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**FORMULATION AND PHYSICAL PROPERTY TEST  
OF LIP TINT PREPARATION FROM MANGOSTEEN  
PEEL EXTRACT (*Garcinia mangostana* L.)  
AS A NATURAL COLOR****Haniva Haika<sup>1</sup>, Ayu Angger Putri<sup>2</sup>**<sup>1,2</sup> Universitas dr. Soebandi, Jl. dr. Soebandi No. 99 Cangkring, Patrang, 68111Email: [hanivahaika@gmail.com](mailto:hanivahaika@gmail.com)**Submitted: 24 Juli 2025****Accepted: 29 Juli 2025****Published: 31 Juli 2025****ABSTRACT**

**Background:** The development of technology in this modern era has increased the demand for beauty products, especially lip colorants such as lip tint, continues to increase. However, many commercial products contain harmful ingredients that can cause irritation. As an alternative, natural colorants are safer. Mangosteen rind (*Garcinia mangostana* L.) can be used as a natural colorant and contains xanthones, anthocyanins, saponins, and tannins.

**Purpose:** To determine whether varying concentrations of mangosteen peel extract (*Garcinia mangostana* L.) affect the physical properties and hedonic evaluation of lip tint preparations.

**Methods:** A laboratory experimental design was employed using mangosteen peel extract obtained through Ultrasonic Assisted Extraction (UAE) with 96% ethanol at a ratio of 1:5. The formulations were evaluated based on physical characteristics (organoleptic, homogeneity, pH, spreadability, and stickiness) and hedonic preferences. Data were analyzed using SPSS 25.

**Results:** Based on the results of the lip tint preparation research, all formulas show good physical properties test standards in organoleptic, homogeneity, pH, spreadability, and stickiness tests. The hedonic test results showed that the most preferred by panelists was F3 with a concentration of 25% from the aspects of color, texture, and aroma. SPSS Kruskal Wallis hedonic test results for color aspects (Sig 0.007 <0.05), texture aspects (Sig 0.003 <0.05), and aroma aspects (Sig 0.010 <0.05). There is a statistically significant difference in the hedonic test results on the aspects of color, texture, and aroma.

**Conclusions:** Variation in the concentration of mangosteen peel extract significantly influences the physical and sensory properties of lip tint preparations.

**Key words:** Lip tint, natural dye, mangosteen peel, physical properties test, hedonic test.



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## INTRODUCTION

As technology continues to advance in this modern era, public demand is increasing, including in the beauty sector (Farika et al., 2024). One of the most frequently used beauty products today is lip tint. Lips are one part of the face whose appearance influences the aesthetic perception of the face. Lips are synonymous with lipstick and its color. Currently, there are new innovations in lipstick, divided into several types, one of which is lip tint. (Yuniarsih et al., 2023).

Lip tint is another form of cosmetic preparation that is more liquid than semi-solid lipstick. Lip tint preparations have a lighter texture and a more natural appearance than using liquid preparations. lipstick (Farika et al., 2024). Lip tints on the market are sold at low prices but often contain unknown ingredients, which can cause side effects such as dry, chapped, and swollen lips. This indicates that these lip tint products may contain harmful ingredients that can irritate the skin of the lips (Khasna et al., 2022).

Some synthetic colorants are known for their toxic effects and pose health risks. As stated by the Indonesian FDA (BPOM RI, 2009) in Public Warning No. K.H.00.01.43.2503 dated June 11, 2009, several dyes such as Red dye K.3 (Color Index 15585), Red dye K.10 (commonly known as Rhodamine B), and Orange dye K.1 (Color Index 12075) are prohibited in cosmetics due to their potential to cause respiratory tract irritation and carcinogenic effects (Pratiwi et al., 2021).

To address this issue, the use of natural dyes can be a safer alternative. The primary aim of incorporating natural pigments into cosmetic formulations is to reduce allergic reactions commonly associated with synthetic colorants. Natural dyes are typically derived from plant, animal, or mineral sources and are more environmentally friendly due to their biodegradability. Moreover, they are generally non-toxic, non-carcinogenic, and safe for the skin (Iskandar et al., 2022).

