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BANANA STEM EXTRACT (*Musa Paradisiaca* L.) IN ANTIOXIDANT SERUM FORMULATION AND HEDONIC EVALUATION

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Abstract

Aging is a natural process that will be experienced by everyone. The use of antioxidants is one of the efforts that are often done to overcome the skin aging process (anti- *aging*). Serum is one of the cosmetic preparations that has several advantages compared to other cosmetic preparations. Until now there has been no research related to antioxidant activity in banana stem extract, therefore it is necessary to test its antioxidant activity on banana stem extract and how its antioxidant activity after being formulated in the form of facial serum. Serum formulations were made using banana stem extract with a concentration ratio of 4% (F1) and 12% (F2), and contained other additives consisting of *xanthan gum*, glycerin, *potassium sorbate, sodium benzoate and aquadest*. The method used to test the antioxidant activity of the extract and serum preparations of banana stem extract was the DPPH method (2,2-diphenyl-1-pikrihydrazil) which was measured by UV-Vis spectrophotometer. From the results of research conducted, banana stem extract has strong antioxidant activity with an IC value of$_{57,393}$ ppm, while serum banana stem extract (*Musa Paradisiaca L.*) has moderate antioxidant activity, where F1 with an IC value of$_{50}$ 162,996 ppm and F2 with an IC value of$_{50.}$ 121.170 ppm. Banana stem serum needs to meet several types of evaluation, one of which is the hedonic test. The hedonic test was carried out to determine the personal responses of the panelists about their likes or dislikes of the banana stem serum that had been made. The banana stem serum that will be evaluated consists of 2 (two) formulas, including F1 containing 4% banana stem extract and F2 containing 12% banana stem extract. Both types of banana stem formulas were evaluated to 40 panelists. Panelists' assessment of serum preparations was categorized into 5 levels, namely: very like (5), like (4), quite like (3), dislike (2) and dislike (1), then the percentage level of preference was calculated. The evaluation results obtained from the hedonic test include the F1 formula which is the most preferred formula (79.3%) and F2 (66.8%).

Keywords: Serum, Banana Stem, Antioxidant, Hedonic.

INTRODUCTION

Skin is one of the organs of the body located on the outside of the human body. This organ is an organ that will be in direct contact with the environment. Its role is to protect the body from damage and adverse environmental influences such as sunlight (*ultraviolet*) and microbes. Skin affects a person's appearance and personality and characterizes various signs of life, namely race, genetics, aesthetics, culture, and nation. Skin can also be an indicator of health (Darmawan, 2013). The skin is very supportive of one's appearance so that it needs to be cared for, maintained, and kept healthy with care and maintenance, then the appearance of the skin will look healthy, well-groomed, and always radiate freshness (Septiani, 2012).

The aging process or *aging* is a biological process that occurs naturally and affects all living things, including all organs of the body such as the heart, lungs, brain, kidneys, including the skin (Winarno et al., 2023). The skin aging process is a physiological process that cannot be avoided (Zahruddin, 2018). *aging* is mostly caused by UV A and B solar radiation, which induces the formation of *Reactive Oxygen Species* (ROS) in the skin and causes oxidative stress when the amount of *ROS* exceeds the ability

of antioxidant defenses in skin cells. Skin aging is usually characterized by dry, scaly, rough skin conditions and is accompanied by the appearance of wrinkles and black spots or spots (Berawi, 2016).

Based on the development of human civilization in modern times, several ways of dealing with skin aging have been found, for example by using cosmetics, laser technology to remove wrinkled lines, as well as foods and drinks that are useful as skin nutrients. The use of natural ingredients as natural cosmetics is in great demand today, considering that these natural ingredients are safer and relatively inexpensive (Berawi, 2016).

Research conducted by Alvionita in 2016 showed that the ethanol extract of plantain heart *(Musa paradisiaca Sapientum)* positively contains anthocyanins and is good as an antioxidant because it has an IC_{50} of less than 50 g/ml. In addition, research conducted by Jamiah et al. (2018), showed that the methanol fraction of plantain peel *(Musa paradisiaca Sapientum)* has antioxidant activity with an IC value of$_{46.82}$ ppm. Research conducted by Khairunnisa et al. (2018), showed that Ambon banana stem sap extract had antioxidant activity.

