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The Utilization of Leaves Extract and Senggani Fruit (*Melastoma candidum* D. Don) as an Interester of Bacterial Growth

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Abstract

Senggani is a plant from the Melastomataceae family and the genus Melastoma. This study aims to determine the effect and the best concentration of Senggani (*Melastoma candidum* D. Don) leaf and fruit extracts to suppress the growth of *Escherichia coli* and *Staphylococcus aureus*. The research design refers to the experimental research design. The independent variable (X) is Senggani leaf and fruit extract with a concentration of 1%, 5% and 10%, the total treatment in this study was 6 treatments so that the total treatment of the tested bacteria was 36 experimental units. The dependent variable (Y) is the inhibition of bacterial growth. The research method used a completely randomized design. The data analysis technique used was descriptive analysis and analysis of variance at the 95% confidence level and the LSD further test at the 95% confidence level. The results of the study concluded that (1) there was a significant effect on the concentration of Senggani (*Melastoma candidum* D. Don) leaf and fruit extract as a growth inhibitor for *Escherichia coli* and *Staphylococcus aureus* (2) Senggani (*Melastoma candidum* D. Don) leaf extract with a concentration of 10% was the best treatment to inhibit the growth of *Escherichia coli* and *Staphylococcus aureus* (3) The highest average diameter of the inhibition zone in *E. coli* given Senggani (*Melastoma candidum* D. Don) leaf extract with a concentration of 10% was 11.17 mm (4) The highest average diameter of the zone of inhibition in *Staphylococcus aureus* given Senggani (*Melastoma candidum* D. Don) leaf extract with a concentration of 10% was 10.16 mm.

Keywords: Senggani, *Melastoma candidum* D. Don, Antibacterial Activity

A. Introduction

Bacteria are one of the microorganisms that cause disease in other organisms (hosts). This kind of bacteria are called by pathogenic bacteria. It is important to control pathogenic bacteria to prevent the spread of disease, and to eradicate pathogenic bacteria in infected hosts. Some examples of microorganisms that cause disease in humans are *Escherichia coli* and *Staphylococcus aureus* (Brook et al, 2001).

The growth of pathogenic bacteria can be inhibited by physical processes, such as by heating or chemicals with antibacterial. The heating process requires high temperature and pressure to

kill microorganisms, so that physical processes cannot be applied to microbes that are in living organisms. To inhibit the bacterial growth with chemicals is by using antibacterials derived from microorganisms or made synthetically. The disproportionate use of antibiotics can cause the emergence of resistant pathogenic bacteria, besides the use of antibacterials brings a side effects for its users. The negative impact of the use of antibacterial irrational among others emergence and development of bacteria resistant to antibacterial, the emergence of 14 diseases caused by bacterial infection resistant and cause toxicity / side effects of drugs (Vimal et al, 2013).

The growing resistance of pathogenic bacteria to antibacterials has led researchers to find a new compound that can fight pathogenic bacteria. One of the compounds that can be used as a natural antibacterial is a compound derived from secondary metabolism plant. Some plants are capable of producing secondary metabolites in extreme environmental conditions. Secondary metabolite compounds can be an antibacterial alternative to eradicate pathogenic bacteria. One plant that has potential as an antibacterial plant is Senggani (*Melastoma candidum* D. Don) (Purwanto, 2015).

The leaves and fruits of Senggani contain antibacterial compounds (Zahra et al, 2012), namely phenols, flavonoids and tannins. Phenol and tannin compounds can inhibit microbial gene expression, while flavonoid compounds can interfere with cell walls and microbial cell membranes (Cowan, 2007). Based on research conducted by Liana (2010), the methanol extract of Senggani leaves was able to inhibit the growth of 15 species of *S. aureus* and *Salmonella typhimurium*. The methanol extract of Senggani leaves has antibacterial activity, so it can be used as an antibacterial alternative. Based on the description above, it is necessary to carry out further research to study the use of Senggani (*Melastoma candidum* D. Don) leaf and fruit extracts as an inhibitor in the growth of *Escherichia coli* and *Staphylococcus aureus*.

