# FORMULATION OF RED DRAGON FRUIT EXTRACT LIPSTICK PREPARATION *(Hylocereus polyrhizus)*

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**A B S T R A C T**

*Lipstick is a cosmetic primer that adds a creative touch to lip color and enhances the visual appeal of facial makeup. Red dragon fruit (Hylocereus polyrhizus), has anthocyanin pigments that make it useful as a natural color pigment for preparing lipstick formulas. The purpose of this study is to determine whether red dragon fruit extract (Hylocereus polyrhizus) can be used to make lipstick preparations and to assess the stability of lipstick preparations using red dragon fruit extract. While this type of research is a study that is carried out experimentally, where the sample is extracted using the maceration method, with the solvent used being 96% ethanol and the addition of 1% citric acid. This study was made in 4 lipstick preparation formulas with each different concentration, namely F0 (0%), F1 (5%), F2 (10%) and F3 (15%). The results of this study indicate that the F0 lipstick preparation produces a creamy yellow color, F1 is pale purple, F2 and F3 are purple. The odor produced is the distinctive odor of oleu rosae, solid shape and soft texture. Formula F0, F1, F2 and F3 have a pH of 6, and do not cause irritation and are stable at cold temperatures (16oC), room temperature (25oC) and high temperatures (45oC). Then at the stage of Homogeneity Test, pH Test, Stability Test has met the testing requirements so that the lipstick is safe to use.*

## INTRODUCTION

Cosmetics are substances or mixtures used on the outside of the human body (lips, nails, skin, and external genital organs), as well as teeth and mucous membranes of the mouth, with the main purpose of cleansing, scenting, changing appearance, improving body odor, and protecting or keeping the body in top condition (Sutaryono et al., 2018).

According to the Regulation of the Head of BPOM No. 19 of 2015, cosmetics in circulation must meet technical requirements including safety, benefits, quality, marking, and claims. Marking includes information about cosmetics in the form of images, writing, or a combination of the two on the packaging or product. A claim is a statement about the benefits, safety, or other information related to cosmetics contained in the marking and advertisement (BPOM, 2015).

Lipstick, often known as lip color, is a cosmetic primer used on lips to beautify their appearance by perfecting the shape and color of their ornaments. Because lipsticks tend to be ingested with saliva, food, and drinks, they can be harmful if they contain substances that can damage the color. According to Lestiana in (Dwicahyani et al., 2019)

The lips are muscle folds in the front of the mouth with a pH of 4.0-6.5 (Pracima, 2015). In modern civilization, many lipsticks contain chemicals that can damage the skin. Herbal lipsticks from plant components, such as dyes from dragon fruit, can avoid these negative effects. Natural cosmetics are suitable for all skin tones and reduce the risk of skin damage due to the use of few herbal ingredients (Mohite and (Gaikwad et al., 2021).

In Indonesia, dragon fruit is cultivated in several regions such as Jember, Bali, Malang, and Pasuruan, and exported to various countries. Red dragon fruit, or *Hylocereus Polyrhizus*, is a relatively new fruit that has gained popularity due to its many health qualities and benefits, as well as its high nutritional content (Farikha et al., 2013).

Flavonoids act as antimicrobials and antivirals and control photosynthesis in plants (Nurwanti et al., 2024).Dragon fruit is popularly cultivated because of its sweeter and juicier taste, and the cultivation process is relatively easy compared to other plants. Dragon fruit can also be used

as a natural dye in cosmetics such as lipstick and has a number of other health benefits (Athaillah et al., 2023).

A good lipstick is a lipstick that attracts the attention of consumers and has an attractive texture and color. The base ingredients in the lipstick formula can affect the texture, melting point, and hardness of the preparation (Kamairudin et al., 2014).

