

## Utilization of Senduduk Fruit Extract (*Melastoma malabathricum*) for Natural Color in Lip Cream

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### Abstract

*Decorative cosmetics function to beautify your appearance with a combination of colors such as blush, hair dye and lip color. A class of cosmetics that women always use to give a more attractive appearance are decorative cosmetics such as lips cream. The coloring ingredients added to lip cream preparations are chosen from an economic perspective, but the optimal level of color stability means that many manufacturers still use dangerous chemical dyes such as Rhodamine B in their products. This dye can cause irritation to the respiratory tract and is carcinogenic. Therefore, the aim of the research is to formulate a lip cream preparation with natural coloring agent from sendunia fruit extract that is safe, useful and of good quality through physical and stability tests. Extraction was carried out using the maceration method for 3x24 hours using 96% ethanol solvent. Senduduk fruit extract lip cream is formulated into 4. The base comparisons carried out were (carnauba wax: microcrystalline wax) F0 (12.6; 10.6), F1 (9.6; 7.6), F2 (7.6; 9.6), and F4 (9 ;9), physical properties assessed from the organoleptic test, homogeneity test, spreadability test, adhesion, pH test. The results of the hedonic test can be concluded that F2 color is the best formulation interested.*

**Keywords:** *cosmetic decorative; lip cream; natural excipient; color cosmetic*

### Introduction

The development of cosmetics in the world is increasing, including in Indonesia (Azorin *et al*, 2022). The beauty of human appearance is greatly supported by the use of cosmetics. The group of cosmetics in which coloring agents play a large role is decorative cosmetics, This because Its function is to beautify the appearance (Abadi *et al*, 2022 ; Aldeen *et al*, 2023). Decorative cosmetic

preparations play an important role in repairing, changing and covering facial flaws as make-up. it can be blush, eyelid color, eyebrows and lips. Women opinion that base beauty is health, then preparation cosmetics used must confirmed use safe ingredients (Diana *et al*, 2022; Kaban *et al*, 2022). However, certain cosmetic manufacturers have opted to incorporate synthetic dyes into their formulations of decorative cosmetic

preparations as a means of cost reduction in the production process. (Alhuda *et al*, 2022).

Rhodamine B dye, Ponceau 3R, Ponceau SX, Methanil Yellow is not permitted as an additional ingredient in cosmetic preparations (Aslihan *et al*, 2022). Repeated use of rhodamine B can cause irritation of the respiratory tract, even liver damage, and is carcinogenic. Research by Dalmaz, A., and Sezen SO 2022 stated the presence of rhodamine B in decorative cosmetics (Zeta *et al*, 2020). Based on research by Guerra E. *et al.*, identification of rhodamine B dye in lipstick found that 1 sample contained positive rhodamine at a level of 0.2299 mg /g. Then, based on research results by Netravati, *et al.*, 2022, it was reported that 4 samples of decorative cosmetics contained Rhodamine B. Natural dyes made from natural ingredients are an appropriate alternative to replace dangerous synthetic dyes (Novelni *et al*, 2023)

Senduduk Fruit (*Melastoma Malabathricum*) one of type weeds that have fruit producer substance color experience anthocyanin (Diza *et al*, 2019). Anthocyanin, a flavonoid pigment, exhibits a spectrum of colors ranging from red to purple and blue. In terms of its chemistry, anthocyanin possesses an aromatic singular structure, featuring functional groups such as OH, OCH<sub>3</sub>, and H. (Edianto *et al*, 2020). This fact makes the anthocyanin dye of the fruit itself safe to use in several products, one of which is cosmetics which has a role as an excipient or natural antioxidant in *lip preparations*. Cream (Listrianah *et al*, 2022).

Based on previous research that has been carried out, there are many natural substances that are used as sources of dyes, but the lack of studies related to the use of senpadu fruit can be a differentiator in this research. Based on fact the use of natural anthocyanin dyes from the extraction of senpadu fruit to be formulated can be a color excipient for decorative cosmetic preparations, namely *lip cream* (Rushikesh *et al*, 2022).