One of the cosmetic dosage forms that have developed recently is serum. According to Kurniawati in 2018, serum is a preparation with low viscosity, because of its low viscosity serum is categorized as an emulsion preparation. Serum has the advantage that it has a high concentration of active ingredients so that the effect is absorbed more quickly by the skin, can provide a more comfortable effect and is easier to spread on the surface of the skin because its viscosity is not too high.

In agro-industrial products related to organoleptic quality, sensory studies are very important to do. No matter how well the packaging is done or as effective as possible the active ingredients contained in a product, if it is organoleptically not liked, the product will not be of interest to consumers. Therefore, human taste is very decisive in the acceptance and evaluation of a product. Goods that are responded positively by the human senses because they produce a pleasant subjective impression and satisfy consumer expectations are said to have high sensory quality. Likewise in the development of *skin care* serum products such as banana stem serum. The product is expected to get a positive response from consumers (Kurniawati, 2018).

Based on the above background, the authors tested the antioxidant activity of extracts and facial serum preparations containing the active ingredient of banana stem extract *(Musa paradisiaca L.).* using the DPPH method *(2,2-diphenyl-1-picrihydrazil)* In addition, it is important to carry out a hedonic test or acceptance test to determine the effect of adding banana stem extract on organoleptic acceptance of banana stem serum quality.

MATERIALS AND METHODS

The materials used in this study included banana stems (*Musa paradisiaca L.*) obtained from the plantations of Duda Timur Village, Selat, Karangasem, Bali, 70% ethanol (Brataco®), Xanthan Gum, Glycerin, Potassium Sorbate, Sodium Benzoate, Aquadest, and DPPH. The tools used in this study include a rotary evaporator, *beaker glass* 100 ml, 250 ml, 500 ml (Pyrex®), porcelain cup (Pyrex®), stir bar (Pyrex®), 10 ml, 100 ml, 50 ml volumetric flasks (Pyrex®). Pyrex®), volumetric pipette 1ml, 2 ml, 5 ml (Pyrex®), 100 ml measuring cup (Pyrex®), test tube (Pyrex®), *ball filler*, dropper pipette, flannel cloth, *tissue*, gram scale (accuracy 0 .1 gram), digital analytical balance

(0.0001-gram accuracy), glass jar. The instrument used in this study was a UV-Vis spectrophotometer (Shimadzu®).

Plant determination

Samples obtained in Duda Timur Village, Selat, Karangasem, Bali were determined at the Center for Biological Research of the Indonesian Institute of Sciences (LIPI) Plant Conservation Center, Eka Bedugul Botanical Gardens.

Preparation of sample extracts and phytochemical screening

The sample used in this study was banana stem (*Musa paradisiaca L.*). The process of making extracts starts from sorting, slicing, chopping, and making extracts. The chopped samples were then extracted by maceration method, using 70% ethanol as solvent. The maceration process was carried out for 3x24 hours and stored in a place protected from sunlight while stirring occasionally. Then the maceration results are filtered with flannel so that the filtrate and residue are separated. The residue obtained is then re-macerated with a new solvent. Each filtrate obtained was then concentrated with *a vacuum rotary evaporator,* until a thick extract was obtained.

Preparation of serum preparations of banana stem extract (*Musa paradisiaca L.*)

The serum formula used in this study is shown in table 1. The type of serum emulsion produced is oil in water type. The serum formulation was started by mixing *xanthan gum* and water as much as 20 times the weight of *xanthan gum*, and stirred until it formed a *corpus* emulsion. The mixture is added glycerin little by little while continuing to stir. Potassium sorbate, sodium benzoate, banana stem extract were added to the mixture sequentially while stirring slowly until homogeneous. The last step is the addition of *aquadest* until the volume is 100mL while stirring until homogeneous. The homogeneous mixture is stored in the prepared container.

