

HEDONIC TEST OF LIPSTICK COMBINATION OF RED DRAGON FRUIT PEEL EXTRACT (*HYLOCEREUS POLYRHIZUS*) AND BEETROOT TUBER EXTRACT (*BETA VULGARIS L.*) AS NATURAL COLORANT

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Abstract

Not all waste from natural materials produced can be utilized properly by humans to produce higher economic value. The waste in question is Red Dragon fruit skin which contains anthocyanin pigments and betasianin pigments. In addition to Red Dragon fruit peel extract, another extract used is Beetroot extract. Until now, the only betasianin pigment produced on a large scale is from Beetroot (*Beta vulgaris L.*). Pigments can be used as colorants in lipstick but the intensity of the resulting color is less attractive. This study aims to determine the lipstick combination of Red Dragon fruit peel extract (*Hylocereus polyrhizus*) and Beetroot extract (*Beta vulgaris L.*) most preferred by panelists as a natural colorant. The method used in this study was experimental. Preparations of Red Dragon fruit peel extract and Beetroot Tuber extract using maceration method with 70% ethanol solvent. Then the extract was made into 3 lipstick preparations formulas with a concentration of 30% in a ratio of 1:2 (X₁); 1,5: 1.5 (X₂); 2:1 (X₃), and also made lipstick base as a negative control. Hedonic test was conducted on 20 panelists. In the hedonic test, panelists were asked to make observations and then fill out a questionnaire on aspects of the assessment which included texture, color, aroma, and appearance of lipstick preparations using a Likert Scale Criteria. The combination lipstick produces colors and hedonic percentage, that is purple with a hedonic percentage of 43.75% (X₁), pink with a hedonic percentage of 51.25% (X₂), and the most preferred is dark red with a hedonic percentage of 58.75% (X₃), while the negative control has a yellow color with the smallest hedonic value of 28.75%.

Keywords: anthocyanins; betasianin; hedonic test

1. INTRODUCTION

Cosmetics are materials or preparations intended for use on the external parts of the human body (epidermis, hair, nails, lips and external genital organs) or teeth and oral mucous membranes primarily to cleanse, perfume, change appearance, and/or improve body odor and protect and maintain the body in good condition (BPOM, 2019).

One of the cosmetic products that is often used especially for women is lipstick. Lipstick is a form of makeup cosmetics or decorative cosmetics, where its use is solely attached to the body part being made up and is not intended to be absorbed into the skin and permanently change existing deficiencies (Anggraini & Ginting, 2019).

Along with the times, people began to switch to natural products ranging from medicines to cosmetics. So there is an increase in the use of natural cosmetics and a lot of market demand for natural cosmetics. Natural ingredients have relatively harmless effects as long as they are used properly compared to synthetic ingredients that are at risk of side effects (Anggraini & Ginting, 2019).

The use of natural colorant in lipstick formulations is one solution to avoid the use of harmful synthetic colorant, natural colorant are colorant (pigments) obtained from plants, animals or mineral sources (Anggraini & Ginting, 2019).

Natural materials that can be used as colorant for cosmetics include Red Dragon fruit (*Hylocereus polyrhizus*) and Beetroot Tuber (*Beta vulgaris* L.). The reason for using colorant of Red Dragon fruit peel extract (*Hylocereus polyrhizus*) and Beetroot Tuber extract (*Beta vulgaris* L.), because they contain anthocyanin pigments and betasianin pigments that can be used as natural lipstick colorant and give different results on color intensity in lipstick coloring formulations (Anggraini & Ginting, 2019).

Anthocyanin pigments are found in several fruits with a distinctive color that is purplish red or bluish. One source of anthocyanins is Red Dragon fruit, besides the fruit, anthocyanin content is also found in the skin of Red Dragon fruit. Red Dragon fruit skin contains anthocyanin pigments which are red to blue pigments. Anthocyanins are natural dyes from the flavonoid group that have three carbon atoms bound to one oxygen atom to connect two aromatic benzene rings (C₆H₆) in their main structure.

The presence of anthocyanins in plants is located in the vacuoles of the plant cells themselves, so anthocyanins are mostly present and can be absorbed by several plant organs such as flower crowns, leaves, fruits, seeds and even tubers (Priska et al., 2018).