B. Literature Review

1. *Classification and Description of Senggani Plants* (*Melastoma candidum* D. Don)

a. Classification

Kingdom	: Plantae
Division	: Spermatophyta
Class	: Dicotyledoneae
Ordo	: Myrtales
Family	: Melastomataceae
Genus	: Melastoma
Species	: *Melastoma candidum* D. Don (Tjitrosoepomo, 2010: 225)

b. Description

Senggani (*Melastoma candidum* D. Don) grows wild in places with sufficient sunlight, such as on the slopes of mountains, shrubs, fields that are not too arid, or in tourist areas as ornamental plant. This plant can be found up to an altitude of 1,650 m above sea level. Senggani is a shrub, its stem is erect, grows approximately 4 m, much branched, scaly and hairy. Its leaf is single leaf type, stemmed, opposite crosswise. The round leaves of the egg are elongated to the oval, the tip is sharp, the base is rounded, the edge is flat, the surface of the short hair is sparse and stiff so that it feels rough with 3 curved leaf bones, 2-20 cm long, 0.75-8.5 cm wide, green color. Compound fertilization comes out at the end of the branch in the form of flat panicles with 4-18 fruit numbers per panicle, 5 crowns, reddish purple in color. Ripe fruit will burst and share in several pieces, dark purple reddish color. It also has small brown seeds. The fruit is edible, while the young leaves can be eaten as fresh vegetables or vegetables (Dalimartha, 2007: 131)

Figure 1. Senggani (*Melastoma candidum* D. Don) (Dalimartha, 2007: 130)

c. *Chemical Content of Senggani Leaves and Fruits* (*Melastoma candidum* D. Don)

Secondary metabolites are compounds that are produced or synthesized by cells in certain organisms for certain growth and conditions. This compound is produced in small amounts and not continuously to defend itself from the environment and does not play an important role in the main metabolic processes (Mariska, 2013). Senggani plant is a plant containing several secondary metabolites, especially in the leaves and fruit. Senggani has been widely used as an herbal plant. In the Malay, Indian, Chinese and Indonesian regions, many use Senggani to treat wounds, diarrhea and other disease problems caused by pathogenic bacteria. This plant contains triterpenoid and alkaloid compounds which can be used as antimicrobials (Rasad, et al., 2012).

Chemical contents possessed by Senggani plant leaves include saponins, tannins, flavonoids, alkaloids and triterpenoids. Senggani leaf extract contains active compounds, namely alkaloids, saponins, tannins and triterpenoids (Hariana, 2008). Meanwhile, Senggani fruit parts contain flavonoids, anthocyanins and tannins (Kristiana, et al., 2008).

Sengani leaves contain hydrolyzed tannin class compounds, namely Nobotanin B which has antibacterial activity against Helicobacter pylori. Apart from tannins, the chemical content of Senggani leaves that have been known include flavonoids and saponins (Funatogawa, et al, 2004). The results of the phytochemical research conducted Sunarti (2000) shows that in leaf water content contained Senggani 11, 20 %, 18.36% tannin content, drying shrinkage in the sun 67.63%. The results of thin layer chromatography showed the presence of polyphenols (tannins). Based on the results of the foam test, it gave positive results for the presence of saponins, while the essential oil levels were very small.

d. *Potential of the leaves and fruit of Senggani* as antibacterial

Antibacterials are substances that can interfere with the growth or even kill bacteria by way interfere with the metabolism of microbes. Antibacteria are included in antimicrobials that are used to inhibit bacterial growth (Madigan, 2005). At present, many antibacterials used are either synthetically made or produced from natural chemicals (Tekur, 2007).

The chemical content of the leaves and fruits of Senggani consists of phenols, tannins, flavonoids, anthocyanins, saponins, alkaloids and triterpenoids that can have potential as antibacterial. Antimicrobial compounds can inhibit the growth of mold, yeast, and pathogenic bacteria, both Gram negative and Gram positive. Gram positive bacteria are more sensitive to antimicrobial compounds than Gram negative bacteria (Dorman and Deans, 2000).

The activity of the secondary metabolite compounds of the leaves and fruit of Senggani (*Melastoma candidum* D. Don) is as follows Phenol and Tannin, Flavonoids (Cowan, 2007), Anthocyanins (Khotimah, 2013), Saponins (Zablotowicz et al, 1996), Alkaloids (Kraft & Hobbs, 2004), Triterpenoids (Maryati, et al. 2007).

e. Mechanism of Action of Inhibition from Antibacterial Compounds

According Tekur (2007), antibacterial has selective toxicity against pathogenic organisms by way of inhibiting the growth of organisms. Antibacterial work, among others, are: a. Inhibits cell wall synthesis b. Inhibits cell membrane function c. Inhibits protein synthesis and impairs ribosome function.

f. Antibacterial Activity Test

Antibacterial activity test can be carried out by diffusion and dilution methods. The diffusion method is carried out by measuring the diameter of the clear zone which is an indication of an inhibitory response to bacterial growth by an antibacterial compound in the extract. The diffusion method can be done in 3 ways, namely the cylinder method, the well method and the paper disc method (Hermawan et al, 2007).

