

## Formulation of Aromatherapy Balm from Essential Oil of Lemongrass (*Cymbopogon citratus* (DC.) Stapf)

### Formulasi Balsam Aromaterapi dari Minyak Atsiri Sereh Dapur (*Cymbopogon citratus* (DC.) Stapf)

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#### ABSTRACT

Lemongrass kitchen (*Cymbopogon citratus* (DC.) Stapf) is one type of spice native to Indonesia containing essential oil that can be used as perfumes, cosmetics, food additives and medicines. The study aims to formulate essential oils of lemongrass kitchen to aromatherapy balm preparations. Essential oils were obtained by steam distillation. The aromatherapy balm preparations were formulated by paraffin liquid, methanol, cera alba and vaseline album, and varying concentrations of essential oil of 0% (F1), 3% (F2), 6% (F3) and 12% (F4). The aromatherapy balms were evaluated their physical quality with organoleptic tests, homogeneity tests, pH tests, GC-MS tests, and hedonic tests. Data were analyzed using one way ANOVA. The results showed that all aromatherapy balm formulas produced an organoleptic test that was yellowish white with a semi-solid form, smell like aromatherapy types. Homogeneity test showed F1-F4 did not change shape during storage. The pH test of the four formulas ranging from 5.27 to 6.89 met the skin neutral pH requirements. The preference test of 40 panelists showed that the panelists preferred the F4 which had a sharper aroma of aromatherapy essential oils. The results show that essential oil of lemongrass kitchen can be formulated to aromatherapy balm preparations with concentration of 12% of lemongrass, the best among the four formulas.

**Keywords:** aromatherapy, balm, essential oil, lemongrass kitchen

#### ABSTRAK

Sereh dapur (*Cymbopogon citratus* (DC.) Stapf) merupakan salah satu jenis tanaman rempah rempah asli Indonesia yang memiliki kandungan minyak atsiri yang dapat dimanfaatkan sebagai parfum, kosmetik, bahan tambahan makanan dan obat. Tujuan

*penelitian ini untuk mengetahui apakah minyak atsiri sereh dapur dapat diformulasikan sebagai sediaan balsam aromaterapi dan mengetahui evaluasi fisik sediaan balsam aromaterapi dari minyak atsiri sereh dapur. Minyak atsiri yang diperoleh dengan cara destilasi uap, kemudian diformulasikan menjadi balsam aromaterapi dengan konsentrasi 0, 3, 6, dan 12%. Evaluasi fisik yang dilakukan berupa uji organoleptik, uji homogenitas, uji pH, uji GC-MS, dan uji hedonik. Hasil penelitian menunjukkan bahwa formula balsam aromaterapi menggunakan minyak atsiri menghasilkan uji organoleptik yaitu pada warna, memiliki warna putih agak kekuningan dengan bentuk setengah padat dan berbau khas aromaterapi. Uji homogenitas menunjukkan F1-F4 selama penyimpanan tidak mengalami perubahan bentuk. Uji pH dari keempat formula berkisar 5,27-6,89 memenuhi syarat pH netral kulit. Uji kesukaan dari 40 panelis menunjukkan bahwa panelis lebih menyukai formula F4 dengan konsentrasi lebih basar yaitu 12%, yang bau khas minyak atsiri sereh dapur aromaterapi yang lebih tajam. Hasil penelitian ini dapat disimpulkan pada balsam aromaterapi dengan konsentrasi 12% minyak atsiri sereh dapur menjadi yang paling baik dari ke empat formula.*

**Kata kunci:** aromaterapi, balsam, minyak atsiri, sereh dapur

## Introduction

Indonesia is a country that has a diversity of plants that can be used as a source of essential oil. Today, essential oils have been used as perfumes, cosmetics, food additives and medicines.

Essential oils in the health sector can be used as an antiseptic, anti-inflammatory, analgesic, and sedative. Essential oils have now been developed and become an Indonesian export commodity which includes essential oils from patchouli, vetiver, nutmeg, cloves, lemongrass, cananga, eucalyptus, sandalwood, pepper, and lemongrass.

