

Effectiveness of Dayak (*Eleutherine palmifolia* (L) Merr) Extracts Against *Escherichia coli* In Vitro

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Abstract: Dayak onion (*Eleutherine palmifolia* (L.) Merr) is hereditary used by the Indonesian Kalimantan Dayak community as a medicinal plant with antimicrobial activity. The active ingredient of Dayak onions can inhibit the growth of bacteria such as *Escherichia coli*. The purpose of this study was to determine the effectiveness of Dayak extract (*Eleutherine palmifolia* (L) Merr) in inhibiting the growth of *Escherichia coli* in vitro. This research method is experimental. Posttest Only Control Group Design research design. Research Results Show that Dayak onion extract can inhibit *Escherichia coli* with concentrations of 10% (6 mm), 20% (8 mm), and 30% (11 mm), 40% (13 mm), 50% (16 mm), 60 % (18 mm) and 70% (20 mm), 80% (20 mm), 90% (24 mm) and 100% (30 mm). The conclusion of the study of Dayak extract has a different effect on the growth of *Escherichia coli* with a significance value of 0,000.

Keywords: *Escherichia coli*; Dayak Onions (*Eleutherine palmifolia* (L.) Merr)

INTRODUCTION

The Indonesian Kalimantan community has used Dayak (*Eleutherine palmifolia* (L.) Merr) as an herbal remedy for diseases such as diabetes, stroke, high cholesterol, high blood pressure, boils, constipation¹, dysentery, proctitis (inflammation of the intestinal shaft), and disorders digestion². Traditional medicine using *Eleutherine bulbous* has reported in research reviews³.

Indications of the content of Dayak onion extracts from phytochemical screening results containing: alkaloids, tannins, saponins, flavonoids, triterpenoids, anthraquinones, naphthoquinones, and steroids^{4,5}. Dayak onions have been shown to have antioxidant^{6,7}, antimitotic⁸, antiacne⁹ and antifungal¹⁰ activities. Like the propolis *Trigona sp* which is antifungal¹¹.

Several studies have reported the effectiveness of ethanol extract of Dayak onion (*Eleutherine palmifolia* (L.) Merr) against various bacteria such as *Escherichia coli*¹², *Salmonella typhi*¹³, *Staphylococcus aureus*^{14,15} and *Streptococcus pyogenes*¹⁶.

Amanda F.R. Research (2014) about Dayak extract in inhibiting the growth of *Escherichia coli* by the disc diffusion method showed the highest effectiveness was at a concentration of 20 mg/ml inhibitory zone of 9.0 mm¹².

Amanda F.R. Study (2014) showed that 96% ethanol extract from Dayak onions was able to inhibit the growth of *Escherichia coli*, but it was not yet known the inhibitory power of distilled water extracts from Dayak onions. The study uses the disc diffusion

technique (paper disc), while this study uses the wells method. The inhibition test method using wells with distilled water extract material is expected to complete information about the effectiveness of the Dayak extract on *Escherichia coli*. This study aims to determine the efficacy of *Eleutherine palmifolia* (L.) Merr onion extract in inhibiting the growth of *Escherichia coli* bacteria in vitro.

MATERIALS AND METHODS

This type of experimental research with research design in the form of a posttest with a control group (posttest Only Control Group Design) is to measure the effect of treatment (intervention) on the experimental group by comparing the group with the control group.

Dayak onion (*Eleutherine palmifolia* (L.) Merr) was then extracted with ten treatments and two repetitions. The research material used was the extract of Dayak (*Eleutherine palmifolia* (L.) Merr). The independent variable in this study was the concentration of extract of Dayak onion (*Eleutherine palmifolia* (L.) Merr) namely 10%, 20%, 30%, 40%, 50%, 60%, 70%, 80%, 90% and 100%. The dependent variable in this study is the inhibitory zone of *Escherichia coli* bacteria.

Making extracts of Dayak onion (*Eleutherine palmifolia* (L.) Merr) with maceration method that is 100 grams in 100 ml distilled water for 24 hours. From the concentration of 100% dilutions made of 10%, 20%, 30%, 40%, 50%, 60%, 70%, 80%, 90% with sterile distilled water diluents. Inhibition test of Dayak onion extract by diffusion method in the well method. The suspension of *Escherichia coli* equivalent to Mac Farland 0.5 as much as 10 μ l spread on Muller Hinton's media, let it sit for 15 minutes then make a 6 mm diameter well using a cork borer tool. Dayak onion extract with various concentrations was put as much as 50 μ l into the muller Hinton media wells; positive control used 50 μ l ceftriaxone, negative control used 50 μ l of sterile distilled water. Repeat two times. It measured the diameter of the inhibition zone after incubation for 18 hours.

RESULTS AND DISCUSSION

The results of the analysis of the normality of research data using the Shapiro-Wilk test obtained a Sig = 1,000 then it can be stated that the data normally distributed. Based on the Anova test results received a Significant value of 0,000, so there is an extra effect of Dayak onions in inhibiting the growth of *Escherichia coli*. Based on the results of the statistical analysis test using the regression test obtained significance value = 0,000.

Shows a variety of different concentrations of Dayak onion extract influence in inhibiting the growth of *Escherichia coli* in vitro. To increase the inhibition zone, the coefficient of determination (R²) analysis performed. Obtained an R square value of 0.996 or 99.6% this value concluded that the concentration of Dayak extract influenced the increase in the diameter of the inhibition zone of *Escherichia coli* by 99.6%.

Table 1. Inhibition zone diameters of Dayak onion extract against *Escherichia coli* at various concentrations.

Concentration of Dayak Onion Extract	Inhibition Zone Diameters (mm)		
	Repetition 1	Repetition 2	Average
10%	6	6	6
20%	8	8	8
30%	11	11	11
40%	13	13	13
50%	16	16	16
60%	18	18	18
70%	20	20	20
80%	22	22	22
90%	24,1	24	24
100%	30	30,1	30
Positive Control	35	35	35
Negative Control	0	0	0

Research Roslizawaty et al., 2013 showed that the growth inhibition of *Escherichia coli* was 6.4 mm at a concentration of 50% of the Ant Plant (*Myrmecodia sp.*) Water Fraction¹⁷. The growth barrier of *Escherichia coli* in this study was far more significant by using Dayak onion distilled water extract, which is at a 50% concentration of 16 mm.

Amanda's study produced inhibitory zones of Dayak ethanol extract at a concentration of 40 mg/ml on average 10 mm¹². The results of this study are different from the effects of Amanda, namely at a concentration of 10% (100 mg/ml) inhibitory zone produced by 6 mm. The thing that makes a difference is because of the different types of extracts. Ethanol extract of Dayak onions is likely to contain more active substances that are antimicrobial such as alkaloids, tannins, saponins, flavonoids, triterpenoids.

Alkaloids make lysis cells by the mechanism of inhibition of cell synthesis¹⁸. Flavonoids are phenol compounds that inhibit the growth of fungi, bacteria, and viruses. Flavonoids inhibit bacterial growth by inhibiting cell membrane function, nucleic acid synthesis, and energy metabolism¹⁹. Triterpenoids act on the outer membrane of the bacterial cell wall, causing damage to the porine so that the permeability of the bacterial cell wall is reduced²⁰. Steroids can reduce the integrity of cell membranes so that cells become brittle and lysis²¹. Tannins work on cell walls or cell membranes, thus interfering with cell permeability so they cannot carry out life activities²².

CONCLUSION

There is an influence of Dayak onion (*Eleutherine palmifolia (L.) Merr*) extract in inhibiting the growth of *Escherichia coli*.

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