



**UNIVERSITI PUTRA MALAYSIA**

**DETERMINATION OF ANTIFUNGAL ACTIVITY OF PLANT EXTRACTS**

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## PENGESAHAN

Dengan ini adalah disahkan bahawa projek yang bertajuk “Determination of Antifungal Activity of Plant Extracts” telah disiapkan serta dikemukakan kepada Jabatan Mikrobiologi oleh Lau Ee Hong (161729) sebagai syarat untuk kursus BMY 4999 projek.

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## ABSTRACT

Fungal disease is considered as one of the current emerging diseases since many fungal pathogens such as *Candida albicans* can undergo mutation rapidly and resistant to common antifungal agents. Plants are expected to contain natural antimicrobial compounds such as alkaloids, flavonoids, and phenolic compounds to protect themselves from microbial diseases. Thus, plants are one of the potential sources to obtain new antifungal agents. The aim of this study was to determine the antifungal activity of 12 species of plants in Malaysia against *Aspergillus niger* and *Candida albicans*. Disc diffusion method was used in this study to assess the antifungal properties of plants and measurement of minimum inhibitory concentration (MIC) was done by resazurin-based microtiter dilution assay. The results showed that all tested plant extracts had no activity against *A. niger* and only 3 extracts (*Coleus amboinicus*, *Ipomoea aquatica*, and *Premna cordifolia*) exhibited weak antifungal activity against *C. albicans*. Among them, *I. aquatica* showed best antifungal activity against *C. albicans* with 10 mm clearing zone at concentration of 25 mg/mL. The MIC of *C. amboinicus*, *I. aquatica* and *P. cordifolia* were 3.125, 1.56, and 3.125 mg/mL respectively. This study showed that none of the tested plants is a potential source of new antifungal agents since all of them failed to inhibit the growth of tested fungi effectively.

## ABSTRAK

Penyakit kulat dianggap sebagai salah satu penyakit yang baru muncul kerana banyak patogen kulat seperti *Candida albicans* boleh menjalani mutasi dengan cepat dan tahan agen antikulat biasa. Tumbuhan dijangka mengandungi sebatian antimikrob semulajadi seperti alkaloid, flavonoid dan fenolik untuk melindungi diri mereka daripada penyakit mikrob. Oleh itu, tumbuh-tumbuhan adalah salah satu sumber yang berpotensi untuk mendapatkan agen antikulat baru. Tujuan kajian ini adalah untuk menentukan aktiviti antikulat daripada 12 spesis tumbuhan di Malaysia terhadap *Aspergillus niger* dan *Candida albicans*. Kaedah cakera resapan telah digunakan dalam kajian ini untuk menilai kemampuan anti-kulat tumbuh-tumbuhan dan pengukuran kepekatan perencatan minimum (MIC) telah dilakukan melalui asai microtiter pencairan berasaskan resazurin. Hasil kajian menunjukkan bahawa semua ekstrak tumbuhan diuji tidak mempunyai aktiviti terhadap *A. niger* dan hanya 3 ekstrak (*Coleus amboinicus*, *Ipomoea akuatik*, dan *Premna cordifolia*) dipamerkan aktiviti antikulat lemah terhadap *C. albicans*. Antaranya, *I. akuatik* menunjukkan aktiviti anti-kulat terbaik terhadap *C. albicans* dengan zon penjelasan 10 mm pada kepekatan 25 mg/mL. MIC untuk *C. amboinicus*, *I. akuatik* dan *P. cordifolia* adalah 3,125, 1.56, dan 3,125 mg/mL masing-masing. Kajian ini menunjukkan bahawa semua tumbuh-tumbuhan yang diuji tidak boleh dijadikan sebagai sumber yang berpotensi agen antikulat baru kerana semua daripada mereka gagal untuk menghalang pertumbuhan kulat yang diuji dengan berkesan.

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## TABLE OF CONTENTS

|  |      |
|--|------|
| PENGESAHAN                               | i    |
| ABSTRACT                                 | ii   |
| ABSTRAK                                  | iii  |
| ACKNOWLEDGEMENT                          | iv   |
| TABLE OF CONTENTS                        | v    |
| LIST OF TABLES                           | viii |
| LIST OF FIGURES                          | ix   |
| LIST OF ABBREVIATIONS                    | x    |
| CHAPTER 1: INTRODUCTION                  | 1    |
| CHAPTER 2: LITERATURE REVIEW             | 3    |
| 2.1 Emerging Microbial Threats to Human  | 3    |
| 2.2 Pathogenic Fungi                     | 4    |
| 2.2.1 <i>Candida albicans</i>            | 4    |
| 2.2.2 <i>Aspergillus niger</i>           | 5    |
| 2.3 Medical Uses of Plants               | 7    |
| 2.3.1 Antimicrobial properties of Plants | 8    |
| 2.3.1.1 Antifungal Properties of Plants  | 9    |
| 2.4 Phytochemicals                       | 10   |
| 2.4.1 Phenolics                          | 11   |