The different types and quantities of preparations used in lipsticks affect their shape. The ingredients that make up the base of lipstick determine its quality. The components used in lipstick preparations should be natural, not synthetic. Natural compounds are more tolerant of the skin and do not cause serious irritation to the lips. Therefore, it is necessary to find substitutes that are safe to use in the lipstick coloring process (Santi et al., 2020).

Based on the potential of red dragon fruit *(Hylocereus polyrhizus)* as a natural dye in the manufacture of lipstick preparations and the limited use of this fruit, therefore, the author is interested in conducting this research to make lipstick formulations and examine the physical stability of natural dyes of red dragon fruit extract (*Hylocereus polyrhizus*).

## METHOD

This research is a type of qualitative research using the laboratory *experiment research* method using red dragon fruit *(Hylocereus polyrhizus)* as a formulation in making lipstick preparations

### Time and Place

This research was conducted in July-August 2024 at the Haluoleo Kendari Pharmacy Laboratory, Southeast Sulawesi

### Tool

Stirring rods, beakers, porcelain cups, lipstick molds, lipstick containers, iron rods, hot plates, flannel fabrics, watch glasses, droppipettes, pestles/tasters, rotary evaporators, horn spoons, analytical scales, universal pH, incubators, and maceration containers are some of the instruments used in this study.

### Material

The ingredients used are ethanol 96%, citric acid 1%, red dragon fruit extract *(Hylocereus polyrhizus)*, BHT, castor oil, oleum rosae, nipasol, cetyl alcohol, lanolin, cera alba, carnauba wax and vaseline album

### Sample Preparation

Red dragon fruit *(Hylocereus polyrhizus)* that has been picked are sorted wet with the aim of removing the dirt attached to the red dragon fruit *(Hylocereus polyrhizus)* peeled and taken part of the fruit then weighed as much as 500 grams

### Dragon Fruit Extract Manufacturing

Red dragon fruit *(Hylocereus polyrhizus)* It is mashed using a blender and then weighed again as much as 500 grams then put into the maceration container. Next, 2.5 liters of 96% ethanol are added and mixed with 1% citric acid until the sample is completely buried or there is a layer on top. After wrapping the jar in black duct tape, soak the mixture for a full day at room temperature, protect it from light, and stir periodically. After one day (24 hours), the strainer is passed through a flannel filter. To produce a viscous extract, the filtrate obtained is also concentrated using a rotary evaporator at a temperature between 40 $^{Oc}$ and 50oC.

### Lipstick Preparation Formulation

Table 1. Lipstick Preparation Formulation

| Ingredient Name | Concentration(%) | | | | Ingredient Properties |
|---|---|---|---|---|---|
| | F0 | F1 | F2 | F3 | |
| Dragon Fruit Extract | - | 5 | 10 | 15 | Active substances |
| BHT | 0,02 | 0,02 | 0,02 | 0,02 | Antioxidant |
| Castor oil | 40,88 | 40,88 | 40,88 | 40,88 | Color disperser |
| Nipasol | 0,1 | 0,1 | 0,1 | 0,1 | Preservatives |
| Cetyl alcohol | 10 | 10 | 10 | 10 | Thickener |
| Lanolin | 12 | 12 | 12 | 12 | Moisturizer |
| Cera Alba | 15 | 15 | 15 | 15 | Fastener |
| Carnauba wax | 9 | 9 | 9 | 9 | Emulsion |
| Oleum rosae | Q.S | Q.S | Q.S | Q.S | Flavoring |

| | | | | | |
|---|---|---|---|---|---|
| Vaselin album | 8 | 8 | 8 | 8 | Base |

**Lipstick Manufacturing Procedure**

All materials obtained are weighed according to the formulation. Cera alba, carnauba wax, castor oil, nipasol, BHT, oleum rosae and dragon fruit extract are melted on a hotplate and then ground until homogeneous (Mass 1). It is mixed with lanolin, vaseline album and cetyl alcohol and then ground until homogeneous (Mass 2). After being liquid (Mass 1), (Mass 2) is mixed into (Mass 1) then slowly ground until homogeneous (Mass 3). After homogeneous (Mass 3) is melted on a hotplate and after melting it is put into a lipstick mold then poured into a container *(roll up)* lipstick and let stand until completely hardened (frozen).

