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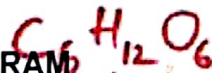
## INTERNATIONAL SEMINAR 2015

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

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CHEMISTRY EDUCATION STUDY PROGRAM  
DEPARTEMENT OF MATHEMATIC AND NATURAL SCIENCE EDUCATION  
FACULTY OF TEACHER TRAINING AND EDUCATION  
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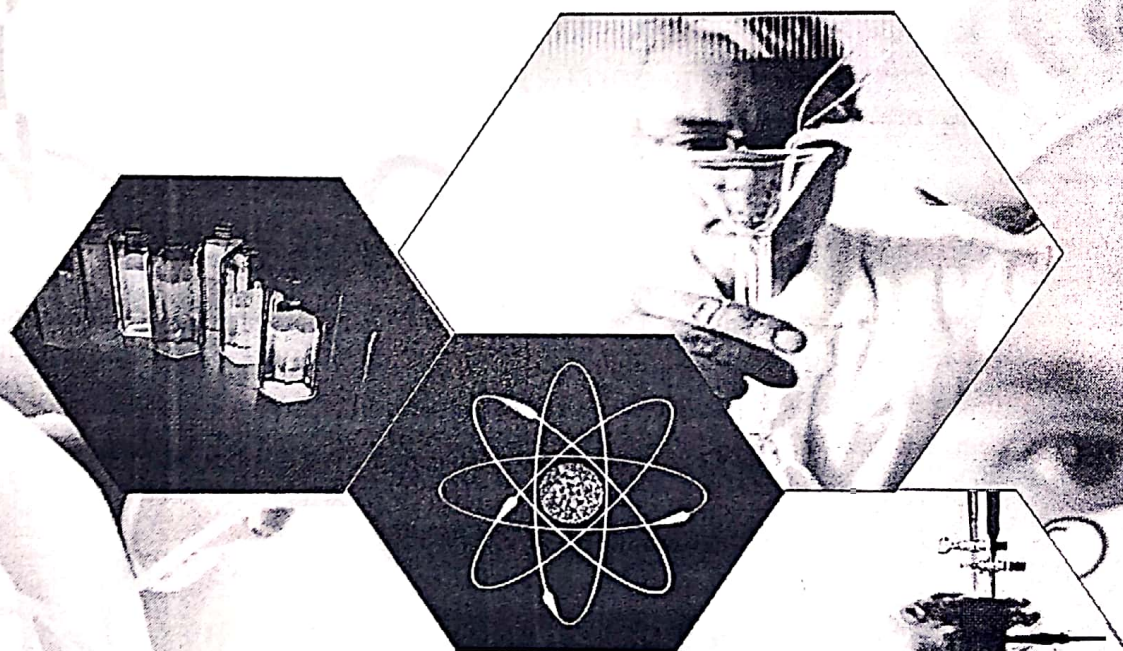


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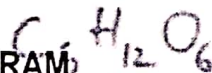


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KNOWLEDGE HISTORY MAPPING OF STUDENTS OF PROSPECTIVE CHEMISTRY TEACHERS TO MOVE TACIT KNOWLEDGE TO ACCOUNTABLE EXPLICIT KNOWLEDGE

Kurroti A'yun..... 38

A REVIEW ON ANTIPYRETICS AND THE SYNTHESIS ON THE OXEPINE DERIVATIVES

Nurul Kasyfita..... 55

DIVERSITY OF SECONDARY METABOLIT OF *ARTOCARPUS ALTILIS*

Erwin..... 62

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

Usman..... 75

EXTRACTION KINETICS OF SAPPANG WOOD DYES (*Caesalpinia sappan* Linn)

Suryani..... 82

MISCONCEPTION RESISTANT LOAD AND INPUT DIMENSION OF STUDENT'S LEARNING STYLES ON CHEMICAL EQUILIBRIUM CONTENT

Septyadi David Eka Aryungga..... 90

MINERALS, NUTRIENTS AND ACTIVE COMPOUNDS OF RAMBUTAN FRUITS

Sukemi..... 98

THE EFFECT OF APPLICATION OF 5E LEARNING CYCLE MODEL  
 COMBINED NUMBERED HEAD TOGETHER (NHT) TOWARD  
 CHEMISTRY LEARNING OUTCOMES ON THE SUBJECT OF SALT  
 HYDROLYSIS IN XI SCIENCE STUDENTS AT SENIOR HIGH SCHOOL 1  
 TANAH GROGOT ACADEMIC YEAR 2014/2015

