

Formulation and Antibacterial Activity Test of Deodorant Spray Ethanol Extract of Ambon Banana Peel (*Musa Paradisiaca* Var. *Sapientum* L.) Against the Growth of *Staphylococcus Aureus* Bacteria

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Abstract

Ambon banana peels (*Musa paradisiaca* var. *sapientum* L.) are generally discarded as organic waste and only used as animal feed. Banana peels will benefit a lot if processed into a product. This study aims to formulate the ethanol extract of banana peel (*Musa paradisiaca* var. *sapientum* L.) into a deodorant spray preparation and test the antibacterial activity against the growth of *Staphylococcus aureus* bacteria using the disc paper method. In this study, 4 deodorant spray preparation formulas were made with different concentrations, namely F0 (no extract), FI (12%), FII (16%), and FIII (20%). Then the physical stability test was carried out on the deodorant spray preparation for 4 weeks including organoleptic test, pH test, clarity test, irritation test, and hedonic test from each of the 4 formulas made showing the results met the stability requirements of the deodorant spray preparation. Furthermore, the antibacterial activity test of deodorant spray preparations with concentrations of 12%, 16%, 20% and K+, K-, obtained the average value of the diameter of the inhibition zone formed, namely 11.41 mm, 16.33 mm, 18.40 mm and 11.75 mm. It can be concluded that the ethanol extract of ambon banana peel can be formulated into a deodorant spray preparation and can provide the maximum antibacterial effect at a concentration of 20% of 18.40 mm.

Keywords: Ambon banana peel; Deodoran spray; *Staphylococcus aureus*

1. Introduction

Body odor is a very serious problem and can interfere with activities. Body odor can be caused by poor hygiene and the presence of bacteria that break down sweat into unpleasant substances. Maintaining hygiene and body odor is essential for healthy behavior and appearance. A person will be more confident if their body smells nice and fresh. Using soap and water as a body cleanser while bathing is relatively ineffective in preventing body odor. So, take some alternative measures such as using cosmetic deodorant products (Veranita et al., 2021).

A dosage form commonly used to treat odor caused by bacteria is deodorant. Deodorant is a product that is believed to combat body odor caused by a mixture of bacteria. Currently, there are many deodorant products with different dosage forms. One of them is deodorant spray. Deodorant spray is a cosmetic product that absorbs sweat, covers body odor and reduces body odor by spraying on certain body parts. The main advantage of deodorant spray compared to other deodorants is that in the active system of deodorant spray there is no contact between the deodorant and the user's skin, which means that the level of hygiene is high (Oktaviana et al., 2019).

One of the natural ingredients that are often used in the manufacture of traditional medicine is the banana plant. Indonesia is a country with an abundance of bananas and therefore a banana exporting country. All parts of the banana plant can be utilized, ranging

from tubers, stems, flowers, leaves, and fruits. The nutritional content of each ripe banana consists of calories, protein, fat, carbohydrates, fiber, calcium, phosphorus, iron, vitamin A, vitamin B, vitamin C and water. Some studies state that bananas can help overcome depression, anemia, blood pressure, constipation, heart disease and nervous system disorders, as well as stimulate the brain. When harvesting bananas, the peel, stems and leaves of bananas (80%) are removed without further processing. Banana peel contains various contents, including carbohydrates, proteins, fats, calcium, iron, phosphorus, and vitamins B and C. Banana peels also contain 14.4% cellulose. Generally, banana peels are only disposed of as organic waste or used as animal feed such as goats, cows and kerba. Banana peels are many profitable when processed into efficient products, but banana peels have not become commonplace in the community (Mardiana et al., 2013).

According to research (Ehioweenguan et al., 2014), Ambon banana peel ethanol extract can inhibit bacterial growth *Klebsiella pneumoniae*, *Pseudomonas aeruginosa*, *Salmonella typhi*, *Escherichia coli* dan *Staphylococcus aureus*. The ability to prevent bacterial growth is due to the active ingredients contained in ethanol extract of Ambon banana peel in the form of flavonoids, saponins, tannins and alkaloids.