Essential oils are known as liquid compounds generally obtained from plant parts by steam distillation. Essential oil that has the potential to be developed is the citronella plant. Lemongrass (*Cymbopogon citratus* (DC.) Stapf) is a plant that has many benefits. The resulting citronella oil is used for the treatment of minor ailments, such as

headaches, stomach, influenza, rheumatism, stomach cramps, aches and relaxation massage (Zulkarnain, 2012).

Balsam is known as an ointment-like liniment, while ointment is known as a semi-solid preparation which is intended for use on the skin or mucous membranes (Zulkarnain, 2012).

Balsam is a preparation of various aromatic gummy substances used to heal and soothe, applied externally as a medicine or reduce irritation. The benefits of balsam include treating colds, abdominal pain or heartburn, both in adults and children topically (Anief, 2008).

Evaluation of the physical properties of topical preparations is necessary to ensure that the preparation has a good pharmacological effect and does not irritate the skin when used. The physical properties of the preparation affect the achievement of the expected pharmacological effect. The parameters

for testing the physical properties of balsam include organoleptic, homogeneity, pH and hedonic test (Wahyuddin, 2015).

Based on research conducted by Hasrita Maghfirah et al, 2018 about "Aromatherapy balm formulation from sembung (*Blumea balsamifera* L.) leaf extract" the results obtained show that the essential oil of sembung can be formulated in balsam with a concentration of 0%, 10 %, 12% and 14%. The ingredients formula used are sembung leaves (active substance), liquid paraffin (binding agent), vaseline album (base), menthol (flavoring) and cera alba (emulsion stabilizer). Based on research conducted by Muchtaridi, 2012 "Research on the Development of Essential Oils as Aromatherapy and Their Potential as Pharmaceutical Preparations Products", the results obtained show that essential oils can be used as aromatherapy. Analysis of the active compounds was carried out by integrating SPE-GC / MS taken from animal blood after inhaling with essential oils. The active compounds which are considered as aromatherapy are 1,8-cineole, linalool, methyl cinnamate, citronellol, citronellal, and citral.

## **Research Methods**

### *Instruments and Materials*

The tools used in this study were a knife, a mask (Sensi), gloves (Sensi), a scale, a dropper (Pyrex), a horn spoon, a water bath, a porcelain cup, a measuring cup (Pyrex), a stirring rod (Pyrex),

spatula, parchment paper, plastic pot, watch glass (Pyrex), glass beaker (Pyrex), funnel (Pyrex), lumping (Pyrex), stove (Rinai), pH meter (Ohaus), spatula, set of steam distillation apparatus (Water Still W4L).

The materials used in this study were citronella essential oil, cera alba, paraffin liquidum (SAFC), menthol, vaseline album.

### *Experiments*

#### 1. Plant authentication

Plant determination are carried out at Herbarium Bogoriense, Botany Division, Biology Research and Development Center-LIPI Cibinong Jl.Raya Jakarta-Bogor KM. 46 Cibinong Bogor, 16911-West Java, to ensure that the plants used are correct.

#### 2. Preparation of plant materials

10 kg of kitchen lemongrass is cleaned, then the washed lemongrass leaves and stems are removed. Then do the chopping of lemongrass leaves and stems, by chopping the leaves and stalks of the kitchen lemongrass into small pieces to make it easier to put them in the distillation tool.

#### 3. Essential oil extraction

Essential oils are carried out using the steam distillation method. This method is chosen because the production of essential oils will be greater (Hendartomo, 2005).

The process is carried out using the steam distillation method in which the kitchen lemongrass plant, as much as 10 kg of cut lemongrass leaves, is put into a distillation device,

then distilled for 4 hours at a temperature of 100°C. After the distillation process is complete. The distillation liquid is transferred to a separating funnel, then wait ( $\pm$  30 minutes) until the solution becomes clear and two layers are visible (Wogo, et al., 2016).

#### 4. Evaluation of essential oil constituents by GC-MS

The essential oil that has been obtained is then tested for the essential oil content using GC-MS, to determine what content is in the essential oil of kitchen lemongrass. Especially whether the citronella essential oil is obtained, contains citral compounds or not (Wogo, et al., 2016).

#### 5. Aromatherapy balsam formulation for kitchen lemongrass essential oil

The formulation is presented in Table 1.