Table 1: Serum Formula of Banana Stem Extract (*Musa paradisiaca L.*)

Ingredient Name	Function	Concentration (%w/v)	
		F1	F2
Banana Stem Extract	Active Ingredient	4	12
Xanthan Gum	Thickener	0.5	0.5
Glycerin	Humectant	10	10
Potassium Sorbate	Preservative	0, 1	0.1
Sodium Benzoate	Preservative	0.1	0.1
Aquadest	Solvent	85.3	85.3

Physical quality test of banana stem extract serum (*Musa paradisiaca L.*)

The physical quality test stage of banana stem extract serum (Musa paradisiaca L.) consists of organoleptic test, transferred volume test, pH test, and homogeneity test. The method of each test is described as follows:

a) Organoleptic

Test This organoleptic test aims to see the physical quality of the preparation made by looking at the aspects of consistency, color and odor after being formulated into a serum. Serum preparations of banana stem extract (*Musa paradisiaca L.*) were observed for consistency, color, and odor. The results of the observations were recorded in the table of organoleptic test results.

b) Transferred Volume Test

transferred volume test is designed as a guarantee that the serum of banana stem extract (*Musa paradisiaca L.*) when removed from the original container, will give the volume of preparation according to the initial volume of 100 mL. The volume of serum preparation of banana stem extract (*Musa paradisiaca L.*) obtained should not be less than 95%. The transferred volume test was carried out by pouring the prepared serum into a measuring cup and then measuring and calculating the percentage of the transferred volume test.

$$\%\ uji\ volume\ terpindahkan = \frac{Volume\ sesudah\ dituang\ (ml)}{volume\ sebelum\ dituang\ (ml)} x\ 100\%$$

$$\%\ uji\ volume\ terpindahkan = \frac{Volume\ sesudah\ dituang\ (ml)}{volume\ sebelum\ dituang\ (ml)} x\ 100\%$$

c) pH

test The pH test aims to determine the level of acidity of the preparation and is associated with skin irritation. The pH measurement was carried out by dipping universal pH paper into 5 mL of banana stem extract serum (*Musa paradisiaca L.*). The color change on the universal pH paper was compared with a color change scale to determine the serum pH of banana stem extract (*Musa paradisiaca L.*).

d) Homogeneity Test Homogeneity

test was carried out by placing the serum of banana stem extract (*Musa paradisiaca L.*) on two slides. The presence or absence of coarse particles on the two slides was observed as an indicator of*Musa paradisiaca L.*homogeneous or inhomogeneous Banana stem extract serum (*Musa paradisiaca L.*) was declared homogeneous if there were no coarse particles on both slides, and declared inhomogeneous for the opposite situation.

Measurement of antioxidant power of banana stem extract and serum (*Musa paradisiaca L.*)

The test was carried out by pipetting 2 mL of sample solution of various concentrations (10 ppm, 30 ppm, 50 ppm, 80 ppm, and 110 ppm), then 2 mL were added to each DPPH. It was replicated 3 times and incubated in a dark room for 30 minutes. The absorbance was measured at a wavelength of 517 nm.

Measurement of the antioxidant power of the ascorbic acid comparison sample.

The test was carried out by pipetting 2 mL of ascorbic acid solution of various concentrations (4 ppm, 6 ppm, 8 ppm, 10 ppm, 12 ppm). Then 2 mL of DPPH was added to each. Incubated in a dark room for 30 minutes. The absorbance was measured at a wavelength of 517 nm.

Processing and Analysis of DPPH Test Data

Parameter used to determine the strength of the antioxidant activity of the serum preparation of banana stem extract is the concentration value of the solution used to reduce the radical properties of DPPH by 50% or better known as the *inhibitimon concentration* (IC_{50}). The IC_{50} was obtained from the linear regression equation between the % inhibition and the inhibitory concentration of free radicals. The percentage of inhibition was calculated by the following equation:

$$\%inhibisi = \frac{Absorbansi\ DPPH - Absorbansi\ sampel\ uji}{Absorbansi\ DPPH}\ x\ 100\%$$

$$\%inhibisi = \frac{Absorbansi\ DPPH - Absorbansi\ sampel\ uji}{Absorbansi\ DPPH}\ x\ 100\%$$

From the inhibition percentage value at each concentration, then a regression curve is made, so that the equation y = bx + a will be obtained and the IC50 by linear regression calculations where the extract concentration (ppm) is the abscissa (x axis) and the percentage inhibition value as the ordinate (y axis). The IC50 is obtained from the calculation of the 50% inhibition percent (Riskiana 2018).