In research (Nina & Fitriani, 2019) Known antibacterial activity of Ambonese banana peel ethanol extract against bacterial growth *Staphylococcus aureus* with concentration variations of 8%, 10%, 12%, 14% and 16%. The maximum inhibitory power test result is found at a 16% concentration of 17.05 mm.

2. Methodology

a. Sampling

The sample used was Ambonese banana peel obtained from Palopo City Central Market, South Sulawesi

b. Ambon Banana Skin Simplisia Processing

- 1) Sample collection (ambon banana peel).
- 2) Samples that have been collected, wet sorted to separate dirt or other foreign materials.
- 3) Sample washing, to remove other impurities attached to the sample.
- 4) Changing the shape of the sample, by chopping (cutting) into small pieces to speed up the sample drying process.
- 5) Drying the sample is done by drying it in the sun covered with a black cloth until it becomes a dry simplisia.
- 6) Dry sorting to separate any other impurities left on the sample.
- 7) The samples that have dried are refined in a blender way to obtain a fine powder.

c. Making Ambonese Banana Skin Ethanol Extract

- 1) The extraction process is carried out by maceration method.
- 2) Using 96% ethanol solvent with 500 grams simplisia powder.
- 3) Simplisia powder is soaked using 3000 ml ethanol. Soaking is carried out for 5 days, in a maceration container protected from light and stirred once in 24 hours for 5 minutes.
- 4) Filtered the results of the bath for 5 days using flannel to separate the simplisia from the filtrate (Filtrate 1).
- 5) Then the powder pulp is remacerated for 3 days with 96% ethanol as much as 1500 ml.

- 6) Filtered the results of maceration using flannel cloth (Filtrate 2). Then the results of filtrates 1 and 2 are mixed.
- 7) The mixture of both filtrates is evaporated and thickened using a water bath.

d. Spray Deodorant Preparation Manufacturing

- 1) Preparing tools and materials
- 2) Calibrate the 100 ml bottle
- 3) Put enough 70% ethanol into the beaker glass
- 4) Add propilenglikol stir until homogeneous
- 5) Add glycerin little by little
- 6) Put the ambon banana peel extract into a beaker glass, stirring until homogeneous
- 7) Add the remaining 70% alcohol to the limit mark and stir until homogeneous.
- 8) Add enough vanilla oil to stir until homogeneous
- 9) Put it in a container (spray bottle).

e. Preparatory Evaluation

- 1) Uji Organoleptik
Organoleptic tests are carried out visually to see the physical appearance of the preparation which includes shape, color, and aroma.(Tofonao, 2019)
- 2) pH Test
The pH determination of the spray can be done by dripping the setup or dipping the pH indicator. PH determination is intended to know the pH of topical preparations. The pH size for the topical preparation should correspond to the skin PH which is 4,5-7 (Afriani, 2017).
- 3) Test for clarity
The clarity test is carried out by pouring deodorant preparations Spray into the test tube then observe under a sodium lamp light (clear or cloudy) or there are particles or not (Wulandari, 2019).
- 4) Irritation Test
Skin irritation test is a skin sensitivity test with the intention of knowing whether the test preparation can cause irritation to the skin or not. Testing was carried out directly on male and female volunteers by means of a patch test where the test preparation was sprayed on the inner arm, then left for 24 hours, after 24 hours symptoms were observed. In case of skin irritation redness, itchy skin, swollen skin (Goddess et al., 2019).
- 5) Uji Hedonik
Hedonic tests are performed to determine the preference for the preparation deodorant Spray. The hedonic test was conducted visually on 14 respondents. Each respondent was asked to spray the preparation deodoran Spray on the skin of the back of the hand and gives an assessment of the parameters of aroma, color, taste or softness. Respondents' assessment of deodorant preparations Spray 4 levels, namely: very like (4), like (3), dislike (2) and very dislike (1), then calculated the percentage of liking level.

