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EXTRACTION OF VALUABLE PHYTOCOMPOUNDS FROM MEDICINAL PLANTS OF *CLINACANTHUS NUTANTS LINDAU* BY SOLVENT-FREE MICROWAVE TECHNIQUE

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ABSTRACT

Medicinal plant is one of the ancient ways used in traditional medicine practices. It is known by the medicine field to contain a valuable phytocompounds such as alkaloids, terpenoids, carotenoids and many more. One of the medicinal plants that being used widely in South-East Asia is *Clinacanthus Nutants Lindau* also known as Sabah Snake Grass. There are a few methods used to extract valuable phytocompounds and mostly used solvents included in the mixtures. The extraction of valuable phytocompounds from Sabah Snake Grass used solvent such as n-hexane, dichloromethane, ethyl acetate and ethanol which actually a high performances liquid chromatography. The solvents used actually helped to classify the chemical compounds within the plant, but it is actually had side effect. The method that used organic solvents, such as ethanol and n-hexane are actually toxic and not suitable to be used for food production or to be included in pharmaceutical field. Furthermore, the addition of solvents will produce a byproduct that can affect the environment and classified as chemical waste after being used as solvents. Therefore, it is important to find a better method that exclude solvents thus reduce the production of hazardous substance to the environment and suitable to be used in food and pharmaceutical industry. The solvents used for this research was distilled water. Process parameter was pursuing out under three different type power (160 W, 240 W and 360 W) and three different solvent-to-feed ratio which is (1:10, 1:20 and 1:30). These three ratios acted differently as the time needed is different between ratio 1:10, 1:20 and 1:30. The increase of solvent requires longer time for the heat to be supplied to the samples. Oher than that, the data shown that the extraction yield increase with as the power of the microwave increase. The highest yield observed was 28.91% (Power =360 W, S/F=1:30).

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CHAPTER ONE
INTRODUCTION

1.1 Research Background

Clinacanthus Nutants Lindau(C.nutants) belonging to the Acanthaceae family also known as Sabah Snake Grass, mostly found in South East region(Alam et al., 2016). The plants mostly used in medicinal fields as it is can be used to cure rashes, insects and snake bites, diabetes and gout. In Malaysia, the leaves being used to boil it and drinks as herbal tea. It is also believed to cure cancer(Johnson, 2007). It is also being used in other Asian countries as Indonesia and China(Huang, Guo, Gao, Chen, & Olatunji, 2015).

C. nutants contains a lot of useful phytocompounds. From previous research, it is proven that valuable phytocompounds such as alkaloids, terpenoids, carotenoids and many more can be found from the plants(Fong, 2015). Other than that, phenolics which actually a part of an antioxidant properties and also exhibit pro-oxidant properties has been found as important phytocompounds([1]Lusia Barek, 2015). It is important and can be used in therapeutic and pharmaceutical fields. The compounds also associate with anticancer properties(Johnson, 2007).

Other than that, one of the most important parts of this research is about the use of solvent-free in the extraction method. Moreover, by focusing on green technology, which will investigate the impact of using water as solvent to extract the valuable phytocompounds from the mixture. Solvents used in the technique are also plays it parts as well. It is because the solvents used will affect the outcome of the phytocompounds(A. N. Mustapa, Martin, Gallego, Mato, & Cocero, 2015). Most research used solvents such as methanol, n-hexane, dichloromethane, ethyl acetate and ethanol which actually a high-performance liquid chromatography(A. N. Mustapa et al., 2015). It will be used to classify the phytocompounds from *Clinacanthus Lindau Nutants.* The procedure of using the solvent will produce a byproduct that can affect the environment and classified as