Hedonic Test

The panelists in this study were 40 students at Mahasaraswati University as volunteer panelists. The panelists have passed the inclusion and exclusion criteria. The inclusion criteria include: student age 20-40 years; male/female students; and willing to volunteer. Exclusion criteria included: having a history of hypersensitivity to certain ingredients; students who are experiencing skin disorders, such as acne, skin infections, burns; sick and in a state of physical and mental health.

The preference test or *hedonic test* was carried out to determine the level of preference of the panelists to the three formulations of banana stem serum (*Musa Paradisiaca L.*) that had been made. The panelists in this study amounted to 40 people. The test was carried out by means of each panelist being asked to rub the preparation on the skin on the back of the hand and giving an assessment of the parameters of aroma, viscosity, texture, color, and the impression of stickiness on the skin. Panelists' assessment of serum preparations was categorized into 5 levels, namely: very like (5), like (4), quite like (3), dislike (2) and dislike (1), then the percentage level of preference was calculated.

Hedonic Test Data Processing and Analysis

The data obtained were analyzed descriptively using percentage analysis. The percentage of preference is categorized according to Table 2.

Table 2: Percentage of Satisfaction with Banana Trunk Serum

No.	Satisfaction Scale	Description
1.	76-100%	Very Satisfied
2.	51-75%	Satisfied
3.	26-50%	Fairly Satisfied
4.	0-25%	Dissatisfied

RESULT AND DISCUSSION

Plant Determination Test Results

Sample used in this study was tree trunks banana (*Musa paradisiaca L*). The determination process was carried out at LIPI (Indonesian Institute of Sciences) Plant Conservation Center "Eka Karya" Botanical Gardens Bali. The results of the determination are as follows:

Kingdom : *Plantae (Plants)*

Subkingdom : *Tracheobionta* (vascular plants)

Superdivision: *Spermatophyta* (Producing seeds)

Division : *Magnoliophyta* (flowering plants)

Class : *Liliopsida* (monocots)

Subclass : *Commelinidae*

Order : *Zingiberales*

Tribe : *Musaceae*

Genus : *Musa*

Species : *Musa paradisiaca* L.

Extraction Results

A total of 2 kg of banana tree trunks were taken and then extracted using the maceration method with a ratio of 1: 5, namely 2 kg of banana tree trunks were extracted using 10 liters of 70% ethanol and remaceration 1 time, the thick extract obtained was 26 gr.

$$Persentase\ rendeman = \frac{26gram}{2000gram}\ x\ 100\% = 1{,}3\%$$

Screening

Screening Results from banana stem extract (*Musa paradisiaca L*and saponins as shown in table 3.

Table 3: Phytochemical Screening Results

No.	Phytochemical	Banana Extract	Stem	alkaloids
1	Alkaloid	yellowish (mayer)	Formation of white precipitate	(+)
		Formation of orange red precipitate (dragendorf)	Produced black color	(-)
2	Flavonoids	formed in red, orange	color Formation of red	(+)
3	Triterpenoid	Formation of brownish red color	Formation of brownish red color	(+)
4	Saponins	Foam is formed, and the foam does not disappear with the addition of 2N HCL	Foam is formed, and the foam does not disappear with the addition of HCL 2N	(+)
5	Tannins	Formation of dark blue/black	color A greenish-yellow color	(-)

Remarks: (+) = contains the compound referred to, (-) does not contain the compound in question.

Physical Quality Test Results

results of physical quality testing of the banana bohon stem extract (*Musa paradisiaca L*) containing are shown in table 4. The physical qualities tested included consistency, color, odor, volume transferred, pH, and homogeneity.

Table 4: Results of Physical Quality

Test Parameter Test	Formula 1	Formula 2
Consistency	thick	liquid
Color	Brown	Brown
Odor	Distinctive odor of extract	Distinctive odor of extract
Transferred volume (%)	98%	97%
pH	6	6
Homogeneity	Homogeneous	Homogeneous

Antioxidant Activity Banana Stem Extract (*Musa paradisiaca L.*)

The results of the percentage of DPPH inhibition can be seen in table 5. The percentage of inhibition produced is entered into the linear regression equation, so that a linear regression equation is obtained as shown in table 5.

