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FORMULATION ANTIAGING CREAM MELASTOMA MALABATCHRICUM EXTRACT WITH POLYOXYETHYLENE MONOSTEARATE AND STEARIC ACID

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ABSTRACT

Karamunting fruit (Melastoma malabathricum L.) contains flavonoids, triterpenoids and tannins. The purpose of this study was to make anti-aging cream preparations using caramunting fruit extract with a combination of PEG 40 stearic acid and stearic acid to obtain optimum physical quality. Extract with 96% ethanol filter in the form of extracts used for cream preparations using a base of PEG 40 stearic and stearic acid, so that 8 formulas were obtained, then optimized based on the physical quality parameters of viscosity, spreadability, adhesion and pH, then optimization of the formula to determine the formula optimum using the Simplex Lattice Design method.

The conclusion obtained based on this research is the optimum combination of PEG 40 stearic and stearic acid in the cream of caramunting fruit extract using the Simplex Lattice Design method, namely PEG 40 Stearate 4.76% and stearic acid 15.74%. The physical quality stability did not change during one month of storage and the cream did not cause irritation. Formula I had a better and almost equal effect on the collagen test while formula V had a better effect on the elasticity test and the moisture test.

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INTRODUCTION

The skin is the outermost and extensive organ that is responsible for protecting muscles, ligaments, and internal organs from ultraviolet (UV) radiation, dehydration, and microorganisms (Mulianingsih & Ambarwati, 2021). The skin can age in areas that are often exposed to direct sunlight such as the face, upper arms and hands, where the skin layer will be thinner, so the skin will be more irritated and brittle (Hanifa et al., 2023). The skin gets drier due to the amount of proteoglycan production and *natural moisturizing factor* (NMF) is reduced, so the skin will look dull which can be said to be premature aging (Husein & Lestari, 2019). The factors that cause premature aging are divided into two, namely internal factors such as stress, immunity, hormonal changes and health as well as external factors such as free radicals, UV radiation and pollutants. Free radicals can be overcome by the use of antioxidants, both synthetic and natural, natural antioxidants usually come from herbal plants. Previous research has revealed that components found in herbal plants can reduce the danger of free radicals, especially UV radiation, by reducing UV light-induced inflammation, eliminating *reactive oxygen species* (ROS) and free radicals that harm the skin (Hanifa et al., 2023).

Karamunting *(Melastoma malabathricum* L.*)* is one of the fruits that contains phenolic compounds so that it has antioxidant activity and acts as a photoprotector because it has the ability to absorb UV rays (Tussabaria Siregar et al., 2024). Karamunting (*Melastoma malabathricum* L.) included in the family *Melastomataceae* and has an international name *Rosemyrle*, the content contained in karamunting fruit contains flavonoid compounds, saponins, quinones, monoterpenes, sesquiterpenes, polyphenolates, tannins, and steroids (Rohani et al., 2021) while the leaves contain flavonoids, glycosides, tannins, steroids, saponins, phenols, galatic acid, hexakosanoic acid (Andi Chandra & Bin Jamaludin, 2024). Anthocyanin compounds are also found in ripe karamunting fruit which functions as an antioxidant (Montella et al., 2021).

Karamunting on the island of Kalimantan is known as an ornamental plant that grows at dawn which has small purple or pink fruits, karamunting fruit can be consumed directly but has a less pleasant taste, the color in karamunting fruit comes from anthocyanin compounds, which can be used as a source of natural dyes while the leaves of karamunting are often processed into medicines (Nor Latifah et al., 2023). Karamunting is one of the plants that is believed to be efficacious as a medicine, including treating diarrhea, abscesses, abdominal pain, toxins, wounds, dysentery and other infectious diseases (Siregar et al., 2024). Karamunting plants are proven to contain several compounds, including flavonoids, tannins, saponins, alkaloids and triterpenoids. The highest levels of flavonoids are found in leaf and fruit extracts (Anggraeni et al., 2021). Research conducted on karamunting leaves shows the presence of flavonoids that have activity as antioxidants and are reported to have activity antioxidants determined by DPPH radical capture test, results were obtained in water fraction with IC50 value of 15.02 µg/mL, ethanol extract with IC50 value of 14.06 µg/mL, ethyl acetate fraction with IC50 value of 14.48 µg/mL with a very strong antioxidant activity category (Dona et al., 2021).