|   |           |
|---|-----------|
| 2.4.2 Flavonoids                                      | 12        |
| 2.4.3 Alkaloids                                       | 12        |
| <b>CHAPTER 3: MATERIALS AND METHODS</b>               | <b>13</b> |
| 3.1 Collection of Plant Materials                     | 13        |
| 3.2 Methanolic Extraction of Plants                   | 13        |
| 3.3 Preparation of Stock Solution from Plant extracts | 14        |
| 3.4 Dilution of Stock Solution                        | 14        |
| 3.5 Collection of Fungi                               | 14        |
| 3.6 Maintenance of Fungal Cultures                    | 15        |
| 3.6.1 Preparation of Sabouraud Dextrose Agar          | 15        |
| 3.6.2 Maintenance of Fungal Isolates                  | 15        |
| 3.7 Identification of Fungal species                  | 15        |
| 3.7.1 Macroscopic Identification                      | 15        |
| 3.7.2 Microscopic Identification                      | 15        |
| 3.8 Antifungal susceptibility test                    | 16        |
| 3.8.1 Disc Diffusion Method                           | 16        |
| 3.8.2 Minimum Inhibitory Concentration                | 17        |
| <b>CHAPTER 4: RESULTS AND DISCUSSION</b>              | <b>19</b> |
| 4.1 Methanolic Extraction of Plants                   | 19        |
| 4.2 Macroscopic Observation of Fungal Isolates        | 21        |
| 4.3 Microscopic Observation of Fungal Isolates        | 22        |

|  |    |
|--|----|
| 4.4 Disc Diffusion Method                | 23 |
| 4.5 Minimum Inhibitory Concentration     | 29 |
| CHAPTER 5: CONCLUSION AND RECOMMENDATION | 32 |
| REFERENCES                               | 33 |



## LIST OF TABLES

| Table |   | Page |
|-------|---|------|
| 1     | Percentage yield of different plant extracts          | 19   |
| 2     | Macroscopic observation of fungal isolates            | 20   |
| 3     | Microscopic observation of fungal isolates            | 21   |
| 4     | Antifungal activity of 12 species of plant extracts   | 27   |
| 5     | MIC of plant extracts against <i>Candida albicans</i> | 29   |

## LIST OF FIGURES

| Figure |  | Page |
|--------|--|------|
| 1      | Clearing zones were observed on the positive control plates with different fungal cultures   | 24   |
| 2      | No clearing zone was observed on the negative control plates with different fungal cultures  | 24   |
| 3      | Each plate consists of different concentrations (6.25, 12.5, 25, 50 mg/mL) of plant extracts with inoculated <i>Candida albicans</i> . | 25   |
| 4      | Each plate consists of different concentrations (6.25, 12.5, 25, 50 mg/mL) of plant extracts with inoculated <i>Aspergillus niger</i>  | 26   |
| 5      | Resazurin-based microtiter dilution assay for plant extracts <i>Ipomoea aquatica</i> and <i>Premna cordifolia</i>                      | 30   |
| 6      | Resazurin-based microtiter dilution assay for plant extract <i>Coleus amboinicus</i>   | 30   |

## LIST OF ABBREVIATIONS

|      |                                  |
|------|----------------------------------|
| %    | Percentage                       |
| °C   | Degree Celcius                   |
| µg   | Microgram                        |
| µL   | Microliter                       |
| DMSO | Dimethyl sulfoxide               |
| DNA  | Deoxyribonucleic acid            |
| g    | Gram                             |
| L    | Liter                            |
| mg   | Milligram                        |
| MIC  | Minimum inhibitory concentration |
| mL   | Milliliter                       |

## CHAPTER 1

### INTRODUCTION

A variety of plants has been used as medicine in traditional medical system. Nowadays, more and more researchers are concerned about the medical uses of plants (Nazmul et al., 2011). More than 10000 species of plants can be found in Malaysia. A lot of Malaysians rely on these local plants especially medicinal plants for their personal health (Burkill and Hanif, 1966). Many researchers in Malaysia are trying to explore novel therapeutic values of these plants especially the antimicrobial properties of plants since microbial infections are becoming more invasive nowadays (Keeler and Tu, 1991).

From the studies, scientists found that plant extracts of many plants exhibit effective antimicrobial properties against several pathogenic bacteria and fungi. Plants are capable to produce a variety of phytochemical compounds as their secondary metabolites and these compounds are biological active and found to be toxic to microorganisms (Arunkumar and Muthuselvam, 2009). Thus, these kinds of compounds could be used as an alternative of synthetic drugs since they have less impact on environment and human (Varma and Dubey, 1999).

The morbidity and mortality rate of severe nosocomial fungal diseases are increasing dramatically in recent years. Most of the fungal infections are caused by opportunistic fungal pathogens and the normally infect patients that are immunocompromised (Gullo, 2009). The advancements in surgery, chemotherapy and organ transplantation lead to a significant increase in the immunological

impairment patients. As a result, more patients are vulnerable to nosocomial fungal infections (Justyna et al., 2009).

Although there are several effective antifungal drugs currently, some of the pathogenic fungi such as *Candida albicans* are appeared to be resistant against those drugs (Justyna et al., 2009). These pathogens are usually widespread in host surrounding or live in the host body as a normal flora. The mortality rates in infected patients remain high even after several antifungal treatments due to the weakened immune system of patients and drug resistance of pathogens (Ruhnke and Maschmeyer, 2002).

Therefore, this study was aimed to find effective extracts from the local Malaysia plants that are able to fight against fungal infections. Twelve local plants will be screened for potential plant extracts that exhibit antifungal properties against two fungal pathogens which are *Candida albicans* and *Aspergillus niger*.

The objectives of this study were:

- i) To extract antifungal compounds from plants.
- ii) To identify the antifungal property of plant extracts
- iii) To compare the antifungal activity of plant extracts.

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