3. Result and Discussion

3.1. Result

a. Baku Material Collection

Ambonese banana sampling was carried out at the Central Market of Palopo City, South Sulawesi. The collection of samples of ambonese banana peels (*Musa paradisiaca* var. *sapientum* L.) is carried out by choosing a good banana peel. The size of the ambon banana peel obtained varies, the color of the ambon banana peel is yellowish green in a mature state to make simplisia powder. To make simplisia powder the stages that must be passed are raw material collection, wet sorting, washing, knitting, drying, dry sorting, and pollination.

b. Simplisia Standardization Results

1) Water Rate Setting Yield

Results of determination of moisture content of ambonese banana peel simplisia (*Musa paradisiaca* var. *sapientum* L.) can be seen in table 3.

Table Water Rate Setting Yield

Parameter	Up to air(%)	Condition
Water level test	4%	≤10%

Determination of water content aims to determine the percentage of water content that is still left in the simplisia. It is important to know the maximum limit of water content in simplisia because if the amount of water contained is too high it will be a medium for the growth of bacteria and fungi that can damage the quality of simplisia (Depkes RI, 2000).

Based on table 3 test results for determining moisture content from ambonese banana peel simplisia powder (*Musa paradisiaca* var. *sapientum* L.) which is 4%, this indicates that it meets the requirements for water content in general, which is not more than 10% (Depkes RI, 2017).

1) Drying Depreciation Setting Yield

The results of the determination of the drying shrinkage of ambonese banana peel simplisia (*Musa paradisiaca* var. *sapientum* L.) can be seen in table 4.

Table Drying Loss Determination Results

Parameter	Shrink Drying (%)	Requirement
Drying shrinkage test	5,5%	≤10%

Drying shrinkage is one of the non-specific parameters that aims to provide a maximum limit (range) of the amount of compounds lost in the process in the drying process. Basically, drying shrinkage is the measurement of substances after drying at a temperature of 105°C until the weight is constant and then expressed in percent. A good requirement for drying shrinkage is less than 10% (Depkes RI, 2000).

According to research (Handayani *et al.*, 2017) Drying shrinkage is the remaining substance after drying at a temperature of 105°C for 30 minutes or until constant weight as a percent value (%). The goal is to provide a maximum limit (range) about the amount of

compounds lost in the drying process. The value for drying shrinkage if not otherwise stated is

less than 10%.

Based on table 4. Drying shrinkage test results obtained from Ambon banana peel simplisia powder (*Musa paradisiaca* var. *sapientum* L.) which is 5.5%, this qualifies as a good drying loss value because it is <10% (Depkes RI, 2000).

3) Immersion Designation

The results of the determination of the marinade of ethanol extract of ambonese banana peel (*Musa paradisiaca* var. *sapientum* L.) can be seen in table 5.

Table Marinade Determination Results

Plant	Powder (gr)	Viscous extract (gr)	Rendamen (%)	Condition (%)
Ambonese banana peel	500	64,8	12,96	≥10

The marinade is a comparison of the weight of the extract obtained with the initial weight of the sample used. The bath states the effectiveness of a particular solvent against the ingredients of an extraction system, but does not indicate the level of activity of that extract (Meilina *et al.*, 2022).

Based on table 5. The results of the marinade determination test were obtained from the ethanol extract of ambonese banana peel (*Musa paradisiaca* var. *sapientum* L.) which is 12.96%, this meets the requirements for the value of thick extract bathing, which is not less than 10% (Ministry of Health RI, 2017).

c. Test Physical Properties of Spray Deodorant Preparations

1) Test Organoleptik

Table Organoleptic Test Results

Parameter	Formula	Observations (Week to)			
		I	II	III	IV
Shape	A	Fall	Fall	Fall	Fall
	B	Fall	Fall	Fall	Fall
	C	Fall	Fall	Fall	Fall
	D	Fall	Fall	Fall	Fall
Aroma	A	Khas vanilla	Khas vanilla	Khas vanilla	Khas vanilla
	B	Khas vanilla	Khas vanilla	Khas vanilla	Khas vanilla
	C	Khas vanilla	Khas vanilla	Khas vanilla	Khas vanilla
	D	Khas vanilla	Khas vanilla	Khas vanilla	Khas vanilla
Color	A	Colorless	Colorless	Colorless	Colorless
	B	Brownish red	Brownish red	Brownish red	Brownish red
	C	Brownish red	Brownish red	Brownish red	Brownish red
	D	Brownish	Brownish	Brownish	Brownish