The cylinder method is to put several cylinders made of glass or stainless steel on an agar medium that has been inoculated with bacteria. Each cylinder is put in such a way that it stands on the agar medium, filled with the solution to be tested and incubated. The well method is to make solid agar that has been inoculated with bacteria. The amount and location are adjusted to the research objectives, then filled with the solution to be tested. The paper disc method is to place a paper disc soaked in the test solution on a solid media that has been inoculated with bacteria (Kusmiyati, 2006).

g. Pathogenic Bacteria

Bacteria are categorized as pathogens if they can cause disease for other organisms. The bacteria tested in this study are classified into Gram negative bacteria and Gram-positive bacteria. Bacteria belonging to the Gram-negative bacteria group are *Escherichia coli*, while Gram positive bacteria is *Staphylococcus aureus*. *Escherichia coli* is included in the Gram-negative facultative anaerobic bacteria that are rod-shaped (Sumarsih, 2003). *Staphylococcus aureus* is grouped as Gram-positive round-shaped bacteria (cocci) that can live in aerobic conditions (Sumarsih, 2003).

C. Methodology

1. Research Design

This research consists of two stages, namely the first stage as preliminary research and the second stage as the main research. This research was conducted from 17 February to 13 August 2014 at the Biology Unit Development Laboratory, Faculty of Teacher Training and Education, Halu Oleo University (UHO), Kendari, Southeast Sulawesi.

This research is an experimental study using a completely randomized design (CRD) by giving Senggani leaf and fruit extracts to the well in NA medium and measuring the clear zone around the well that has been treated on NA medium that has been inoculated with indicator bacteria.

This study used NA medium that had been inoculated with the test bacteria and given 6 treatments, namely Senggani leaf and fruit extract with a concentration of 1% (X1), 5% (X2) and 10% (X3) respectively. all of them were repeated three times, so that the total treatment of the tested bacteria was 36 experimental units. The schematic design of this research is listed in Table 1.

Table 1. Research design on the utilization of leaf and fruit extracts of senggani (*Melastoma candidum* D. Don) as an inhibitor of bacterial growth

Design Based on RAL Mining Results		
Escherichia coli (A)		
X1.2.A2	X2.2.A2	X3.2.A1
X3.2.A3	X1.2.A1	X1.1.A3
X2.1.A1	X2.1.A2	X1.1.A3
X3.2.A2	X2.1.A3	X2.2.A1
X2.1.A1	X3.2.A1	X3.1.A3
X1.1.A2	X3.2.A2	X1.1.A3
Staphylococcus aureus (B)		
X1.2.B2	X2.2.B2	X3.2.B1
X3.2.B3	X1.2.B1	X1.1.B3
X2.1.B1	X2.1.B2	X1.1.B3
X3.2.B2	X2.1.B3	X2.2.B1
X2.1.B1	X3.2.B1	X3.1.B3
X1.1.B2	X3.2.B2	X1.1.B3

Information :

X1 : 1% extract concentration 1 : Leaf extract

X2 : 5% extract concentration 2 : Fruit extract

X3 : 10% extract concentration

X1.1.A1 : X1 treatment of leaf extract on *Escherichia coli* the 1st replication

X3.1.B3 : X3 treatment of leaf extract on Staphylococcus aureus 3rd replication

2. Instruments

a. Tools used

The tools used in this study are listed in Table 2.