One form of cosmetic preparation that can be used to protect the skin is cream. Cream is an emulsion consisting of water and oil, intended for use on the skin. Creams can made in the

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form of M/A emulsion where this type has the advantage of being easy to wash with water, if used on the skin, there will be evaporation and an increase in the concentration of a drug that is soluble in water so as to encourage its absorption into skin tissue (Saryanti et al., 2019). Cream *Anti Aging* is a cream specifically designed to prevent premature aging, disguise blemishes, dark spots on the face and remove wrinkles under the eyes yet the cream *Anti Aging* synthetics have side effects such as allergic reactions so creams *Anti Aging* from herbal plants can be used as a solution. Stearic acid is one of the additional ingredients found in M/A type creams, but the addition of stearate acid in the cream can cause the cream to become softer so that the viscosity is lower. The type of base that has a high viscosity will cause the diffusion coefficient of a drug in the base to be low, so that the release of the drug from the base will be small and PEG 40 stearate is usually used as an emulgator when there is a *Estringen salt* or strong electrolytes present in the formula. Polyoxyethylene stearate can be mixed with other surfactants to get a balanced cream or lotion between hydrophilic and lipophilic. Optimization with the *Simplex Lattice Design* (SLD) aims to determine the right concentration of the ingredient so that a formula is obtained that has optimal physical properties and a response that can be accepted by consumers (Purwanto et al., 2024). This SLD method is one of the methods that can be used to optimize the formula in cream preparations. The SLD method is very effective and efficient because it only requires a few experiments (Raihanah et al., 2022).

Based on the description above, research was conducted to make *an anti-aging* cream preparation from karamunting fruit extract using a combination of PEG 40 stearate and stearate acid with the *Simplex Lattice Design* method using Software Design Expert 10.0.3.1 so that it can provide the most optimal comparison of PEG 40 stearate and stearate acid to produce cream preparations.

RESEARCH METHODS

Tools and Materials

The tools used in making preparations are maceration bottles, evaporators, water baths, analytical scales (*Ohaus*), glass tools (*Pyrex*), UV-Vis spectrophotometer, EH *900U Skin Analyzer*. Karamunting (*Rhodomyrtus tomentosa* (Aiton) Hassk) obtained from Cilik Riwut road kilometer 5 of Palangkaraya City, 70% ethanol, stearic acid, propylene glycol, polyoxyethylene stearate, cetyl alcohol, glyceryl monostearate, hydroxy-butyl toluene (positive control), methyl paraben, perfume, aquadestilata, and conventional cream. The test animal used was a female *New Zealand* rabbit that was shaved with a weight of between 2-4 kg and approximately 7-8 months old.

1. Determination of karamunting simplicia powder

Karamunting samples related to the morphological characteristics of karamunting plants to the literature were determined to be true and proven at the Laboratory of Pharmaceutical Biology, Setia Budi University, Surakarta.

2. Making karamunting fruit powder

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The dried simplisia is mashed and then sifted using sieve number 40 until the sifted powder is gone.

3. Preparation of karamunting fruit extract

The manufacture of karamunting extract using the maceration method of 1 Kg of karamunting fruit powder is soaked with 96% ethanol as much as 10 L stored for 5 days while occasionally shaken, then the extract is evaporated using an evaporator and stored at a temperature of 40 oC so that a thick extract is obtained.

4. Standardization of extracts includes:

a. **Organoleptics.** Organoleptic examination of the extract was carried out using the five senses by observing the shape, consistency, smell, taste and color of the extract.

b. **Determination of drying shrinkage.** An extract of 0.1g was weighed in a sealed porcelain crucible that had previously been heated to 1050C for 30 minutes and had been sealed. The extract is flattened by shaking until it is a layer 10 – 15 mm thick and dried at a set temperature until a fixed weight, the lid is opened, the crus are left closed and cooled in a desicator to room temperature, then the fixed weight obtained is recorded to calculate the percentage of drying shrinkage.

$$\text{Moisture Content} = \frac{Berat\ sebelum\ pengeringan - bobot\ akhir}{Berat\ sebelum\ pengeringan}\ X100\%$$

c. Determination of ash rate. A certain amount of 0.2 g of extract is carefully weighed in weighed crus, gently incandescent. Then the temperature is gradually increased to 600 ± 250C until it is carbon-free, then cooled in a decigator, and weighed by the weight of the ash. Ash content is calculated in percent of the weight of the initial sample. The ash obtained from the determination of ash content, then boiled with 25 ml of concentrated HCL acid for 5 minutes, the acid-insoluble part is collected, filtered through ash-free filter paper, washed with hot water, filtered and weighed, determined the content of acid-insoluble ash in percent of the weight of the initial sample.

$$\text{Ash Content} = \frac{Berat\ awal - berat\ akhir}{berat\ awal}\ X\ 100\%$$

d. Determination of acid insoluble ash content. The ash obtained at the determination of the ash content is boiled with 25 ml of dilute sulfuric acid for 5 minutes, the acid-insoluble part is collected then filtered with ash-free filter paper and the residue is rinsed with hot water. The filtered ash and the filter paper are put back in the same silicate crust. After that, the extract is incandescent using a kiln slowly (with the temperature gradually increased to 600±250C).