## Methods

### Tools and Materials

The material used is Melastoma Sendunia fruit Malabathricum (MI-M) from young cultural activists from Puput Village, Central Bangka Regency, Bangka Belitung. The materials used include 96% ethanol with 20 grams of HOC (CH<sub>2</sub>CO<sub>2</sub>H)<sub>2</sub> (Citric Acid), HCl solution, NaOH, Beeswax, oleum ricini, Cetyl alcohol, dimethicone, kaolin, and ol.rosae. The research tools used include a set of extraction tools, rotary evaporator, pH meter and viscometer. The instrumentation includes a brand FT-IR spectrophotometer Shimadzu QP-2010, Color ultraviolet-visible spectrophotometer (UV-VIS). Detection brand Cary 50 and Shimadzu QP-2010 GC-MS spectrophotometer and brand mass spectrophotometer (MS) Shimadzu QP-2010.

### Procedure

#### Extraction Process

Self-extraction (*Melastoma Malabathricum*) is carried out using the maceration method. Extraction is carried out by soaking fresh fruit in a macerator then adding 96% ethanol until the simplicia is submerged. Maceration lasts for 3x24 hours with occasional stirring and observation. The maserate is removed from the macerator, after that, the resulting macerate is evaporated using a *rotary evaporator* at a temperature of 80 degrees Celsius with a speed of 40 rpm (Fiardilla *et al*, 2020; Fadhli *et al*, 2020).

#### Characteristic Test

First, make a mother liquor of senpadu fruit extract at a concentration of 1,000 µg / mL using ethanol and water as solvents. Then 5 mL of the stock solution was diluted with each of ethanol and distilled water in a 50 mL volumetric flask to measure the absorbance using UV- Vis spectrophotometry at a wavelength of 475-550 nm (Princess *et al.*, 2020). Testing FTIR spectrum (Shimadzu: QATR-S) was performed with use wave 4000-6000 cm<sup>-1</sup> (Putri *et al*, 2020).

### Decorative Cosmetic Formulation

This formulation functions for the preparation of decorative cosmetics, namely lip color cream in semi-solid form. The formulation step in this research is to weigh all the ingredients needed, including Beeswax, Oleum ricini, Cetyl Alcohol, Dimethicone, Kaolin. The amalgamation within the evaporator cup involves the liquefaction of the oil phase, consisting of components such as beeswax, cetyl alcohol, dimethicone, and castor oil, over a water bath. Once the oil phase has fully melted, it is gradually incorporated into the heated cup while simultaneously grinding. Subsequently, the addition of kaolin is carried out incrementally during the grinding process until a homogeneous mixture is achieved, followed by the introduction of the thick supercritical fluid (SDF) extract. Once homogeneous, add ol. rosae as a fragrance to taste (Tan *et al*, 2022). For formulation as shown in Table 1.

Table 1. Cosmetic Decorative Formulation

Material	Concentration (%w/w)			
	F0	F1	F2	F3
Senpadu Fruit Extract	0	5	10	15
Carnauba Wax	9	6	8	5.4
Microcrystalline Wax	7	4	8	3,4
Dimethicone	10	10	10	10
BHT	0.1	0.1	0.1	
Castor oil	45	45	45	45
Cetyl Alcohol	5	5	5	5
Titanium dioxide	0.5	0.5	0.5	0.5
Propylene glycol	15	15	15	15
Paraben Profile	0.18	0.18	0.18	0.18
Kaolin	3	3	3	3
Oleum Rosae	0.05	0.05	0.05	0.05
Olive oil	100	100	100	100

### Evaluation of Decorative Cosmetic

Organoleptic Observation of the physical appearance of the preparation is carried out using panca senses in describing shape, color, smell and taste. Checking pH, viscosity, spreadability: pH measurements are carried out using a calibrated pH meter. Then the calibrated electrode is dipped into the base that has been made. The number shown by the pH meter is recorded as the pH value of

the preparation. The viscosity level is measured with a Rion viscometer, then the results are observed and compared with the viscosity of a safe and quality lip cream. Spreadability test, the test is carried out by weighing 1 g of each lip cream preparation and placing it in the middle of two glass plates. Then 125 g of ceramic stone was added and left for 1 minute then the lip diameter was recorded spread cream (Nattaya *et al*, 2023).