Table 2. Tools used in research

No	Name	Function
1	Erlenmeyer	Container put medium
2	Funnel	Skip the extract filter results
3	Autoclave	Sterilize tools and materials including medium
4	Petri dishes	Medium container ready to be inoculated
5	Beaker	A container for mixing medium ingredients
6	Laminar air flow	Place to inoculate and perform aseptic activity
7	Measuring cup	Measure the solution
8	Bunsen	Sterilization by means of flame
9	Pipette	Remove the distilled water and extract it
10	Hot plate	Heat up the medium mixture
11	Stir rod	Homogenize the medium mixture
12	Ohous balance	Weighing ingredients
13	Spoit	Transferring the solution upon dilution
14	Mortal	Pounding Senggani leaves and fruit
15	Calipers	Measuring clear zone on NA medium
16	Test tube	Medium container
17	Syringe filter 0,22 µm	Filter the extract from microorganisms
18	Ose	Remove bacteria from culture stock
19	Water bath	Evaporating the sidtilled water solvent
20	Incubator	Incubate the best bacteria

b. Materials used

The materials used in this study are listed in Table 3

Table 3. Materials used in the study.

No	Name of Material	Function
1	Nutrien Agar	Medium for testing antibacterial activity
2	Nutrien Broth	Test bacteria growth medium
3	Alkohol 70%	Antiseptic
4	Paper	Wrapping petri dishes and test tubes during sterilization
5	Gauze	Filter the extract
6	Cotton	Stoppers for glassware during sterilization
7	Alumunium foil	Wrapping glassware at the time of sterilization
8	*Staphylococcus aureus* (ATCC 25923)	Test bacteria
9	*Escherichia coli* (ATCC 35218)	Test bacteria
10	Senggani Leaves	Extract ingredients
11	Senggani Fruit	Extract ingredients
12	Sterie distilled water	Solvent
13	Ethanol 70%	Surface sterilizer
14	Sodium Hypochlorite 5,25%	Surface sterilizer

The preparation of the leaves and fruit extract of Senggani at a concentration of 1% is to mix 0.1 mL of the extract in 9.9 mL of sterile distilled water. The 5% concentration was prepared by mixing 0.5 mL of thick extract of Senggani (*Melastoma candidum* D. Don) leaves and fruit in 9.5 mL of sterile distilled water. A concentration of 10%, was prepared by mixing 1 mL of Senggani (*Melastoma candidum* D. Don) leaf and fruit extract in 9 mL of distilled water. Furthermore, the extract was filtered using a 0.22 µm syringe filter

Antibacterial activity testing was carried out by using the Kirby Bauer well diffusion test with the Well Diffusion or Cup Plate Technique technique. The base layer medium is poured into a petri dish. Then aseptically the sterilized crushing tool is placed on the media so that the base of the base layer media solidifies. Furthermore, the soft agar medium is poured into a petri dish containing 1 mL of tested bacteria and put in the refrigerator for 60 minutes (Kusmiati and Malik, 2002: 2).

After the solid medium is removed, the tool is removed and a well is formed, then 0.2 mL of Senggani leaf and fruit extract are inserted into the well. Furthermore, the media containing the test bacteria and leaf and fruit extracts of Senggani was put back into the

refrigerator for 60 minutes, so that the extract could diffuse in the media, then incubated in an incubator and observed every 1 hour. until a clear zone forms around the extract well.

3. Technique of Data Analysis

The data obtained were then analyzed using descriptive analysis and using Analysis of Variance (ANAVA) / Analysis of Variance at the 95% confidence level ($\propto = 0{,}05$). A further test was carried out using BNT because the KK value obtained in this study was> 5% (Hanafiah, 2010).

D. Findings and Discussion

1. Findings

a. Data from observations of inhibition of the concentration of Senggani leaf and fruit extracts

Data from observations of the inhibitory power of Senggani leaf and fruit extract concentrations on the growth of *Escherichia coli* and *Staphylococcus aureus* were seen by measuring the diameter of the inhibition zone around the wells of NA medium that had been inoculated with bacteria. The antibiotic test result is shown in Figure 1

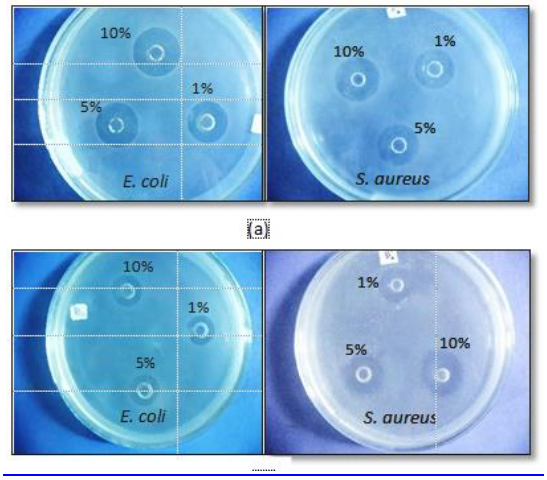

Figure 1. Antibacterial activity test results (a) Clear zone on NA medium well given senggani leaf extract (b) Clear zone on NA medium well given senggani fruit extract

