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**Evaluation of *Ficus minahassae* Fruit Extract as a Natural Agent against *Propionibacterium acnes***

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Accepted: 4 Maret 2025 ; Approved: 18 April 2025

**ABSTRAK**

Buah *Ficus minahassae* diketahui mengandung senyawa bioaktif yang potensial sebagai anti bakteri. Penelitian ini bertujuan untuk mengetahui aktivitas anti bakteri *Propionibacterium acnes* dari ekstrak buah *F. minahassae*. Buah *F. minahassae* diekstraksi menggunakan etanol. Uji aktivitas antibakteri menggunakan disc diffusion methods. Berdasarkan hasil penelitian diperoleh bahwa ekstrak buah *Ficus minahassae* mampu menghambat bakteri *P. acnes* pada konsentrasi 200, 300, 400, 500 dan 600 mg/disc dengan diameter zona hambat 11,68, 13.33, 14.35, 15.47, dan 17.82 mm secara berurutan. Ekstrak buah *F. minahassae* dapat dikembangkan sebagai bahan baku obat khususnya anti bakteri *P. acnes* penyebab jerawat

**Kata kunci :** anti bakteri, *Propionibacterium acnes*, *Ficus minahassae*

**ABSTRACT**

*Ficus minahassae* fruit is known to contain bioactive compounds that have the potential to act as antibacterial agents. This study aims to determine the antibacterial activity of *Propionibacterium acnes* from *F. minahassae* fruit extract. *F. minahassae* fruit is extracted using ethanol. Antibacterial activity test using the disc diffusion method. Based on the results of the study, it was obtained that *F. minahassae* fruit extract was able to inhibit *P. acnes* bacteria at concentrations of 200, 300, 400, 500, and 600 µg/disc with inhibition zone diameters of 11.68, 13.33, 14.35, 15.47, and 17.82 mm, respectively. *F. minahassae* fruit extract can be developed as a raw material for drugs, especially anti-bacterial *P. acnes*, which causes acne.

**Keywords:** Antibacterial, *Propionibacterium acnes*, *Ficus minahassae*

**1. INTRODUCTION**

Indonesia is a country with abundant biodiversity, including various plant species that have the potential as sources of natural medicinal ingredients<sup>1</sup>. One of these biodiversities is the genus *Ficus* which is included in the Moraceae family. This genus has more than 800 species spread across various tropical and subtropical regions in the world<sup>2</sup>. In Indonesia itself, several *Ficus* species have been used traditionally to treat various diseases, including skin problems<sup>3</sup>. *Ficus minahassae* is one of the endemic species of Sulawesi that has received less attention in scientific research, although it has been used by local people as a traditional medicine<sup>4</sup>.

*F. minahassae* fruit is empirically used by the community to treat boils, prevent diabetes, and cure bruises<sup>5</sup>. Acne or *acne vulgaris* is a common skin disease, especially in adolescents and young adults, with a global prevalence reaching 9.4%<sup>6</sup>.

The pathogenesis of acne involves various factors, one of which is infection with the bacteria *Propionibacterium acnes* (*Cutibacterium acnes*)<sup>7</sup>. *P. acnes* is an anaerobic Gram-positive bacterium that is a normal flora in pilosebaceous follicles, but under certain conditions it can act as an opportunistic pathogen and trigger an inflammatory response that contributes to the development of acne<sup>8</sup>. This bacterium produces lipase that hydrolyzes triglycerides into free fatty acids that can irritate

follicular epithelial cells and trigger inflammation<sup>9</sup>. Conventional acne treatment often uses antibiotics such as clindamycin, erythromycin, and tetracycline<sup>10</sup>. However, long-term use of antibiotics can cause bacterial resistance, which is a global problem in public health<sup>11</sup>. Studies have shown that *P. acnes* resistance to various antibiotics has increased significantly in recent decades<sup>12</sup>. Therefore, the search for natural active ingredients as alternatives to antibiotics is very important to overcome this resistance problem. The genus *Ficus* has been reported to contain various bioactive compounds such as flavonoids, alkaloids, terpenoids, and phenols that have antimicrobial, anti-inflammatory, and antioxidant activities<sup>13</sup>.

Studies on several *Ficus* species have shown antibacterial activity against various pathogens, including *P. acnes*. For example, *Ficus carica* extract has been shown to have significant activity against this acne-causing bacteria<sup>14</sup>. In addition, *Ficus deltoidea* also shows potential as an anti-acne agent due to its antibacterial activity against *B. subtilis*<sup>15</sup>. Although many studies have been conducted on several *Ficus* species, studies on *F. minahasae*, especially its antibacterial activity against *P. acnes*, are still very limited. In fact, as an endemic species of Sulawesi, *F. minahasae* has great potential to be developed as a sustainable and economically valuable natural medicine. Therefore, this study aims to test the antibacterial activity of *P. acnes* from *Ficus minahasae* fruit extract.

## 2. RESEARCH METHODS

### Sample Collection

*Ficus minahasae* fruit was taken from Tumaluntung Village, Tareran District, South Minahasa Regency in February 2025. The sample was placed in a plastic bag and then taken to the laboratory for further analysis.

