

FORMULATION OF SOLID SOAP EXTRACT OF LEMONGRASS (*Cymbopogon nardus* L. Rendle)

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ABSTRACT

Background: Lemongrass (*Cymbopogon nardus* L. Rendle) is a plant that produces commercially available soaps in various shapes, colors, sizes, and aromas, demonstrating the versatility of lemongrass (*Cymbopogon nardus* L. Rendle), a traditional and increasingly popular skin cleanser. Lemongrass is also known to contain essential oils such as citronellal, citronellol, and geraniol, which have a distinctive aroma. **The** purpose of this study was to determine how to formulate solid bath soap using lemongrass (*Cymbopogon nardus* L. Rendle) leaf extract and how to conduct a physical evaluation test of solid bath soap preparations using lemongrass (*Cymbopogon nardus* L. Rendle) leaf extract. This type of research is an experimental laboratory. **The** method uses ethanol as a solvent, the maceration extraction method uses 96% ethanol as a solvent. **The** research stages include sample processing, preparation preparation, and physical evaluation tests. The results of this study showed that the organoleptic test results obtained were solid bath soap that was green in color, had a distinctive aroma, had a smooth texture, and was in solid form. The homogeneity test for all formulas was declared homogeneous, which is indicated by the absence of coarse grains. The pH test results for F1 were 8.91, F2 9.03 and F3 9.11. The foam height produced was F1 (100 mm), F2 (110 mm) and F3 (120 mm). **conclusion** is that the physical examination of the solid bath soap shows that the solid bath soap does not meet the pH test requirements for formula one, although lemongrass leaf extract (*Cymbopogon nardus* L. Rendle) can be processed into solid bath soap.

INTRODUCTION

Soap as one of the body cleansers used by the community and serves to help clean dirt on the skin, including sweat and also cosmetic residues. The use of soap to clean the skin is increasing and diverse among the public. Soap preparations are generally divided into two types such as solid soap and liquid soap. The types of solid soap are opaque soap, translucent and transparent soap. The use of soap with chemical content on the skin can reduce or even eliminate the function of skin bacteria to maintain moisture which can cause dry and uncomfortable skin (Zulbayu, 2020). One of the non-food items that is very important and common for people to use and maintain personal hygiene is soap. Besides being used to maintain personal hygiene, soap can also be used to treat skin disorders caused by bacteria or fungi. The two most commonly used types of soap are liquid soap and solid soap, based on their physical form (Widyasanti, 2019).

Cosmetics are compounds or ingredients that have the ability to alter appearance, enhance attractiveness, nourish, cleanse and protect. Bath soap is one of the most important cosmetics for skin care. By using sodium or potassium compounds combined with fatty acids from vegetable or animal fats in liquid, soft or hard form, foaming or without additives such as perfume, making soap a skin cleanser that is safe to use and does not irritate the skin (Hilmarni, 2024).

Another definition of soap is the process in which fatty acids react with an alkaline base (NaOH or KOH), producing solid soap when reacting with NaOH and liquid soap when reacting with KOH. A good soap should have strong cleaning ability and be durable in a wide range of temperatures and water hardness levels. To maximize usage (user cycle), a good bar of soap should be solid and have strong physical qualities. It should also be sufficiently resistant to water absorption (water reabsorption) when not in use. For a bar of soap to maintain its cleaning effectiveness, it must be able to produce sufficient lather (Rashati, 2022).

Soap contains surfactants, which are oleochemical derivatives that can bind to a mixture of fat and water because one of the molecules has a hydrophilic group (polar part that likes water) or the other molecule has a hydrophobic group (non-polar part that likes oil or fat). By reducing the surface tension of water, surfactants facilitate the removal of dirt from the skin (Pangestika, 2021). The process

of making bath soap involves the reaction and fatty acids from vegetable or animal fats with NaOH or KOH. Because both liquid and solid soap can produce foam. With various additives, including softeners, fragrances and other non-toxic ingredients, soap functions as a cleanser (Prabawa, 2017). One way to prevent and protect the skin from bacterial diseases is by using soap. Chemical interactions between potassium or sodium and fatty acids from vegetable or animal fats produce soap a cleanser (Idrawati, 2022).