Figure 1 shows that the inhibition zone in the NA medium wells given Senggani (*Melastoma candidum* D. Don) fruit extract was bigger in *Staphylococcus aureus* than *E. coli*, while the Senggani leaf extract showed a larger inhibition zone in *Escherichia coli* than *Staphylococcus aureus*. Senggani leaf extract has a larger inhibition zone than Senggani fruit extract, both in *E. coli* and *Staphylococcus aureus*.

The relationship between the type of extract and the average diameter of the inhibition zone of tested bacteria is shown in Figure 2.

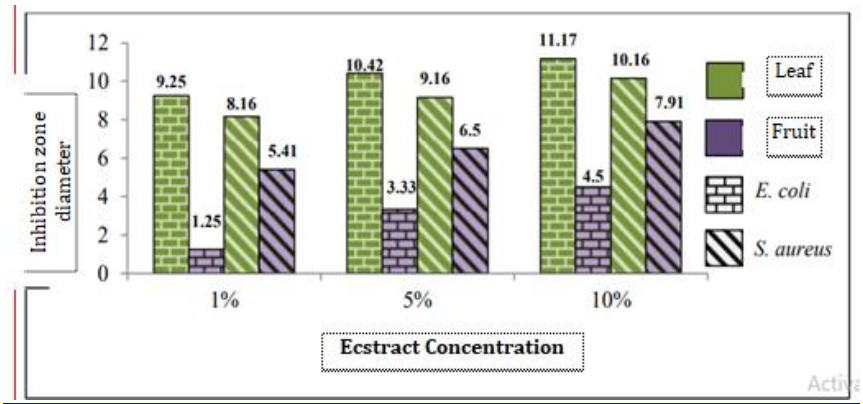

Figure 2. The relationship between extract types and the average diameter of the growth inhibition zone of *Escherichia coli* and *Staphylococcus aureus*

b. Hypothesis test

The results of analysis of variance in diameter of the growth inhibition zone of *Escherichia coli* around the wells of NA medium which were given treatment are listed in Table 4 .

Table 4. Results of sidik analysis of variance in diameter of the growth inhibition zone of *Escherichia coli*

Source Diversity	JK	Db	KT	F_{hitung}	$F_{tabel\ (0,05)}$
Treatment	258.39	5	51.67	130.55**	3,11
Error	4.75	12	0.395		
Total	263.14	17			

Description : ** = very different
KK = 9,45 %

Based on Table 4., it shows that the concentration of Senggani leaf and fruit extract had a significant negative effect on the growth of *Escherichia coli* which was marked by Fcount> Ftable. Furthermore, to determine the difference in the effect of each treatment on the inhibition zone diameter, the Least Significant Difference (LSD) test was used at the 95% confidence level. The results of the LSD analysis are presented in

Table 5. LSD test results effect of senggani leaf and fruit extracts on the growth of *Escherichia coli*

Extract Concentration	Average	Different with				
		$X_1.2$	$X_2.2$	$X_3.2$	$X_1.1$	$X_2.1$
1% ($X_1.2$)	1,25	-				
5% ($X_2.2$)	3,33	2,08*	-			
10% ($X_3.2$)	4,50	3,25*	1,17*	-		
1% ($X_1.1$)	9,25	8,00*	5,92*	4,75*	-	
5% ($X_2.1$)	10,42	9,17*	7,09*	5,92*	1,17*	-
10% ($X_3.1$)	11,17	9,92*	7,84*	6,67*	1,92 *	$0,75^{tn}$
		$BNT_{0,05}$=1,11				

Note : ^{tn} = not significantly different
* = significantly different

The LSD showed that the test level of 95% concentration of leaves and fruit extracts Senggani provides a real negative effect on the growth of *Escherichia coli* in which all treatments significantly different from one another, except $X_3.1$ were not significantly different X_2 .1. Based on Table 4.2, the best treatment is the treatment of Senggani leaf extract with a concentration of 10% (X_3.1), while the optimum concentration range is X_2.1-X_3 .1.

The results of the analysis of the various diameters of the growth inhibition zone of *Staphylococcus aureus* around the wells of NA medium which were given Senggani leaf and fruit extracts with various comparisons are listed in Table 6.