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5. Testing of antioxidant activity in karamunting fruit extract

The antioxidant activity test of karamunting fruit extract was carried out using the DPPH method. Karamunting fruit extract with a concentration of 100 ppm is made by dissolving 25 mg of karamunting fruit extract in 25 ml of 96% ethanol. Then add DPPH 100 ppm. The standard curve uses vitamin C with a concentration of 1-10 ppm. *Operation time* (OT) is oriented between 1-30 minutes. Absorbance is measured at a wavelength of 520 nm.

6. Cream making

The first way to make karamunting extract cream is to design a formula. The formula of karamunting extract cream is made with type M/A with a design of 8 formulations.

Table 1. Karamunting Extract Cream Formulation Design

Name Material	Formula 1	Formula 2	Formula 3	Formula 4	Formula 5	Formula 6	Formula 7	Formula 8
Karamunting fruit extract	0.2%	0.2%	0.2%	0.2%	0.2%	0.2%	0.2%	0.2%
Propylene glycol	10%	10%	10%	10%	10%	10%	10%	10%
Disodium edetate	0.01%	0.01%	0.01%	0.01%	0.01%	0.01%	0.01%	0.01%
Polyoxyethilene stearate	10%	0.5%	5.25%	7.625%	2.875%	10%	0.5%	5.25%
Cetyl alcohol	5%	5%	5%	5%	5%	5%	5%	5%
Stearic acid	10.5%	20%	15.25%	12.875%	17.625%	10.5%	20%	15.25%
Mineral oil	10%	10%	10%	10%	10%	10%	10%	10%
Paraffin	15%	15%	15%	15%	15%	15%	15%	15%
Butyl hydroxyl toluene							0.1%	
Nipagin	2%	2%	2%	2%	2%	2%	2%	2%
Perfume	Qs	Qs	Qs	Qs	Qs	Qs	Qs	Qs
Aquadest.	Ad 100ml	Ad 100ml	Ad 100ml	Ad 100ml	Ad 100ml	Ad 100ml	Ad 100ml	Ad 100ml

How to make cream. Paraffin, cetyl alcohol, mineral oil are melted using a water bath at a temperature of 70-750C, then BHT (mixture 1) is added. Propylene glycol, sodium edate, nipagin, polyoxyethylene stearate, and stearic acid are dissolved in hot water (mixture 2). Mix 1 with mix 2 little by little while stirring with a stamfer until a base is formed, then add the extract and perfume, stirring again until homogeneous.

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7. Physical Quality Testing of Karamunting Fruit Extract Cream

a. **Organoleptic test**. The organoleptis test of the cream includes a test of the color, smell, and consistency of the cream to determine the physical state of the cream. Observations are carried out every week for 4 weeks.

b. **Test the homogeneity of the cream**. The cream to be tested is applied to 3 glasses of the object to be homogeneous. If there are no coarse grains on the three glasses, then the cream tested is homogeneous. This homogeneous test was carried out 3 times of replication. The first test is carried out on the day the cream preparation is made, after the finished cream is immediately tested for homogeneity. The cream preparation is then stored for one week and tested again for homogeneity, and so on every week for one month.

c. **Test the viscosity of the cream**. The viscosity measurement of the cream was carried out with the viscotester VT-0-4E (Rion CO, Ltd). The rotor is attached to the viscotester by locking it counterclockwise. The cup is filled with a sample of cream to be tested, after that place the rotor in the middle containing the cream, then the tool is turned on. The rotor starts to rotate and the viscosity pointer needle will automatically move to the right, then once stable the viscosity is read on the scale of the rotor used.

d. **Test the spread of the cream**. This test is carried out by placing transparent glass on graph paper, then on the glass is placed 0.5 g of cream, then covered with transparent glass and left for ± 5 seconds to get how much diameter the area is formed. Then it is continued by adding a load of 50, 100, 200, and 500 g on the transparent glass and observing the diameter of the formed area. The specification of the preparation is that the cream can be spread easily and evenly.