Information:

A= Formula 0 without ambon banana peel extract

B=Formula I ekstrak kulit pisang ambon 12%

C= Formula II ekstrak kulit pisang ambon 16%

D = Formula III Ambon banana peel extract 20%

The purpose of organoleptic tests carried out is to see the physical appearance of the preparation which includes shape, aroma, and color (Tofonao, 2019). An examination of organoleptic tests on the replicated preparations 3 times was performed in the 1st, 2nd, 3rd and 4th weeks by observing the shape, aroma, and color of the deodorant preparations *Spray* visually.

Based on table 6. Organoleptic tests in this study organoleptic trials weeks 1, 2, 3 and 4 there was no change from the 4 formulas. The results of this organoleptic test prove that deodorant preparations *Spray* Ambonese banana peel ethanol extract (*Musa paradisiaca var. sapientum* L.) that is made stable is indicated by no change in shape, aroma and color for 4 weeks storage at room temperature. The varied colors obtained in formulation III with an extract concentration of 20% are because the higher the concentration of the extract used, the more concentrated the color produced (Noviardi *et al*, 2018).

2) Test pH

Table pH Test Results

Replication	Examination (Week to)				War – War	Condition
	I	II	III	IV		
Formula 0	5	6	6	5	5,5	
Formula 1	5	5	5	5	5	4,5-7 (Afriani, 2017)
Formula 2	5	5	5	5	5	
Formula 3	5	5	5	5	5	

Information:

Formula 0 = Without ambon banana peel extract

Formula I = Concentrate of ambon banana peel extract 12%

Formula II = Concentrate of ambon banana peel extract 16%

Formula III = Concentrate of ambon banana peel extract 20%

The purpose of the pH test is to see the acidity level of the preparation to ensure that the preparation does not cause irritation to the skin. Pharmaceutical preparations given topically or transdermally the pH must be adjusted to the pH of the skin. The preparation should not be too acidic as it can irritate the skin. Sensitivity reactions on the skin can occur due to external influences such as the use of topical preparations, therefore to find out the degree of similarity of a preparation is very important so that the preparation is in accordance with the pH of the skin so that it does not cause irritation if the pH is too acidic, and the skin will scaly if the pH is too alkaline (Bob & Melviani, 2022). Therefore, the pH value or acidity of a cosmetic preparation used topically must match the pH of the skin.

Based on table 7. pH test results in this study, pH of deodorant preparations *spray* in Formula I, Formula II and Formula III from week I to week IV there is no change in pH but in Formula 0 there is a change in pH. Changes in pH can be caused due to environmental conditions such as light, temperature, and air humidity (Aulia, 2017). pH tests from F0, FI, F2 and F3 before and after testing for 4 weeks meet the requirements of skin pH requirements of 4.5-7 (Afriani, 2017).

3) Test for clarity

Table Clarity Test Results

Replication	Examination (Week to)				Condition
	I	II	III	IV	
Formula 0	Jernih	Jernih	Jernih	Jernih	clear and free of foreign particles (Kurniasih, 2021)
Formula 1	Jernih	Jernih	Jernih	Jernih	
Formula 2	Jernih	Jernih	Jernih	Jernih	
Formula 3	Jernih	Jernih	Jernih	Jernih	

Information:

Formula 0 = Without ambon banana peel extract

Formula I = Concentrate of ambon banana peel extract 12%

Formula II = Concentrate of ambon banana peel extract 16%

Formula III = Concentrate of ambon banana peel extract 20%

The purpose of the clarity test is to determine the clarity of the deodorant preparation *spray* which is made and observed homogeneous preparations or not, because if the preparations *spray* Not homogeneous, it will affect the preparation so that it is difficult to spray on the skin because of particles that are not mixed in the preparation. In addition, inhomogeneous preparations cause the resulting therapeutic effect is not optimal because the materials used cannot be mixed perfectly (Wulandari, 2019).