Table 6. Results of sidik analysis of variety of *Staphylococcus aureus* growth inhibition zone diameter in NA medium wells given senggani leaf and fruit extracts

Source Diversity	JK	Db	KT	F_{hitung}	$F_{tabel\ (0,05)}$
Treatment	44,81	5	8,96	37,96**	3,11
Error	2,83	12	0,23		
Total	47,65	17			

Note:** = different very real
KK = 6,15%

Based on Table 6, it shows that the concentration of Senggani leaf and fruit extracts with various comparisons has a significant negative effect on the growth of *Staphylococcus aureus* which is indicated by $F_{count} > F_{table}$. Furthermore, to determine the difference in the effect of each treatment on the inhibition zone diameter, the Least Significant Difference (LSD) test was used at the 95% confidence level . The results of the LSD analysis are presented in Table 7.

Table 7. LSD Test Results Effect of Senggani Leaf and Fruit Extracts on the Growth of *Staphylococcus aureus*

Extract Concentration	Average	Different with				
		$X_1.2$	$X_2.2$	$X_3.2$	$X_1.1$	$X_2.1$
1% ($X_1.2$)	5,41	-				
5% ($X_2.2$)	6,50	1,09*	-			
10% ($X_3.2$)	7,91	2,50*	1,41*	-		
1% ($X_1.1$)	8,16	2,75*	1,66*	0,25^{tn}	-	
5% ($X_2.1$)	9,16	3,75*	2,66*	1,25*	1,00*	-
10% ($X_3.1$)	10,16	4,75*	3,66*	2,25*	2,00*	1,00*
$BNT_{0,05} = 0,84$						

Note: ^{tn} = not significantly different
* = significantly different

The LSD test results showed that at the test level 95% the concentration of Senggani (*Melastoma candidum* D. Don) leaf and fruit extract had a significant negative effect on the growth of *Staphylococcus aureus* where all treatments were significantly different from each other, except X1.1 was not significantly different from X3 .2. Based on Table 4.4, the best treatment is the treatment of Senggani (*Melastoma candidum* D. Don) leaf extract with a concentration of 10% (X3.1), while the optimum concentration range is X3.2- X3.1

2. Discussion

The results showed that the leaves and fruit extracts of Senggani (*Melastoma candidum* D. Don) can inhibit the growth of *Escherichia coli* and *Staphylococcus aureus* which is characterized by the formation of a clear zone around the well on NA medium given the extract. Leaf extract of Senggani showed the highest average diameter of the inhibition zone compared to Senggani fruit extract against *Escherichia coli* and *Staphylococcus aureus*.

The inhibition of Senggani leaf extract is greater in *Escherichia coli* than *Staphylococcus aureus*, this is because *Staphylococcus aureus* is a bacterium resistant to several antibacterials (Buhner, 1999). However, on the other hand, Senggani fruit extract showed the highest average diameter of the inhibition zone was found in *Staphylococcus aureus*, while *Escherichia coli* showed the lowest average diameter of the inhibition zone. This is due to the high level of flavonoids in Senggani which are able to inhibit peptidoglycan transpeptidase so that it interferes with the formation of the cell wall of Gram-positive bacteria (Gloria et al, 2019).

Based on observations, the best concentration in leaves and fruit extracts of Senggani inhibiting the growth of *Escherichia coli* and *Staphylococcus aureus* were Senggani leaf extracts with a concentration of 10%, but the extract was only bacteriostatic, because clear zone that is formed can become cloudy again. The results showed that the average diameter of the inhibition zone at concentrations of 1%, 5% and 10% of Senggani leaf extract was higher than that of fruit extracts, both in *Escherichia coli* and *Staphylococcus aureus*. This indicates that the leaf extract has a better antibacterial component than the fruit extract in inhibiting the growth of Gram negative and Gram positive bacteria.

