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Oil extracts from fresh and dried *Iban* ginger

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ABSTRACT

The present study aims to investigate the chemical properties of a new ginger species called *Iban* ginger. Oil extracts yield from both fresh and dried *Iban* ginger were compared via Soxhlet extraction production method. Subsequently, the chemical composition of the extracts was characterized and analysed. The associated chemical constituents and bioactive compounds were explored using gas chromatograph mass spectrometry (GCMS) and Fourier transformed infrared spectroscopy (FTIR) analysis for chemical constituents and plant active compound study. Results obtained show that yield of the oil increases with the increase of extraction time, freshness of ginger and type of solvent use. Although *Iban* ginger is known to be comparatively hotter in taste, the bioactive compounds properties are similar or in close agreement with other types of gingers reported in literature. Finally, acetone equivalent-extraction time of recycled ethanol is introduced herewith and found to be minimum around 2 h, as far as the present study is concerned.

1. Introduction

Ginger is known by its scientific name as *Zingiber officinale,* a member of Zingiberaceae family. Ginger can be used for food favouring, as ginger drink and can even as catalyst to enhance bioenergy production [1]. Over the years, ginger has become one of the herb plants that is often used for natural preservative and medicinal purpose due to the presence of its bioactive compounds that provides medicinal properties which helps to improve health. Natural preservatives derived from plant sources have been actively studied as an alternative to synthetic materials [2]. In the present research, while normal gingers are widely known and used by many, the local ginger *Iban* ginger is scarce and relatively expensive available locally in particular from Districts of Kuching and Serian, Sarawak, Malaysia. Unlike conventional gingers, the *Iban* ginger is known to be slightly hotter than ordinary gingers in taste and could enhance spicy sensation. Generally, the usage of organic manures improved quantity and quality of essential oil [3]. Organic manures play an important role in the growth and biomass of aromatic and medicinal plants leading to organic and cleaner production. Also, organic manures can improve chemical compositions and the quality of aromatic and medicinal plant viz. Dracocephalum kotschyi [4]. The present study reports the ginger oil extracts production from *Iban* ginger plant (*Zingiber officinale*) that are planted with sandy soils and organic chicken manures.

In the production of plant oil extracts, various solvents like methanol, ethanol, petroleum ether, dichloromethane and *n*-hexane had been widely used[1]. Alfaro et al. [5] observed that most researchers found ethanol as one of the best solvents due to high yield. Meanwhile, Gonçalves et al. [6] described the fractionation of Citrus bergamia essential oil using ethanol/water mixtures as solvents. Bio-oil production of Lemon Myrtle extract oils was conducted by Bakar et al. [7] in a fixed-bed reactor via pyrolysis method within a temperature range of 350–550 °C. It was found that an increase in pyrolysis temperature led to a decrease in organic acid and ketones. The present study opted for the affordable conventional Soxhlet distillation extraction technique together with the use of recycle solvent i.e. recycled ethanol to investigate its suitability to achieve good plant extract yield. Thus the primary aim of the present paper is to compare the *Iban* ginger extracts yield using acetone and ethanol, estimate the acetone equivalent-extraction time and effectiveness of employing recycled solvent i.e ethanol-recycled ethanol for synthesis of ginger oil as compared with acetone. It is to be noted that ethanol is about 30% more expensive than acetone. Apart from that, this paper also presents: (i) production of oil extracts derived from local

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[1] It is to be noted that care must be taken when considering solvents like methanol and dichloromethane in extraction of products as these solvents are known toxic. There are usually for non-food applications.

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