Based on table 8. The results of the clarity test in this study deodorant preparations *spray* From Ambon banana peel ethanol extract (*Musa paradisiaca var. sapientum* L.) indicates that at F0, FI, FII, and FIII produce clear preparations. This indicates that the preparations made in this study are mixed homogeneously so that they can be sprayed onto the skin easily. In this clarity test, results are obtained that meet the clarity test criteria for deodorant preparations *spray* that is, clear preparations and free from foreign particles (Kurniasih, 2021).

4) Irritation Test

Table Irritation Test Results

Irritation Test	Formula	Sukarelawan													
		1	2	3	4	5	6	7	8	9	10	11	12	13	14
Reddish skin	F0	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	BECOME	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	BECOME	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	CHILD	-	-	-	-	-	-	-	-	-	-	-	-	-	-
In the clan, the gutter-gutal	F0	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	BE	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	BECOME	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	CHILD	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Swollen skin	F0	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	BE	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	BE	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	SONS	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Information:

Formula 0 = Without ambon banana peel extract

Formula I = Concentrate of ambon banana peel extract 12%

Formula II = Concentrate of ambon banana peel extract 16%

Formula III = Concentrate of ambon banana peel extract 20%

(+) = Irritation occurs

(-) = No Irritation occurs

Skin irritation test is a skin sensitivity test with the intention of knowing whether the preparation can cause irritation to the skin or not. Direct testing of volunteers totaling 14 people in good health and has stated the availability of volunteering by means of patch tests with test preparations sprayed on the inner arm, then left for 24 hours observed symptoms that arise are typical allergies in the test area, namely the inner arm, with symptoms of skin redness, itching and swollen skin (Dewi *et al.*, 2019).

Based on table 9. The results of the irritation test in this study, deodorant *spray preparations* from ethanol extract of ambonese banana peel (*Musa paradisiaca var. sapientum* L.) in Formula 0, Formula I, Formula II, and Formula III did not occur irritation to the skin in the form of redness, itching and swelling.

5) Hedonic Test or Favorite Test

The respondents of the hedonic test in this study were students of Semester 7 of the S1 Pharmacy Study Program, Faculty of Health Sciences, University of Muhammadiyah Palopo. The number of respondents used amounted to 14 people who were calculated based on the population using the slovin formula. The hedonic test was used to see the level of respondents' preference for deodorant *spray preparations* from ambonese banana peel extract (*Musa paradisiaca var. sapientum* L.). Each respondent was asked to spray a deodorant *spray preparation* on the skin of the back of the hand and give an assessment of the parameters of aroma, color, and taste of cows. The respondents' assessment of deodorant *spray preparations* consisted of 4 levels, namely: very like (4), like (3), dislike (2) and very dislike (1).

Table Hedonic Test Results of Color, Aroma and Taste Effect

Formula	Parameter	Favorite			
		Respondent Assessment			
		STS	TS	S	SS
F0	Color	-	2	8	4
	Aroma	-	-	12	2
	Soft effect	-	-	11	3
BE	Color	-	2	10	2
	Aroma	-	2	10	2
	Gentle effect	-	-	11	2
BE	Color	-	3	11	-
	Aroma	-	1	12	-
	Gentle effect	1	1	11	1
ME II	Color	1	3	9	1
	Aroma	1	-	12	1
	Soft effect	-	1	11	2

Information:

Formula 0 = Without ambon banana peel extract

Formula I = Concentrate of ambon banana peel extract 12%

- Formula I I = Concentrate of ambon banana peel extract 16%
 Formula III = Concentrate of ambon banana peel extract 20%
 STS = Strongly Dislike
 TS = Dislike
 SS = Very Like
 S = Like

Hedonic test is an organoleptic sensory analysis used to determine the magnitude of quality differences between several similar products by assessing or scoring certain properties of a product and to determine the level of liking of a product (Mayangsari *et al.*, 2022).

