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## Original Article

Antimicrobial Activity and Phytochemical Properties of *Actinodaphne Glomerata* Leaves ExtractKuspradini Harlinda<sup>1</sup>, Suharyani Ine<sup>2\*</sup>, Manalu Julinda<sup>1</sup><sup>1</sup>Faculty of Forestry, Mulawarman University, Jl Ki Hajar Dewantara Kampus Gunung Kelua, Samarinda, East Kalimantan, 75116, Indonesia ,<sup>2</sup>STIKES Muhammadiyah Kuningan, Jl. Raya Cigugur-Cirendang No. D4 Rt. 09 Rw. 03 Blok Cisumur Kelurahan Cipari Kabupaten Kuningan, Jawa Barat, Indonesia

## ABSTRACT

This research aimed to determine the antimicrobial activity and chemical compounds by phytochemical analysis of *Actinodaphne glomerata* leaves. The extraction was performed by maceration method using *n*-hexane solvent. The antimicrobial activity was tested by agar diffusion method against *Candida albicans*, *Staphylococcus aureus*, *Streptococcus mutans*, and *Streptococcus sobrinus*. The *n*-hexane crude extracts were tested for its antimicrobial activity using 125, 250 and 500 µg/well of concentrations. Based on the result of the phytochemical analysis, it showed that *n*-hexane extract of *A. glomerata* leaves contained alkaloids, triterpenoid and carbohydrates. The extract inhibited all tested microorganisms, and the best inhibition zone was shown against *S. sobrinus* (19.56 mm) at concentration 500 µg/well.

**Keywords:** *Actinodaphne glomerata*, *n*-hexane extract, Phytochemical, Antimicrobial.

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## INTRODUCTION

The potential of so much of the plants in Indonesia, especially in East Kalimantan to be used as an essential oil of one of them is the family plant Lauraceae, the species is found in tropical and sub-tropical especially in the Americas, Africa, and Asia<sup>1</sup>. In Indonesia, Lauraceae known as "medang" or "huru" is a plant family consisting of 31 genus and about 3000 species. Most species in the family plant Lauraceae is widely used for building materials and used as a traditional medicine in maintaining human health. This plant is mostly found in secondary forest. *Actinodaphne glomerata* (Medang paya), is one of actinodaphne genus plant which have antimicrobial activities. Some species of the *Actinodaphne* genus are used in traditional medicine such as rheumatic pain and fractures. Based on the above explanation, the research aimed to find out of the antimicrobial activity and phytochemical properties<sup>2</sup>.

## MATERIALS AND METHODS

## Materials

The fresh leaves of *A. glomerata* (Figure 1.) were collected from Education Forest Laboratory of Forestry Faculty, Mulawarman University, East Kalimantan,

Indonesia, and authenticated by the Laboratory of Dendrology and Forest Ecology, Faculty of Forestry, Mulawarman University, Indonesia.

## Methods

## Extraction Method

The samples were air-dried at room temperature, somewhere ground to make powder. Dry powdered about 430.04 g of the sample was extracted using *n*-hexane at room temperature for 24 hours, then filtered the using filter paper. The filtrates were evaporated using rotary evaporator with the water bath set at 39 – 40 °C.



Figure 1. *Actinodaphne glomerata* (Medang paya)

### Phytochemical Analysis

Phytochemical analysis was performed by Spot test to known for the presence of active compounds in a plant. Several phytochemical tests of alkaloid test, flavonoid test, and tannin test refer to Kokate method<sup>3</sup>, saponin test, carbohydrate test, triterpenoid test and steroid test referring to Harborne method<sup>4</sup>, carotenoid test and coumarin test referring to Senthilmurugan method<sup>5</sup>.

### Antimicrobial Assay

Antimicrobial activity of the sample was determined by using agar diffusion method<sup>6-9</sup> with modification. The various types of microorganisms used in this study are *Candida albicans*, *Staphylococcus aureus*, *Streptococcus mutans*, and *Streptococcus sobrinus*. All materials were sterilized by autoclaving at 15 lbs pressure (121 °C) for 15 min. Twenty ml sterile Nutrient Agar media were poured into sterile petridishes. Furthermore, 100 µl of microbial suspension were inoculated by sterile swab and

spread all over the surface of the media plates after the media were set to solidify. Five wells with a 6 cm diameter were bored in solidified media using sterile cork-borer in a petridish. Twenty µl of the extract at different concentration (125 µg/well, 250 µg/well, and 500 µg/well) were added into the well. Chloramphenicol was an antibiotic for positive control at the concentration of 10µg/well and acetone as a negative control. The plates were incubated at 37 °C for 18-24 hours. Their clear formation around the well were measured after incubation and presented in mm. The clear zone formation indicated as the presence of antimicrobial.

### RESULT AND DISCUSSION

The extraction process of the compound using the maceration method with *n*-hexane solvent at room temperature. The rendement of this extraction yield 0.87 %. The rendement calculated by divided the final weight (weight of the extract yielded) with the initial weight multiplied by 100%<sup>10</sup>.

