

THE POTENTIAL OF SECONDARY METABOLITES COMPOUNDS OF METHANOL EXTRACT STEM BARK MELOCHIA UMBELLATE AS ANTI-BACTERIAL

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Submission date: 10-Feb-2022 02:04PM (UTC+0700)

Submission ID: 1759133441

File name: 1_Pro siding_Usman_SI_Kim_2015.pdf (288.89K)

Word count: 3015

Character count: 17400

ISBN No. 979-3707-41-7

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INTERNATIONAL SEMINAR 2015

**The Innovation in Chemistry Education in Supporting
Green Chemistry Toward The Advanced KalTim 2018**

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6 Carbon 6 Hydrogen 6 Oxygen

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**THE INNOVATION IN CHEMISTRY EDUCATION IN SUPPORTING
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Held on September 12th, 2015

In Hall of Rector 4th floor FKIP UNIVERSITAS MULAWARMAN

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PREFACE

International Seminar on Chemistry in 2015 has been carried out on 12 September 2015 in Hall Rector Lt-4 Mulawarman Samarinda. Activities of the International Seminar organized by Study Program of Chemistry and fully supported by the Dean of Faculty Teacher and Training Education, Rector Mulawarman University and Forum Cooperation Chemists Eastern Indonesia (FK3TI).

The seminar was attended by a number of participants consisting of: four guest speakers who come from Universitas of Bayreuth Germany, University of Technology Malaysia, Hasanuddin University Makassar, State University Surabaya, and 45 speakers company on were divided into six groups presenting parallel and six speakers poster of lecturers from various universities in Indonesia and teachers through out East Kalimantan.

Papers presented in these proceedings is the result of research covering the fields of chemistry, chemistry education, science education and science education. As well as the papers presented in these proceedings has been selected by the Papers evaluation team of the International Seminar of the committee of Chemistry 2015. Efforts publishing these proceedings have been conducted as much as possible and if there are errors and efficiencies in the publication of these proceedings, the criticisms and suggestions are expected in order to improve the The subsequent publication of proceedings.

We as the committee would like to thank all those who have supported and helped the implementation of the International Seminar in 2015 and the publication of these proceedings.

Chairman of the committee

Dr. Usman, M.Sc.

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2
**THE POTENTIAL OF SECONDARY METABOLITES COMPOUNDS OF
METHANOL EXTRACT STEM BARK MELOCHIA UMBELLATE AS
ANTI-BACTERIAL**

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ABSTRACT

A Study antibacterial essay of the methanol extracts of steam bark *M.umbellate* (Houtt) Stapf var. *degrabrata* (Paliasa). The results of this study showed that the methanol extract from the bark of *M. umbellate* (Houtt) Stapf var. *degrabrata* group of compounds containing alkaloids, flavonoids, triterpenoids, phenolics and saponins. Methanol extract from the bark of *M. umbellate* can inhibit the growth of bacteria *Bacillus subtilis*, *Staphylococcus aureus*, gram-negative bacteria as well as representing *Escherichia coli*, *Salmonella thypi*, and *Pseudomonas aeruginosa* representing gram-positive bacteria. At a concentration of 400 ppm of methanol extracts of these plants showed effective barrier against bacteria tested, with a zone of inhibition, respectively as follows: 12.67 mm against bacteria *B. subtilis*, 12.97 mm against bacteria, *S. aureus*, 11.86 mm against bacteria *E. coli* and 12.12 mm against bacteria *S. thypi*. However, methanol extract from the bark of *M. umbellate* showed no impediments to the growth of bacteria *Pseudomonas aeruginosa*.

Keywords: Antibacterial essay, methanol extract of *M. umbellate*

INTRODUCTION

Sterculiaceae is a tropical plant genus consists of 70 species and 1500. Most species of the families of plants such as trees and shrubs (Mabberley, 1997). Groups of plants are widely used by people as food, housing and traditional medicine. For example *Kleinhovia hospita* Lin since formerly used as a traditional medicine in several countries including China, Malaysia, Papua New Guinea and Indonesia to treat hepatitis, scabies, Tetter and pruritus (Gan, et al., 2009). *Sterculia setigara* Del (*Melochia tomentosa*) and *Sterculia tragacantha* Lindl are two species of the family *Sterculiaceae* most widely used as a traditional medicine in West Africa to treat dysentery, ulcers, syphilis, epilepsy, and malaria (Igoli, et al., 2005). Dry powder of the leaves of the plant *S. setigara* normally used by the

doctors in the state of Bauchi (Nigeria) for the treatment of tuberculosis (chronic cough with blood stains) and HIV / AIDS (Babalola, et al., 2012).