One of the plants that can serve as a source of natural dye for cosmetic products is mangosteen peel. It contains compounds such as xanthones, anthocyanins, saponins, and tannins (Risantie et al., 2025). The presence of anthocyanin pigments in mangosteen peel makes it suitable for use as a natural coloring agent (Nugraha et al., 2021).

Based on the explanation above, in an effort to develop natural colorants for lip tint formulations, the researchers aimed to investigate the formulation of lip tint containing mangosteen peel extract (*Garcinia mangostana* L.) as a natural dye. This study utilized varying concentrations of mangosteen peel extract 15%, 20%, and 25% which were evaluated for their physical characteristics (organoleptic properties, pH, spreadability, and adhesiveness) as well as through hedonic testing.

## MATERIALS AND METHODS

The tools used in this research are analytical scales (CHQ), ultrasonic cleaner (BIOBASE), oven (memmert), mortar, stemper, 50 ml beaker glass (Pyrex), 1000 ml beaker glass (Pyrex), pH meter (Hanna HI98107), dropper, object glass, waterbath



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(BIOBASE), porcelain cup, wooden tongs, rotary evaporator (IKA HB10 basic), stirring rod, ruler (butterfly), spreadability tester, adhesion tester.

The materials used in this study were extracts Mangosteen peel (*Garcinia mangostana* L.), ethanol 96%, distilled water, olive oil, glycerin, DMDM hydantoin, ascorbic acid, TEA, cera alba, strawberry essence, and sorbitol.

### Manufacture from Simple Drugs and Mangosteen Peel Powder (*Garcinia mangostana* L.)

Collecting mangosteen fruit (*Garcinia mangostana* L.) obtained from Tlogosari Village, Tiris District, Probolinggo Regency, East Java, The mangosteen peel samples used were ripe mangosteen fruit. The ripeness of the mangosteen fruit was sorted based on color from reddish to purplish as a characteristic of the presence of anthocyanins. After being cleaned, the mangosteen peel was separated into hard and soft parts. The soft part of the peel was used as the main raw material. The mangosteen peel was cleaned and chopped into small pieces, then dried in an oven at 50°C for approximately 6 to 8 hours. After drying, the peel was ground into a coarse powder (Nadia et al., 2022).

### Manufacture from Mangosteen Peel Extract (*Garcinia mangostana* L.)

The preparation from mangosteen peel extract (*Garcinia mangostana* L.) was carried out using 96% ethanol solvent. 200 grams of mangosteen peel powder was weighed and 1000 ml of 96% ethanol solvent was added in a beaker glass with a powder: solvent ratio (1:5) stirred so that the ingredients and solvent could be mixed evenly, after that place the beaker glass on an ultrasonic cleaner that had been filled with distilled water (Lismeri et al., 2023). Then extracted for 30 minutes at a temperature of 50°C (Kristina et al., 2022). After extraction, the extraction results were filtered and concentrated using a rotary vacuum evaporator with a pressure of 100 mbar, a temperature of 40°C with a speed of 100 rpm until a thick extract is obtained (Kristina et al., 2022).

### Lip Tint Formula Mangosteen Peel Extract (*Garcinia mangostana* L.)

Prepare the tools and materials, melt the oil phase (cera alba and olive oil) at a temperature of 55°C, mix the water phase (glycerin, DMDM hydantoin, TEA, ascorbic acid) in a heated mortar, then mix the mixture of the oil phase and the water phase in a heated mortar until homogeneous. Add sorbitol and essence until homogeneous, then add the extract of mangosteen rind according to the level of concentration. The addition of mangosteen peel extract in the final process aims to prevent the formulation from being exposed to air for too long (Risantie et al., 2025). The final step is to put the preparation into a container and close it tightly.

## RESULT AND DISCUSSION

### Plant Determination

of mangosteen (*Garcinia mangostana* L.) plant identification was to determine the authenticity of the plant used. The mangosteen plant identification was conducted at the

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UPT Materia Medika Batu Malang with the letter number 000.9.3/127/102.20/2025. The results showed that the sample used was indeed the *Garcinia mangostana* L. species.