The main pigment present in Red Beetroot Tuber (*Beta vulgaris* L.) is betasianin (containing 75%-95% betanin). Betasianin is a flavanoid group pigment that is bound to sugar so that it is a polar, nitrogenous pigment and is a substitute for anthocyanins. Betasianin is the red or red-purple pigment in beets and is a betalain derivative. Until now, the only betasianin pigment produced on a large scale is from Beetroot (*Beta vulgaris* L.). The red color in fresh beetroot is caused by betasianin pigment, a nitrogen-containing compound (Putri, 2016).

According to Hotnida (2015) in her research on lipstick formulation with 5%, 10% and 15% concentration of Red Dragon fruit peel extract, it was found that lipstick with 15% concentration gave good results, but the color of Red Dragon fruit peel extract was less clear. This may be due to the less high concentration of red dragon fruit peel extract used (Yulyuswarni et al., 2018).

In previous research by Lutfia, Sutyasningsih and Widayanti (2014) using thick Beetroot extract with concentrations of 15%, 20%, 25% as a natural coloring ingredient in lipstick stick preparations. The concentration of Beetroot extract that has been chosen has met the qualifications of a good lipstick colorant based on the provisions of BPOM RI, 2019 (Ramadani et al., 2022).

Based on the above background, a study was conducted to determine the lipstick combination of Red Dragon fruit peel extract (*Hylocereus polyrhizus*) and Beetroot Tuber extract (*Beta vulgaris* L.) preferred by panelists as a natural colorant and to determine the lipstick formula

of the combination of Red Dragon fruit peel extract (*Hylocereus polyrhizus*) and Beetroot Tuber extract (*Beta vulgaris* L.) that is most preferred by panelists as a natural colorant.

2. METHOD

Tool

Digital scale (Precision Electronic Weighing Balance Henherr), beaker glass, measuring cup, mortar and stamper, vaporizer cup, watch glass, object glass, water bath, thermometer, three-legged stool, asbestos gauze, spiritus lamp, flannel cloth, pH meter, oven, glass funnel, stirring rod, spatula, dropper pipette, wooden tongs, parchment paper, and lipstick container.

Materials

Cera alba, lanolin, vaselin flavum, tween 80, methyl paraben, BHT (*Butyl Hydrocstoluene*), PPG (*Propylene Glycol*), oleum rocini and oleum rosae.

Samples of Red Dragon fruit and Beetroot Tuber were obtained from Jagasatru Market, Pekalipan District, Cirebon City. The required Red Dragon Fruit is 1 kg while the Beetroot fruit is 1,5 kg.

Formulation of Lisptik Combination of Red Dragon Fruit Peel Extract (*Hylocereus polyrhizus*) and Beetroot Tuber Extract (*Beta vulgaris* L.)

Mix methyl paraben, PPG and Red Dragon fruit peel extract and Beetroot Tuber extract (M₁). BHT and oleum rocini were melted on a water bath (M₂). Put cera alba, vaselin flavum, lanolin and tween 80 in a vaporizer cup and heat them on a water bath (M₃). After that, mix M₂ into M₃ while melting until a cream is formed. Add a mixture of methyl paraben, PPG and Red Dragon fruit peel extract and Beetroot Tuber extract. Then, add oleum rosae to the mixture until a homogeneous cream is formed. After mixing in a liquid state, the mixture is molded into a lipstick container with a concentration of 30% (Rakhmayanti et al., 2020).

Table 1. Formulations of Lipstick

Ingridients	Ingridients Usability	Formulations (g)			
		X ₁	X ₂	X ₃	K ⁻
Red Dragon Fruit Peel Extract	Active Ingredients	1	1,5	2	-
Beetroot Tuber Extract	Active Ingredients	2	1,5	1	-
Cera Alba	Conclusion Enhancers	2	2	2	2
Lanolin	Lipstick Base	1	1	1	1
Vaselin Flavum	Lipstick Base	0,5	0,5	0,5	0,5
Tween 80	Emulgator	1	1	1	1
Methyl Paraben	Preservative	0,4	0,4	0,4	0,4
BHT	Moisturizer	0,05	0,05	0,05	0,05
PPG	Humectant	1	1	1	1
Oleum Rocini	Disperses the Color Substance Evenly	10	10	10	10
Oleum Rosae	Parfume	add 3 gtt	add 3 gtt	add 3 gtt	add 3gtt

Note :

X₁ : Combination lipstick formulation of Red Dragon fruit peel extract and Beetroot Tuber extract with a ratio of 1: 2.