**Lipstick Preparation Quality Inspection**

Organoleptis Test

Organoleptic observations were made on each preparation during 4 weeks of storage, to see if there was any change in the shape, color, or smell of the lipstick preparation.

Homogeneity test

Applying a lipstick preparation on a smooth and white surface of the material allows one to check the homogeneity of the lipstick preparation. Cutting lipstick lengthwise and looking for color dots is one way to assess the homogeneity and color stability of the formula.

pH Test

The universal pH paper is dipped in the solution and the discoloration of the paper is observed using the indicator color specified on the pH paper container. Samples are prepared at a concentration of 1%, which is equivalent to 1 g of sample diluted in 10 ml of distilled water. The pH of each lipstick recipe is determined based on its concentration.

Irritation Test

The purpose of this test is to determine whether the finished lipstick preparation irritates the skin or not. Open patch test (*Patch Test*) on the inside of the forearm of 10 participants is the method used in this irritation test. The open patch test is carried out by attaching the prepared area to the attachment site, leaving it open, and observing what happens. Redness, itching, or swelling are signs of a favorable irritation reaction, based on observation of the reaction.

Stability Test

Stability testing using the cycling test method, in this case, is an accelerated stability test. These six rounds of the test were conducted at three different temperatures $16^{Oc}$ Cold temperature, $25^{Oc}$ room temperature and $45^{Oc}$ high temperature. One cycle lasts for 24 hours. The test instrument is used at three different temperatures $16^{Oc}$ in the refrigerator, $25^{Oc}$ at room temperature, and $45^{Oc}$ in the incubator. It is considered whether the lipstick has changed from its original print shape in the shape-change category, whether the lipstick has changed from its original color during the lipstick manufacturing process in the color-change category, and whether the lipstick still has a distinctive perfume smell in the odor change category.

**RESULTS & DISCUSSION**

**Result**

Table 4.1 Results of Organolepstical Test of Red Dragon Fruit Extract *(Hylocereus polyrhizus)*

| Dosage | Organolepstis |
|---|---|
| F0 | Beige yellow color, homogeneous, characteristic smell of oleum rosae, dense shape, soft texture |
| F1 | Pale purple color, homogeneous, characteristic smell of oleum rosae, dense shape, soft texture |
| F2 | Purple color, homogeneous, characteristic smell of oleum rosae, dense shape, soft texture |
| F3 | Purple color, homogeneous, characteristic smell of oleum rosae, dense shape, soft texture |

Information:

F0 : Lipstick without dragon fruit extract (0%)

F1 : Lipstick with dragon fruit extract concentration (5%)

F2 : Lipstick with dragon fruit extract concentration (10%)

F3 : Lipstick with dragon fruit extract concentration (15%)

Table 4.2 Results of Homogeneity Test of Red Dragon Fruit Extract *(Hylocereus polyrhizus)*

| Dosage | Homogeneity |
|---|---|
| F0 | Homogeneous |
| F1 | Homogeneous |
| F2 | Homogeneous |

| | |
|---|---|
| F3 | Homogeneous |

Information:
F0 : Lipstick without dragon fruit extract (0%)
F1 : Lipstick with dragon fruit extract concentration (5%)
F2 : Lipstick with dragon fruit extract concentration (10%)
F3 : Lipstick with dragon fruit extract concentration (15%)

Table 4.3 Results of pH Test of Red Dragon Fruit Extract *(Hylocereus polyrhizus)*

| Dosage | Ph |
|---|---|
| F0 | 6 |
| F1 | 6 |
| F2 | 6 |
| F3 | 6 |

Information:
F0 : Lipstick without dragon fruit extract (0%)
F1 : Lipstick with dragon fruit extract concentration (5%)
F2 : Lipstick with dragon fruit extract concentration (10%)
F3 : Lipstick with dragon fruit extract concentration (15%)