**Mangosteen Peel Extract (*Garcinia mangostana* L.)**

In this study, the mangosteen peel extract (*Garcinia mangostana* L.) was made using the Ultrasonic Assisted Extraction (UAE) method. The ultrasonic method was chosen because when compared to other methods, the ultrasonic method produces a more concentrated extract, more active substances, and the time used is shorter because the working process of this tool is with the help of ultrasonic waves which are able to increase the breakdown of cell walls, in the liquid phase below its boiling point, it can cause spontaneous bubbles and increase the permeability of the cell wall (Kristina et al., 2022). The solvent used in this extraction is 96% ethanol because this solvent is selective, non-toxic, has good absorption and high extraction ability so it can extract non-polar, semi-polar and polar compounds (Wendersteyt et al., 2021).

**Physical Properties Test Results from Mangosteen Peel Extract (*Garcinia mangostana* L.) Lip Tint Preparation****Organoleptic Test**

Organoleptic testing aims to observe the physical appearance of the mangosteen peel extract (*Garcinia mangostana* L.) lip tint preparation by through examination of the preparation's color, form, and scent that has been made. The organoleptic test results revealed differences in color between the resulting preparations. F1 was light brown, F2 was brown, and F3 was dark brown. This difference in color occurs because the higher the concentration of the extract used, the more intense the resulting color (Fadhilah et al., 2022).

The organoleptic test results for the texture from the mangosteen peel extract lip tint preparation in three formulas showed a liquid texture. This result is in accordance with the parameters for determining the texture of lip tint in the study (Delta, 2024), which showed that all three formulas also have a liquid texture. The organoleptic test results for the aroma of the lip tint preparation showed that the three formulas had the same aroma, namely strawberry essence. This is because each formula was given the same dose of essence. The purpose of adding the essence was so that the unpleasant odor of mangosteen peel could be covered by the aroma of the essence (Yuliasti et al., 2023).

**Homogeneity Test**

The homogeneity test was conducted to determine whether the lip tint preparation had rough or fine spots as evidence of proper mixing of the preparation. The outcome of the uniformity test on the lip tint formulation containing mangosteen peel extract (*Garcinia mangostana* L.) that had been carried out showed that the three lip tint preparation formulas were homogeneous preparations characterized by an even distribution of color, no coarse grains or lumps in the preparation. The results obtained were in accordance based on the findings of the study conducted by (Hamsina et al., 2022) regarding the specifications for the homogeneity test of the lip tint preparation, there were no coarse grains or spots when applied to a glass object.



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**pH test**

The pH evaluation was conducted to assess the pH level of the lip tint preparation so that it is safe for use. If the pH of the lip tint preparation is less than 4.5, it can cause irritation to the skin of the lips so that the lips become sore, while if the pH of the lip tint preparation is above 7, it can cause the lips to become dry and scaly (Imani et al., 2022). The results of the pH test of the lip tint preparation showed that 3 formulas had met the safe pH test range for lip skin, namely 4.5-7 (Farika et al., 2024). The pH test value increased according to the level of mangosteen peel extract (*Garcinia mangostana* L.) in each formula. Based on the observation results, the pH of the mangosteen peel extract was 5.6. In a study conducted by (Debiyanti, 2022), the higher the concentration of the extract, the higher the resulting pH value.

The results of the physical properties of the pH test were then analyzed using SPSS. The results of the Kruskal Wallis test showed (Sig 0.025 <0.05) meaning that there were significant differences between the formulas, so the Post Hoc Mann Whitney U Test was carried out. All formulas showed significantly different pH values. So it can be seen that increasing the concentration of mangosteen peel extract (*Garcinia mangostana* L.) in the lip tint preparation causes the pH value to increase.

**Spread Power Test**

The spreadability test was conducted to determine the ability of the lip tint preparation to spread evenly when applied to the lips. If the spreadability of the lip tint preparation is less than 5 cm or more than 7 cm, it can cause the preparation to be difficult to spread evenly when applied (Debiyanti, 2022). The results of the spreadability test of the mangosteen peel extract (*Garcinia mangostana* L.) lip tint preparation showed that 3 formulas had met the good spreadability range of 5-7 cm (Delta, 2024). The spreadability of the lip tint decreased in relation to the amount of mangosteen peel extract (*Garcinia mangostana* L.) in each formulation. According to Delta (2024), a higher concentration of the extract leads to reduced spreadability in the lip tint product. This can occur because high variations in extract concentration can cause complex interactions between compounds. Thus, causing changes in the physical and chemical properties of the preparation, such as increased viscosity which affects spreadability.