X₂ : Combination lipstick formulation of Red Dragon fruit peel extract and Beetroot Tuber extract with a ratio of 1,5 : 1,5.

X₃ : Combination lipstick formulation of Red Dragon fruit peel extract and Beetroot Tuber extract with a ratio of 2 : 1.

K⁻: Negative control lipstick without extract.

Physical Characteristics Evaluation of Lisptik Combination of Red Dragon Fruit Peel Extract (*Hylocereus polyrhizus*) and Beetroot Tuber Extract (*Beta vulgaris* L.)

Organoleptic

The organoleptic test carried out is a physical quality test of the lipstick preparations including shape, color and aroma (Athailah et al., 2023).

Homogeneity

Little amount of the lipstick preparations is applied on the object glass, then covered with deck glass and observe whether there are coarse particles or not. Homogeneous criteria are when there are no particles or coarse grains in the lipstick preparations (Lestari, 2021).

pH Test

Weighed lipstick with a concentration of 1%, which is weighed 1 gram. Then, it is melted on a water bath and the electrode is dipped in lipstick preparations. Let the device show the pH value until it is constant and the number shown by the pH meter is the pH of the lipstick preparations (Lestari, 2021).

Smearability Test

Apply lipstick on the skin of the back of the hand, then observe the amount of color that sticks to the treatment 5 times (Lestari, 2021).

Melting Point Test

Put the lipstick preparation in an oven with an initial temperature of 50°C for 15 minutes. If within 15 minutes the lipstick preparation has not melted, the temperature is increased by 1°C every 15 minutes and observe at what temperature the lipstick preparations begins to melt (Rakhmayanti et al., 2020).

Hedonic Test

Hedonic test was conducted on panelists by applying the preparations formula on the back of the hand. Then the panelists chose the most preferred formula by filling out the prepared questionnaire, with the following conditions: (a) Scale 5 = Very Like; (b) Scale 4 = Like; (c) Scale 3 = Neutral; (d) Scale 2 = Dislike (e) Scale 1 = Very Dislike. The percentage of liking for each preparation was calculated and the parameters used in the hedonic test included texture, color, aroma and appearance (Rakhmayanti et al., 2020).

Data Analysis

Data from the hedonic test results were processed and analyzed using several SPSS (*Statistical Product and Service Solutions*) software tests including Normality Test, Homogeneity Test, DMRT Test (*Duncan's Multiple Range Test*) and Duncan's Post Hoc Test.

3. RESULTS AND DISCUSSION

Organoleptic

Organoleptic test is a test carried out using the human senses as a parameter for identification. Some things that must be done in the process of organoleptical testing of the lipstick preparations are observing the shape, color and aroma of lipstick preparations (Debiyanti, 2022). In the organoleptic test, the results obtained :

Table 2. Organoleptic Test

Formula	Form	Color	Aroma
X ₁	Solid	Purple	Distinctive Aroma
X ₂	Solid	Pink	Distinctive Aroma
X ₃	Solid	Dark Red	Distinctive Aroma
K ⁻	Solid	Yellow	Distinctive Aroma

Based on the table above, it can be seen that each lipstick formula has a solid form. The color produced from each formula has different color characteristics because formula 1, formula 2 and formula 3 use a combination of natural colorant from Red Dragon fruit peel extract and Beetroot Tuber extract, while the negative control uses lipstick bases, that is lanolin and vaselin vlafum and then the aroma produced from each lipstick has a distinctive aroma.



