

**SYNTHESIS OF BIODIESEL FROM PALM OIL USING
MUSA SPP. PEEL AS CATALYST: A REVIEW**

FATHIN FATIHAH BINTI MOHAMAD SAZALI

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

FEBRUARY 2023

**SYNTHESIS OF BIODIESEL FROM PALM OIL USING *MUSA SPP.*
PEEL AS CATALYST: A REVIEW**

FATHIN FATIHAH BINTI MOHAMAD SAZALI

**Final Year Project Report Submitted in
Partial Fulfilment of the Requirements for the
Bachelor of Science (Hons.) Chemistry with Management
in the Faculty of Applied Sciences
Universiti Teknologi MARA**

FEBRUARY 2023

This Final Year Project Report entitled “**Synthesis of Biodiesel From Palm Oil Using *Musa Spp.* Peel As Catalyst: A Review**” was submitted by Fathin Fatimah Binti Mohamad Sazali in partial fulfillment of the requirements for the Degree of Bachelor of Science (Hons.) Chemistry with Management, in the Faculty of Applied Sciences, and was approved by

Dr. Jeyashelly Andas
Supervisor
Faculty of Applied Sciences
Universiti Teknologi MARA
02600 Arau
Perlis

Dr. Zuliahani Ahmad
Head Centre of Studies
Faculty of Applied Sciences
Universiti Teknologi MARA
02600 Arau
Perlis

Dr. Siti Nurlia Ali
Program Coordinator
Faculty of Applied Sciences
Universiti Teknologi MARA
02600 Arau
Perlis

February 2023

ABSTRACT

SYNTHESIS OF BIODIESEL FROM PALM OIL USING *MUSA SPP.* PEEL AS CATALYST: A REVIEW

To reduce waste and promote the production of biodiesel, a lot of research had been carried out to convert the banana peel waste into a useful heterogeneous catalyst inducing the synthesis of palm oil into renewable biofuels. This review paper comprised of comparing analyses from different journals relating to the activity of banana peels as a catalyst and the synthesis of biodiesel. This paper also aims to determine the percentage yield of biodiesel produced at different transesterification parameters. The optimization of transesterification activity parameters which are catalyst loading, reaction time, the molar ratio of oil and methanol, and temperature do affect the percentage yield of biodiesel. The calcined banana ash was found to be rich in minerals that affect the catalytic activity producing higher and better quality of biodiesel yield meaning that it was effective to be utilized as a catalyst. The catalyst produced also showed that different species of banana from multiple sources can produce a percentage yield of biodiesel of more than 94% with different approaches to transesterification parameters. A report studies showed that waste cooking oil conversion into biodiesel using calcined banana peel ash (CBPA) produces a 100% yield of biodiesel. Hence, this review paper evaluates and uses different viewpoints regarding the research on the synthesis of biodiesel from palm oil by using banana peel catalyst which is driven to develop better renewable energy.

TABLE OF CONTENTS

	Page
ABSTRACT	i
ABSTRAK	ii
ACKNOWLEDGEMENTS	iii
TABLE OF CONTENTS	iv
LIST OF TABLES	vi
LIST OF FIGURES	vii
LIST OF ABBREVIATIONS	viii
CHAPTER ONE INTRODUCTION	10
1.1 Background of the study	10
1.2 Problem statement	11
1.3 Research questions	12
1.4 Significance of study	12
1.5 Objectives of study	13
CHAPTER TWO LITERATURE REVIEW	14
2.1 Biofuels	14
2.1.1 First-generation biofuels	14
2.1.2 Second-generation biofuels	15
2.1.3 Third-generation biofuels	16
2.1.4 Fourth-generation biofuels	17
2.2 Biodiesel sources	17
2.2.1 Palm biodiesel statistics in Malaysia	18
2.2.2 Palm oil and its current issues in Malaysia	20
2.3 Transesterification	20
2.4 <i>Musa spp.</i>	24
2.4.1 Banana as bio-based heterogeneous catalyst	26
2.4.2 Catalyst preparation	27
2.5 Optimization of transesterification activity parameters	27
2.5.1 The effect of catalyst loading or catalyst weight (% , w/v)	28
2.5.2 The effect of reaction time	28
2.5.3 The effect of the molar ratio of palm oil to methanol	29
2.5.4 The effect of calcine temperature	29
2.6 Comparison of biodiesel production using <i>Musa spp.</i> based heterogeneous catalysts and palm oil feedstock	30
2.7 Properties and qualities of biodiesel	34
2.7.1 Ash of sulfate	35