

**PHYTOCHEMICAL SCREENING AND ANTIBACTERIAL
ACTIVITY ON *Piper betel* LEAVES**

NURUL AIDA BINTI SAROL

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

JULY 2017

Final Year Project entitled “**Phytochemical Screening and Antibacterial Activity on *Piper betel* Leaves**” was submitted by Nurul Aida binti Sarol, in partial fulfilment of the requirements for the Degree of Bachelor of Science (Hons.) Chemistry, in the Faculty of Applied Sciences, and was approved by

Dr. Ropisah binti Me
Supervisor
B. Sc. (Hons.) Chemistry
Faculty of Applied Sciences
Universiti Teknologi MARA
72000 Kuala Pilah
Negeri Sembilan

Nurul Huda binti Abdul Halim
Project Coordinator
B. Sc. (Hons.) Chemistry
Faculty of Applied Sciences
Universiti Teknologi MARA
72000 Kuala Pilah
Negeri Sembilan

Mazni binti Musa
Head of Programme
B. Sc. (Hons.) Chemistry
Faculty of Applied Sciences
Universiti Teknologi MARA
72000 Kuala Pilah
Negeri Sembilan

Date: _____

TABLE OF CONTENTS

	Page
ACKNOWLEDGEMENTS	iii
TABLE OF CONTENTS	iv
LIST OF TABLES	vi
LIST OF FIGURES	vii
LIST OF ABBREVIATIONS	ix
ABSTRACT	x
ABSTRAK	xi
CHAPTER 1 INTRODUCTION	
1.1 Background of study	1
1.2 Problem statement	3
1.3 Significance of study	4
1.4 Objectives of study	5
CHAPTER 2 LITERATURE REVIEW	
2.1 Herbal Medicine	6
2.2 The Classification of Plant Chemicals in <i>Piperaceae</i> Family	8
2.2.1 Uses of Some <i>Piperaceae</i> Species in Traditional Medicine	11
2.2.2 Components of Some <i>Piperaceae</i> Species in Traditional Medicine	14
2.3 Phytochemical Studies on <i>Piper betel</i> species	18
2.3.1 Uses of <i>Piper betel</i> Leaves	19
2.3.2 Chemical Constituent and Phytochemistry of <i>Piper betel</i> Leaves	20
2.4 Bioactivity study of <i>Piper betel</i> leaves	23
2.4.1 Antibacterial Activity	23
CHAPTER 3 METHODOLOGY	
3.1 Materials	24
3.1.1 Raw materials	24
3.1.2 Chemicals	24
3.1.3 Apparatus	25
3.1.4 Instrument	25
3.2 Extraction of chemical compound from <i>Piper betel</i> leaves	25
3.3 Thin Layer Chromatography (TLC)	28
3.4 Phytochemical screening on the extracted sample	28
3.4.1 Test for flavonoid	29
3.4.2 Test for phenolic Compounds	29
3.4.3 Test for tannins	29

3.4.4 Test for saponins	30
3.4.5 Test for phlobatannins	30
3.4.6 Test for terpenoids (Salkowski test)	30
3.4.7 Test for alkaloids	31
3.5 Antibacterial Activity	31
3.5.1 Media Preparation of Nutrient Agar (NA)	31
3.5.2 Culturing Microbe of Nutrient Broth (NB)	32
3.5.3 Sample Preparation	32
3.5.4 Disk Diffusion Method	32
3.5.5 Control Test	33
CHAPTER 4 RESULT AND DISCUSSION	
4.1 Extraction of sample	34
4.2 Thin Layer Chromatography (TLC)	38
4.3 Phytochemical analysis of <i>Piper betel</i> leaves	41
4.4 Antibacterial Activities	47
CHAPTER 5 CONCLUSIONS AND RECOMMENDATIONS	52
CITED REFERENCES	54
APPENDICES	57
<i>CURRICULUM VITAE</i>	58

ABSTRACT

PHYTOCHEMICAL SCREENING AND ANTIBACTERIAL ACTIVITY ON *Piper betel* LEAVES

The aim of this study are to extract the plant, to determine the TLC profile of the extracted sample, to carry out the phytochemical screening and to conduct antibacterial activities of the plant crude towards Gram-positive and Gram-negative bacteria. *Piper betel* leaves were extracted by using Soxhlet extractor with continuous heat extraction for 6 – 8 hours. Extractions were done successively by using two solvent which are chloroform and ethanol which have different polarity. The highest percentage extraction yield was found in chloroform extract with 13.10% compared to ethanol extract, the percentage extraction yield was 5.32%. These two types of extract were used to determine the presence of different bioactive compounds by Thin Layer Chromatography (TLC) profile. Two combinations of Hex:EtOAc and Toluene:EtOAc were used as a mobile phase to give maximum resolution of spots. The phytochemical screening of *Piper betel* leaves has been studied to determine the presence of metabolites. Ethanol extract was found to give positive result for flavonoid, phenolics, tannins, phlobatannins and alkaloids tests while chloroform extract gave positive result for saponins and terpenoids tests only. Antibacterial activities were tested using four bacteria strain against two extracts by using disk diffusion method. Bacteria employed for Gram-positive were *Bacillus subtilis* and *Staphylococcus aureus* while the Gram-negative are *Escherichia coli* and *Salmonella typhimurium*. Ethanol extract shows strongest antibacterial activity against both Gram-positive and Gram-negative bacteria than chloroform extract.