X₁ X₂ X₃ K⁻

Figure 1. Lipstick Preparations

Homogeneity

The homogeneity test is carried out to determine the uniformity of particles and the even distribution of particles in the preparation (Lestari, 2021). In testing the homogeneity of the lipstick preparations, an object glass is needed for the area where the preparations will be applied. The preparations are said to be homogeneous if there are no spots or coarse grains on the object glass (Debiyanti, 2022). In the homogeneity test, it was found that all lipstick preparations did not have coarse particles or coarse grains on the object glass. From this evaluation, it can be said that all lipstick formulas are homogeneous where the active substance is evenly dispersed in the preparations.

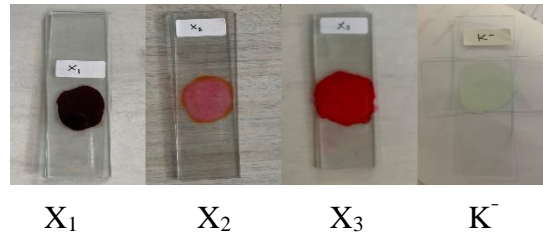


Figure 2. Homogeneity Test

pH Test

The pH test is a test conducted to measure the acidity or basicity of a solution or preparations (Debiyanti, 2022). In the pH test of the lipstick preparations, the results obtained :

Table 3. pH Test

Formula	pH
X ₁	6,90
X ₂	6,85
X ₃	6,75
K ⁻	7,0

The pH test was carried out in one experiment without repetition because it showed results that were in accordance with the physiological pH of the skin. Based on the table above, it shows that the lipstick preparations does not irritate the skin because it is not too acidic and also does not cause the skin to become scaly because it is too alkaline. So that the pH of the lipstick preparations produced is in accordance with the physiological pH requirements of the skin, which is still in the pH range of 4.5-8 (Lestari, 2021). The higher the concentration of dragon fruit peel in lipstick preparations, the lower the pH value because according to Nazzarudin et al. (2011), red dragon fruit skin contains higher pectin so that the acid produced is higher and the pH value decreases (Wiyono et al., 2023).

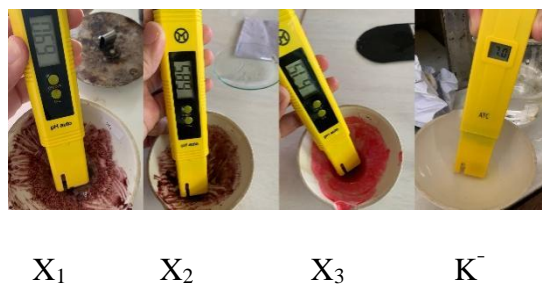


Figure 3. pH Test

Smearability Test

The smearability test was carried out on the preparations of each formula by applying it five times on the back of the palm and observing the color (Iskandar et al., 2022). Lipstick preparations that have good smearability are seen from the amount of dye that sticks when applied. Conversely, the smearability test is said to be bad if there is only a little color attached when applied (Debiyanti, 2022). In the smearability test, it was found that all lipstick preparations when applied the color results were evenly distributed.



Figure 4. Smearability Test

Melting Point Test

The melting point test is carried out by putting the preparation into the oven with various temperature variations to determine the melting point of the preparation (Debiyanti, 2022). In the melting point test, the results showed that the lipstick preparations formula X₁ melted at 54°C, X₂ melted at 57°C, X₃ melted at 58°C and the negative control preparation melted at 56°C. So it can be said that all lipstick preparations fulfill the melting point test, because according to SNI (Indonesian National Standard) No.16-4769-1998 the requirements for a good lipstick melting point are in the range of 50°-70°C. (Yulyuswarni et al., 2018).

Hedonic Test

The hedonic test was conducted to determine the differences in panelists liking for the quality of each lipstick preparation formula. The following are the accumulated hedonic test results from 20 panelist.