e. **Test the adhesion of the cream**. This test is carried out by placing a sufficient amount of cream on a glass object that has been determined in width, then another glass object is placed on top of the cream with a load of 1kg for 5 minutes. Next, the glass object is installed on the test device. The 80g load was released and the time was recorded until the two glass objects were released. Repeat 3 times. Tests were performed for the other cream formulas with 3 attempts each.

f. **Emulsion type test**. The determination of the emulsion type is carried out with the addition of *methyl blue*. Oil-in-water (M/A) cream will be homogeneous when stirred, but when a blue dot appears, it indicates the water-in-oil type (M/A).

g. **pH test**. pH determination using a pH meter. The instrument is first calibrated using a neutral pH buffer solution (pH 7.01) and an acidic pH buffer solution (pH 4.01) until the instrument shows a pH value. The electrode is washed with aquadestilatate and then dried with tissue paper. The test was carried out by dissolving 1g of cream in 100 ml of aquadistillate water. The electrode is placed in the solution, the ph of the solution appears in the screen.

h. Irritation test. The test animal used was a rabbit with an experimental time of 72 hours. The female white rabbit used was 3 heads. Each rabbit that has had its back

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shaved is applied as much as 0.5 grams of the optimal formula of karamunting fruit extract cream, the positive control of Olay® cream total effect 7, and the negative control, namely the base of M/A cream, then closed with a gauze. Observation of erythema and edema that occurs is carried out at the 24th and 72nd hours after administration

8. Freeze Thaw Testing

Freeze and thaw testing is carried out to see the physical stability of the cream after being stored for 30 days at different temperatures. The test was carried out by storing the cream (± 2 grams) in the refrigerator at 4ºC for 2 days and then storing the cream in a climatic chamber with a temperature of 40ºC for the same time. After testing, phase separation is observed.

9. Antiwrinkle Activity Testing in Test Animals

The rabbits that will be used in the study are adapted to their environmental conditions (cage) first for approximately one week. Rabbits are free to obtain food and drink under conditions of room temperature, normal humidity and a 12-hour light/dark cycle. The rabbits used amounted to 4 heads. The rabbit's back skin is then divided into 4 parts using perforated aluminum foil. All rabbits that will be used in the study are shaved on their backs. The rabbit is first carefully placed into the restainer. The rabbit's back is then carefully shaved using a hair shaver. The rabbit's shaved back is covered with aluminum foil glued using hypoallergenic plaster. Aluminum foil paper has previously been divided into 4 parts (Parts I, II, III, and IV). Each part is given a hole with a size of 2x2 cm. Part I at the time of irradiation is closed using aluminum foil again. Part I as a normal control is not treated with UV-A irradiation. Parts II, III, and IV are treated with UV-A irradiation. Irradiation is carried out at a suberythermal dose of 50-65 mJ/cm2 for 2 weeks.

10. Anti-wrinkle Cream Application

After the rabbits were induced wrinkles, the wrinkle parameters were observed on day-0 without being treated using the Skin Analyzer tool. On day-1, they were given treatment according to the experimental group 1 time a day for 30 days.

11. Observation of Anti-Wrinkle Activity

Wrinkle parameters were observed on day-0, day-1, day-7, day-15, day-21, day-30. The observed wrinkle parameters included percent collagen, percent moisture, and percent elasticity using the Skin Analyzer tool.

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RESULTS AND DISCUSSION

1. Results of Karamunting Plant Determination

Based on the results of the identification, it is confirmed that the plant used in this study is a karamunting plant (*Melastoma malabathricum* L.) with details listed in table 2 below.

Table 2. Results of Karamunting Plant Determination

Sample Name	:	Karamunting Fruit
Sample	:	Fresh
Species	:	*Melastoma malabathricum* L.
Synonym	:	*Melastoma candidum* D.Don; *Melastoma affine* D.Don
Familia	:	Melastomataceae

2. Making Karamunting Fruit Extract

The manufacture of karamunting extract using the maceration method with 96% ethanol solvent. The maceration method uses a simple way of working and equipment, so that a thick extract of karamunting fruit is obtained as much as 178.3 grams. The percentage of yield obtained was 17.83%.