Table 5: Percentage of Inhibition of Banana Stem Extract

Concentration (ppm)	Average Absorbance Blank	Average Absorbance Extract	Inhibition (%)	Linear Regression Equation
10	0.685	0.431	37,080	y = 0.2624x + 34.94 r^2 = 0.9848
30	0.685	50	0.399 41.752	
0.685	0.344	49.781	80	
0.685	0.295	56.934	110	
0.628	Figure	0.256	62.628	

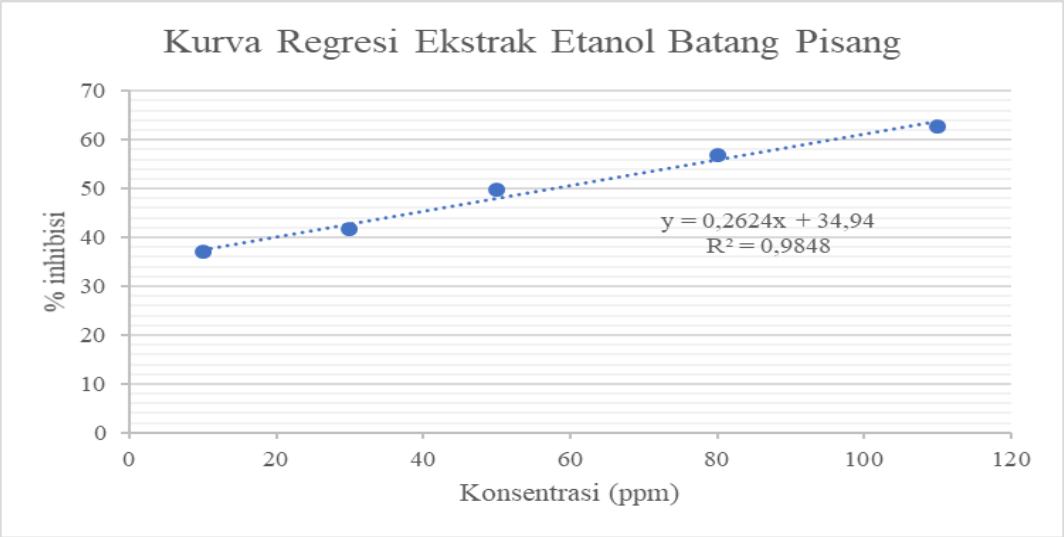

Figure 1: Linear Regression of Banana Stem Ethanol Extract

From the linear regression curve, it can be calculated that the IC_{50} of banana stem ethanol extract is as follows: as follows:

$y = bx + a$

$y = 0.2624x + 34.94$

$50 = 0.2624x + 34.94$

$x = 57,393\ ppm$

So the IC_{50} of banana betang ethanol extract is 57.393 ppm. The values obtained indicate that the ethanol extract of banana stems has strong antioxidant activity.

Antioxidant Activity of Banana Stem Extract Serum (*Musa paradisiaca L.*)

The results of the percentage inhibition of DPPH serum banana stem extract formula 1 (F1) can be seen in table 6. The resulting inhibition percentage was entered into the linear regression equation, so that the linear regression equation was obtained as shown in table 6.

Table 6: Antioxidant Activity Test Results Banana Stem Extract Serum F1

Concentration (ppm)	Absorbance Control	Sample	Inhibition	Linear Regression Equation
10	0.695	0.543	21.870	y = 0.1876x + 19.422 $R2^{0.9572}$ =
30	0.695	0.535	23,022	
50	0,695	0,489	29,640	
80	0,695 0,443	36,259	110	
0,695	0,425	38,849	Figure	

