

## Formulation of flower ethanol extract lip cream combrang (*Etlingera elatior* (Jack) R. M. Sm.) and roselle flower (*Hibiscus sabdariffa* L.) as a natural dyeing substance

### Formulasi sediaan *lip cream* ekstrak etanol bunga kecombrang (*Etlingera elatior* (Jack) R. M. Sm.) dan bunga rosella (*Hibiscus sabdariffa* L.) sebagai zat pewarna alami

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#### Abstract

**Introduction:** The kecombrang flower and roselle flower are known as sources of natural antioxidants and have the potential to be used as natural dyes in lip cream products. Both types of flowers contain compounds such as tannins, flavonoids, and saponins. **The aims** of study to analyze the effect of varying concentrations of ethanol extract from the kecombrang flower (*Etlingera elatior* (Jack) R. M. Sm.) and the roselle flower (*Hibiscus sabdariffa* L.) on the color of lip cream formulations. **The method** of research was conducted through laboratory experiments that included sampling, extract preparation, product formulation, physical quality evaluation, and panelist preference testing. Data were analyzed descriptively by calculating the percentage of preference levels and presented in the form of tables and graphs. **The results** show that the preparation has a semi-solid texture, with colors ranging from light pink to dark pink in certain combinations, and a purplish pink for the 10% roselle extract formulation. The pH of the preparation is in the range of 5.1-5.4, without coarse grains, good spreadability, an average spread distance of 5.5 cm, an average adhesion time of 12.73 seconds, and no irritation. The cycling test indicates color instability, changing from light pink to dark brownish purple. Based on the hedonic test, formulation F5 has the highest preference level, which is 88.33%. **The conclusion** of this study is that the ethanol extract of kecombrang and rosella flowers produces a light pink lip cream that is suitable for formulation in lip cream preparations. The higher the concentration of the extract used, the darker the pink color produced, with a texture that tends to be more liquid and a decreasing pH.

**Keywords:** Lip Cream, Kecombrang Flower, Rosella Flower

#### Abstrak

**Pendahuluan:** Bunga kecombrang dan bunga rosella dikenal sebagai sumber antioksidan alami dan berpotensi digunakan sebagai pewarna alami dalam produk lip cream. Kedua jenis bunga ini mengandung senyawa seperti tanin, flavonoid, dan saponin. **Tujuan** penelitian ini untuk menganalisis pengaruh variasi konsentrasi ekstrak etanol bunga kecombrang (*Etlingera elatior* (Jack) R. M. Sm.) dan bunga rosella (*Hibiscus sabdariffa* L.) terhadap warna formulasi lip cream. **Metode** penelitian dilakukan melalui eksperimen laboratorium yang mencakup pengambilan sampel, pembuatan ekstrak, formulasi produk, evaluasi mutu fisik, serta uji kesukaan panelis. Data dianalisis secara deskriptif dengan menghitung persentase tingkat kesukaan dan disajikan dalam bentuk tabel dan grafik. **Hasil** menunjukkan bahwa sediaan memiliki tekstur setengah padat, dengan warna bervariasi dari pink muda hingga tua pada kombinasi tertentu, dan pink keunguan untuk formulasi ekstrak rosella 10%. pH sediaan berada pada rentang 5,1-5,4, tanpa butiran kasar, daya oles baik, daya sebar rata-rata 5,5 cm, daya lekat rata-rata 12,73 detik, dan tidak menimbulkan iritasi. Uji *cycling* mengindikasikan ketidakstabilan warna, yang berubah dari pink muda menjadi ungu tua kecoklatan. Berdasarkan uji hedonik, formulasi F5 memiliki tingkat kesukaan tertinggi, yaitu 88,33%. **Kesimpulan**

penelitian ini adalah bahwa ekstrak etanol bunga kecombrang dan rosella menghasilkan lip cream berwarna pink muda yang sesuai diformulasikan dalam sediaan lip cream. Semakin tinggi konsentrasi ekstrak yang digunakan, semakin tua warna pink yang dihasilkan, dengan tekstur yang cenderung lebih cair dan pH yang menurun.