3. Standardization of Karamunting Fruit Extract

The standardization of karamunting fruit extract was carried out to determine the specific parameters and non-specific parameters. The results of the standardization of the extract can be seen in table 3 below which includes:

Table 3. Extract Standardization Results

Parameters	Test Result (%)	Standard
Organoleptis	Thick, brownish-purple, distinctive odor, bitter taste	Thick, brownish-purple, distinctive odor, bitter taste
Moisture content	8,95%	No more than 10%
Ash content	0,88%	No more than 9.42%
Acid insoluble ash content	0,03%	No more than 0.20%

Based on table 3. It is known that the water content of the simplileft karamunting fruit is 8.95%, where the content meets the general requirements, which is below 10%. Moisture content greater than 10% can be mold growth (Ministry of Health of the Republic of Indonesia, 2020). The determination of water content is carried out to provide a minimum or large limit on the water content in the sample because the high water content causes instability

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of the drug preparation, where bacteria and fungi grow quickly and the active ingredients contained in it can decompose.

The determination of total ash content and acid insoluble ash content aims to provide assurance that simplicia does not contain certain heavy metals exceeding the set value because it can be harmful to health and to find out the minerals contained in the studied simplicia as well as organic compounds left during combustion. Total ash is divided into two, the first is physiological ash, which is ash that comes from the plant tissue itself, and non-physiological ash, which is the residue after combustion, which comes from the outside that is found on the surface of the simplisia. The content of acid insoluble ash determines the amount of silica, especially the sand present in simplicia by dissolving total ash in hydrochloric acid (Ministry of Health of the Republic of Indonesia, 2020). The results of determining the total ash content of karamunting fruit simplicia were 0.88% and the results of determining the insoluble ash content of karamunting fruit simplicia acid was 0.03%.

4. Results of Identification of Karamunting Fruit Extract Compounds

Compound identification of karamunting fruit extract was carried out to obtain information on the group of metabolite compounds contained in karamunting fruit extract, phytochemical screening carried out on karamunting fruit extract including flavonoids, steroids and tannins. Table 4 below shows the identification results of karamunting fruit extract.

Table 4. Results of Identification of Karamunting Fruit Extract Compounds

Sample Test	Results (+/-)
Flavonoids	+
Steroids	+
Tannins	+

Information:

(+) : Detected
(-) : Not Detected

5. Antioxidant Test Results

Antioxidants from fruit extract from the karamunting test method (*Melastoma malabathricum* L.) with a sample weight of 0.02161 grams, which were read at a λmax wave of 520nm using blanks of 2,499 and Å sample of 0.653 produced a content of 74.63%.

6. Cream Making Results

The formulation of this cream preparation uses a combination of PEG 40 stearate and stearic acid. PEG 40 stearate is used as an emulsifying agent with a concentration of 0.5-10% and stearic acid as an emulsifying and hardening agent with a concentration of 1-20%. This study was optimized by determining the limits on each component, namely PEG stearate with

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a range of 0.5-10% and stearic acid with a range of 10.5-20%. This combination is made to have good physical properties in the preparation that will affect the activity, longer and safer to use. The physical properties of the cream include viscosity, spreadability, adhesion and pH tests. The relationship between physical properties is that the greater the viscosity, the smaller the dispersion and the greater the adhesion (Husein & Lestari, 2019).

7. Determination of Physical Quality Test Profile of Karamunting Fruit Extract Cream

The results of each test of the physical properties of the mixture of materials will be obtained from the physical properties profile of the mixture of materials from equations and calculations based on *Simplex Lattice Design* using the *design expert program*. The results obtained will be used to determine the optimal formula**.** The table shows the average results of the physical properties of *the cream* based on viscosity, spreadability, adhesion and pH. The physical property profile of this *cream* is then made a reference to determine the optimal formula using the *Simplex Lattice Design* method using the *design expert program.*

Table 5. Physical Quality Profile of the Cream for Determination of Optimal Formula

Formula	Viscosity (dPas)	Spread power (cm)	Adhesion (sec)	Ph
I	128.9±6.33	3.51±0.13	5.93±1.04	4.75±0.15
II	159.7±6.87	2.85±0.13	13.40±2.05	5.31±0.15
III	139.9±5.28	3.05±0.14	8.87±1.04	4.95±0.17
IV	132.4±6.04	3.21±0.14	7.27±0.64	4.89±0.15
V	150.1±7.41	2.96±0.14	9.93±0.72	5.19±0.18

8. Results of Physical Quality Test Determination through *the Simplex Lattice Design Method*

The Simplex Lattice Design method is a method used for formulation optimization Karamunting Fruit Extract Antiaging Cream. Simplex Lattice Design is very effective and efficient because it only requires a few experiments (Raihanah et al., 2022). The Simplex Lattice Design method aims to determine the concentration ratio of Combinations PEG 40 Stearic and Stearic Acid which can produce Cream *antiaging* karamunting fruit extract which has optimal physical properties.