### Result and Discussion

The result of fresh fruit extract alone with 96% ethanol is a dark purplish liquid and when dropped on filter paper it leaves a bright reddish purple stain. Then the extract is evaporated at a temperature according to the boiling point of the ethanol solvent, namely 80 °C and the amount of extract is reduced (Sandra *et al*, 2019). The results of the evaporated extract can be seen in Figure 1. The initial fruit weight was 50 grams with 1000 mL of ethanol solution and the evaporation results were 250 mL and the extract yield was 8.48%. The yield of the extract obtained meets the requirements according to the Indonesian Herbal Pharmacopoeia, namely not less than 8.1%[10]. The high yield results were found in the macerated extract yield because the extraction time was 3 days so that the compound withdrawal process was maximized (Nurliyaman *et al*, 2022).

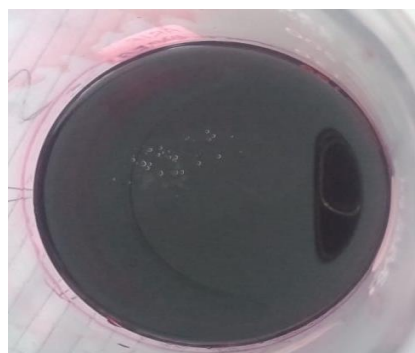


Figure 1. Senduduk Fruit (*Melastoma Malabatricum*) Extract.

The ratio of sample and extract results obtained was 1:1.5 as presented in Table 2. The purplish color of the SdF extract indicates that it contains anthocyanin compounds

which are natural pigments belonging to the flavonoid group. Furthermore, in this research, characterization was carried out using Fourier Transform Infrared Spectroscopy (FT-IR) to test the purity of the dye by detecting functional groups.

Table 2. Result of Senduduk Extract

sitting alone (g)	Ethanol solvent (mL)	Extract weight (g)
111	555	175.78

UV Vis spectrophotometer is also used to identify the stability of dyes in extracts. Identification is carried out by measuring the maximum absorption based on the wavelength range of 400-600 nm. The wavelength was chosen based on anthocyanin which has a maximum absorption between 465-560 nm.

The spectrum characteristics of anthocyanins have peaks in band 1 ( $\lambda$  465-560) and band 2 ( $\lambda$  270-280). The resulting extract gives a typical absorption indicating anthocyanin because it absorbs at wavelengths of 215 nm, 283 nm, and 524 nm (Figure 2). This absorption is in accordance with the research of Larasati et al., 2022. The UV spectrum of anthocyanin of sendua fruit which shows absorption at wavelengths of 279 nm, 317 nm and 525 nm.

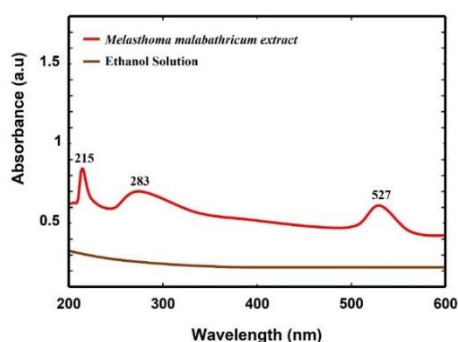


Figure 2. UV-Vis Spectrum of Senbangun fruit (*Melastoma Malabathricum*) Extract and Ethanol Solvent.

FTIR spectrum testing was performed using a wave number of 4000-600  $\text{cm}^{-1}$ . The result of the characterization of the wave number spectrum can be seen in Figure 3. Interpretation of the infrared spectrum shows that the anthocyanins in the SdF extract contain functional groups such as alcohol OH which is shown by absorption at a temperature of 3265  $\text{cm}^{-1}$  region. The C=C aromatic bond is shown by absorption at 1640  $\text{cm}^{-1}$ , 1416  $\text{cm}^{-1}$ . Aromatic CH bond at 1043  $\text{cm}^{-1}$ . Based on the information obtained from UV-Vis spectroscopy and infrared spectroscopy, the extract of the fruit of sanduduk contains anthocyanin compounds (Iwan et al., 2023).

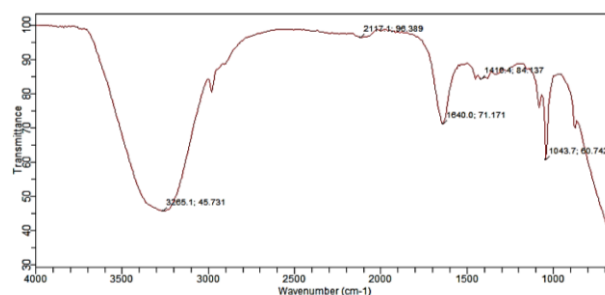


Figure 3. FT-IR Result of Senduduk Extract.