Paliasa is a plant that is included in the family Sterculiaceae. The plant consists of three different plant species are of the genus *Kleinhovia hospita* Linn of the genus *Kleinhovia*, while *Melochia umbellata* (Houtt) Stapf var. *degrabrata* and *Melochia umbellata* (Houtt) Stapf var. *visenia* that both of the genus *Melochia*. Paliasa plant is widely used in South Sulawesi as a traditional medicine for the treatment; liver disease, hypertension, diabetes, cholesterol and hepatitis (Raflizar, 2006). *K.hospita* leaves and bark are used as a cough medicine, then the content of cyanogenic compounds are assumed to kill ectoparasites such as lice. Leaf extracts showed antitumor activity against sarcoma in mice. The third methanol extract of leaves of these plants can improve heart function of mice induced with *karbontetraklorida*, but *M.umbellate* (Houtt) Stapf var. *degrabrata* most effective in improving liver function (Lalo, A., 2003.).The three types of leaf extracts paliasa also toxic to larvae shrimp *Artemia salina*, where the plant leaf extract of *M. umbellate* (Houtt) Stapf var. *degrabrata* that showed the most toxic among other types paliasa leaf extract (Tayeb, et al., 2007).

So far the data has not been much research exploring paliasa bioactive compounds from plants as raw material, especially anti-bacterial species *M. umbellate* (Houtt) Stapf var *degrabrata*. Some results of research on the nature of the toxicity and other bioactive properties of plants have been reported paliasa namely; results of toxicity screening of methanol.

METHODS

Extraction and Phytochemical Test

A total of 5.25 kg finely powdered bark of *M. umbellate* (Houtt) Stapf var. *degrabrata* (Paliasa) macerated with methanol for 1 x 24 hours (3 times). The methanol extract was filtered and collected then concentrated under reduced pressure using an evaporator to obtain a methanol extract of brown as much as 393, 58 grams. The methanol extract was taken as much as 10 grams and put in a bottle vial to be tested phytochemical and anti-tuberculosis test. Phytochemical test is conducted, the alkaloid test with reactant Meyer, Wagner and Dragendorf; flavonoids test with reactant (Mg powder in 0.2 ml of concentrated HCl), phenolic test with FeCl₃ reagent, triterpenoids and steroids test with LB and Salkowski reagent and test reagent saponin with foam. Phytochemical test results can be seen in Table 1.

Antibacterial test

Test bacteria used in this study comes from a pure culture laboratory of Microbiology, Faculty of Pharmacy Unhas. Bacteria test consists of gram-positive bacteria (*B. subtilis* and *S. aureus*) and Gram-negative bacteria (*P. aeruginosa*, *E. coli* and *S. thypi*). The bacteria rejuvenated in TSA medium in slanted tubes for 2 x 24 hours at a temperature of 25 ° C. Colonies were grown in agar slant taken one loop, and then homogenized with 9 ml of saline solution, and incubated at 10 cm petri dish containing medium Mueller Hinton Agar (MHA). Test performed with an anti-bacterial agar diffusion method using paper discs (paper disc) 6 mm diameter were deposited on the surface of MHA medium. Subsequently dropped by 20 mL extract and isolate the compound, and then incubated for 2 x 24 hours at a temperature of 25 °C. Testing the activity of methanol extract performed by measuring zone of inhibition on bacterial culture using a sliding bar that is expressed in mm.

Methanol Extracts Against Bacteria Test for *M. tuberculosis*

Inhibition test methanol extract against bacterial test done by the diffusion method using couplers bottle. A total of 5 bottles that have been sterilized LJ medium was prepared, the first bottle was added a solution of 20 mL of DMSO (negative control), the second bottle just berisim LJ medium, third and fourth bottles each methanol extract was added to a concentration of 100 ppm and 200 ppm as 20 mL, added a fifth bottle rifampicin (tuberculosis medicine) to 20 mL as a positive control. Subsequently the fifth screw bottles were incubated at 37 °C for 3 weeks. The test results on the inhibition of methanol extract of *M. tuberculosis* can be seen in Figure 1.

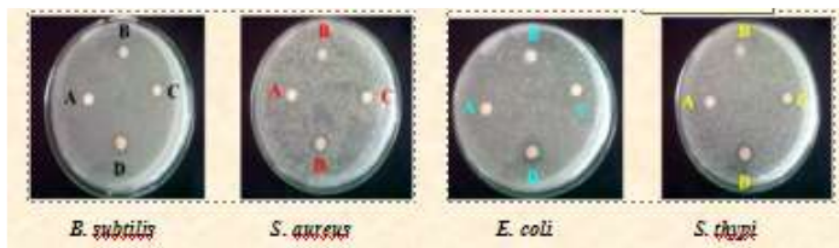


Figure 1 The observation of inhibition of methanol extract of the stem bark of *M. umbellate* (Houtt) Stapf var. *degrabrata* (paliasa) against the test bacteria

Keterangan :

A = negative control

B = conct.extract 100 ppm

C = conct.extract 200 ppm

D = conct.extract 400 ppm

Table 2 Results of antibacterial tests methanol extract of the stem bark of *M. umbellate* (Houtt) Stapf var. *degrabrata* K

No.	Conct. Ppm	zone diameter of bacterial inhibition (mm)			
		<i>S. aureus</i>	<i>B.subtilis</i>	<i>E. coli</i>	<i>S. thypi</i>
1	100	t.m	8,15	t.m	t.m
2	200	9,42	11,05	t.m	8,17
3	400	12,67	12,97	11,58	12,12
4	KN	t.m	t.m	t.m	t.m
5	KP	14,95	14,00	14,25	14,00