**Kata kunci :** Lip Cream, Bunga Kecombrang, Bunga Rosella



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## Introduction

Lip cream is a semi-solid lip color product. Among various types of lip makeup, lip cream is currently highly favored, especially among young women and teenagers, due to its smooth texture and stronger adherence compared to other lip color products [1]. However, many lip creams on the market today use chemical-based colorants. Research by Retnasari (2019) found that all pink lip cream samples sold in Pasar Raya Kota Padang contained the heavy metal lead (Pb), with levels of 13.9801 g/g in sample DS, 42.8855 g/g in sample HB, and 77.5368 g/g in sample KB. Among these samples, two (HB and KB) had lead levels exceeding the safe limit of 20 ppm established by BPOM RI under regulation HK.03.1.6662, making them unsafe for use [2].

The side effects of using chemically colored lip cream, such as those containing rhodamine, are concerning. Long-term use of rhodamine B in food and cosmetic products can lead to cancer and liver function disorders [3,4]. Therefore, there is a strong need for natural colorant innovations for lip creams, as these are considered safer and reduce the risk of allergies compared to chemical colorants. Every ingredient used in the production of lip cream, including colorants, must be confirmed safe for human use [5].

Kecombrang is a perennial plant from the Zingiberaceae family that grows as a shrub and can reach a height of about 3 meters [6]. It has an upright, sheath-covered, green pseudostem and produces rhizomes. Kecombrang flower (*Etilingera elatior* (Jack) R. M. Sm.), one of Indonesia's native flora widely used as a natural dye, has a reddish hue and a look similar to ornamental plants like banana plants or galangal [7]. Kecombrang flowers contain various compounds, including tannins, flavonoids, saponins, steroids, essential oils, anthocyanidins, and polyphenols. Chemical analysis using GC-MS has identified 39 compounds in kecombrang flowers, with primary components being 1-dodecanol (13.82%), dodecanal (12.10%), and 17-pentatriacontane (10.52%). Additionally, the plant contains vitamin E (tocopherol), which functions as an antioxidant, boosts immunity, prevents coronary heart disease, and aids in DNA synthesis [5].

Meanwhile, rosella flowers (*Hibiscus sabdariffa* L.) are a type of shrub that is easy to cultivate and widely known as a medicinal plant. Rosella offers various health benefits, such as aiding digestion, being anti-cancer, anti-hypertensive, anti-diabetic, anti-spasmodic, antibacterial, and anthelmintic (anti-worm), and inhibits the growth of fungi or parasites that cause high fever [6]. Rosella is also rich in natural antioxidants, with phytochemicals present in all parts of the plant, including flowers, leaves, stems, and fruit. Key phytochemicals in rosella include phenols, alkaloids, tannins, flavonoids, saponins, organic acids, anthocyanins, and polysaccharides [7].

According to research conducted by Agustina (2021) about Cream Blush Formulation Using Rosella Petal Extract (*Hibiscus sabdariffa* L.) as a Coloring Agent result different blush colors depending on

concentration. At a 1% concentration, it produces a pale pink color; at 3%, it results in a standard pink; and at 5%, it creates a bright pink. This cream blush has a characteristic waxy aroma and a semi-solid consistency [8]. Kecombrang flowers (*Etlingera elatior* (Jack) R. M. Sm.) and roselle (*Hibiscus sabdariffa* L.) are combined in this formulation because kecombrang's high antioxidant content can prevent oxidation, which helps avoid rancidity [9], while rosella enhances the lip cream's color intensity. Thus, this combination can be an innovative solution for safe natural colorants in lip cream [10]. This study aims to utilize kecombrang and rosella flowers as natural colorants in lip cream while testing various quality parameters. It is expected that the combination of these natural colorants will yield a stable color that meets different test criteria, including stability tests, organoleptic tests, homogeneity, pH, spreadability, and adhesiveness.

## Experimental Section

The type of research conducted in this study is laboratory experimental research. In this study, the independent variables investigated are the formulations of lip cream using extracts of kecombrang flower (*Etlingera elatior* (Jack) R. M. Sm.) at concentrations of 10%, 15%, and 20%, as well as extracts of rosella flower (*Hibiscus sabdariffa* L.) at concentrations of 5%, 7.5%, and 10% (F1;F2;F3). Additionally, the study includes single concentrations, specifically the kecombrang flower extract at 20% (F4) and the rosella flower extract at 10% (F5), to evaluate the testing parameters and their effectiveness. This research was conducted from June to August 2023 at the cosmetology laboratory of Helvetia Institute of Health in Medan.

### Materials and Apparatus

The plant materials used are torch kecombrang flower and roselle flower. The ingredients for making the lip cream are 95% ethanol, citric acid, distilled water, castor oil, carnauba wax, beeswax, lanolin, kaolin, methyl paraben, BHT, tocopherol, titanium dioxide, and fragrance. The tools used in this study for making lip cream include a porcelain dish, digital scale, glass object, water bath, and pH meter.