Table 4. Hedonic Test Results for Lipstick

Panelist	Hedonic Test Assessment of Lipstick															
	X ₁				X ₂				X ₃				K-			
	T	W	A	P	T	W	A	P	T	W	A	P	T	W	A	P
A	3	5	5	5	4	4	5	5	3	4	5	5	5	4	5	5
B	4	4	5	5	5	4	4	4	5	5	4	5	4	3	3	5
C	4	4	4	5	5	5	5	5	4	4	4	5	4	3	4	4
D	5	5	5	5	5	4	5	5	5	5	5	5	4	3	4	5
E	5	5	5	5	5	4	5	5	5	4	5	5	5	5	5	5
F	4	5	3	5	4	4	4	4	4	5	5	5	4	3	4	3
G	4	4	3	5	5	5	4	4	4	5	5	5	5	3	4	5
H	3	3	4	4	4	5	4	5	4	5	4	5	3	3	4	3
I	4	3	4	4	4	4	4	4	4	3	3	3	4	3	3	3
J	4	5	5	5	5	5	5	4	5	5	5	5	4	4	4	4
K	5	4	5	5	5	5	5	5	5	5	5	5	4	5	5	5
L	4	4	5	5	5	5	5	5	5	5	5	5	4	4	5	5
M	3	4	4	5	5	5	4	5	4	5	4	5	4	4	4	5
N	4	4	3	5	5	5	3	5	5	5	4	5	5	3	4	5
O	3	5	5	5	3	5	5	4	4	5	5	5	3	4	5	4
P	4	2	4	4	4	5	3	4	4	5	5	4	4	4	3	4
Q	4	5	5	5	5	5	5	5	5	5	5	5	4	5	5	5
R	4	4	3	4	4	4	4	4	4	4	3	3	4	4	4	3
S	4	5	3	4	4	4	3	4	4	4	3	4	4	4	3	4
T	4	4	3	4	4	4	3	3	4	4	3	4	4	3	3	3

Note :

Assessment Aspects :

T : Texture

W : Colour

A : Aroma

P : Appearance

Hedonic test is an assessment of the sample tested in the study based on the level of liking of the panelists. To find out the level of liking, after the formulation of the preparation, it is necessary to conduct a favorability test conducted on several panelists. Then, the panelists will fill out a questionnaire regarding the best formula according to the assessment of each panelist. Then, the data will be known after calculating the percentage of liking in each formula (Debiyanti, 2022).

$$\text{Percentage (\%)} = \frac{a}{80} \times 100\%$$

a : The number of research results for each formulations.

b : The number of expected values, obtained from the number of data panelists.

Panelists were selected based on inclusion criteria and exclusion criteria. Inclusion Criteria: (a) Female; (b) Age between 20-35 years; (c) Physically and mentally healthy and; (d) Declared

their availability to be hedonic test panelists. Exclusion Criteria: Does not have a history of allergic skin disease (Nurdianti et al., 2021).

The hedonic test was conducted on 20 panelists. To determine the level of liking, after the formulation of the preparation, it is necessary to conduct a favorability test conducted on several panelists. Then, the panelists will fill out a questionnaire regarding the best formula according to the assessment of each panelist. The assessment aspects include texture, color, aroma and appearance of the lipstick preparation. The scale used in the hedonic test is a Likert Scale, with a Likert Scale, the variables to be measured are translated into variable indicators. The answer to each instrument that uses the Likert Scale has a gradation from very positive to very negative.

Table 5. Five Likert Scale Criteria

Likert Scale	Score
Very Like	5
Like	4
Neutral	3
Dislike	2
Very Dislike	1

The hedonic test results were obtained from the results of the highest Likert Scale Criteria, that is scale 5, the results showed that the purple lipstick preparation had a hedonic percentage of 43.75% (X_1), the pink lipstick preparation had a hedonic percentage of 51.25% (X_2), and the negative control or lipstick base produced a yellow color that was less preferred by the panelists had a hedonic percentage of 28.75%. The lipstick preparation most preferred by panelists is formula X_3 which produces a dark red color with a hedonic percentage of 58.75%.

4. CONCLUSION

Based on the results of the research that has been done, it can be concluded that the lipstick combination of Red Dragon fruit peel extract (*Hylocereus polyrhizus*) and Beet tuber extract (*Beta vulgaris* L.) is favored by panelists as a natural colorant. The lipstick combination of Red Dragon fruit peel extract (*Hylocereus polyrhizus*) and Beetroot tuber extract (*Beta vulgaris* L.) The most preferred formula by the panelists is formula X_3 which produces a dark red color at a concentration of 30% with a ratio of 2:1, which has a very like percentage of 58.75%.

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