

UNIVERSITI TEKNOLOGI MARA

**CHEMICAL CONSTITUENTS FROM THE
FLOWER OF *MACARANGA TRILOBA***

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ABSTRACT

In the present work, phytochemical study was conducted on *M. triloba* collected from Pasir Raja, Terengganu with the aim of isolating and identifying the flavonoids constituents from the flower of the plant. The phytochemical procedures adopted were vacuum liquid chromatography followed by column chromatography, medium pressure liquid chromatography, radial chromatography and preparative thin layer chromatography. The structural elucidation was accomplished by spectroscopic methods such as 1D-NMR (^1H , ^{13}C , DEPT), 2D-NMR (COSY, HMQC, HMBC), UV, IR and MS and comparison with published data. Isolation and purification of the flower of *M. triloba* afforded seven compounds comprising of five flavonoids that are 6-prenyl-3'-methoxy-eriodictyol, nymphaeol-B, flavonoid DL 4, nymphaeol-C and 6-farnesyl-3',4',5,7-tetrahydroxyflavanone and two coumarins that are 5,7-dihydroxycoumarin and scopoletin. Three flavonoids, 6-prenyl-3'-methoxy-eriodictyol, flavonoid DL4 and 6-farnesyl-3',4',5,7-tetrahydroxyflavanone were isolated for the first time from *Macaranga* genus. 6-Prenyl-3'-methoxy-eriodictyol, nymphaeol-B, nymphaeol-C and 6-farnesyl-3',4',5,7-tetrahydroxyflavanone were tested for antioxidant, cytotoxic and antiplasmodial activity. The antioxidant activities were evaluated using the ferric thiocyanate (FTC) and thiobarbituric acid (TBA) method while the radical scavenging activity was measured by the 1,1-diphenylpicryl hydrazyl (DPPH). In FTC assay, the four flavonoids demonstrated high percent of inhibition with range of 98-100% while in TBA the percent of inhibition is slightly reduced to 81-92%. The DPPH test showed 6-farnesyl-3',4',5,7-tetrahydroxyflavanone had strong radical-scavenging activity with IC_{50} values of 12.2 $\mu\text{g/ml}$ followed by nymphaeol-B (13.5 $\mu\text{g/ml}$) and nymphaeol-C (16.5 $\mu\text{g/ml}$) while 6-prenyl-3'-methoxy-eriodictyol is a weak radical scavenger (155 $\mu\text{g/ml}$). The four flavonoids were also tested for cytotoxic activity against three cancer cell lines namely HeLa, HL60 and MCF-7. Three flavonoids showed significant cytotoxicity in the range 11.6 – 23.5 $\mu\text{g/ml}$. 6-Farnesyl-3',4',5,7-tetrahydroxyflavanone inhibited strongly the growth of HeLa, HL60 and MCF-7 cancer cell lines with IC_{50} values of 1.3 $\mu\text{g/ml}$, 3.3 $\mu\text{g/ml}$ and 5.6 $\mu\text{g/ml}$ respectively. Finally, for the antiplasmodial activity, 6-farnesyl-3',4',5,7-tetrahydroxyflavanone displayed the strongest inhibition activity with an IC_{50} value of 0.06 μM followed by nymphaeol-C and nymphaeol-B with the values of 2.04 μM and 4.02 μM . The results of these test indicated that 6-farnesyl-3',4',5,7-tetrahydroxyflavanone showed strong activities against antioxidant, cytotoxic and antiplasmodial suggesting the potential of this compound as cure for anticancer and antiplasmodial.

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CHAPTER 1

INTRODUCTION

1.1 Background

Natural product chemistry has been a topic of great interest since ancient times, relevant to the preparation of food stuff, colouring matters, fibers, toxins and medicine. Separation methods for the study of natural products have been developed and have greatly stimulated the development of the refined techniques used today, such as the various analytical and preparative chromatographic methods (column chromatography, GC, TLC, HPLC, paper chromatography). These methods have made it possible for the isolation of extremely small quantities of compounds. Instruments for the structural determination of compounds such as UV, IR, 1D- and 2D-NMR and MS have been developed and refined rapidly.

The flora of Malaysia is generally considered as one of the richest flora in the world due to the constantly warm and uniformly humid climate. Considering that Malaysia has about 12 000 species of flowering plants of which about 1300 have potential as medicinal agent (Burkill, 1935), the potential of drug discovery from Malaysian plants is very good. Medicinal plants can be used to cleanse the bowels, open congested sinuses, help mend broken bones, stimulate the brain, increase libido, ease pain, aid digestion, and a thousand other purposes. Topically, herbs can repair damaged skin, soothe a wound, improve complexion, heal bruises and relieve aching muscles. Medicinal plants demonstrate great versatility for the treatment of a broad variety of health needs. This group of plants has been categorized into several families such as Annonaceae, Acanthaceae and Euphorbiaceae (Wiert, 2000).