UNIVERSITI TEKNOLOGI MARA

DETERMINATION OF ACETAMINOPHEN COMPOUND FROM *AQUILARIA SP.* LEAVES BY HYDRODISTILLATION AND ITS ANTIMICROBIAL ACTIVITY ON *E.COLI*

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Thesis submitted in fulfilment
of the requirements for the degree of
Master of Science

Faculty of Chemical Engineering

April 2017

ABSTRACT

Aquilaria sp. is known for its valuable agarwood. Determination of acetaminophen compound from *Aquilaria* leaves would increases the potential of an alternative drug to replace the synthetic drugs as the leaves become waste although the trees rich in medicinal benefits. *Aquilaria malaccencis, Aquilaria subintegra* and *Aquilaria crassna* were chosen as the subject. The objectives of this study are to study the chemical structure in the leaves extract of each species by using Fourier Transform Infrared Spectroscopy (FTIR) and to determine highest acetaminophen compound within a range of drying temperature (30, 40, 50, 60, 70 °C) through hydrodistillation in the leaves by High Performance Liquid Chromatography (HPLC). Besides that, the antimicrobial activity of acetaminophen extracted towards *E.coli* is also being studied. In the characterization study, the similar compounds found in both synthetic acetaminophen and in the leaves extract. Drying at 60 °C promotes the highest extraction of acetaminophen for each three species. Meanwhile, the highest acetaminophen extracted were from *Aquilaria crassna* leaves with 81.36 μg/g of acetaminophen whereas 44.15 and 24.64 μg/g were extracted from *Aquilaria subintegra* and *Aquilaria malaccencis* respectively. The leaves extract with the highest acetaminophen concentration for each species involved in antimicrobial activity. *Aquilaria crassna* leaves extract showed a significant inhibition by agar spreading method at dilution of 10^9 cfu/mL. The numbers of colonies significantly reduced to 81 cfu/mL. Therefore, all three species of *Aquilaria* leaves extract contained acetaminophen compound, which deliberately may contribute to antipyretic activity and has inhibition effect in growth of *E.coli*.

ACKNOWLEDGEMENT

"In the name of Allah, the Most Gracious, the Most Merciful"

Firstly, I wish to thank Allah for giving me chance and guiding me to pursue my study in Master level. With only His guidance and help, I managed to complete the journey of my study. In this tough journey, Allah completed my life with the presence of people that have supported me all the way through difficulties. Allah has eased my journey for the opportunity to have supportive supervisor, husband, family, and friends.

My first gratitude and thanks is to my supervisor, Prof. Dr. Ku Halim Ku Hamid for the patience, moral supports and comments on improving this study. Nevertheless, big thanks to my co-supervisors, Ms. Habsah Alwi and Dr. Nik Raikhan, especially for their unconditional help while performing and completing this study. Thank you for the support, tolerance and patience in guiding me to complete this study. My sincerest appreciation would go to En. Mohibah for his continuous moral support, comments and idea from the early stage till the end of this journey. This journey would not be an easy one without the helps from the technical support team, En. Yazid, En. Irwan, En. Nazmi, Pn. Suhaila, and lastly to Pn. Azizan. Thank you for helping me to set up to ease the experimental works at the faculty.

My deepest appreciation goes to my parents and my siblings. I would not able to achieve this success without their never-ending moral supports, encouragements and love especially financial support and useful advice. I hope that I can make you proud; Mak Ayah and I can become a role model for my little brothers and sisters.

My heartiest appreciation goes to my husband, En.Zulkefli Austad for encouraging me throughout this journey and to my parents in law for their encouragement. Lastly, huge thanks to my friends, without supports and pray from them, I am nobody in this struggle journey. This achievement is for all of you. Thank you.

TABLE OF CONTENTS

CHAPTER ONE
INTRODUCTION

1.1 RESEARCH BACKGROUND

Plants are well known for its multiple benefits in various fields. In such cases, the medical field is the most advantageous as plants are high in medicinal value and can be used to cure illness and diseases. In ancient times, plants are the only source for curing diseases and illnesses. Among the uses of herbs are to treat and relieve cough, asthma, skin ailments, diarrhoea, fever and cancer. Nowadays, synthetic drugs have become a common practice in the treatment of various diseases. However, synthetic drugs may have adverse effects on consumers if taken excessively. As for instance, these synthetic drugs can cause gastritis, asthma and even liver damage. Among available synthetic drugs in the market are paracetamol, ibuprofen and aspirin. Hence, researchers these days are keen to produce natural based drugs to replace synthetic drugs to shift to a healthier option.

Hot boil extraction method is the most common method used by industry. In order to obtain the medicinal active compound from various species of plants, extraction such as hot boil extraction were implemented. Commonly used extraction techniques are soxhlet extraction, supercritical fluid extraction, maceration, percolation and infusion [1]. Hydrodistillation techniques such as water distillation, steam distillation, water and steam distillation usually used are for aromatic plants. According to Handa [2], latest extraction methods for aromatic plants are solid phase microextraction, microdistillation, protoplast extraction, molecular distillation and molecular distillation. Modern and conventional methods are different based on the high yield value and effectiveness of the method applied. Nevertheless, both of the methods are advantageous in many ways and still applicable until now.

Aquilaria, in its scientific name is known as an aromatic plant. There are many species can be found such as *Aq. malaccencis, Aq. subintegra, Aq. hirta* and *Aq. crassna.* It largely found in Asian countries including India, Malaysia, Indonesia and China. This species is famous for its pleasant smell, which originates from the agarwood. Besides its specialty in aromatic substances, agarwood already been used