Lip cream organoleptic test was carried out using the five senses to describe color, texture and aroma. Based on observations, there is no difference in terms of color except for the color in F0, which is white because there is no added extract (Silva et al, 2021). The white color of the base is influenced by yellow *carnauba wax* and yellowish white *microcrystalline wax*, so that the mixture of the two waxes forms a white color at F0. The addition of *Melastoma Malabathricum* fruit extract which contains anthocyanin gives a natural color to the preparation so that the *lip cream preparation* containing the extract will be red to red in color (Lourith et al, 2020). The concentration used in F1, F2 and F3 is not too high, namely 5%, so the resulting color is heart red (Ginting et al, 2022), which can be seen in Figure 4.



Figure 4. Organoleptic Test.

The four formulas provide *lip cream* with a semi-solid texture like cream in general, namely not too dense and easy to spread. The addition of extracts to preparations can influence organoleptics both in terms of color, texture and aroma (Ramadhan et al, 2019).

The homogeneity test of the *lip cream preparation* ensures that all formulation ingredients are mixed well, This test affects the levels of active compounds in *lip cream preparations* (Tonapa et al, 2021). Homogeneity is an important factor that determines the quality of lip cream products, because the active ingredients used are in the form of extracts, which must be mixed evenly with other ingredients. The product is considered homogeneous if the product applied to the glass window does not contain coarse grains (Tahir et al, 2023). The results of the homogeneity test can be seen in Figure 5.



Figure 5. Homogeneity of Lip Cream.

The pH test is carried out to determine the degree of acidity of the *lip cream preparation*. pH testing is carried out with a pH meter that has calibrated electrodes (Jablonowska et al, 2021). The pH measurement results show pH data of 6 for each formulation. The pH of the *lip cream preparations* all formulations have met the lip pH requirements, namely 3.8 - 4.7 so that the senggani fruit extract preparation is safe to

use if seen from the pH value so that it does not make the lips dry due to The pH of the preparation is too alkaline and does not irritate the stratum corneum layer of the lips because the pH is too acidic (Julianti et al, 2022).

The spreadability test is carried out to see that the *lip cream preparation* that has been formulated has the ability to spread on the surface of the lips (Fadhli et al., 2020). The spreading power test of each formulation obtained a mean  $\pm$  SD spreading value of  $6.2 \pm 0.1$  cm, respectively;  $5,6 \pm 0.1$  cm;  $5,7 \pm 0.1$  cm; and  $5.53 \pm 0.5$  cm, this shows that all formulas meet the requirements for good spreadability, namely in the range of 5-7 cm (Sartika et al, 2019). The widest distribution was obtained in Formula 0 with an area of 6.2 cm. The results of the formulation spreadability test can be seen in Figure 6.

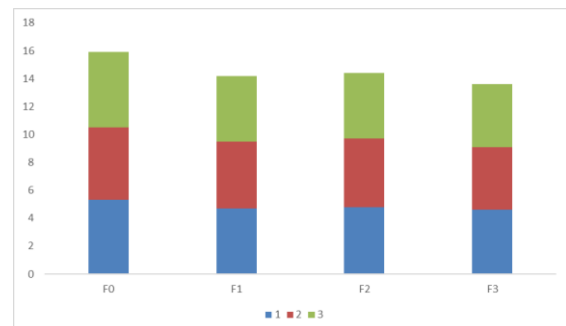


Figure 6. Spreadability Test.

The preference test was carried out on 35 panelists from the Sumatra Institute of Technology, Lampung University, Bandar Lampung University, Raden Intan University Lampung, Gadjah Mada University to see the assessment of the color, smell and texture of senggani fruit extract lip cream using the Wardah colorfix shade 08 lip cream as a comparison. *go getter*. Based on the results of the hedonic test, the highest color test value was owned by the F2 preparation. The highest aroma test value is owned by the F0 preparation. The highest texture test value was owned by preparation F2. The highest mean  $\pm$  SD results in the color, aroma and texture tests were owned by F2 which had the highest average value in the color, aroma and

texture tests. The results of the hedonic test can be seen in Figure 7 and table 3.