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Table 6. Results of Physical Quality Test Through *the Simplex Lattice Design Method*

Parameters	Similarities	Statistics		Statistical conclusions
		anova	lack of fit	
Viscosity	Y = 128.5(A) + 159.6(B) - 15.4(AB)	< 0.0001	0,06	Suitable model
Spread power	Y= 3.455 (A) + 2.865 (B) -0.32 (AB)	0,0009	0,10	Suitable model
Adhesion	Y= 6.03(A) + 13.235(B) – 3.05(AB)	< 0.0001	10,73	Suitable model
Ph	Y = 4.77(A) + 5.29(B) -0.04(AB)	0,0024	0,10	Suitable model

Table 6 shows the results of the equation of the physical quality test of karamunting fruit extract cream on the parameters of viscosity, spread, adhesion, and pH. In the viscosity test, Formula II has a higher viscosity than others due to the difference in the concentration of stearic acid and polyoxylethylene stearate in each formulation, where high viscosity can be produced by adding the concentration of stearic acid which can act as a *thickening agent* in creams. The higher the viscosity, the smaller the cream spread, and the lower the viscosity, the larger the diameter *of the cream* spread. Good spreading power will make it easier when applied to the skin. The factor that affects the diameter of the dispersion power of a preparation is the number of extracts used in each of each formula. Based on the fact that the lower the consistency of the cream preparation with the lower adhesion time, it can make the cream more easily spread.

The requirement for a good cream spread is 5-7 cm, the best spread is Formula I because the formula has low viscosity and good spread, but it is not in the range of good cream spread. Formula II has a strong adhesion time, because it can be known that the greater the viscosity, the greater the adhesion produced, a good cream can guarantee an effective contact time with the skin, so that the cream is not too sticky when applied to the skin. Creams that stick to the skin for a long time are expected to have the expected effect and can protect the skin for a relatively long time. In the pH test, all formulas fall within the pH range required for the skin, which is 4.5-6.5.

9. Determination of Optimum Formula Profile

The optimization of the cream in this study is based on physical quality testing in the form of viscosity test, dispersion test, adhesion test, and pH using the design expert program. The value range for desirability is between 0 to 1.0. This value, if it is close to a value of 1.0, shows that it is getting more perfect. Optimization is carried out not to obtain a desirability score of 1.0, but to find the best conditions to bring together all the functions of the goal (Raihanah et al., 2022). The results of the optimum formula profile prediction are shown in the table and figure 1 below:

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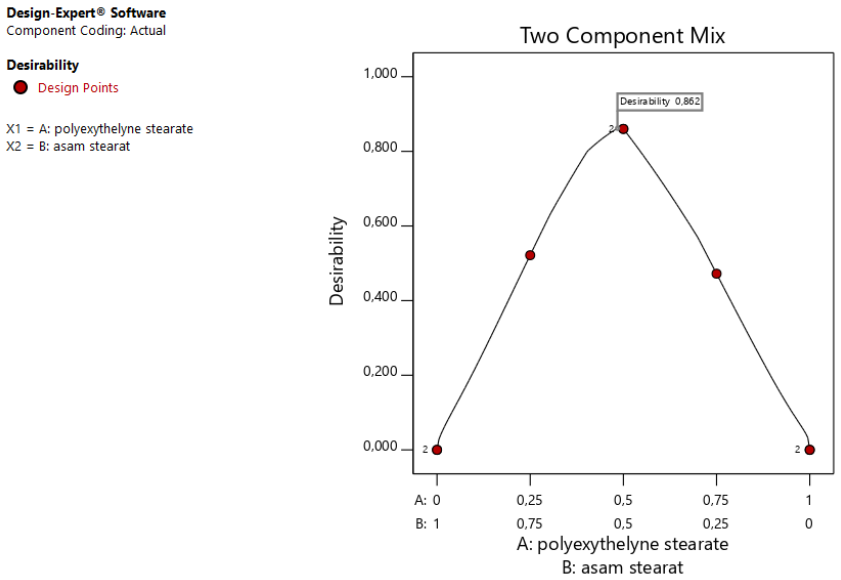

Figure 1. Desirability Value Profile of Optimum Formula

The desirability value is the value of the optimization objective function that shows the ability of the program to meet the desired criteria. In Figure 1, the target criteria are used so that a desirability value is obtained which shows a value of 0.850. The program predicts a viscosity response using a target target of 140.785 dpas, a dispersion response with a target target of 3.073 cm, an adhesion response with a target of 8.942 cm, and a pH response with a target of 5.03 with polyoxyethylene stearate of 4.76% and stearic acid of 15.74%.