### Extraction

Samples of kecombrang flowers (*Etlingera elatior* (Jack) R. M. Sm.) and roselle flowers (*Hibiscus sabdariffa* L.) were obtained from Sigli, Pidie sub-district, Pidie district, Aceh province. A total of 2 kg of flower petals were collected, washed, then wet-sorted and separated from the seeds. The collected flower petals were then dried. Roselle and torch ginger flower simplicia were each weighed to 300 grams, placed in a macerator, and dissolved in a 95% ethanol solution with 1% citric acid until an acidic pH (pH 2-3) was achieved. The macerator was sealed with aluminum foil and left for 5 days protected from light, with frequent stirring, before being filtered. The filtrate was then processed using a rotary evaporator at a temperature of 40°C to produce a thick extract. The extraction result is shown in Figure 1.



**Figure 1.** Thick extract of kecombrang and roselle flowers

### Lip Cream Formulation

The following is the formulation of ingredients used in the preparation of the lip cream with kecombrang flower and roselle flower extract, as shown in Table 1.

**Tabel 1.** Formulation of lip cream with kecombrang flower and roselle flower extract [11]

Materials	Formula					
	F0	F1	F2	F3	F4	F5
Kecombrang flowers extract	0%	10%	15%	20%	20%	-
Roselle flowers extract	0%	5%	7,5%	10%	-	10%
Castor oil	2,2	2,2	2,2	2,2	2,2	2,2
Cera Flava	0,25	0,25	0,25	0,25	0,25	0,25
Carnauba wax	0,25	0,25	0,25	0,25	0,25	0,25
Lanolin	0,25	0,25	0,25	0,25	0,25	0,25
Tocoferol	0,10	0,10	0,10	0,10	0,10	0,10
Kaolin	1,2	1,2	1,2	1,2	1,2	1,2
Titanium dioxide	0,25	0,25	0,25	0,25	0,25	0,25
Methyl paraben	0,15	0,15	0,15	0,15	0,15	0,15
Butylated hydroxy toluene (BHT)	0,5	0,5	0,5	0,5	0,5	0,5
Fragrance	qs	qs	qs	qs	qs	qs

Lip cream was made by each materials is individually weighed, and the torch ginger and roselle flower extracts are dissolved in castor oil (mass 1). Cera flava, carnauba wax, and lanolin are melted in a water bath (mass 2). Mass 1 and mass 2 are then mixed in a heated mortar. Kaolin, tocopherol, and titanium dioxide are added to the mortar and ground until homogeneous. Methyl paraben and fragrance are added and ground until uniform, followed by the addition of BHT. Once homogeneous, the mixture is placed into a lip cream container [12].

### Evaluation of Lip cream Formulation

The evaluation of the formula includes the organoleptic test, homogeneity, pH value, spreadability, adhesion, and stability test (cycling test method). Organoleptic test is intended to see the physical appearance of the preparation which includes form, color and odor [13]. The homogeneity test is carried out by using flat transparent glass: when a certain number of preparations applied to a piece of glass or other suitable transparent material, the preparation must show a homogeneous arrangement and do not show any coarse grains [14]. Measurement of pH values is carried out using a pH meter. Firstly, the tool was calibrated by using an acidic buffer and aqueous buffer then the electrodes were rinsed with distilled water and wipe it with tissue. Weigh 1 g of the preparation and dissolve it in 100 ml distilled water. Then the electrodes are immersed in the solution. Let the pH meter show a constant pH value [15]. Weigh the lip cream as much as 0.5 grams then place into the middle of a petri dish. Put another petri dish on top of the gel and let it remain for a minute. Add 50 gram and 100 gram load then measure the dispersion diameter [11].

## Results and Discussion

### Evaluation of the lip cream formulation

Evaluation of lip cream preparations includes organoleptic properties, homogeneity, pH, spreadability, dispersibility, and adhesiveness can be seen in Table 2 below.

Based on the organoleptic examination results of the lip cream preparation, the obtained formulation has a semi-solid and smooth texture, with varying colors. The lighter and brighter colors were observed in F1, which was light pink, F2, which was a slightly brighter light pink, and F3, which was dark pink. The preparations also have a soft strawberry scent. The differences in each formula are influenced by the combination of the concentrations of torch ginger flower extract and roselle flower extract used. Meanwhile, in F4, the pink color produced is weaker compared to F5. It is evident that the natural color effect from roselle flowers is stronger than that of kecombrang flowers. These results meet the organoleptic criteria for the lip cream formulation, as shown in Figure 2.