Table 4.4 Results of Stability Test of Red Dragon Fruit Extract *(Hylocereus polyrhizus)*

| Dosage | Stability (24 hours) | | |
|---|---|---|---|
| | 16°C | 25°C | 45°C |
| F0 | Stable | Stable | Stable |
| F1 | Stable | Stable | Stable |
| F2 | Stable | Stable | Stable |
| F3 | Stable | Stable | Stable |

F0 : Lipstick without dragon fruit extract (0%)
F1 : Lipstick with dragon fruit extract concentration (5%)
F2 : Lipstick with dragon fruit extract concentration (10%)
F3 : Lipstick with dragon fruit extract concentration (15%)

Table 4.5 Results of Irity Test of Red Dragon Fruit Extract *(Hylocereus polyrhizus)*

| Dosage | Irritation | | |
|---|---|---|---|
| | Day 1 | Day 2 | Day 3 |
| F0 | - | - | - |
| F1 | - | - | - |
| F2 | - | - | - |
| F3 | - | - | - |

Information:
1. No reaction : -
2. Erythema : +
3. Erythema and papules : + +

**Discussion**

In this study, the lipstick formulation was developed by utilizing the natural color of red dragon fruit extract *(Hylocereus polyrhizus)* as the main dye. The anthocyanin content in dragon fruit gives it a red to purple color. Dragon fruit functions as an active substance, natural dye, as well as antioxidant that helps moisturize lips, remove dead skin cells, and give a red or purple color effect to the preparation.

A total of 500 grams of fresh red dragon fruit are taken and sorted wet to remove impurities, then peeled and the pulp is separated. The dragon fruit that had been weighed was then extracted by maceration method using 2.5 liters of 96% ethanol mixed with 1% citric acid. The addition of citric acid aims to create an acidic atmosphere that can damage cell membranes and dissolve anthocyanin pigments from cells. Because anthocyanins are unstable in neutral or alkaline solutions, acidic conditions are used throughout the extraction procedure. The maceration method also called cold extraction was chosen because of its simplicity, including soaking the powdered simplicia in a solvent liquid without heating. Due to its high selectivity, non-toxic nature, efficient absorption capacity, and ability to inhibit the development of bacteria and fungi, 96% ethanol is used.

After a 24-hour maceration process with occasional stirring, the filtrate is filtered to separate it from the residue. The filtrate obtained is then concentrated using *Rotary Evaporator* to concentrate the extract and separate the ethanol solvent 96% from the active compounds in the red dragon fruit. The solvent flows out of the spherical flask, marking the end of the evaporation process. Extraction yielded 97.25 g of sensitive red as a result.

The resulting viscous extract is used to make formulations at concentrations of 0%, 5%, 10%, and 15%. The concentration results were obtained from pre-formulation tests that had been carried out previously. There are two stages in making this lipstick preparation, namely the assessment stage and the lipstick preparation stage. Cera alba, carnauba wax, castor oil, nipasol, BHT, oleum rosae, and dragon fruit extract are melted on a hotplate during the lipstick manufacturing stage. then ground until homogeneous (Mass 1) then mixed with lanolin, vaseline album and cetyl alcohol then ground until homogeneous (mass 2). After the liquid (Mass 1), (Mass 2) is mixed into (Mass 1) the mixture is slowly ground until homogeneous (Mass 3. After homogeneous (Mass 3) is melted on a hotplate and after melting it is put into a lipstick mold after which it is poured into a container *(roll up)* Lipstick and let stand until completely hardened (frozen)

Furthermore, the lipstick preparation evaluation stage is an important stage that aims to test the feasibility of the results as a standardized preparation that is ready to be marketed and according to the requirements. The evaluation of this lipstick preparation includes organoleptis test, homogeneity test, pH test, irritation test and stability test