10. Freeze Thaw Test Results

The cream test using the *freeze thaw* method aims to see whether the cream is still stable or not after being treated at different temperatures. This initial test was carried out at a temperature of 40°C and stored for 2 days in the oven, after which the cream was stored at a temperature of 4 °C, this test was carried out in 5 cycles with the aim of being able to observe whether there was separation in the cream or not. The results of the cream stability test with *the freeze and thaw* method showed that the cream of karamunting fruit extract after the freeze thaw test was not found to be separated from cycle 1 to cycle 5, this shows that the cream emulgator is well mixed where the water phase and oil phase are stable.

11. Cream Irritation Test Results to Test Animals

Patching is carried out in a closed manner (Patch test) using a test unit consisting of filter paper, aluminum foil and palster with the aim of guaranteeing and assisting the absorption of the tested material and avoiding environmental influences. Observations were made at 0 hours before the test material was attached and 24, 48, 72 hours after the test material was released. The results of the irritation test can be seen in table 6 below.

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Table 6. Results of the Irritation Test of Karamunting Fruit Extract Cream

Test Animals	Eritma	Edema
Rabbit 1	0	0
Rabbit 2	0	0
Rabbit 3	0	0
Rabbit 4	0	0
Rabbit 5	0	0

From the table above, it shows that the five rabbits obtained an irritation index of 0 to the cream of karmunting fruit extract. Based on these results, it can be said that karamunting fruit extract cream does not cause skin irritation reactions.

12. Anti-Wrinkle Activity Test Results

This anti-aging activity test uses the EH900U series digital test skin analyzer. The collagen test is one of the *skin analyzer* devices used to see tight or sagging skin. The results of this test show that Formula I provides a better collagen test effect than Formula II-VI, negative control and positive control. Formula I cream showed that the effect of increasing levels was good where rabbits who initially had less collagen fibers could become normal, while other cream formulas experienced an increase and decrease in collagen fibers. Formula 1 karamunting fruit extract cream has almost the same effectiveness as conventional cream. After the collagen test, the next test is the elasticity test. This test is used to determine whether the rabbit's skin is elastic (stretched) or stiff. Formulas V and VI have the effect of improving elasticity compared to other formulas, positive and negative control and also conventional creams. Moisture test to show the condition of the water in the skin. Formula V has the best moisture value than any other formula. The results of Formula V are almost equivalent to conventional creams.

CONCLUSION

The conclusion of this study is as follows:

1. The combination of PEG 40 stearate and stearic acid using the *Simplex Lattice Design application* obtained a concentration of PEG 40 stearate of 4.76% and stearic acid with a concentration of 15.74% for the optimal cream formula in the cream of karamunting fruit extract and has stable stability in 30 days of storage including the physical quality test of the cream in the form of viscosity test, dispersibility test, adhesion test, and pH test.
2. Karamunting fruit extract cream in storage for 30 days which includes viscosity test, dispersion test, adhesion test and pH test has good stability.

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3. In the collagen test, formula I has a better effect and is equivalent to conventional cream, but in the collagen test and moisture test, formula V has a better effect and is equivalent to conventional cream, and from the results of research, karamunting fruit extract cream does not cause irritation to the skin.

BIBLIOGRAPHY

Andi Chandra, M., & Bin Jamaludin, W. (2024). Education and Training on Tea Processing from Karamunting Leaves (Rhodomyrtus tomentosa) in Landasan Ulin Utara Village. *Panrita Abdi Journal*, *8*(1), 30–36. Http://Journal.Unhas.Ac.Id/Index.Php/Panritaabdi

Anggraeni, L. N., Fakhruddin, F., & Irawan, Y. (2021). Effect of Ethanol Extract of Karamunting Leaves (Rhodomyrtus Tomentosa (Ait.) Hassk.) on cholesterol and triglyceride levels in hyperlipidemia white mice. *Journal of Borneo* Scholars, *5*(1), 96–104. Https://Doi.Org/10.54411/Jbc.V5i1.229

Ministry of Health Ri. (2020). Indonesian Pharmacopoeia Edition VI. In *Indonesian Pharmacopoeia* (Issue 3, pp. 9–11).