### Extraction

A total of 1000 grams of *Ficus minahasae* fruit was cleaned with a diverting flow, then put in a glass container and macerated with 96% ethanol with a ratio of 1: 3. The maceration process was carried out three times. The extract was filtered using filter paper, then

evaporated using a rotary evaporator at a temperature of 40 °C until a dry extract was obtained. The extract was then tested for its activity against *Propionibacterium acnes* bacteria

### Preparation of Test Bacterial Culture

*Propionibacterium acnes* bacteria obtained from laboratory culture stock were grown in 100 mL of sterile nutrient broth (NB) media and incubated at 37 °C for 1 x 24 hours.

### Antibacterial Testing

Antibacterial testing followed the disc diffusion method. 1 ml of bacterial culture that had been rejuvenated in nutrient broth was put into 100 mL of sterile nutrient agar media that had not hardened, then poured into a sterile petri dish and left to harden. *F. minahasae* fruit extract was spotted on sterile paper discs with concentrations of 200, 300, 400, 500 and 600 µg/disc. The positive control used was chloramphenicol 20 µg/disc and the negative control was H<sub>2</sub>O 10 µl/disc. Paper discs were placed on the surface of solid media containing bacteria in a petri dish and incubated at 37°C for 1x24 hours. Antibacterial activity was observed by the presence of an inhibition zone in the area of the paper disc that was given the extract. The diameter of the inhibition zone was measured using a caliper in millimeters. Measurement of inhibition zone diameter using the formula<sup>16</sup>:

$$\text{Formula: } D = \frac{A + B + C}{3}$$

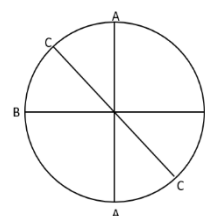
Description:

D= inhibition zone diameter

A= vertical diameter

B= horizontal diameter

C= diameter diagonal



## 3. RESULTS AND DISCUSSION

*Ficus minahasae* fruit was extracted by maceration using 96% ethanol solvent. This method was chosen because it is simple and can also avoid damage to chemical compounds in plants that cannot withstand hot temperatures. Ethanol solvent is used because it can filter polar and nonpolar chemical compounds.



**Figure 1.** *Ficus minahassae* fruit

The extract obtained from maceration was brownish in color, the extract was concentrated using a rotary evaporator at a temperature of 40 °C and a concentrated extract of 30 grams was obtained. Evaporation was carried out using a rotary evaporator at a temperature of 40 °C to prevent damage to the compounds contained in the *Ficus minahassae* fruit.

In testing antibacterial activity, all materials and equipment used were sterilized using an autoclave. An autoclave is a tool that uses high-pressure steam to sterilize equipment and materials. Thermodynamic physics and the properties of steam are the basis for the operation of an autoclave. At standard atmospheric pressure (1 atm or 101.3 kPa), water boils at 100

° C. However, in an autoclave, the pressure is increased to 15 psi (103 kPa), so that the boiling point increases to 121 ° C. This higher temperature is essential for the sterilization of tools and materials<sup>17</sup>.

Based on the results of the antibacterial activity test, it was found that the *F. minahassae* fruit extract was able to inhibit *P. acnes* bacteria which was indicated by the presence of an inhibition zone area on the disc paper given the *F. minahassae* fruit extract. The extract concentration of 200-600 µg/disc, had a varying inhibition zone power ranging from 11.68-17.82 mm. The higher the extract concentration, the larger the inhibition zone produced.

**Table 1.** Results of the antibacterial activity test of *P. acnes* from *F. minahassae* fruit extract

Concentration	Repeat		Average
	I	II	
200	12.01	11.35	11.68
300	12.17	14.49	13.33
400	13.59	15.11	15.35
500	14.28	16.67	15.47
600	16.92	18.73	17.82
Positive control 20 µg	25.52	27.28	26.42
Negative control 10 µl	-	-	-

From the test results that have been carried out (Table 1) shows that at a concentration of 200 µg/disc has an average inhibition zone of 11.68 mm, a concentration of 300 µg/disc has an average inhibition zone of 13.33 mm, a concentration of 400 µg/disc has an inhibition zone of 14.35 mm, a concentration of 500 µg/disc has an inhibition zone of 15.47 mm and a concentration of 600 µg/disc has an inhibition zone of 17.82 mm, a positive control

of 20 µg/disc has an average inhibition zone of 26.42 mm and a negative control has no antibacterial activity. Inhibition zone of 2-5 mm is included in the very weak category, an inhibition zone of 5-10 mm is in the moderate category, 10-20 mm is in the strong category and more than 20 mm is included in the very strong category<sup>18</sup>. Based on the research results above, the inhibition zone value obtained had an average value of 11.68-17.82 mm, which in this case is included in the strong category.

*F. minahassae*, an endemic species of Sulawesi, has various bioactive compounds in its fruit that contribute to its pharmacological potential. *Ficus minahassae* fruit contains bioactive compounds such as steroids, flavonoids, tannins, saponins, and polyphenols<sup>19, 20</sup>.

#### 4. CONCLUSION

Based on the results of the research that has been conducted, it was obtained that the *F. minahassae* fruit extract has antibacterial activity against *P. acnes* at extract concentrations of 200, 300, 400, 500 and 600 µg/disc with a strong category.

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