

# Antibacterial Activity Analysis of Zanthoxylum Acanthopodium DC Extract on Bacteria of Bacillus Subtilis, and Salmonella Typhi

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**Abstract.** Research has been conducted on the antibacterial activity analysis of Zanthoxylum acanthopodium DC extract on Bacillus subtilis, Salmonella typhi using disc diffusion method. This study aims to determine the ability of Zanthoxylum acanthopodium DC extract in inhibiting the growth of Bacillus subtilis, and Salmonella typhi. Zanthoxylum acanthopodium DC was extracted by maceration method using 96% ethanol. In this extraction process, phytochemical test was carried out to find out the secondary metabolite content in Zanthoxylum acanthopodium DC. Phytochemical test indicate Zanthoxylum acanthopodium DC contained alkaloids, tannins, saponins, and steroids. Antibacterial activity analysis were measured in three concentrations of 25%, 50%, 75%. The best antibacterial activity was observed on Salmonella typhi bacteria with 75% extract concentration which produced a clear zone diameter of 19 mm and 20 mm.

**Keywords:** Zanthoxylum acanthopodium DC, antibacterial, disc diffusion

## 1 Introduction

Indonesian society has hundreds of years had the tradition of using plants from the surrounding environmental as traditional medicine. Spices are also used in the pharmaceutical industry (medicine) and cosmetic industry.

Food is a major human need and composed of chemical compounds which are nutrients also needed by microbes to help their growth. The presence of microbes in food come from various sources, such as raw materials, apparatus used during the processing, food storages, people involved in processing and the surrounding environment. Based on the collected data from several cases of poisoning in community, most are caused by bacteria of Bacillus subtilis, and Salmonella typhi. Bacillus subtilis is a Gram-positive bacteria form an oval-shaped endospore in the central part of cell. (Aini et al. 2013), whereas Salmonella typhi is a bacterial strain that causes typhoid fever.

Based on the research conducted by Helwina Shasti, et allin 2017 on “In Vitro Antibiotic Activity Test of (Zanthoxylum acanthopodium DC) Andaliman extract on growth of Staphylococcus aureus”, the extract of andaliman (Zanthoxylum Acanthopodium DC) has the effect of antibiotics on bacterial growth of Staphylococcus aureus. In this study, it would like

to examine of Antibacterial activity analysis of Zanthoxylum acanthopodium DC Extract On Bacteria Bacillus subtilis, and Salmonella typhi”

## 2 Research Method

The andaliman extract was obtained by maceration using ethanol. The dried andaliman fruit was made into powder and then macerated for 3 days using ethanol. The extract was concentrated by rotary evaporator to reduce the solvent. Concentrated extract was prepared into solution in different concentration (25%; 50% and 75%). The antibacterial activity was analysed using Kirby-Bauer method as a method for testing the antimicrobial susceptibility of bacteria based on the growth of inhibition zones size on a lawn culture around disks impregnated with the antimicrobial agent. The extract was also tested for its secondary metabolites content to determine the secondary metabolites presence. The secondary metabolites were analysed including the flavonoids, alkaloids, saponin, tannin, steroids and terpenoids.

## 3 Results And Discussion

Phytochemical screening and antibacterial activity are presented in the tables below.

**Table 1.** Secondary Metabolite Phytochemical Screening Test on Ethanol Extract

No	Phytochemical Screening	Result
1.	Flavonoid	-
2.	Saponin	+
3.	Tannin	+
4.	Steroid	+
5.	Alkaloid	+
6.	Triterpenoid	-

Description: (+)= Exist; (-)= Not exist

**Table 2.** Antibacterial Test Results

No.	Bacteria	Concentration	Clear Zone diameter	
			d <sub>1</sub>	d <sub>2</sub>
1.	<i>Bacillus subtilis</i>	25 %	10 mm	10 mm
		50 %	11 mm	15 mm
		75 %	14 mm	15 mm

	Kloramfenikol	26 mm	
	DMSO	9 mm	
2. <i>Salmonella typhi</i>	25 %	7 mm	10 m
			m
	50 %	11 mm	17 m
			m
	75 %	19 mm	20 m
			m
	Kloramfenikol	30 mm	
	DMSO	10 mm	

In Table 1, it can be seen that andaliman phytochemical screening contains saponins, tannins, steroids and alkaloids. The antibacterial activity of andaliman extract on *Bacillus subtilis* (14 mm and 15 mm) and *Salmonella typhi* (19 mm dan 20 mm) shows the highest activity at 75% concentration. The concentration of 25% of two bacteri was classified as medium strength while the extract with a concentration 50-75% is strong because it has inhibition zone of 11-20mm, 5-10 mm of medium strength, while <5 mm is categorized to be low strength.

Referring to general standard issued by David Stout it indicated microbes are susceptible to antibacterial if the plant has a size of inhibition of 10-20 mm. It confirm that andaliman extract with concentration of 50-75 % can be used as an antibacterial.

#### 4 Conclusion And Recommendation

##### Conclusion

1. Extract of andaliman has the best antibacterial activity with *Salmonella typhi* at a concentration of 75 % with 19 and 20 mm of inhibition zone.
2. Secondary metabolite compounds found in andaliman extract which have antibacterial activity are alkaloids, steroids, tannins and saponins.

##### Recommendations

1. Further research is needed to determine the andaliman contents when using non-polar, and semi-polar solvents.
2. It also necessary to determine the structure of alkaloids, saponins, tannins, steroids and tannins which function as antibacterial.

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