The results of the physical properties of the spreadability test were then analyzed using SPSS. The Kruskal Wallis test results showed (Sig 0.023 <0.05) signifying a statistically significant difference, so a Post Hoc Mann Whitney U Test was conducted. All formulas showed significantly different spreadability values. So it can be seen that increasing the concentration of mangosteen peel extract in the lip tint preparation causes a decrease in spreadability.

**Adhesion Test**

The adhesion test was conducted to determine the lip tint preparation's adhesion ability when applied to the lips. The adhesion test results showed that the 3 formulas met



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the standard specifications for the lip tint preparation adhesion test, which was >60 seconds. The adhesiveness of the formulation increased in line with the amount of mangosteen peel extract (*Garcinia mangostana* L.) present in each formula. A higher concentration of the extract resulted in a longer adhesion time of the preparation (Nuha, 2024). This is because in the lip tint preparation formulation, the higher the extract concentration, the less sorbitol solvent was added. This causes the adhesion power of F3 to be greater than that of F1 and F2 because the consistency of F3 is thicker.

The results of the physical properties of the spreadability test were then analyzed using SPSS. The ANOVA test results showed (Sig. 0.000 <0.05) signifying a statistically significant difference, so the Post Hoc LSD test was continued. All formulas showed significantly different adhesion values. So it can be seen that increasing the extract concentration causes the adhesion value to last longer.

### Hedonic Test

A hedonic evaluation was carried out to assess how much the respondents liked the lip tint formulation containing mangosteen peel extract (*Garcinia mangostana* L.). The hedonic test was conducted on 30 panelists who had met the inclusion and exclusion criteria to become panelists. Then, the panelists filled out a questionnaire regarding the best formula according to each panelist's assessment. Each panelist was asked to determine whether they disliked (1), disliked (2), liked (3), and strongly liked (4). (4) by applying lip tint preparations to the back of the hand with different concentrations of mangosteen peel extract (*Garcinia mangostana* L.). Hedonic test parameters include color, texture, and aroma.

In the hedonic test results on the color of the lip tint preparation, the value of F1 with a concentration of 15% was 1.83, F2 with a concentration of 20% had a value of 2.36, and F3 with a concentration of 25% had a value of 2.43. Furthermore, it was analyzed using SPSS. The Kruskal-Wallis test results indicated a significance value (Sig. 0.007 <0.05) signifying a statistically significant difference. Color assessment is a component that can be seen directly by the panelists and is important in determining the quality of acceptance of a cosmetic preparation (Debiyanti, 2022). The lip tint preparation in F3 was preferred by the panelists compared to F1 and F2. This is because F3 uses a concentration of 25% mangosteen peel extract which is the highest concentration, resulting in a more intense color than F1 and F2 which can affect the panelists' preference for color assessment.

In the hedonic test results on the texture of the lip tint preparation, the value of F1 with a concentration of 15% was 2.46, F2 with a concentration of 20% was 2.80, and F3 with a concentration of 25% was 3.16. Furthermore, it was analyzed using SPSS. The Kruskal-Wallis test results indicated a significance value (Sig. 0.003 <0.05) signifying a statistically significant difference. Texture assessment was observed based on the level of softness and stickiness of the preparation (Tahniah, 2024). The lip tint preparation in F3 was preferred by the panelists compared to F1 and F2. This indicates that the panelists showed varying preferences regarding the texture of the lip tint, with formulation





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F3 being the most preferred. This is because F3 has a more even distribution so that the resulting preparation is not too runny.

