioplastic degradation by growing in 96-well flat bottomed microtiter plate. The rate of biodegradability LDPE mixed with potato starch were analysed by using soil buried test, enzymatic activities and Fourier Transform Infrared Spectroscopy (FTIR). The rate of biodegradation of LDPE mixed with potato starch is influenced by enzymatic activities of *A. niger* and *R. oryzae*. The weight losses of LDPE mixed with potato starch during biodegradation were also determined. The percentage weight loss of LDPE mixed with potato starch in biofilm is the highest which is 0.48% compared to *A. niger* and *R. oryzae* which are 0.31% and 0.24% respectively. In short, the rate of degradation of LDPE mixed with potato starch is higher when using biofilm of *A. niger* and *R. oryzae* compared to *A. niger* or *R. oryzae* alone. Based on FTIR analysis, there are structural changes of the polymeric matrix which indicates LDPE mixed with potato starch were biodegraded by *A. niger*, *R. oryzae* and their biofilm. In conclusion, this study will give benefits to communities to solve the problems due to the abundance of plastics with a convenient, cheaper and environmentally way.

Keywords: *Aspergillus niger*, *Rhizopus oryzae*, biofilm, LDPE mixed potato starch

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