**Table 1.** Aromatherapy essential oil of kitchen lemongrass oil formulation

Materials	Formula			
	F1	F2	F3	F4
Lemongrass oil	-	3%	6%	12%
Parafin. liq	8 g	8 g	8 g	8 g
Menthol	6 g	6 g	6 g	6 g
Cera alba	6 g	6 g	6 g	6 g
Vaselin album	20 g	20 g	20 g	20 g

#### 6. Production of balsam

Weigh all the ingredients, namely paraffin liq (binder), vaseline album (Balsam Basis), menthol (aroma giver) and cera alba (emulsion stabilizer), then melt it on a water

bath, after all the ingredients are melted and mixed, add the oil extract essential lemongrass into the balsam as much as 0%, 3%, 9% and 12% then stir until it is homogeneous and let it cool and put it in a container that is already available (Wahyuddin, 2015).

#### 7. Physical evaluation of balsam preparations

Organoleptic testing is carried out by observing the preparation from the shape, smell and color of the preparation. The specifications of the preparation that must be met are that of a semi-solid dosage form, the color must be in accordance with the specifications at the time of initial manufacture and the smell is not rancid (MOH, 2014).

For homogeneity test, 1 gram of balsam and then smeared on a piece of glass or other suitable transparent material must show a homogeneous arrangement. A homogeneous preparation is characterized by the absence of lumps in the basting result, an even structure and a uniform color from the starting point of basting to the end point of basting, the top, middle and bottom of the balsam container (MOH, 2014).

Test the pH of balsam by inserting a pH meter into the preparation, then a numeric scale will appear that will move randomly, wait until the number stops and does not change. The results of the pH value on the balsam will be seen on a digital display (Anonymous, 1985). The pH of the balsam preparation must match

the pH of the skin, namely 4-6 (Tranggono and Latifa, 2007).

The hedonic test was carried out to find out the public opinion regarding the physical quality of the aromatherapy balm from citronella essential oil that has been made by Panelists which was used by 40 people. The number of levels of preference varies from 1-9 depending on the specified quality range (Wahyuddin, 2015).

#### Data Analysis

The data obtained in this study were analyzed using descriptive analysis method. Data can be presented in tables, graphs, or pictures in narrative form according to the results given.

#### Results and Discussion

Based on the identification carried out at the Herbarium Bogoriense in the Botanical Sector of the Biology Research Center-LIPI Bogor, kitchen lemongrass obtained from a private garden in Cibodas Village, Sagaranten District, Sukabumi Regency, West Java, is a type of *Cymbopogon citratus* (DC) Stapf of the Poaceae.

In this study, the plant used was the kitchen lemongrass plant *Cymbopogon citratus* (DC). Stapf previously washed the leaves and stems first, then put them in a steam distillation device, which was carried out at the Research Institute for Medicinal and Aromatic Plants (Balitro) Jl. Student army No. 3 Menteng. West Bogor. The process of essential oil isolation is

carried out by the distillation method-water vapor with a test method based on SNI 01-0005-1995. 10 kg of used citronella and oil obtained as much as 30 ml.

The analysis of kitchen lemongrass essential oil was carried out at the Jakarta Regional Health Laboratory (LABKESDA) using the Agellint Technologies 7890 Gas Chromatograph Instrument with the MGNONWAX file method, with a flow rate of 0.6 ml/minute, a temperature of 60°C as a result of the analysis of kitchen lemongrass essential oil, as shown in Table 2.

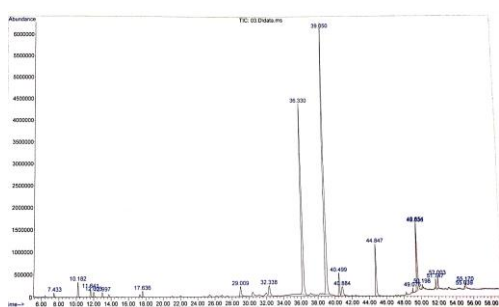
**Table 2.** Results of the analysis of lemongrass essential oil

RT (min)	Compound	Quantity (%)
10.128	β-myrcene	1.59
29.006	Linalool	1.68
32.337	Caryophyllene	2.08
36.328	Neral	27.55
39.052	Citral	38.81
40.499	Geranyl acetate	2.98
40.883	γ-murolene	2.11
44.847	Geraniol	6.67
49.636	Benzyl benzoate	4.64
49.652	Benzyl benzoate	5.79

Based on Table 2, it was known that the compound with the highest presentation in lemongrass essential oil was citral. Where according to research journals (Sufyan et al., 2018) states that citral compounds function as aromatherapy.