Yuni Kurnia..... 171

PROSPECTIVE CRITICAL THINKING AND COGNITIVE STUDENTS  
 BASED LEARNING THROUGH INQUIRY

Abdul Hamid..... 182

THE EFFECTIVENESS OF LIPASE IMMOBILIZATION ON CHITOSAN  
 BEADS CROSS-LINKED BY GLUTARALDEHYDE

Lizma Febrina..... 188

BIOSORPTION OF CADMIUM (Cd) AT GREEN COCO FIBER(*Cocos  
 nucifera*) WAS ACTIVATED BY USING ATOMIC ABSORPTION  
 SPECTROPHOTOMETER (AAS) METHOD

Syamsidar HS..... 198

The Effect of Voltage on The Metal Concentration (Hg, Pb, and Zn), Conductivity  
 and Color on The Electrocoagulation - Flotation Process in a Waste Incinerator  
 Liquid.

Merry Anggriani..... 208

THE DIFFERENCE OF COGNITIVE LEARNING OUTCOMES BETWEEN  
 STUDENTS WHO LEARNED BY USING PROBLEM SOLVING AND  
 PROBLEM POSING LEARNING MODELIN SALT HYDROLYSIS  
 MATERIAL

Dian Eka Wati..... 218



# 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. *vienia* 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  $FeCl_3$  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.

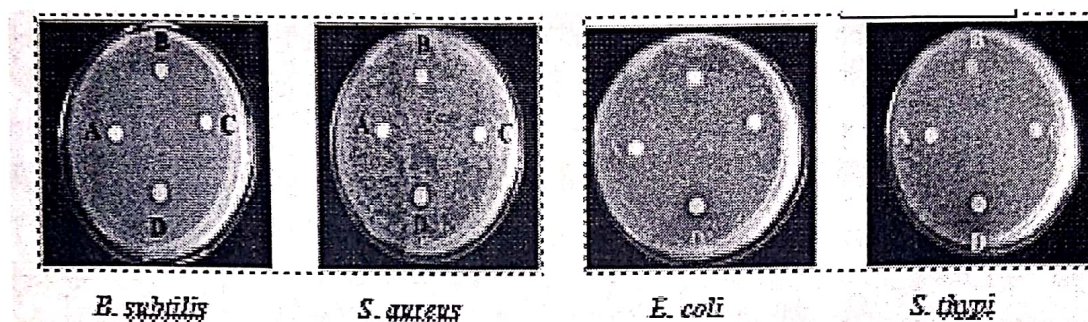


Figure 1 The observation of inhibition of methanol extract of the stem bark of *M. umbellate* (Houtt) Stapf var. *degrabrata* (paliasa) against the test bacteria

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

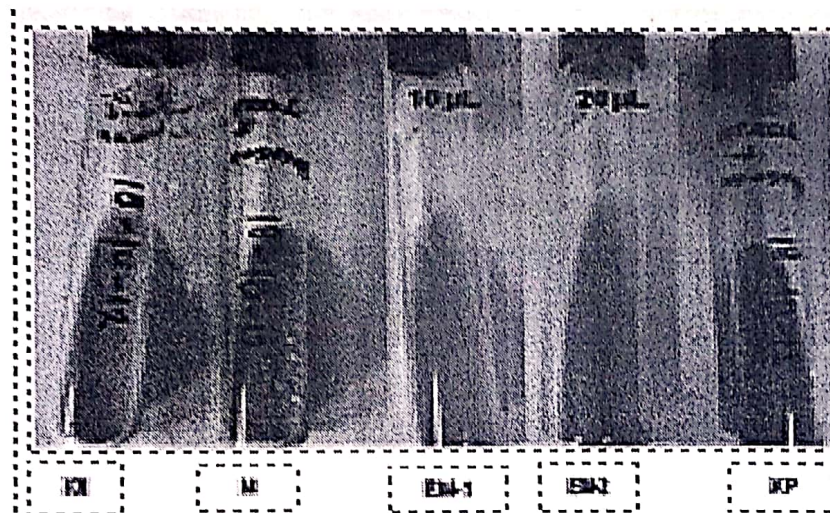
t.m = no inhibition





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 (rifampisin)

Figure 1 Power inhibition of methanol extract of the stem bark of *M. umbellate*(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).

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 (Almagboul, et al., 1988)..

## 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

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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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