Research conducted by Liana (2010) stated that the best methanol extract of Senggani leaves to inhibit the growth of Salmonella typhimurium was a concentration of 300 mg / mL with an inhibitory zone diameter of 14.17 mm, while in *Staphylococcus aureus* was a concentration of 300 mg. / mL with the inhibition zone diameter of 13.07 mm. The results of the observations in this study showed that the extract that best inhibited the growth of the tested bacteria was the 10% concentration of Senggani leaf extract in *Escherichia coli* with an inhibition zone diameter of 11.17 mm, while in *Staphylococcus aureus* was a concentration of 10% with the diameter of the inhibition zone is 10.16 mm. This indicates that Senggani leaf

extract has a relatively strong inhibitory activity, but when compared to the methanol extract of Senggani leaves, the inhibitory activity of Senggani leaf extract *Escherichia coli* and *Staphylococcus aureus* are still low. This is due to differences in the type of solvent used during maceration of the material. Methanol solvent is better than distilled water in producing extracts (Vardiana et al, 2018).

The leaves of Senggani have very high levels of tannins compared to other parts of plant organs (Sunarti, 2000). The antibacterial activity of tannin compounds is related to their ability to inactivate microbial adhesins, enzymes, and transport proteins on cell membranes (Cowan , 2007) so that it will interfere with the process of microbial gene expression. The ability of tannin compounds to inactivate protein transport causes disruption of the transport of nutrients from the environment into cells which results in disruption of cell metabolism, while the ability of tannin compounds to inactivate enzymes causes disruption of the transcription process in bacterial gene expression.

Senggani fruit has high levels of flavonoids and anthocyanins (Kristiana, et al., 2008). The antibacterial activity of flavonoid compounds has lipophilic properties that can damage bacterial cell membranes, besides that flavonoids can inhibit peptidoglycan transpeptidase which results in disruption of bacterial cell wall formation. The rigid portion of the bacterial cell wall is made of a polymer known as peptidoglycan. Peptidoglycan is a polymer consisting of three types of building materials, namely acetylglucosamine (AGA), acetylmuramic acid (AAM) and a peptide consisting of amino acids (Pelczar & Chan, 2008), the three types of building materials are linked with the help of the peptidoglycan transpeptidase enzyme. Meanwhile, the high anthocyanin compounds in Senggani can increase the mechanism of action of flavonoids (Gloria et al, 2019).

The cell wall of Gram positive bacteria consists of two layers composed of ± 90% peptidoglycan, 1-4% lipids and teapot acid, while Gram negative bacteria consists of three layers composed of about 10% peptidoglycan, 11-22% lipids and lipopolysaccharides (LPS) (Pelczar and Chan, 2008). Senggani leaf extract is better to inhibit the growth of Gram-negative bacteria, because the tannin compounds are able to inhibit the transcription process which will interfere with the translation process and cause microbial gene expression to be disrupted and cells will become lysed. Senggani fruit extract can inhibit the growth of Gram-positive bacteria, because its flavonoid compounds can inhibit an enzyme that plays a role in the formation of bacterial cell walls, namely peptidoglycan transpeptidase. However, the flavonoid compounds in Senggani fruit do not completely lysis the cells, this is because the transcription process is still running, so that it can repair cell wall damage (Liana, 2010).

Analysis of Variety aims to determine the effect of leaf and fruit extracts of Senggani on the inhibition of cell growth of *Escherichia coli* and *Staphylococcus aureus*. The results of the analysis of the Sidik of Variety calculation showed that there was a significant effect of the treatment of Senggani leaf and fruit extracts on the inhibition of cell growth of *Escherichia coli* and *Staphylococcus aureus*. This is due to the antibacterial content in the leaves and fruit of Senggani which causes a decrease in the growth of *Escherichia coli* and *Staphylococcus aureus*. The results of the BNT further test with a confidence level of 95% obtained the best treatment to inhibit the growth of *Escherichia coli* and *Staphylococcus aureus* cells, which was a 10% concentration of Senggani cloudy after a few hours.

Antibacteria are differentiated based on their ability to suppress growth or kill bacteria, namely antibacterials that are bactericidal and bacteriostatic. Bactericidal antibiotics are antibiotics that can kill bacterial cells, while bacteriostatic antibiotics are antibiotics that can only inhibit the growth of bacterial cells (Rahayu, 2014: 2).

E. Conclusion

Based on the results of research and discussion, it can be concluded that the 10% concentration of Senggani (*Melastoma candidum* D. Don) leaf extract water is the best treatment to inhibit the growth of *Escherichia coli* and *Staphylococcus aureus*. The average diameter of the highest inhibition zone in *Escherichia coli* given Senggani leaf extract with a concentration of 10% was 11.17 mm. whereas the highest average diameter of the inhibition zone in *Staphylococcus aureus* given Senggani leaf extract with a concentration of 10% was 10.16 mm.

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