Native to tropical climates, lemongrass leaves are a plant with antimicrobial properties that improve skin health by reducing acne. The lipophilic compounds contained in lemongrass leaves have the ability to penetrate the cell membrane of bacteria. Lemongrass leaves have a number of active substances that provide antimicrobial properties. Chemical substances including polyphenols, alkaloids, flavonoids and essential oils are found in lemongrass leaves (*Cymbopogon nardus* L. Rendle). Because lemongrass leaves also contain essential oils, alkaloids and flavonoids that have antibacterial properties, lemongrass leaves can be utilized to make gel preparations and other acne treatment solutions that are safe, practical and practical (Sarlina, 2017). Lemongrass leaves are medicinal plants that contain flavonoid compounds which are one type of antioxidant and have heat-sensitive properties (Nurwanti et al., 2024).

Described as a salt compound containing fatty acids used for body cleansing in solid form, foaming with or without other additions and not irritating the skin in the Indonesian National Standard (SNI) 1994 (Sukawaty, 2016).

Based on the description above, it shows that bioactive compounds such as flavonoids, tannins and alkaloids present in lemongrass leaves are known to provide antibacterial, antifungal and good effects for skin health and essential oil content in lemongrass leaves such as citronellal, citronellol and geraniol have a distinctive aroma. Therefore, a solid soap formulation study of ethanol extract of lemongrass leaves was conducted to utilize the synergism or cooperation of active compounds such as flavonoids, essential oils, tannins and alkaloids in inhibiting bacterial growth on the skin.

METHODS

Research Design

This type of research is Laboratory experimental, namely lemongrass leaves (*Cymbopogon nardus* L. Rendle) formulated in the form of solid bath soap preparations with formulations I, II and III, evaluating the physical characteristics of each preparation in the form of organoleptic, homogeneity, pH and foam height.

Time and Place of Research

This research was conducted at the Baubau Polytechnic Pharmacy Laboratory and Mandala Waluya Kendari City in June to August 2025.

Tools and Materials

The tools used in this study include glass jars, wooden stirrers, glass containers, plate glass, rotary evaporators, blenders, soap molds, handmixers, horn spoons, analytical balances, stirring rods, 100 mm funnels, 60 mm funnels, 1000 mL beakers, 250 mL beakers, 100 mL beakers, 100 mL measuring cups, 50 mL measuring cups and plastic funnels

The materials used in this study are lemongrass leaf extract (*Cymbopogon nardus* L. Rendle) distilled water, alcohol, 96% ethanol, coconut oil, NaOH, olive oil, palm oil and filter paper are the materials used in this study.

Sampling

Lemongrass (*Cymbopogon nardus* L. Rendle) leaf samples were taken from Topa Hamlet, Talaga Baru Village.

Working Procedure

Sample Preparation

Lemongrass (*Cymbopogon nardus* L. Rendle) leaf material was picked to remove dirt and stems, lemongrass leaves were selected and sabotaged. The samples came from Topa Hamlet, Talaga Baru Village. After cleaning, they were drained and rinsed under running water. The leaves are then separated based on the stem and the lemongrass leaves are divided into separate parts with the stalk and the leaves are dried using sunlight for five to ten days or until completely dry. After drying, the sample was ground into powder.

Preparation of Lemongrass Leaf Extract (*Cymbopogon nardus* L. Rendle).

The maceration process is used to prepare ethanol extract of lemongrass leaves (*Cymbopogon nardus* L. Rendle). Lemongrass leaves (*Cymbopogon nardus* L. Rendle) were weighed as

much as five hundred grams, placed in a glass container, immersed in five liters of 96% ethanol, then macerated using a macerator for the first two hours of stirring, then allowed to stand for twenty-two hours. Filter paper was used to filter the extract and 96% ethanol was used to macerate again for two hours. The second stirring involved soaking for 22 hours. After the liquid extract was collected, the extract was evaporated on a water bath to produce a thick extract (Panaungi, 2022).

Formulation of Lemongrass Leaf Extract (*Cymbopogon nardus* L. Rendle)

Table 1. Formulation of Lemongrass Leaf Extract (*Cymbopogon nardus* L. Rendle)

Source: Primary Data, 2025.