Description :

KN = Negative control (DMSO)

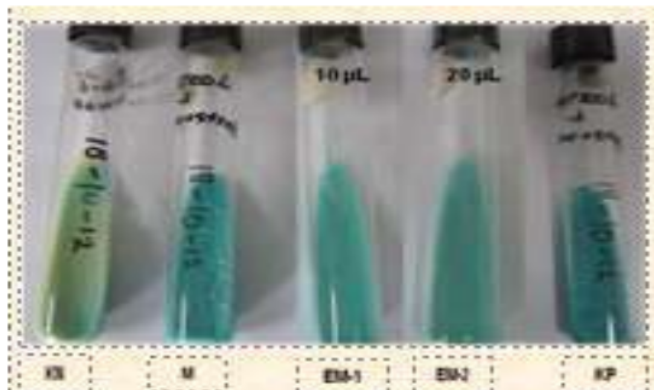
KP = Positive control

t.m = no inhibition

Antibacterial test results as seen in Table 2, showed that the methanol extract of the stem bark of *M. umbellate* (Houtt) Stapf var. *degrabrata* have inhibitory effect on both types of bacteria (gram negative and gram positive bacteria). It can be explained that the active compounds in the methanol extract qualitatively or quantitatively important role on the cell membrane of gram-negative bacteria and gram-type positive (Hanaa et al., 2011). According to Calderon and Sabundayo (2007) the effect of the antibiotic activity of plant extracts against bacterial growth may be caused by the following factors, among others; reaction mechanisms, chemical structure, or spectrum of activity. Broad-spectrum antibiotics in plants affect the growth of various bacteria, both gram-negative bacteria and the type of target gram-positive bacterial cell wall or cell membrane or interfere with essential bacterial enzymes (Sowmya. Et al., 2011).

Test results methanol extract bioactivity against test bacteria showed that the methanol extract of the stem bark of *M. umbellate* (Houtt) Stapf var. *degrabrata* showed inhibitory effect on bacterial growth at a concentration of *M. tuberculosis* 100ppm and 200 ppm. It can be explained that the active compounds in the methanol extract qualitatively or quantitatively important role on the cell membrane of gram-negative bacteria and gram-type positive (Adeniyi,

et al.,2004)



Description :

KN = Negative control (DMSO)

M = Medium

EM-1 = Methanol extract 100 ppm

EM-2 = Methanol extract 200 ppm

KP = Positive control (rifampicin)

Figure 1 Power inhibition of methanol extract of the stem bark of *M. umbellata*(Houtt) Stapf var. *degrabrata* (paliasa) against *Mycobacteria tuberculosis*

Effect of antibiotics in plant extracts against bacterial growth may be caused by the following factors include reaction mechanisms, chemical structure, or spectrum of activity. Broad-spectrum antibiotics in plants affect the growth of various bacteria, both gram-negative bacteria and the type of target gram-positive bacterial cell wall or cell membrane or interfere with enzymes in the process of protein synthesis in bacteria (Mann, et al., 2008)..

The content of phytochemicals such as alkaloids, flavonoids, tannins, phenols, saponins, and several other aromatic compounds are plant secondary metabolites that play an important role in the defense mechanism against harmful microorganisms and herbivorous insects other (Sonibare, et al., 2009). The existence of groups such as phenolic compounds, tannins, saponins, and steroids

in the extract can act as an antimicrobial. Class of compounds tannins will bind proline-rich proteins and interfere with the process of protein synthesis. Antimicrobial properties of phenolic among others; degrade cell walls, interact with and disrupt the cytoplasmic membrane composition, membrane protein damage, destroy enzymatic mechanism for energy production and metabolism, as well as alter nutrient uptake and electron transport. Moderate steroid compounds has been reported to have antibacterial properties, because steroids cause leakage of liposomes (Adeniyi, et al., (2004).

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Conclusions

1. Methanol extract of the stem bark of *M. umbellate* (Houtt) Stapf var. *degrabrata* class of compounds containing alkaloids, flavonoids, triterpenoids, phenolic and saponin.
2. The methanol extract of the stem bark of *M. umbellate* (Houtt) Stapf var. *degrabrata* potential as an antibacterial against both types of bacteria is gram negative and gram positive bacteria
3. Methanol extract of *M. umbellate* (Houtt) Stapf var. *degrabrata* have inhibitory effects against *M. tuberculosis* at a concentration of 100 ppm and 200 ppm

Acknowledgements

1. Thanks, go to the Department of Chemistry, Laboratory of Organic Chemistry and Laboratory of Microbiology, Faculty of Pharmacy Faculty of Hasanuddin University who has provided facilities to conduct this research.
2. Our thanks are also conveyed to the Bogor-based, Center for Research and Development of Botany, Biological Research and Development Center (LIPI), Bogor, which has been identified specimens of this plant

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