Based on the pH test results for the lip cream formulations, the F0 formula has a neutral to basic pH of 7.1. This result differs from the other formulations that contain natural coloring from flower extracts. The presence of roselle and torch ginger flower extracts causes a pH reduction in formulas F1 through F5.

However, the pH results still meet the requirements for lip cream formulation, as the pH does not exceed the pH of the lips, which is between 4.0 and 6.5. The homogeneity test showed no coarse particles in the formulation. The natural color in the formulation is also evenly distributed throughout the lip cream, indicating that the natural color from the ethanol extract of roselle and kecombrang flowers can mix evenly with other ingredients in the lip cream formulation. The spreadability test was assessed by the amount of color that adheres to the lips after application. Based on the spreadability test results, the lip cream formulation meets the spreadability requirements. Good spreadability is indicated by a rich and even color distribution. All formulations, F1 to F5, exhibit good spreadability upon application. The natural color of the lip cream also adheres well to the skin and remains with just one application [10]. The spreadability test results showed a diameter of 5-6 cm. The spreadability test is conducted to determine how quickly the lip cream spreads upon application, making it easier to apply to the lips. The lip cream is classified as a semi-solid formulation, with an ideal spreadability range of 5-7 cm [16]. The spreadability test results indicate that the lip cream meets the spreadability requirements. Adhesion refers to how long the formulation stays adhered to the lips. An ideal release time for lip cream is around < 60 seconds [17]. Based on the adhesion test results, all lip cream formulations fall within the good adhesion category. The natural color in the lip cream also adheres quickly upon application.

**Table 2.** Evaluation Results of Lip Cream Formulation with Kecombrang Flower Extract (*Etlingera elatior* (Jack) R. M. Sm.) and Roselle Flower (*Hibiscus sabdariffa* L.)

Evaluations	Formula					
	F0	F1	F2	F3	F4	F5
Organoleptic						
Color	White	Light pink	Light pink	Dark pink	Nude	Purplish pink
m	Semisolid	Semisolid	Semisolid	Semisolid	Semisolid	Semisolid
Homogeneity	Homogeneous	Homogeneous	Homogeneous	Homogeneous	Homogeneous	homogeneous
pH	7,1±0,105	5,4±0,051	5,3±0,043	4,8±0,134	5,5±0,053	5,1±0,055
Spreadability	Uniform	Uniform	Uniform	Uniform	Uniform	Uniform
Dispersibility(cm)	5,0±0,201	5,6±0,142	5,5±0,136	5,5±0,22	5,8±0,064	5,7±0,155
Adhesiveness (seconds)	19,31±0,10	11,97±0,21	10,48±0,07	12,40±0,138	11,40±0,152	10,85±0,052

Note : The pH, spreadability, and adhesiveness values listed are the mean ± SD.



**Figure 2.** Organoleptic Test of Lip Cream Formulation

### The effect of the extracts combination

With an increase in concentration of the combined extracts of kecombrang flower and roselle flowers, the color intensity varies as follows: F1, with 10% kecombrang extract and 5% roselle flower extract, produces a light pink color; F2, with 15% kecombrang extract and 7.5% roselle, results in a slightly brighter light pink; and F3, with 20% kecombrang extract and 10% roselle, creates a dark pink color. In terms of color intensity, F4, containing 20% kecombrang extract, has a nude color, while F5, with 10% roselle extract, shows a purplish-pink with a brighter color intensity. The resulting color is largely influenced by the concentration of roselle extract, which provides a dark pink. Comparing the combination of both extracts to the single extract



concentrations, the roselle flower extract shows a stronger and brighter color intensity. For example, F3, with 20% kecombrang and 10% roselle, results in a dark pink color, which differs significantly from the single-extract formulations: 20% kecombrang (F4) produces a nude color, and 10% roselle (F5) gives a purplish-pink.

## Conclusions

A lip cream formulation with a combination of ethanol extracts from torch ginger flower and roselle flower, as well as single extracts, results in a lip cream color with varying color intensities. The higher the concentration of ethanol extracts from torch ginger flower and roselle flower formulated in the lip cream, the darker the pink color produced, the more liquid the texture becomes, and the lower the pH.

## Conflict of Interest

All authors have nothing to declare.

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## Supplementary Materials

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