The results of the hedonic tests that have been carried out can be concluded that the F2 color hedonic test is the most popular formulation. This is influenced by the lowest concentration of carnauba wax compared to other formulas so that the resulting texture is not too oily (Ridwan *et al*, 2023).

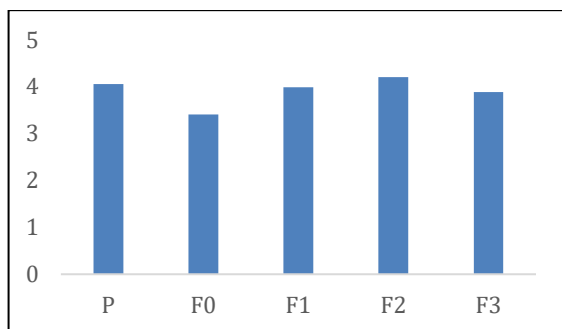


Figure 7. Test Likeability

The results of the aroma test that have been carried out can be concluded that F0 has the most popular aroma, this is due to the fact that there is no addition of senggani fruit extract to the formula.

Table 3. Likeability Test Result

sitting alone (g)	Ethanol solvent (mL)	Extract weight (g)
111	555	175.78

The stability test was carried out using an accelerated stability test using the *cycling test method*. The cycling stability test is carried out by applying stress to the product and its packaging with extreme temperature changes at certain time intervals. The results of visual observation of all formulations showed that the color of the preparation remained bright red, had a *rose aroma*, and a cream-like texture. The texture of the four formulas at the end of the cycle has a semi-solid consistency but is easy to spread, especially at F0, this is influenced by the *carnauba wax concentration* reaching 12.64%

which can increase the consistency of the preparation. The results of physical observations from the stabilization test can be seen in Figure 8.

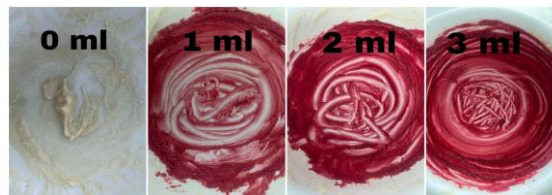


Figure 8. Organoleptic Observations of the 6<sup>th</sup> Cycle.

The pH testing of *lip cream preparations* is carried out periodically in each cycle (1-6). The results obtained from testing the pH of the formula are 4.5-6.5, where the pH corresponds to the pH of the lips. The graph of the pH stability test results can be seen in Figure 9.

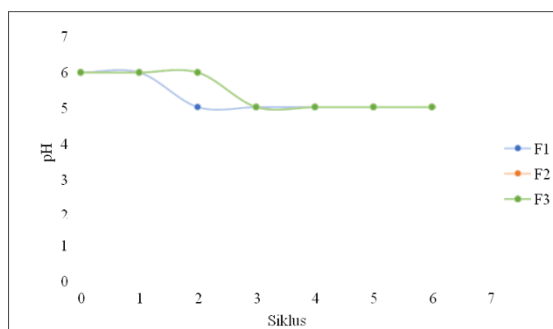


Figure 9. pH Stability Test.

Lip cream spreadability testing is carried out periodically in each cycle. This observation aims to determine changes in spreadability that occur in formulas 1, 2, 3 of *lip cream preparations*. The test results showed that there was a decrease in each formula, especially in cycles 0 to 1.

## Conclusion

Senduduk Fruit (*Melastoma Malabathricum*) can be used as a natural coloring in lip cream to give it a purplish red color. The higher the ethanol extract of the senpadu fruit which is converted into lip cream, the resulting color will be the same as the color of the senpadu fruit, the higher the pH. The content of the sendua fruit extract is

5%, 10%, and 15% which meets the evaluation requirements of the organoleptic test, homogeneity test, viscosity test, and pH test, and does not cause irritation and the results of the acceptability of the preparation in terms of color and texture, panelists prefer the preparation at a concentration of 10 % and in terms of aroma, the panelists preferred preparations at a concentration of 5%. Lip cream from sendua fruit extract (*Melastoma Malabathricum*) has good stability in physical tests, pH tests, spreadability tests, and adhesiveness during 6 storage cycles. However, in F3, the sticking test does not meet the requirements with a test value of less than 60 seconds.

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