



***PHYTOCHEMICAL PROPERTIES AND ANTIMICROBIAL AND
ANTIOXIDANT ACTIVITIES OF *Uvaria micrantha* (A.DC.) Hook. f. &
Thomson***

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ANTIOXIDANT ACTIVITIES OF *Uvaria micrantha* (A.DC.) Hook. f. &
Thomson**



By

YONG KOK KIAN

**A Project Report Submitted in Partial Fulfilment of the Requirements
for the Degree of Bachelor of Forestry Science in the
Faculty of Forestry
Universiti Putra Malaysia**

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DEDICATION

Special dedicated to:

My family

Prof. Dr. Rozi Mohamed

Lab members in Forest Biotech Laboratory

And all my friends

Thank you for your encouragements and supports

And the sacrifices that you have given.

Thank you for your supports that helped me in this research and study.

ABSTRACT

Uvaria micrantha (A.DC.) Hook. f. & Thomson is a medicinal plant species used by local people in Malaysia. However there are limited scientific evidence to validate the medicinal properties of *U. micrantha*. In this study, phytochemical screening of the leaf extracts of *U. micrantha* using methanol, hexane and ethyl acetate was conducted. The antimicrobial and antioxidant activities of extracts were determined using agar disk-diffusion and 2, 2-diphenyl-1-picrylhydrazyl (DPPH) tests. The methanol extract was rich in phytochemicals such as alkaloids, phenols and terpenoids, while the hexane and ethyl acetate extracts had only terpenoids. Antimicrobial activity against the bacteria species *Staphylococcus aureus* was only detected in the methanol extract. Comparing to the ascorbic acid as positive control, methanol extract showed higher antioxidant activities than the hexane and ethyl acetate extracts. The presence of phytochemicals and antimicrobial and antioxidant activity in the leaf part of *U. micrantha* provides support to its uses as medicinal plant by the locals.

ABSTRAK

Uvaria micrantha (A.DC.) Hook. f. & Thomson merupakan sejenis tumbuhan ubatan yang digunakan oleh penduduk tempatan di Malaysia. Namun begitu, hanya bukti saintifik yang terhad telah dikemukakan untuk menunjuk kegunaan *U. micrantha* sebagai ubatan. Fitokimia dalam ekstrak bahagian daun *U. micrantha* dengan menggunakan metanol, heksana dan etil asetat telah dikenalpastikan dalam kajian ini. Aktiviti antimikrob dan antioksidan oleh ekstrak daun *U. micrantha* telah dikenalpasti dengan kaedah kajian peresapan cakera dan 2, 2-difenil-1-pikril-hidrazil (DPPH). Ekstrak metanol telah didapati mengandungi fitokimia seperti alkaloid, fenol dan terpenoid, sedangkan ekstrak heksana dan etil asetat hanya mengandungi fitokimia terpenoid. Aktiviti antimikrob terhadap *Staphylococcus aureus* hanya dapat dikesan dalam ekstrak metanol. Berbanding dengan asid askorbik sebagai kawalan positif, ekstrak metanol menunjukkan aktiviti antioksidan yang lebih tinggi berbanding dengan ekstrak heksana dan ekstrak etil asetat. Kegunaan *U. micrantha* sebagai tumbuhan ubatan telah dibuktikan dengan kandungan fitokimia dan aktiviti antimikrob dan antioksidan di bahagian daun *U. micrantha*.

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APPROVAL SHEET

I certify that this research project report entitled “Phytochemical Properties and Antimicrobial and Antioxidant Activities of *Uvaria micrantha* (A.DC.) Hook. f. & Thomson” by Yong Kok Kian has been examined and approved as a partial fulfilment of the requirements for the Degree of Bachelor of Forestry Science in the Faculty of Forestry, Universiti Putra Malaysia.

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LIST OF ABBREVIATIONS

B.C.	Before Christ
WHO	World Health Organization
US	United States
HIV	Human immunodeficiency virus
H ₂ O ₂	Hydrogen peroxide
ROS	Reactive Oxygen Species
CLSI	Clinical and Laboratory Standard Institute
DNA	Deoxyribonucleic acid
DPPH	2, 2-diphenyl-1-picryl-hydrazyl
H	Hydrogen Atom
DPPH ₂	2, 2-diphenyl-1-picrylhydrazine
PCR	Polymerase Chain Reaction
ITS	Internal Transcribed Spacer
μL	Microliter
°C	Degree Celcius
TAE	Tris base, acetic acid, Ethylenediaminetetraacetic acid
EtBr	Ethidium Bromide
UV	Ultra Violet
bp	Base pair
BLAST	Basic Local Alignment Search Tool
NCBI	National Center of Biotechnology Information
g	Gram
mL	Milliliter
mg/mL	Milligram per milliliter
μg/mL	Microgram per mililiter
mm	Millimeter
Ab value	Absorbance value
nm	Nanometer
<i>IC</i> ₅₀	Half maximal inhibitory concentration
ng/μL	Nanogram per microliter

CHAPTER ONE

INTRODUCTION

1.1 General Background

1.1.1 History of Medicinal Plants

People has been using medicinal plants as the cure in disease since ancient time with no knowledge on the plants' actual effect but only experience from trial and error. Although plants has been used in traditional medicines for centuries, but the first documentation of the uses of plant in medicine can be traced back to 3,000 B.C. Over 250 plants species has been recorded on a Sumerian clay slab in cuneiform letters as raw materials for 12 drugs (Petrovska, 2012).