No.	Material	Weight			Function
		Formulation I	Formulation II	Formulation III	
1.	Lemongrass leaf extract	7 g	8 g	9 g	Active substance
2.	NaOH	14,35 g	14,35 g	14,35 g	Base soap
3.	Olive oil	50 g	50 g	50 g	Softener
4.	Coconut oil	30 g	30 g	30 g	Producer foam
5.	Plam oil	20 g	20 g	20 g	Hardener soap
6.	Aquadest	ad. 300 mL	ad. 300 mL	ad. 300 mL	Solvent

Description:

F1 : Solid soap formulation containing 7 grams lemongrass leaf extract

F2: Solid soap formulation containing 8 grams lemongrass leaf extract

F3: Solid soap formulation containing lemongrass leaf extract 9 grams

The process of making solid bath soap all the

necessary tools and equipment must be prepared before the ingredients are weighed according to Table 1 to make solid bath soap. In Formula 1 lemongrass leaf extract is 7 grams, Formula 2 lemongrass leaf extract is 8 grams and Formula 3 lemongrass leaf extract is 9 grams. Lemongrass leaf extract as an active substance is put into a 1000 mL beaker and then stirred until homogeneous after that NaOH solution is added as a soap base as much as 14.35 grams after stirring until homogeneous after that olive oil is added as a softener as much as 50 grams and then stirred again until everything is flat after homogeneous, coconut oil is added as a foam producer as much as 30 grams and then stirred again until homogeneous again added plam oil as a soap hardener as much as 20 grams. Furthermore, a hand blender is used to stir until the mixture is homogeneous until it reaches the trace point, which is the point where the soap has formed and thickened. After that, fill the mold with soap and let it sit for one to three days.

Physical Evaluation Test

Organoleptic Test

Organoleptic testing is carried out to observe the color, shape and aroma of solid bath soap preparations (Lau et al., 2021).

Homogeneity Test.

The homogeneity test was carried out by taking a small amount of solid bath soap preparation from the extract and then applying it to the preparation glass, then observing whether there were particles and recording the results obtained. The criteria for homogeneous soap is that there are no visible grains in the soap (Rusli, 2019).

pH test

pH testing is done by dissolving 1 gram of soap into 10 mL of distilled water in a beaker. Furthermore, the calibrated pH meter is dipped in liquid. The pH degree obtained is observed and the results are recorded. Based on SNI requirements, the pH value of solid bath soap is 9-11 (Panaungi, 2022).

Foam Height Test

The fourth test involves measuring the foam height of the soap preparation. Foam is an important element in measuring the quality of soap that has been made, because it can help in the cleaning process and spread the aroma of soap used on the skin. Based on SNI requirements, the foam height in solid soap should be 13-220 mm (Panaungi, 2022).

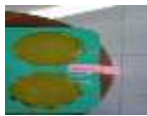
RESULTS & DISCUSSION

Lemongrass plants are herbal plants that fulfill belonging to the grass type and are a type of plant with a height reaching 50 to 100 cm. Lemongrass plants (*Cymbopogon nardus* L. Rendle) have parts including roots, stems and leaves which are components of lemongrass plants. Essential oils contained in lemongrass stems are often used as kitchen spices with a fragrant aroma, while lemongrass roots are also usually used in traditional medicine (Yuliningtyas, 2019). Lemongrass leaves also contain essential oils containing citral and geraniol. Curryophyllene contained in lemongrass is antibacterial, antifungal, anti-inflammatory, antitumor and also as an anesthetic while citral is antiseptic and antihistamine (Sapitri, 2021).

The results of the maceration process using initial stirring for two hours in a macerator, the mixture was allowed to stand for twenty-two hours. The extraction results were filtered using filter paper, then remacerated using 96% ethanol for 2 hours. In the second stirring, soaking was carried out for 22 hours (Panaungi, 2022). The maceration method is carried out by immersing the simplisia powder in a liquid solvent. The extraction process is carried out for approximately 3 days of soaking process with occasionally stirring the rendamen so that it can be mixed with the solvent. After maceration, the filtrate is collected and evaporated using a Rotary Evaporator to obtain ethanol extract of lemongrass leaves (*Cymbopogon nardus* L. Rendle). after the evaporation process the extract is then weighed and then put into a glass container.

Solid bath soap is one of the essential items and is often used by humans to clean themselves. Soap can not only be used to clean the skin. But it can also eliminate bacteria on the skin. In the research of making solid bath soap using ethanol extract of lemongrass leaves (*Cymbopogon nardus* L. Rendle) after the process of making solid bath soap then tested by physical evaluation preparations using a number of tests, such as organoleptic, homogeneity, pH and foam height.