Organoleptic test is one of the physical parameters to determine whether or not there are organoleptic changes including color, odor and visually observed shape. The results of the organoleptic test showed that there was a difference in color in each formula, this can be seen in the formula F0 produces a beige yellow color, F1 produces a pale purple color, F2 and F3 produce a purple color. The F0 preparation has a creamy yellow color due to the absence of dyes added to the formula. The difference in color in this lipstick preparation is caused by the influence of the color concentration given to each formula. The higher the color concentration, the better the color produced. Then the results of the organoleptic test which included the smell of shape and texture at F0, F1, F2 and F3 showed that the lipstick preparation had an oleum rosae aroma, a dense shape and had a soft texture.

Furthermore, by cutting the lipstick preparation, the homogeneity test on the F0, FI, FII, and FIII formulas showed that the composition of the preparation was homogeneous. When the preparation is applied to a smooth or white surface, there will be no rough spots.

The pH test is carried out to find out if the pH of the lipstick is in accordance with the pH of the lips, which is 4-6.5. The results of the pH examination obtained showed that lipstick preparations with red dragon fruit extract coloring starting from F0, FI, FII and FIII each had the same pH with an average pH of 6, which is safe if used on lips because it is in accordance with lipstick safety standards.

Stability test using the (*Cycling Test*), it is a rapid stability test that uses a wide range of temperatures to identify discoloration, shape, and odor. Where the observation results obtained in each formula F0, FI, FII and FIII with varying temperatures ranging from cold temperature (16oC), room temperature (25oC) and high temperature (45oC) are stable. It is declared stable at cold temperatures (16oC) because there is no change in texture or color due to cold temperatures. If the lipstick is stable, then there will be no separation of the components (e.g. oils and waxes). Then at room temperature (25oC) it is said to be stable because there is no significant change in texture, color, smell or homogeneity at this temperature. At high temperatures (45oC), it shows that the lipstick is stable because the lipstick is able to survive in hot conditions without melting, deforming or separating components. The advantages of stability testing using the *cycling test* In particular, these tests can be completed quickly and serve as a good simulation in the event of daily or annual temperature changes. However, the downside of this cycle test is that it is performed at a specific temperature for a predetermined period of time, which causes the pressure to fluctuate.

An irritation test was conducted on 10 panelists, each using a fourth formula, used to test the effects on the forearm for three days. The absence of red, itchy, or swollen skin was one of the negative findings for irritation reactions from observations made on days 1, 2, and 3.

## CONCLUSION

Based on the results of research conducted on the formulation of lipstick preparations for red dragon fruit extract *(Hylocereus polyrhizus)*, it can be concluded that one of the formulations that can be used to make lipstick preparations is red dragon fruit extract. The characteristics of lipstick are influenced by variations in the concentration of dragon fruit extract, which manifests as variations in hue between formulas. At the evaluation test stage of lipstick preparations, the results were obtained, namely the organoleptic test on the formulas F0, 01, F2 and F3 has a distinctive odor, has a dense shape and soft texture but has a different color in the F0 and F1 formulas. Then at the stage of Homogeneity Test, pH Test, Stability Test has met the test requirements so that the lisptick is safe to use.

Limited research on the formulation of lipstick preparations for red dragon fruit extract *(Hylocereus polyrhizus)* can be seen on Study of the composition of active ingredients, namely ERed dragon fruit contains antioxidants and natural pigments (betacyanins) that are beneficial for cosmetics, but its color stability in cosmetic formulations still needs further research. Then on Stability of the preparation It is a challenge to maintain the stability of the color, texture, and quality of natural-based lipsticks such as red dragon fruit extract during storage or use. Formulation optimization The use of red dragon fruit extract in lipstick preparations requires the study of interactions with other lipstick base ingredients, such as waxes, oils, and additional dyes, to obtain optimal texture and durability.

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