Based on table 10. The results of the hedonic test that had been carried out using a Google Form questionnaire with each respondent asked to observe each formula made. The assessment of color, aroma and soft impression in the most preferred F0, FI, FII and FIII preparations is in FI with a color assessment of 8 people like and 2 people really like, this is obtained from the use of Ambon banana peel extract which is used relatively low so as to produce a non-concentrated dosage color. The aroma assessment of 12 people likes and 2 people really likes, this is obtained from the addition of a distinctive vanilla aroma. The assessment of soft impressions as many as 11 people like and 2 people really like, this is due to the use of glycerin as a moisturizer (humectant) in F1.

6) Antibacterial Activity Test

Table Antibacterial Activity Test Results

Bakteri	Concentration	Replication			Avg. (mm)	Inhibitory force	Say
		I	II	II			
<i>S. aureus</i>	FI 12%	6,25	9,25	18,75	11,41	Strong	0.001
	BE 16%	15,75	20,5	12,75	16,33	Strong	
	FIII 20%	16,25	21,22	17,75	18,40	Strong	
	K+	10,5	11,25	13,5	11,75	Strong	
	Towards-	0	0	0	0	-	

Information:

- Formula I = Concentrate of ambon banana peel extract 12%
 Formula I I = Concentrate of ambon banana peel extract 16%
 Formula III = Concentrate of ambon banana peel extract 20%
 K+ = Positive Control
 Towards- = Control Negative

Based on table 11 test results of antibacterial activity of deodorant preparations *spray* Ambonese banana peel ethanol extract (*Musa paradisiaca var. sapientum* L.) with each concentration can form an inhibitory zone on bacterial growth *Staphylococcus aureus*. It can be seen that a large inhibitory zone is found in FIII with a concentration of 20%, which is 18.40 mm, categorized as strong. This is consistent with Davis and Stout's (1971) research in (Harita, 2019) which states that the diameter of the inhibitory zone <5 mm is categorized as weak, 5-10 is categorized as medium, 10-20 is categorized as strong and >20 is categorized

as very strong. This is in line with research (Nina & Fitriani, 2019) Known antibacterial activity of Ambonese banana peel ethanol extract against bacterial growth *Staphylococcus aureus* With concentration variations of 8%, 10%, 12%, 14% and 16% with maximum resistance results given at 16% concentration of 17.05 mm.

This is supported by (Pelczar MJ & Chan ECS, 1998) which states that one of the factors that affect antimicrobial activity is the concentration of antimicrobial ingredients. The inhibitory power produced by antimicrobial substances (active substances) will be higher if the concentration is also high (Amrie *et al.*, 2014).

The results of antibacterial activity tests with several concentrations and repeats, showed that deodorants *Spray* Ambonese banana peel ethanol extract (*Musa paradisiaca var. sapientum* L.) can inhibit bacterial growth *Staphylococcus aureus* which is one of the bacteria that cause body odor, this is according to research (Ehioweenguan *et al.*, 2014)) which states that ethanol extract of Ambonese banana peel can inhibit bacterial growth *Klebsiella pneumoniae*, *Pseudomonas aeruginosa*, *Salmonella typhi*, *Escherichia coli* dan *Staphylococcus aureus*. The ability to prevent bacterial growth is due to the presence of secondary metabolite compounds contained in ethanol extract of Ambonese banana peel in the form of flavonoids, saponins, tannins and alkaloids.

Flavonoid compounds have an antibacterial mechanism by inhibiting the formation of cell proteins. In addition, flavonoids are lipophilic which can disrupt bacterial cell membranes (Fadila *et al.*, 2020). Saponin compounds have the ability to diffuse through the outer membrane of bacterial cells and bacterial cell walls then bind to the cytoplasmic membrane so that it interferes and ultimately reduces the stability of the bacterial cell membrane, this causes the bacterial cell membrane to leak

So that fluid comes out of the cell and eventually causes the bacterial cell to die (Ningsih *et al.*, 2016). Tannin compounds have antibacterial abilities by penetrating bacterial cell walls and interacting with proteins in bacterial cells (Mailoa *et al.*, 2014). Alkaloid compounds have as antibacterial by disrupting the constituent of the peptidoglycan layer on bacterial cells, so that the bacterial cell wall layer is not formed intact and causes cell death (Darsana *et al.*, 2012).