In the hedonic test results on the aroma of lip tint preparations, the value of F1 with a concentration of 15% was 2.90, F2 with a concentration of 20% had a value of 3.23, and F3 with a concentration of 25% had a value of 3.46. Furthermore, it was analyzed using SPSS. The Kruskal-Wallis test results indicated a significance value (Sig. 0.010 < 0.05) signifying a statistically significant difference. Aroma is one of the sensory parameters of a product that can be observed with the sense of smell (Debiyanti, 2022). The lip tint preparation in F3 was preferred by the panelists compared to F1 and F2. This suggests that the panelists exhibited varying preferences regarding the aroma of the lip tint, with formulation F3 being the most favored. The purpose of adding essence is so that the unpleasant smell of mangosteen peel can be covered by the aroma of essence (Yuliasri et al., 2023).

**CONCLUSION**

Based on the conducted research, it can be concluded that variations in the concentration of mangosteen peel extract (*Garcinia mangostana* L.) influence both the physical properties (including organoleptic characteristics, pH level, spreadability, and adhesiveness) and the hedonic evaluation of the lip tint formulation.

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TABLE AND FIGURE

Table 1. Formulation of Mangosteen Peel Extract Lip Tint Preparation

Material	Formula (grams)			Utility
	F1	F2	F3	
Mangosteen peel extract	7.5	10	12.5	Natural dyes
Olive oil	10	10	10	Color disperser
Glycerin	1.5	1.5	1.5	Humectant
DMDM hydantoin	0.5	0.5	0.5	Preservative
Ascorbic acid	0.2	0.2	0.2	Antioxidants
TEA	3	3	3	Emulsifier
Cera alba	3	3	3	Adhesive
Strawberry essence	0.2	0.2	0.2	fragrance
Sorbitol	ad 50	ad 50	ad 50	Solvent

Table 2. Organoleptic Test Results of Preparations Mangosteen Peel Extract Lip Tint

Formula	Color	Form	Aroma
F1	Light brown	Liquid	Strawberry
F2	Chocolate	Liquid	Strawberry
F3	Dark brown	Liquid	Strawberry

Table 3. Results of Preparation Homogeneity Test Lip Tint Mangosteen Peel Extract

Formula	Homogeneity
F1	Homogeneous

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F2	Homogeneous
F3	Homogeneous

Table 4. Results of pH Test of Preparations Mangosteen Peel Extract *Lip Tint*

Formula	pH * $\pm$ SD
F1	5.8 $\pm$ 0.05 <sup>a</sup>
F2	6.1 $\pm$ 0.05 <sup>b</sup>
F3	6.4 $\pm$ 0.05 <sup>c</sup>

Table 5. Results of the Spreadability Test of the Mangosteen Peel Extract *Lip Tint Preparation*

Formula	Spread Power (cm) * $\pm$ SD
F1	5.3 $\pm$ 0.05 <sup>a</sup>
F2	5.1 $\pm$ 0.04 <sup>b</sup>
F3	5.0 $\pm$ 0.05 <sup>c</sup>

Table 6. Results of the Adhesion Test of the Mangosteen Peel Extract *Lip Tint Preparation*

Formula	Adhesion (seconds) * $\pm$ SD
F1	60.83 $\pm$ 0.51 <sup>a</sup>
F2	63.20 $\pm$ 0.15 <sup>b</sup>
F3	67.37 $\pm$ 0.77 <sup>c</sup>

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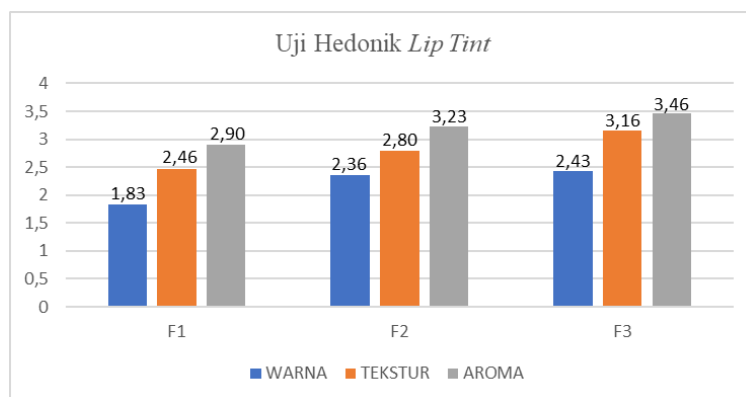


Figure 1. Hedonic test bar chart