

ACKNOWLEDGEMENT

Upon completion of this project, I would like to express my deep gratitude to various people for their contribution. First of all I would like to express my great appreciation to my supervisor, Madam Farnidah Jasnir for her valuable suggestions and continuous guidance throughout this research. This research would not be completed without her valuable advices and encouragement.

Other than that, I would also like to give my sincere thanks to the project coordinator Mr. Ajimi Jawan and my second examiner Dr. Lo Chor Wai for their motivation and opinion to complete this project.

Apart from that I would like to thank Mr Mohd Ruzaleh Nurdik, Mr Hanafi Sadli and Mr. Sufri Salimun for the provision of facilities throughout my research. Not to forget Mrs. Fiona from SAFODA Kinarut for giving the permission to collect the sample used in this research.

Many thanks also to my colleagues Amer Shahjehan Hassan, Nurfitri Annisa Mohamad, Nurfarahin Abu Bakar and Nurfitri Harman for their continuous supports. Lastly, I would like to express a very special thanks to both my parents for their endless support and understanding in completion of my research. Thank you.

TABLE OF CONTENTS

	Page
ACKNOWLEDGEMENT	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 of study	1
1.2 Problem statement	2
1.3 Significance of study	3
1.4 Objectives of study	3
CHAPTER 2 LITERATURE REVIEW	
2.1 Botanical information	4
2.1.1 Taxonomy of <i>Acacia mangium</i>	4
2.1.2 Characteristics of <i>Acacia mangium</i>	5
2.2 Phytochemical constituents of <i>Acacia mangium</i>	5
2.3 Test organisms	6
2.2.1 <i>Staphylococcus aureus</i>	6
2.2.2 <i>Streptococcus agalactiae</i>	8
2.2.3 <i>Escherichia coli</i>	9
2.2.4 <i>Pseudomonas aeruginosa</i>	10
2.2.5 <i>Candida albicans</i>	12
2.4 Bacterial and fungal cell wall	13
2.5 Antibiotics mode of action against bacteria and fungi	14
2.6 Bacterial capsule	15
2.7 Plant parts extraction	15
2.8 Antibacterial activity of plant secondary metabolites	17
2.9 Disc diffusion	18
2.10 Minimum inhibitory concentration and minimum bactericidal concentration	19
CHAPTER 3 METHODOLOGY	
3.1 Materials	21
3.1.1 Raw materials	21
3.1.2 Materials	21
3.1.3 Chemicals	21
3.1.4 Instruments	22

LIST OF TABLES

3.2	Methods	23
3.2.1	Plant parts collection	23
3.2.2	Plants parts extraction	24
3.2.3	Phytochemical screening	25
3.2.4	Antimicrobial assay	26
3.2.5	Minimum inhibitory concentration and minimum bactericidal concentration	27

CHAPTER 4 RESULTS AND DISCUSSIONS

4.1	Phytochemical screening of <i>Acacia mangium</i> leaves extract	30
4.2	Antimicrobial assay of <i>Acacia mangium</i> leaves extract	33
4.3	Determination of minimum inhibitory concentration and minimum bactericidal concentration of <i>Acacia mangium</i> leaves extract	39

CHAPTER 5 CONCLUSION AND RECOMMENDATION

5.1	Conclusions	44
5.2	Recommendations	46

CITED REFERENCES	48
-------------------------	----

APPENDICES	55
-------------------	----

CURICULUM VITAE	58
------------------------	----

ABSTRACT

INVESTIGATION OF PHYTOCONSTITUENTS AND ANTIMICROBIAL EVALUATION OF *Acacia mangium* LEAVES EXTRACT

Acacia mangium is one of the most abundant plant in Malaysia since its introduction as a main source of wood and pulp for the wood industry. With the increasing trend of multi-drug resistance microbes and increasing cost for a mean to fight these microbes, a highly available and sustainable source of antimicrobial agent is required. This study focuses on determining the potential of *Acacia mangium* leaves as a source of antimicrobial agent by achieving several objectives including detecting the phytoconstituents of leaves extract, antimicrobial assay against gram-negative bacteria, gram-positive bacteria and a fungus and followed by determination of minimum inhibitory concentration (MIC) and minimum bactericidal concentration (MBC) against tested organisms. The methods used were extraction of *Acacia mangium* leaves in 50% methanol and 50% acetone followed by phytochemical screening to detect the presence of compounds that has a potential as antimicrobial agents, disc diffusion assay of both solvents leaves extract and the determination of MIC and MBC. The results presented that 50% methanol and 50% acetone leaves extract showed the presence of phenol, tannins, flavonoids, terpenoids and alkaloids while reducing sugar was absence in both solvent leaves extract. Saponin were only detected in 50% methanol leaves extract while protein and quinones were only detected in 50% acetone leaves extract. The antimicrobial activity of both solvent plant leaves extract were further evaluated against gram-negative bacteria, gram-positive bacteria and a fungus that showed only *Acacia mangium* 50% acetone leaves extract exhibit moderate antimicrobial activity against *S. aureus* at 12.33 ± 1.15 mm while both solvents extract showed no antifungal activity against *C. albicans*. Antibacterial activity against *S. aureus*, *E. coli* and *P. aeruginosa* is considered as weak. The MIC and MBC for 50% methanol leaves extract against *S.*, *E. coli* and *P. aeruginosa* was determined to be 15,630 $\mu\text{g/ml}$, 7,810 $\mu\text{g/ml}$ and 31,250 $\mu\text{g/ml}$ respectively. For 50% acetone extract, the MIC and MBC for *S. aureus*, *E. coli* and *P. aeruginosa* was determined to be 3,900 $\mu\text{g/ml}$, 3,900 $\mu\text{g/ml}$ and 15,630 $\mu\text{g/ml}$ respectively while for *S. agalactiae* the MIC and MBC was 62,500 $\mu\text{g/ml}$ and 125,000 $\mu\text{g/ml}$ respectively. *Acacia mangium* 50% methanol and 50% acetone leaves extract shown no antifungal activity against a weak fungus *C. albicans* and showed an overall weak antibacterial activity against gram-negative and gram-positive bacteria. Recommendation for future research of *Acacia mangium* would be to diversify solvent used for extraction, antibiotic disc against test organisms and quantification assay of secondary metabolites detected in the extract.