Table 1. Organoleptical Test Results

Formula	Image	Odor	Shape	Color
<i>F1</i>		<i>Typical lemongrass leaves</i>	<i>Solid</i>	<i>Dark green</i>
<i>FII</i>		<i>Typical lemongrass leaves</i>	<i>Solid</i>	<i>Dark green</i>
<i>FIII</i>		<i>Typical lemongrass leaves</i>	<i>Solid</i>	<i>Dark green</i>

Source: Primary Data, 2025.

Organoleptic tests on formulas 1, 2 and 3 are the results of organoleptic tests or solid bath soap preparations after being made can be seen in solid bath soap preparations, namely formulations 1, 2 and 3 which show that formula F1 is solid, smells typical of lemongrass leaves and is dark green in color. In F2 is solid, smells typical of lemongrass leaves, dark green in color. F3 is solid, smells typical of lemongrass leaves and is dark green in color.

Table 2: Homogeneity Test Results

<i>Formula</i>	<i>Image</i>	<i>Value</i>	<i>Standard Value of body wash</i>
<i>F1</i>		<i>Homogeneous</i>	<i>Homogeneous</i>
<i>FII</i>		<i>Homogeneous</i>	
<i>FIII</i>		<i>Homogeneous</i>	

Source: Primary Data, 2025

The homogeneity test on formulas 1, 2 and 3 is the result of the homogeneity test or solid bath soap preparation after being made can be seen in the bath soap preparation on which shows that Formulas 1, 2 and 3 which show that the formulation is homogeneous and meets the standards. The preparation does not meet the homogeneity standard if it contains lumps or granules.

Table 3. pH Test Results

<i>Formula</i>	<i>Image</i>	<i>Bath Soap Yield Value</i>	<i>Bath Soap pH Standard Value</i>
<i>F1</i>		<i>8, 91</i>	<i>9-11</i>
<i>FII</i>		<i>9, 03</i>	
<i>FIII</i>		<i>9, 11</i>	

Source: Primary Data, 2025

The pH test in formulas 1, 2 and 3 is the result of the pH test or solid bath soap preparation after it can be seen in the solid bath soap preparation, namely formulations 1, 2 and 3 which show that formula F1 has a pH value of 8, 91 and does not meet the preparation testing standards. In formula F2 has a pH value of 9, 03 and meets the preparation testing standards. Formula F3 has a pH value of 9, 11 and meets the dosage testing standards on solid bath soap.

Table 4. Foam Height Test Results

<i>Formula</i>	<i>Image</i>	<i>Bath Soap Yield Value</i>	<i>Standard Value of Bath Soap</i>
<i>F1</i>		<i>100 mm</i>	<i>13-220 mm</i>
<i>FII</i>		<i>110 mm</i>	
<i>FIII</i>		<i>120 mm</i>	

Source: Primary Data, 2025

The foam height test in formulas 1, 2 and 3 is the result of the foam height test or solid bath soap preparation after making it can be seen in the solid bath soap preparation, namely formulations 1, 2 and 3 which show that formula F1 has a foam height value of 100 mm and meets the preparation testing standards. In formula F2 has a foam height value of 110 mm and meets the preparation testing standards and in formula F3 has a foam height value of 120 mm. Where the three formulas meet the foam height standard.

CLOSING

Based on the results of the research that has been carried out, namely solid bath soap from lemongrass leaves (*Cymbopogon nardus* L. Rendle), it can be concluded that the process of making solid bath soap using lemongrass leaf extract (*Cymbopogon nardus* L. Rendle) can be formulated into solid bath soap. Conducted through physical valuation assessment of solid bath soap preparations. The results of organoleptical analysis in the form of solid soap are dark green in color, distinctive aroma, fine texture and solid shape. The homogeneity test was carried out to produce homogeneous data. The pH test with F1 concentration is 8, 91 F2 is 9, 03 and F3 is 9.11. The foam height test has a height of F1 which is 100 mm, F2 which is 110 mm and F3 which is 120 mm. The three formulations in formula one for the pH test did not meet the requirements of the physical evaluation test for a good solid bath soap preparation.

It is recommended to conduct further research using various procedures to observe the physical assessment test on solid bath soap preparations made from ethanol extract of lemongrass leaves (*Cymbopogon nardus* L. Rendle). By using stability testing methods and varying the concentration of ingredients.

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