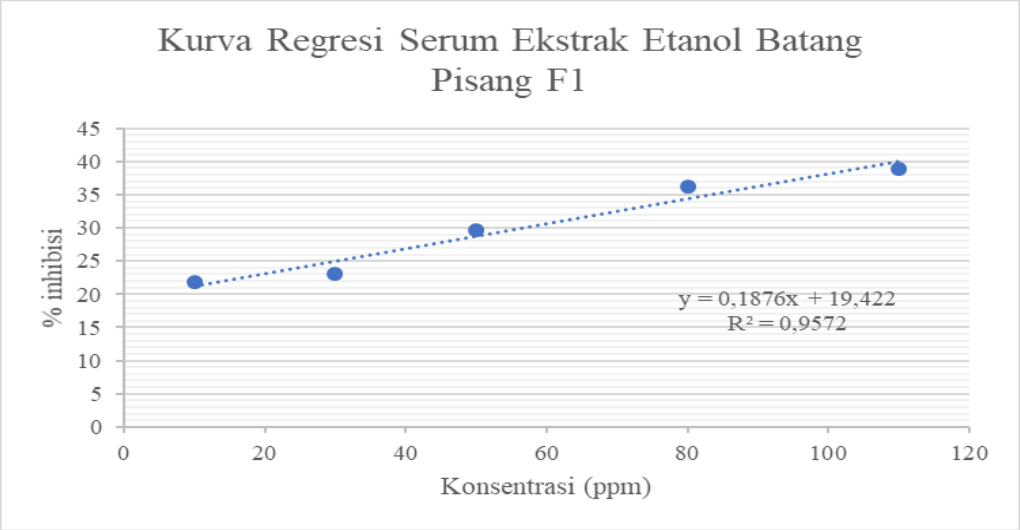

Figure 2: Linear Regression Curve of Banana Stem Ethanol Extract Serum F1

From the linear regression curve, the IC_{50} of serum banana stem ethanol extract F1 can be calculated as follows:

y = bx + a

y = 0.1876x + 19.422

50 = 0.1876x + 19.422

x = 162.996 ppm

So the IC_{50} serum ethanol extract of banana stem F1 is 162.996 ppm ppm. From the values obtained, it shows that the serum ethanol extract of banana stem F1 has moderate antioxidant activity.

The results of the percentage inhibition of DPPH serum banana stem extract formula 2 (F2) can be seen in table 7. The resulting inhibition percentage is entered into the linear regression equation, so that a linear regression equation is obtained as shown in table 7.

Table 7: Serum Antioxidant Activity Test Results Banana Stem Extract

Concentration (ppm)	Absorbance Control	Sample	Inhibition	Linear Regression Equation
10	0.685	0.392	42.774	y = 0.0701x + 41.506 r^2 = 0.9654
30	0.685	0.388	43,358	
50	0.685	0.382	44.234	
80	0.685	0.36	47.445	
110	0.685	0.347	49.343	

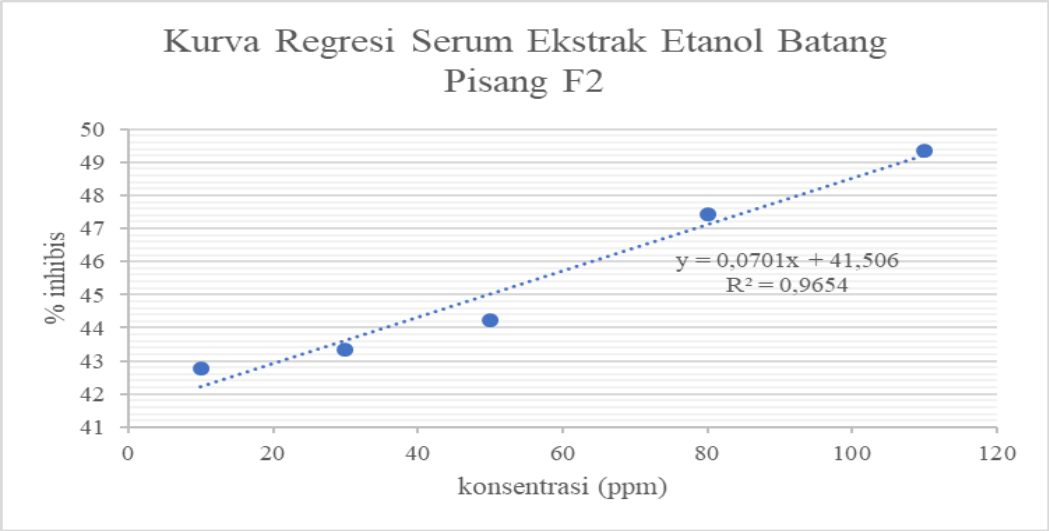

Figure 3: Linear Regression Curve of Banana Stem Ethanol Extract Serum F2

From the linear regression curve, the IC_{50} of serum banana stem ethanol extract F2 can be calculated as follows:

y = bx + a

y = 0,0701x + 41,506

50 = 0,0701x + 41,506

x = 121,170 ppm

So the IC_{50} of serum ethanol extract of banana betang F2 is 121,170 ppm. From the values obtained, it shows that the serum ethanol extract of banana stem F1 has moderate antioxidant activity.

The results of testing the antioxidant activity of the ascorbic acid comparison sample

The results of the percentage inhibition of control DPPH (comparison solution) of ascorbic acid can be seen in table 8. The resulting inhibition percentage is entered into the linear regression equation, so that a linear regression equation is obtained as shown in table 8.

Table 8: Antioxidant Activity Test Results Comparative Sample Ascorbic Acid

Concentration (ppm)	Absorbance Control	Sample	Inhibition	Linear Regression Equation
4	26.804	0.355	0.485	y = 7.4536x – 2.6392 r^2 = 0.9992
6	41.856	0.282	0.485	
8	58.144	0.203	0.485	
10	12	0.485	0.137 71.752	
0.485	0.066	86,392	Figure	

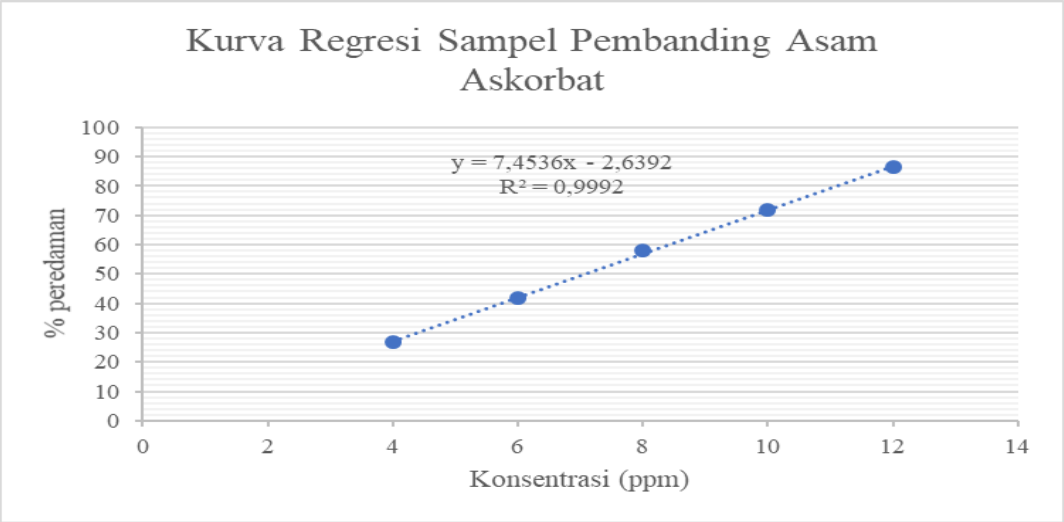

Figure 4: Linear Regression Curve Ascorbic Acid Comparative Sample

From the linear regression curve, the IC_{50} of the ascorbic acid comparison solution can be calculated as follows:

y = bx + a

y = 7.4536x – 2 ,6392

50 = 7.4536x – 2.6392

x = 7.062 ppm

The IC_{50} of the ascorbic acid comparison solution obtained was 7.062 ppm. This value indicates that the ascorbic acid comparison solution has a very strong antioxidant activity.

The results of the comparison of antioxidant activity tests between ascorbic acid, banana stem extract, banana stem extract serum with a concentration of 4% (F1) and serum banana stem extract with a concentration of 12% (F2) can be seen in Table 9. The data shown in the table shows that antioxidant activity was ordered from strongest to weakest including ascorbic acid solution, banana stem extract, banana stem extract serum concentration of 12% (F2), and the weakest was banana stem extract serum formula 4% (F1).