The practices of using medicinal plants in disease treatment are happening worldwide even for now. According to bulletin of the World Health Organization (WHO) in March 2004, several countries has strong practice of the use of medicinal plants in their traditional medicine. About eighty per cent of African population have the habits on using certain types of herbal based medication while the global market on medicinal products has the sales up to 60 billion US Dollars. There are also much more attention on these traditional herbal plants from the global. Investment from industrial sector and intensive research in countries like China, India, Nigeria and United States of America on their local medicinal plants and the chemical compounds has been conducted lately (Tilburt & Kaptchuk, 2008).

1.1.2 Medicinal Plants in Malaysia

In Malaysia, many traditional medicines are originated from these medicinal plants. Malaysia has 6,000 herbal species which has known medicinal properties, while only 1,230 of these plant species are used in Malay, Chinese, Indian and indigenous people's traditional medicine (Maznah, 2007). Malaysia traditional medicine system is originated from the Unani systems of medicine, then it is being altered with the introduction of traditional medicine practice by the Indonesian, Chinese, Indian and indigenous people (Alsarhan et al, 2014).

The expenditure on traditional medicine are much higher than allopathic medicine with an estimated of US\$500 million spend annually compared to US\$ 300 million (World Health Organization, 2002). Medicinal plants research in Malaysia has happened since last fifty years from the government-funded universities and institution. Although the research effort on these plants are still on going, most of the findings are only academic-based on little recommendation on development. Some of the promising findings has yet received further research in depth nor development into new medication products (Jantan, 2004).

1.1.3 Phytochemicals in Medicinal Plants

Phytochemical is derived from the Greek word "phyto" which means plants with the word "chemical", which is defined as the bioactive non-nutritive compound synthesis naturally from the plant parts and food which capable to reduce the impact of persisting diseases (Liu, 2004). As the trend on

phytochemical researches begin to emerge globally, many researches on the phytochemicals in different plants species with their medicinal properties have been published. In Iran, the flavonoid and phenol compounds in plant species *Mellilotus officinalis*, *Equisetum maximum*, *Plantago major*, *Adiantum capillus-veneris* and *Urtica dioica* and their antioxidant activity has been investigated (Pourmorad et al., 2006). The extract of plant species *Ficus microcarpa* are examined for the total phenolic and flavonoids content with the antibacterial and antioxidant activities exhibits in the extract by group of researchers in Japan (Ao et al., 2008).

However, in Malaysia, most of the medicinal plants are consumed by the local have no solid scientific proofs on their effects or health benefits. In Malay traditional medicine, the knowledge and prescription of the medicinal plants were informed orally from the elder to the young (Jamal et al, 2011). In the fifties, researchers started the effort on the investigation of phytochemicals content in the plants. As stated by Jantan (2004) in his finding in Malaysian Journal of Health Science, phytochemical screening on 205 plant species in Sabah (Arthur,1954) and screening of alkaloids on 200 plant species in Peninsular Malaysia (Douglas & Kiang, 1957) were the two earliest reports in Malaysia that study in the phytochemicals of medicinal plants. These types of study were carried out extensively for more plants species as the tests were simple, cheap, sensitive, selective and fast in showing results. These experiment was carried out as the first step to identify useful phytochemical for further investigation and formation of new drugs.

The government had funded research programmes in year 2001 to 2005 under the 8th Malaysian Plan for certain widely used medicinal plants species like *Andrographis paniculata* (Hempedu Bumi) and *Labisia pumila* (Kacip Fatimah). Till now, there are five research groups made up of researcher from various background of studies actively conducting the herbal research on the medicinal plants species recommended in the 8th Malaysian Plan (Jantan, 2004). There are still a lot of medicinal plants species in Malaysia not being extensively research despite the fact that they have been used for centuries as traditional medicine.

1.2 Problem statements

Although *U. micrantha* has been used in traditional medicine remedies, only few researches were done on this particular species. The research on *U. micrantha* was only limited to their morphological features and notes of their usage by the locals.

There are little or no scientific evidence to proof its medicinal effects as the local communities claimed. Recently, studies of species *U. chamae* as medicinal plant has been conducted in Nigeria and showing some positive results (Okwu & Iroabuchi, 2009; Okwuosa et al, 2012). As the two species is in the same genera, a similar medicinal effect of *U. micrantha* can be predicted.

1.3 Objectives

1. To identify the phytochemical properties in methanol, hexane and ethyl acetate extracts from leaf tissues of *U. micrantha*.
2. To determine the antimicrobial and antioxidant activities of the extracts of *U. micrantha* leaves.



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