UNIVERSITI TEKNOLOGI MARA

FTIR ANALYSIS OF ACETAMINOPHEN ON DRIED AQUILARIA MALACCENCIS LEAVES

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ABSTRACT

Aquilaria malaccencis leaves is a traditional herbal that has been long used for medicinal remedies. Its various health benefits have also been the main focus on many researches. Acetaminophen is a synthetic drug often used to treat fever and other illness and this compound can be found in *Aquilaria malaccencis* leaves. Currently, there are still lack of studies conducted on the presence of acetaminophen in *A. malaccencis* leaves. Meanwhile, vacuum far-infrared drying (VFIR) has been found to increase drying time and product quality in preservation of food and agricultural products. There are still little studies conducted on the effect of VFIR on *Aquilaria malaccencis* leaves. A study to determine the presence of acetaminophen was conducted by drying the leaves using VFIR dryer at temperature of 30°C, 40°C, 50°C, 60°C and 70°C. The dried leaves were extracted using hydrodistillation method. The presence of acetaminophen in the extracted sample is determined by using Fourier-transform Infrared (FTIR) Spectroscopy. FTIR has been widely used for characterisation of a compounds due to its relatively simple and it allows investigation of functional groups, bonding types, and molecular conformations; hence, providing molecular-level information. A peak from the spectral data was identified at 1640 cm-1 region for all three of the dried extracted sample. An extraction of fresh leaves of *A. malaccencis* leaves were carried out and analysed with FTIR in order to compare it with the extraction of dried *A. malaccencis* leaves. Two additional peaks can be observed and identified at 1498 cm^{-1} and 1542 cm^{-1} region. The infrared bands that can be identified from the spectral data belonging in the spectrum of acetaminophen are carbonyl vibration, NH bending and C-NH bending. This shows that there was presence of acetaminophen in *Aquilaria malaccencis* leaves.

Contents

CHAPTER ONE

INTRODUCTION

1.1 BACKGROUND STUDY

Aquilaria malaccensis is a species of plant belongs to the *Thymelaeaceae* family, famously known as agarwood is a heavy and fragrant resinous wood formed in Aquilaria trees. This species originates from South and Southeast Asian countries and mainly found in Bangladesh, India, Indonesia, Laos, Malaysia, Myanmar, the Philippines, Singapore, and Thailand (Alwi et al, 2017).

Aquilaria has wide range of applications and often used as incense, perfumery, medicine, religious ceremony, and as ornamentals. The highly prized essential oil distilled from this herb is generally used in perfumery and cosmetic products in Middle-Eastern countries. (Adam et al, 2017). Other than the ordinary uses of *Aquilaria* tree, it has also been found to have many medicinal benefits as health supplement.

Numerous studies have been conducted concentrating on the medicinal benefits of this tree and the fact that all parts of this plant are very beneficial to health makes this tree unique. Studies on *Aquilaria* leaves have shown that it has various health properties such anti-oxidant, anti-microbial, anti-inflammatory activity and hepatoprotective. Addition to that, *Aquilaria* leaves have been shown to have potential as anti-cancer and in anti-diabetic activity (anti-hyperglycemic) (Hashim et al, 2016). Moreover, *Aquilaria malaccensis* is deemed as valuable and important tree commonly in South Asia and often used as traditional medicine to relieve pain, fever, rheumatism, arrest vomiting, and asthma (Samadi et al., 2017). Drying method of *Aquilaria* leaves in order to extract the compounds is similar to the drying method of food and agricultural materials. This drying method is usually applied in food preservation.

The oldest method of food preservation includes sun drying and hot air drying and is widely adopted due to its advantages such as low capital investment and simple operation. However, it is shown to have more undesired effect than benefits such as long drying time and high labour cost for sun drying (Xie et al., 2017). Meanwhile, manufacturing conventional fried foods has long adopted hot air drying method. When higher quality product is required, freeze-drying method was developed later. Even so, an issue arises with hot air drying which are its losses of thermal energy (Mongpraneet et al, 2002).

Energy transfer mechanism of far-infrared radiation (FIR) works distinctively by direct absorption of electromagnetic wave by the product with no loss to the surrounding. Because of this, significant energy could be saved. In terms of drying foods and agricultural materials, infrared radiation has received more attention during the past decade due to the reduced energy requirement of the process. Various studies have proposed and tested the infrared radiation method and it has been found that infrared radiation