Dona, R., Furi, M., & Suryani, F. (2021). Determination of Total Phenolic Levels, Total Flavonoids and Antioxidant Activity Test from Karamunting Leaf Extract and Fraction (Rhodomyrtus Tomentosa (Aiton) Hassk). *Indonesian Journal of Pharmaceutical Research*, *9*(2), 72–78. Https://Doi.Org/10.51887/Jpfi.V9i2.975

Hanifa, D., Ningsih, W., & Bakhtiar, A. (2023). Formulation and Evaluation of Peel-Off Masks from Avocado Fruit Oil (Persea Americana). *Journal of Catalyst*, *8*(1), 99–110. Http://Doi.Org/10.22216/Jk.V5i2.5717http://Ejournal.Kopertis10.Or.Id/Index.Php/Katalisator

Husein, E., & Lestari, A. B. S. (2019). Optimization of the Formula of Ower Sunfl Cream Preparation (Helianthus Annuus L.) Oil. *Indonesian Journal of Pharmaceutical Sciences*, *17*(1), 62–67.

Montella, C., Noval, & Kurniawati, D. (2021). Formulation And Evaluation Of Karamunting Fruit Extract Nano Spray Gel (Rhodomyrtus Tomentosa (Aiton) Hassk .) With Carbopol 940 Concentration Variations. *Jsm*, *10*(2), 117–128.

Mulianingsih, A. M., & Ambarwati, N. S. S. (2021). The use of aloe vera (aloe vera) as a raw material for skin beauty care. *Cosmetology*, *11*(1), 1–10.

Nor Latifah, Hayatus Sa'adah, & Retna Eka Dewi. (2023). Formulation of Suction Tablet Preparation from Ethanol Extract of Karamunting Fruit (Melastoma Polyanthum) as an Antioxidant. *Jcps (Journal Of Current Pharmaceutical Sciences)*, *7*(1), 664–672.

Purwanto, A., Amrina, F., & Riauwati, R. (2024). Optimization of the Formula of Patikan Kebo Leaf Ethanol Extract Cream (Euphorbia Hirta L.) With the Simplex Lattice Design method. *Journal of Indonesian Pharmaceutical Personnel*, *7*(2), 520–532. Https://Doi.Org/10.36387/Jifi.V7i2.2081

Raihanah, R., Noval, N., & Tumanggor, A. H. U. (2022). Optimization of the formulation of

fast disintegrating tablets (FDT) of diphenhydramine Hcl with Ac-di-sol as a superdisintegrant and mannitol as a filler. *Indonesian Journal of Pharmacy & Science*, *5*(1), 8–19. Https://Doi.Org/10.52216/Jfsi.Vol5no1p8-19

Rohani, R., Mayasari, D., & Rijai, L. (2021). Study on the concentration of ethanol extract of Karamunting leaves (Melastoma malabathricum L) in cream preparations on physical properties and antioxidant activity. *Proceedings Of Mulawarman Pharmaceuticals* Conferences, *14*(10), 272–279. Https://Doi.Org/10.25026/Mpc.V14i1.584

Saryanti, D., Setiawan, I., & Safitri, R. A. (2019). Optimization of Stearic Acid and Tea in the Preparation Formula of Kepok Banana Peel Extract Cream (Musa Paradisiaca L.). *Indonesian Journal of Pharmaceutical Research*, *1*(3), 225–237. Https://Doi.Org/10.33759/Jrki.V1i3.44

Siregar, E. D. N. F., Oktiani, B. W., Kurniawan, F. K. D., Aspriyanto, D., & Wardani, I. K. (2024). Toxicity Test of Karamunting Leaf Extract (Rhodomyrtus Tomentosa (Aiton) Hassk.) Against the heart of the Wistar rat. *Journal of Dentistry*, *Viii*(2), 90–96. Https://Ppjp.Ulm.Ac.Id/Journals/Index.Php/Dnt/Article/View/13117/7176

Tussabaria Siregar, H., Yuniarti, R., Indrayani Dalimunthe, G., & Sari Lubis, M. (2024). Determination of Spf (Sun Protection Factor, Ethanol Extract Of Karamunting Fruit (Rhodomyrtus Tomentosa (Aiton) Hassk), Determination Of Spf (Sun Protection Factor, Ethanol Extract Of Caramunting Fruit (Rhodomyrtus Tomentosa (Aiton) Hassk). *Farmasainkes*, *3*(2), 183–193.