

UNIVERSITI TEKNOLOGI MARA

**STUDY ON CHEMICAL
CONSTITUENTS, ANTIOXIDANT
AND CYTOTOXIC ACTIVITIES OF
Dracaena umbriatica Ridl. AND *Luvunga
scandens* Buch-Ham.**

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AUTHOR'S DECLARATION

I declare that the work in this thesis was carried out in accordance with the regulations of Universiti Teknologi MARA. It is original and is the result of my own work, unless otherwise indicated or acknowledged as reference work. This thesis has not been submitted to any other academic institution or non-academic institution for any degree or qualification.

I, hereby, acknowledge that I have been supplied with the Academic Rules and Regulations for Post Graduate, Universiti Teknologi MARA, regulating the conduct of my study and research.

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ABSTRACT

Medicinal plants from two different families had been chosen for the phytochemical investigation. Attempt on isolation of dichloromethane extract of the leaves of *Dracaena umbriatica* was not so successful due to the presence of only traces of compounds that overlapping heavily with chlorophyll. However, four pure compounds had been successfully isolated from the methanol extract of the leaves and dichloromethane extract of the roots of *D. umbriatica*. Compound 3-*O*-[α -*L*-rhamnopyranosyl (1 \rightarrow 4)- α -*L*-rhamnopyranosyl (1 \rightarrow 4) - β -*D*-glucopyranosyl]-25(*R*)-spirost-5-en-3 β ,17 α -diol (**D1**), spiroconazole A (**D2**) and mixture of stigmaterol-3-*O*- β -*D*-glucopyranoside and β -sitosterol-3-*O*- β -*D*-glucopyranoside (**D3a**) had been isolated using several techniques of chromatography from the methanolic extract of the leaves. All these compounds were saponins. A mixture of stigmaterol-3-*O*- β -*D*-glucopyranoside and β -sitosterol-3-*O*- β -*D*-glucopyranoside (**D3b**) had also been found in dichloromethane extract of the roots of this plant. Compound **D3a** and **D3b** were basically the same compound containing the mixture of two components, stigmaterol-3-*O*- β -*D*-glucopyranoside and β -sitosterol-3-*O*- β -*D*-glucopyranoside. However, the compositions of the two components were slightly different. The pure isolated compounds however exhibited good to moderate antioxidant activity (above 70% inhibition) when assayed by FTC and TBA assays. Cytotoxicity of all four pure compounds from *D. umbriatica* against human breast cancer cell line (MCF-7) showed that compound **D1**, **D2**, **D3a** and **D3b** exhibited very strong cytotoxicity with IC₅₀ values lower than 10.0 μ g/mL. Therefore, those four compounds were considered as potent cytotoxic compounds against MCF-7. In addition, four pure compounds had been isolated from the dichloromethane extract of the roots of *Luvunga scandens*. Two of them were xanthenes whereas another two pure compounds were coumarin and triterpene. The two isolated xanthenes were new compounds which were determined as 10-hydroxy-5-methoxy-2,2-dimethylpyrano[3,2-*b*]xanthen-6(2*H*)-one (**L1**) and 10-(2,6-dihydro-5-methoxy-2,2-dimethyl-6-oxopyrano[3,2-*b*]xanthen-10-yl-oxo)-5-methoxy-2,2-dimethylpyrano [3,2-*b*]xanthen-6(2*H*)-one (**L2**). However, the coumarin was found to be ostruthin (**L3**) while the triterpene was limonin (**L4**). These two were known compounds that had been isolated earlier from other species of the genus *Luvunga*. Ostruthin and **L1** exhibited good radical scavenging activity when assayed by DPPH with IC₅₀ values of 9.5 and 12.7 μ g/mL, respectively while the other two compounds **L2** and limonin showed poor radical scavenging activity with IC₅₀ values of 42.8 and 85.3 μ g/mL, respectively. Results from FTC and TBA assays showed all the four compounds isolated from *L. scandens* possessed moderate antioxidant activity with percentage of inhibition higher than 70%. Results from cytotoxic activity indicated that only ostruthin showed significant IC₅₀ value (23.5 μ g/mL) which can be considered as a cytotoxic compound against human breast cancer cell line (MCF-7) while the other three isolated compounds were inactive. This research has succeeded in isolating five compounds from *D. umbriatica* and four compounds from *L. scandens* which served as important contribution to the existing knowledge of the phytochemicals of the genus *Dracaena* and *Luvunga*. At the same time, several antioxidants and cytotoxic compounds against human breast cancer cell line (MCF-7) had been discovered from this research.

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CHAPTER ONE

INTRODUCTION

1.1 MEDICINAL PLANTS

Medicinal plants have been used by mankind as a source of medicines since ancient times. Information on the uses of plant materials as medicines can be found in archeological finds, old literature and history books. Of the 250,000 higher plant species on earth, more than 80,000 are medicinal plants. More than 35,000 plant species have been reported to be used in various human cultures around the world for medicinal purposes. However, the number could be much higher as knowledge on the indigenous uses of plants was mostly passed on orally from one generation to another and has largely remain undocumented (Ibrahim, 2004).

Tropical countries are a treasure house of a wide variety of medicinal plants. Some species are found wild, while a number of species have been domesticated by the farmers such as traditional vegetables and spices. Many species have been grown in the backyard and become part of traditional home remedies. A limited number of species are commercially cultivated though a few more have potential for large-scale production (Joy et al., 1998).

Malaysia is known as one of the richest and the oldest rain forest in the world because it is characterized by high rainfall. Malaysian forest consists of many varieties of plants. At least 500 genera and more than 5000 species were found in the flora of Malaysia and 900 species had being used in traditional medicine (Omar et al., 2009). Burkill (1966), in his extensive compilation of the economic products of the Malaysia peninsula, recorded not less than 1,300 medicinal plants have been used traditionally as malay folk medicine.

The herbal products today symbolise safety in contrast to the synthetics that are regarded as unsafe to human and environment. Although herbs had been priced for their medicinal, flavouring and aromatic qualities for centuries, the synthetic products of the modern age surpassed their importance, for a while. However, the blind dependence on synthetics is over and people are returning to the naturals with hope of safety and security (Joy et al., 1998). Thus, the study of medicinal plants was, is and will remain an important activity when it comes to provide evidence for the traditional medicines and to develop better herbal remedies (Faizal, 2008). Nowadays, with the