

**PRODUCTION OF BIOETHANOL FROM *Durio zibenthinus*
FRUIT PEEL BY USING ENZYMATIC HYDROLYSIS
AND FERMENTATION**

WAN MOHAMAD FARHAN BIN WAN AHMAD

**Final Year Project Report Submitted in
Partial Fulfillment of the Requirements for the
Degree of Bachelor of Science (Hons.) Biology
in the Faculty of Applied Sciences
Universiti Teknologi MARA**

JANUARY 2017

ABSTRACT

PRODUCTION OF BIOETHANOL FROM *Durio zibenthinus* FRUIT PEEL BY USING ENZYMATIC HYDROLYSIS AND FERMENTATION.

Bioethanol is identified as the lead potential of alternative energy. Scientist has experimenting on various source of organic matter to transform it into bioethanol. In this research, the subject that is identified to be a potential bioethanol resources are durian fruit peel due to its potential glucose content. The objective of this research is to identify the potential of *Durio zibenthinus* fruit's peel as source of bioethanol production, to determine the presence of concentration of bioethanol in the fruit peel. The method used in this research are the spectrophotometer UV-light analysis for quantitative analysis and Fourier Transform Infrared (FTIR) analysis for qualitative data. Whereas the method conducted, the pH of the sample for 168 hours were taken to analyze the suitable pH for the fermentation process to occur. The result showed the declining activity for the bioethanol production for first 48 hours and then inclining after the next hour. This showed the activity of bioethanol production is present during the fermentation process. In the qualitative result, the presence of bioethanol wavelength structure was focused in the data. The wavelength structure in the result satisfied the requirements that are needed for indication of bioethanol presence. So that the bioethanol presence in pre and post fermentation in durian peel sample can be proved. As a conclusion, the objective of this research to discover the potential of durian fruit peel as a bioethanol resource was achieved by proving the inclining concentration of bioethanol during fermentation process and the detection of bioethanol wavelength in FTIR test.

TABLE OF CONTENT

	PAGE
ACKNOWLEDGEMENTS	iii
TABLE OF CONTENTS	iv
LIST OF TABLES	vi
LIST OF FIGURES	vii
LIST OF ABBREVIATIONS	viii
ABSTRACT	ix
ABSTRAK	x
CHAPTER 1: INTRODUCTION	
1.1 Background Study	1
1.2 Problem Statement	2
1.3 Significance of the Study	3
1.4 Objectives of the Study	3
CHAPTER 2: LITERATURE REVIEW	
2.1 <i>Durio zibethinus</i>	5
2.1.2 The taxon of <i>Durio zibethinus</i> in Malaysia	6
2.1.3 The uses of <i>Durio zibethinus</i>	6
2.2 Biofuel	7
2.2.1 Bioethanol and renewable energy	7
2.2.2 Economic Effect of Bioethanol	8
2.2.3 Potential of durian peel in bioethanol production	8
2.3 Hydrolysis of Cellulose Material	9
2.4 Fermentation Technology	10
2.5 Role of Fungus as Biocatalyst in Bioconversion Reaction	11
2.6 Relationship Between pH and Bioethanol Production in Yeast (<i>Saccharomycess cerevisae</i>)	12
2.7 Fermentation Process of The Yeast to Yield Bioethanol	13
CHAPTER 3: METHODOLOGY	
3.1 Material	15
3.1.1 Raw materials	15
3.1.2 Chemicals	15
3.1.3 Apparatus / Equipment	15
3.2 Methods	16
3.2.1 Microorganism and Culture Media	16
3.2.2 Drying and grinding	16
3.2.3 Cooking and liquifaction	16

3.2.4	Enzymatic hydrolysis using <i>Aspergillus niger sp.</i>	17
3.2.5	Filtration and benedict test for testing sugar content in solution	17
3.2.6	Fermentation with yeast	17
3.2.7	Determination of bioethanol concentration by using spectrophotometer	18
	3.2.7.1 Preparation of calibration curve	18
	3.2.7.2 Determination of alcoholic concentration in sample	19
3.2.8	Determination of the functional group in the sample by using FTIR	19
 CHAPTER 4: RESULTS AND DISCUSSION		
4.1	Determination of Ethanol Concentration by Using Spectrophotometer	21
4.2	Qualitative Analysis of the Bioethanol Presence Using FTIR	24
 CHAPTER 5: CONCLUSION AND RECOMMENDATIONS		28
 CITED REFERENCES		30
APPENDICES		34
CURRICULUM VITAE		37

LIST OF TABLES

TABLE	TITLE	PAGE
2.1	Yield of bioethanol in SSF of dilute-acid penetrate rice straw	14
3.1	The proportion of water and alcohol used in calibration curve	18
4.1	Relationship between concentration of ethyl alcohol and its optical density	22
4.2	Relation between pH, time of fermentation of the Sample and the unknown concentration of the sample.	23
4.3	Simplified reading of the sample peak.	27