The positive control used in this study was deodorant *Spray* (brand X) on the market with antibacterial claims with active substance content *Aluminium chlorhydrate* as an active ingredient serves to suppress bacterial growth and reduce sweat production by closing pores (Rossalinda *et al.*, 2021). While the negative control used is aquades so that there is no diameter of the inhibitory zone because it does not have antibacterial activity.

Data from antibacterial activity research from several concentrations of ethanol extract of ambonese banana peel (*Musa paradisiaca var. sapientum* L.) followed by analysis of one-way test data (*One Way Anova*). *One-way test (One Way Anova)* is a type of parametric statistical test that aims to determine whether there are average differences between groups. Before conducting *One Way Anova* testing, a normality test was first carried out using the *Shapiro-Wilk* test which aims to measure the data used is normally distributed or not. Then proceed with a homogeneity test using *Levene statistics* which aims to determine whether the distribution of data comes from the same population or not.

The results of the antibacterial normality test of the deodorant spray preparation of ambonese banana peel ethanol extract (*Musa paradisiaca* var. *sapientum* L.) against *Staphylococcus aureus* bacteria using the Shapiro-Wilk test can be seen in (appendix 17) obtained the results of FI $p = 0.443$, FII $p = 0.752$, FIII $p = 0.570$, K + $p = 0.463$ which is greater than $p > 0.005$, this shows that the diameter of the inhibitory zone of the spray deodorant preparation Ambonese banana peel ethanol extract (*Musa paradisiaca* var. *sapientum* L.) is normally distributed.

The homogeneity result obtained a significant value in each data $p > 0.029$ greater than $p > 0.005$ which means that the diameter data of homogeneous resistance can be seen in (appendix 17). From these results, further testing can be carried out using *One Way Anova*.

The results of statistical testing using *One Way Anova* obtained a value of $p = 0.001$. The value obtained smaller than $p < 0.005$ can be seen in (appendix 17). This shows that the diameter data of the inhibitory zone of the Ambonese banana peel ethanol extract deodorant spray preparation (*Musa paradisiaca* var. *sapientum* L.) there is a significant difference. Testing continued with the *Post-Hoc Test*, significant or significantly different data marked by the presence of stars (*) can be seen in (appendix 17) F1 concentrations (10%), F2 (16%), F3 20% and K⁺ (positive control) significantly different from K⁻ (negative control).

4. Conclusion

- a. Ambonese banana peel extract (*Musa paradisiaca* var. *sapientum* L.) can be formulated into deodorant *spray preparations* that meet physical stability evaluation tests including organoleptic tests, pH tests, clarity tests, irritation tests, and hedonic tests.
- b. Ethanol extract of ambon banana kult (*Musa paradisiaca* var. *sapientum* L.) which is formulated into a deodorant *spray preparation* with three different concentrations, namely 12% concentration with an average value of 3.16 mm categorized weak, 16% concentration with an average value of 4.08 mm categorized weak and 20% concentration with an average value of 5.41 mm categorized as medium.
- c. Antibacterial activity test of deodorant *spray preparation of* ethanol extract of ambonese banana peel (*Musa paradisiaca* var. *sapientum* L.) provides maximum antibacterial activity effect on the growth of *Staphylococcus aureus* bacteria, which is at a concentration of 20%.

