

**A COMPARATIVE STUDY OF *Phaleria macrocarpa* (Scheff.) Boerl FRUITS  
AND LEAVES WITH RELEVANCE TO PHYTOCHEMICAL CONSTITUENTS  
AND ANTIBACTERIAL ACTIVITY**

**LIZAWATI SARAN BARU @ PETER**

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

**JULY 2017**

## TABLE OF CONTENTS

	Page
<b>ACKNOWLEDGMENTS</b>	iii
<b>TABLE OF CONTENT</b>	iv
<b>LIST OF TABLES</b>	v
<b>LIST OF FIGURES</b>	vii
<b>LIST OF ABBREVIATIONS</b>	viii
<b>ABSTRACT</b>	ix
<b>ABSTRAK</b>	x
<b>CHAPTER 1 INTRODUCTION</b>	
1.1 Background and problem statement	1
1.2 Significance of study	3
1.3 Objectives of study	3
<b>CHAPTER 2 LITERATURE REVIEW</b>	
2.1 <i>Phaleria macrocarpa</i>	
2.1.1. Taxonomy	5
2.1.2. General information	5
2.1.3. Uses and properties	6
2.1.4. Antibacterial activity	7
2.2 Test organisms	
2.2.1. <i>Staphylococcus aureus</i>	7
2.2.2. <i>Escherichia coli</i>	8
2.2.3. <i>Bacillus subtilis</i>	9
2.2.4. <i>Salmonella enterica</i>	10
2.3 Solvent selection	
2.3.1 Ethanol	11
2.3.2 Methanol	12
2.4 Screening method	
2.4.1 Phytochemical screening	12
2.4.1.1 The benefits of phytochemicals	13
2.4.2 Agar diffusion method	14
2.4.2.1 Antibacterial sensitivity test	16
<b>CHAPTER 3 METHODOLOGY</b>	
3.1 Materials	
3.1.1 Raw material	17
3.1.2 Test organism	17
3.1.3 Apparatus	17
3.1.4 List of chemical/media	18
3.2 Methods	
3.2.1. Collection of sample	19
3.2.2. Sample preparation	20
3.2.3. Sample extraction	20

3.2.4. Phytochemical screening	21
3.2.4.1. Alkaloid	21
3.2.4.2. Phenols	21
3.2.4.3. Tannins	21
3.2.4.4. Flavonoid	21
3.2.4.5. Terpenoids	22
3.2.4.6. Protein	22
3.2.4.7. Coumarins	22
3.2.4.8. Emodins	23
3.2.5. Disc diffusion method	
3.2.5.1. Preparation of bacteria culture	23
3.2.5.2. Agar media preparation	23
3.2.5.3. Broth media preparation	24
3.2.5.4. Physiological solution	24
3.2.5.5. 0.5 McFarland standard	24
3.2.5.6. Standard antibiotics disc	24
3.2.5.7. Preparation of filter paper disc	25
3.2.5.8. Disc diffusion test	25
<b>CHAPTER 4 RESULT AND DISCUSSION</b>	
4.1 The phytochemical test of <i>Phaleria macrocarpa</i> extracts	26
4.2 The antibacterial activity of <i>Phaleria macrocarpa</i> extracts	31
<b>CHAPTER 5 CONCLUSION AND RECOMMENDATION</b>	
5.1 Conclusion	37
5.2 Recommendation	38
<b>CITED REFERENCES</b>	39
<b>APPENDICES</b>	45
<b>CURRICULUM VITAE</b>	50

## LIST OF TABLES

Table	Caption	Page
2.1	The benefits of each phytochemicals	13
4.1	Phytochemical screening of <i>Phaleria macrocarpa</i> fruits	26
4.2	Phytochemical screening of <i>Phaleria macrocarpa</i> leaves	27
4.3	Phytochemical contain in <i>Phaleria macrocarpa</i> extract	28
4.4	Inhibition zone of <i>Phaleria macrocarpa</i> fruits extract	31
4.5	Inhibition zone of <i>Phaleria macrocarpa</i> leaves extract	32
4.6	Standard range of inhibition zone diameter in disc diffusion susceptibility test	33
4.7	Inhibition zone of negative control and positive control	34

## ABSTRACT

### A COMPARATIVE STUDY OF *Phaleria macrocarpa* (Scheff.) Boerl FRUITS AND LEAVES WITH RELEVANCE TO PHYTOCHEMICAL CONSTITUENTS AND ANTIBACTERIAL ACTIVITY

Increased bacterial resistance and adverse synthetic drug side effects cause researchers to turn to plants as an alternative because plants have smaller side effects. *Phaleria macrocarpa* has been traditionally used as medication in Malaysia and Indonesia for decades. It is important to acquire information on the phytochemical and antibacterial activity of *P. macrocarpa* in Sabah as less study has been reported. Maceration method was used to extract the phytochemical content of the plant by using methanol and ethanol as a solvent. Whereas, standard phytochemical test was used to identify the presence of phytochemicals in the extract. The phytochemical study showed fruit extracts contained alkaloid, phenols, tannins, flavonoids, terpenoids, protein and coumarins, while leaves extracts contained phenols, tannins and coumarins. This shows that, dried fruits have more phytochemicals constituents than fresh fruits; fresh leaves extract and dried leaves have the same number of phytochemicals; ethanolic fruits and leaves extract possessed more phytochemical than methanolic fruit and leaves extract. For antibacterial activity, *Salmonella enterica* (ATCC 14028) is resistance to all the fruits and leaves extracts; fruits extracts does not have antibacterial activity except for methanolic dried fruits extract, which has weak antibacterial activity against *Escherichia coli* (ATCC 11229) and *Staphylococcus aureus* (ATCC 43300); *Escherichia.coli* (ATCC 11229) and *Staphylococcus aureus* (ATCC 4330) are resistance to leaves extract; ethanolic leaves extract have weak antibacterial activity toward *Bacillus subtilis* (ATTC 6633); methanolic leaves extract have weak antibacterial activity toward *Bacillus subtilis* (ATCC 6633), *Escherichia coli* (ATCC 11229) and *Staphylococcus aureus* (ATCC 4330). Based on the antibacterial activity, methanolic extracts have more antibacterial activity than ethanolic extracts; dried extracts have more antibacterial activity than fresh extracts; leaves extracts have more antibacterial activity compared to fruits extracts; fruits and leaves extracts have prominent antibacterial activity toward gram-positive than gram-negative bacteria. This study suggest that *P. macrocarpa*'s fruits and leaves have the potential to be used as medication. More studies should be done to obtain more information on this plant, especially in Sabah.