**Table 1.** Phytochemical Screening of *Actinodaphne glomerata*

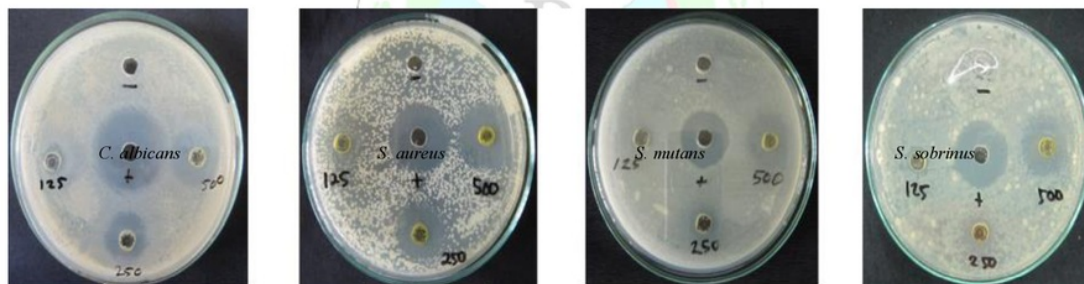
#### Secondary Metabolite

Alk	Flav	Tan	Sap	Trp	Ster	Crb	Cum	Crt
+	-	-	-	+	-	+	-	-

(+) available, (-) unavailable, Alk (Alkaloids); Fla (Flavonoids); Trp (Terpenoids); Tan (Tannin); Sap (Saponin); Ste (Steroids); Crt (Carotenoids); Cum (Cumarin); Crb (Carbohydrate).

Inhibition of the extract can be seen from the inhibition diameter (mm), and the clear zone percentage of the test extract sample with different concentrations are presented in the following figure 2.

The result of phytochemical analysis is presented in Table 1.



**Figure 2.** Antimicrobial test from an *n*-hexane extract of *A. glomerata* leaves

The result showed that the samples inhibited all tested microorganisms with different inhibitory values in tested concentrations (Table 2.). The best inhibition zone was

shown against *C. albicans* (18.11±0.51) followed by *S. sobrinus* (16.78±6.16), *S. aureus* (16.00±2.40), while the lowest activity showed against *S. mutans*.

**Table 2.** Antimicrobial Activity of *n*-hexane extract of *A. glomerata* leaves

Microbial	Zone of Inhibition (mm) ± SD			
	Chloramphenicol (10µg/well)	500 µg/well	250 µg/well	125 µg/well
<i>C. albicans</i>	24.11±2.36	18.11±0.51	15.33±0.88	8.56±0.96
<i>S. aureus</i>	22.11±0.19	16.00±2.40	12.67±3.28	8.67±0.58
<i>S. mutans</i>	19.11±0.69	16.78±0.51	6.56±5.68	4.67±4.04
<i>S. sobrinus</i>	23.11±0.51	16.78±6.16	13.22±3.86	11.11±0.84



## DISCUSSION

The process of extracting the compound using the maceration method with *n*-hexane solvent at room temperature. After going through several stages: filtering, concentration and drying extract, The rendement of this extraction yield 0.87%. The rendement calculated by divided the final weight (weight of the extract yielded) with the initial weight multiplied by 100%<sup>10</sup>. A phytochemical analysis is a simple, fast, and highly selective method, which can be used to identify the class of compounds and to know the existence of biologically active compounds distributed in plant tissues<sup>11</sup>.

The result of phytochemical analysis shown that *n*-hexane extract of *A. glomerata* leaves contained alkaloids, triterpenoids, and carbohydrates. According to Rahayu<sup>12</sup> these compounds are known to have antimicrobial properties. Pyo<sup>13</sup> state that the content of phytochemical compounds with various factors namely species, varieties, growth conditions, season variations, processing methods, and storage.

Inhibition of *n*-hexane extract on microbial at a concentration of extract 125 ppm, 250 ppm, 500 ppm per well can be seen from the measurement of inhibition zone that was formed showed that The extract has antimicrobial activity on several samples studied. Inhibition of the extract can be seen from the inhibition diameter (mm), and the clear zone

percentage of the test extract sample with different concentrations are presented in figure 2.

From Table 2, showed that the samples inhibited all tested microorganisms with different inhibitory values in tested concentrations. This statement is in line with the opinion of Andries<sup>13</sup> which the difference inhibition zone may be due to the concentration of inoculum, time of incubation, sample concentration and the antimicrobial ability of sample. The best inhibition zone was shown against *C. albicans* (18.11±0.51) followed by *S. sobrinus* (16.78±6.16), *S. aureus* (16.00±2.40), while the lowest activity showed against *S. mutans*.

## CONCLUSION

The result from this study can be concluded that *n*-hexane extract of *A. glomerata* leaves has compounds of alkaloid, terpenoids, and carbohydrate. Such components as potential bioactive compounds that have the potential to inhibit the growth of microorganisms and can be as natural antimicrobial microorganisms.

## ACKNOWLEDGMENTS

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