5. Reference

- Afriani, T. (2017). Ylang-Ylang Oil Gel Formulation and Antibacterial Power Test against Acne-Causing Bacteria. *Journal of Applied Science and Technology*, 11(3), 246.
- Amrie Aga, Ivan, S, A., & Ramadhani. (2014). Effectiveness Test of Leaf and Root Extracts of *Harrisonia Perforata* Merr. Against the Growth of *Vibrio Cholerae* Bacteria. *Online Journal of Natural Science*, 3(3), 331-340.
- Darsana, I. Besung, I. Mahatmi, H. (2012). Potensi Daun Binahong (*Anredera cordifolia* (Tenore) Steenis) Dalam Menghambat Pertumbuhan Bakteri *Escherichia Coli* Secara In Vitro'. *Indonesia Medicus Veterinu*.4

- Ministry of Health of the Republic of Indonesia. (2000). General Standard Parameters of Medicinal Plant Extracts. Directorate General of Food and Drug Administration.
- Department of Health of the Republic of Indonesia. (2017). Indonesian Herbal Pharmacopoeia. Directorate General of Food and Drug Administration.
- Dewi, I. P., Wijaya, W. R., & Verawaty. (2019). Inhibition Test of Deodorant of Kersen Leaf Ethanol Extract (*Muntingia calabura* L.) Against the Growth of *Staphylococcus epidermidis* Bacteria. *Journal of Prayoga Academy of Pharmacy*, 4(1), 24-32.
- Ehiowemwenguan, G., Emoghene, A. O., & Inetianbor, J. E. (2014). Antibacterial And Phytochemical Analysis Of Banana Fruit Peel. In *Iosr Journal Of Pharmacy (Iosrphr)* (Vol. 4, Issue 8).
- Mardiana, R., Yuniati, & Dita, S. F. (2013). Utilization of Organic Waste of Cajun Banana Peel (*Musa balbisiana*) as a Solid Soap Preparation Material to Counteract Free Radicals. *Research Gate: Pharmaceutical Sciences*, 1(4), 73-75.
- Mayangsari, F. D., Djati Wulan Kusumo, & Zurotul Muarifah. (2022). Physical and Hedonic Characteristics Test of Antiaging Sleeping Mask with Red Pomegranate Peel Extract. *Manuntung Scientific Journal*, 8(2), 302-310.
- Meilina, A., Nindita, Y., & Sunarsih, E. S. (2022). Activity Test of 70% Ethanol Extract of Yellow Ambon Banana Peel (*Musa acuminata* colla) on Wound Healing in Rabbits (*Oryctolagus cuniculus*). *Generics: Journal Of Research In Pharmacy*, 2(2), 119-126.
- Oktaviana, M. I., Pahalawati, I. N., Kurniasih, N. F., & Genatrika, E. (2019). Formulation of Deodorant Spray from Essential Oil of Basil Leaves (*Ocimum basilicum* L.) as an Antibacterial Cause of Body Odor (*Staphylococcus epidermidis*). *Pharmacy: Pharmaceutical Journal Of Indonesia*, 16(2), 396.
- Rossalinda, R., Wijayanti, F., & Iskandar, D. (2021). Effectiveness Of Matoa Leaf (*Pometia pinnata*) Extract As An Antibacterial *Staphylococcus Epidermidis*. *Stannum: Journal of Science and Applied Chemistry*, 3(1), 1-8.
- Tofonao, T. O. (2019). Formulasi Dan Uji Aktivitas Antibakteri Ekstrak Etanol Kulit Jeruk Nipis (*Citrus aurantifolia* (Christm.)Swingle) Dalam Sediaan Deodoran Terhadap *Staphylacoccus epidermis*. In *Skripsi*.
- Veranita, W., Wibowo, A. E., & Rachmat, R. (2021). Formulation of Deodorant Spray Preparations from a Combination of Essential Oil of Kalamansi Orange Peel (*Citrofortunella microcarpa*) and Green Tea Extract (*Camellia sinensis* L) and Antibacterial Activity Test. *Journal of Science and Health*, 3(2), 142-146.
- Wulandari, A. A., Tivani, I., & Akhmad, A. B. (2019). Effect of Different Concentrations of Propylenglycol on Physical Properties Test of Deodorant Spray Preparation of Beluntas Leaf Extract (*Pluchea indica* Less.). *Politeknik Harapan Bersama*, 09, 1-6.