Table 9: Comparison of Antioxidant Activity Tests for Extracts, Serum, and Ascorbic Acid

Sample	IC Value$_{50}$ (ppm)	Category
Ascorbic Acid	7,062	Very strong
Banana Stem Extract	57,393	Strong
Formula 1 (4%)	162,996	Medium
Formula 2 (12%)	121,170	Medium

Test test results Hedonic

The results of the hedonic test of *skin care* banana stem *Musa Paradisiaca L.*) from F1 and F2 can be seen in Table 10 below. The parameters of aroma, texture and sticky impression for all formulas were given a value of 4 (four) by the panelists, so it can be concluded that the panelists liked the three formulas from the aspect of aroma, texture and sticky impression. The viscosity parameter in F1 and F2 gets the same

high value, namely 4 (four) which means that the panelists like the viscosity in formulas 1 and 2. The color parameter is superior in formula 1 with a value of 3 which means quite like it. The overall parameters preferred by the panelists are F1 and F2.

Table 10: Average Value of Banana Stem Serum Hedonic Test

No	Formula	Aroma	Thickness	Texture	Color	Sticky Impression	Whole Product	Description
1.	F1	4	4	4	3	4	4	
2.	F2	4	3	4	2	4	3	

Description: very like (4), like (3), quite like (2), and dislike (1)

Panelist satisfaction with each formula is measured by the percentage of satisfaction as shown in Table 11. Formula 1 shows very satisfied results, while F2 shows satisfied results.

Table 11: Percentage of Likes Banana Stem Serum

No	Formula	Aroma (%)	Thickness (%)	Texture (%)	Color (%)	Sticky Impression (%)	Whole Product (%)
1.	F1	96	96	98	80	98	93
2.	F2	96	83	94	46	96	83

Description: 76-100% (very much like); 51-75% (likes); 26-50% (quite likes); 0-25% (dislike)

Panelists' satisfaction with each parameter is also measured and the results are shown in Table 11. Aroma parameters in all formulations get a percentage of 78%, which means that panelists are very satisfied with the aroma in all formulas. The viscosity parameter was assessed by panelists with the highest percentage being at F1, texture at F1, color at F1, and sticky impression at F1.

The difference in the concentration of banana stem extract in the formula affects the color of the serum preparation more. The results of the hedonic test on 40 panelists with five existing parameters showed that the panelists were very satisfied with the serum formula 1 compared to the serum formula 2, from the scores obtained, it was clear that the differences in the assessment of the color parameters of the serum preparations caused the panelists to be more satisfied with the serum formula. 1, the difference in the concentration of brown color is caused by the amount of active substance (banana stem extract) added to each formulation. Serum formula 2 with a concentration of stem extract as much as 12% has a concentration of banana stem extract that is more than that of serum formula 1, this is a factor that causes the preparation to have a less attractive color for *skin care* such as facial serum, because the higher the concentration of the active substance added, the more concentrated the brown color produced in the serum product will be.

CONCLUSION

The results obtained can be concluded that banana stem extract (*Musa Paradisiaca*) has a strong category of antioxidant activity with an IC value of$_{50}$ 57,393 ppm while the serum of banana stem extract (*Musa Paradisiaca*) has moderate antioxidant activity, where F1 with an IC value of$_{50}$ 162,996 ppm. and F2 with IC$_{50}$ 121.170 ppm. Antioxidant activity was ordered from strongest to weakest including banana stem extract, banana stem extract serum concentration of 12% (F2), and the weakest was

banana stem extract serum formula 4% (F1).

The hedonic test of banana stem serum (*Musa Paradisiaca* L.) assessed that the panelists were very satisfied with the F1 formula compared to the F2 formula. The highest satisfaction with a score of 80% on the parameters of aroma, viscosity, texture, color and sticky impression is owned by the F1 formula. The addition of extract concentration in the F2 formula caused a decrease in preference for the parameters of aroma, viscosity, texture, color and sticky sensation.

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