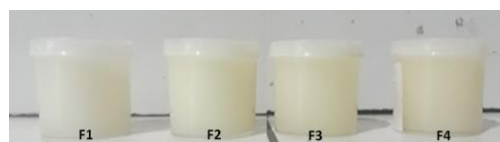
This aromatherapy preparation of lemongrass essential oil was made into 4 formulas by varying the concentration of lemongrass. The

manufacture of aromatherapy balms began with the preparation of tools and materials, then proceed with weighing the ingredients according to the desired concentration variation. The ingredients used were liquid paraffin as a binder, menthol as flavoring, cera alba as a stabilizer for balsam preparations, vaseline album as the basis for the balsam preparation and citronella essential oil as an active substance as well as an antioxidant, each ingredient was melted on a water bath with temperature. 50-60°C into a liquid perfectly mixed. The melted balsam base with the weighed citronella essential oil. Before mixing, the base is left to stand for a while, this is to reduce the temperature of the balsam base. At a temperature of 35- 40°C mixed the essential oil of kitchen lemongrass into the balsam base and stir evenly, the addition of essential oil at a temperature of 35-40 °C was carried out so that the oil did not evaporate and avoid scouring the active substances in the lemongrass essential oil and entered into a plastic pot and let stand until the balsam texture half solid.



**Figure 1.** Chromotogram of lemongrass essential oil

Organoleptic testing was carried out observing the dosage form, odor and color of the preparation. According to the Indonesian Ministry of Health, the specifications of the preparation that must be met are to have a semi-solid dosage form, the color must be in accordance with the specifications at the time of initial manufacture and have a distinctive smell. Testing is done once a week for 1 month.



**Figure 2.** Aromatherapy balm

**Table 3.** The organoleptic of the aromatherapy balsam

Formula	Odor	Texture	Color
<b>F1</b>	Mentol	Semi-solid	RAL 9010 pure white
<b>F2</b>	Lemon-grass	Semi-solid	RAL 9010 pure white
<b>F3</b>	Lemon-grass	Semi-solid	RAL 9010 pure white
<b>F4</b>	Lemon-grass	Semi-solid	RAL 9010 pure white

The results of the homogeneity test for the essential oil of lemongrass in room temperature storage for 4 weeks had good homogeneity on the 4 formulas. In storage for 4 weeks, no visible granule spots were seen on the slide, in other words the balsam was made homogeneous.

The pH test results showed that the pH of the four formulas had decreased because the temperature factor had a major effect on the formation of acid levels where low storage temperatures were obtained in low concentrations of acid, because of the inhibition of growth of acid bacteria, and vice versa. Preparations with a higher pH, causing irritation and dry skin. Topical preparations usually had a skin pH between 4.5 - 6.5 pH measurements carried out at room temperature without replications.

**Table 4.** Result of pH test.

Formula	Week			
	I	II	III	IV
<b>F1</b>	5.27	5.25	5.21	5.01
<b>F2</b>	6.09	5.55	5.27	5.11
<b>F3</b>	6.22	5.38	5.13	5.29
<b>F4</b>	5.98	6.06	5.35	5.24

Hedonic test is a test method used to measure the level of liking for a product using an assessment sheet. Obtained data was calculated by looking for the mean results for each panelist at the 95% confidence level to calculate the interval of the mean quality value preferred by the panelists based on color, smell and texture.

The hedonic test observations showed that the mean values gave for F1-F4 include good color, smell and texture. Based on the Table 6, it showed that the color value interval in the aromatherapy balsam preparation of lemongrass essential oil was the highest at F4 with a score of 7 (likes), while in F1,

F2 and F3 the scores obtained are the same, with a score of 6 (rather like). Table 6 above shows that the highest odor value interval in the aromatherapy balsam preparation of kitchen lemongrass essential oil was at F4 with a score of 8 (really likes), while the smallest odor value was at F1 with a score of 3 (dislike), while at F2 and F3, the scores obtained were the same, with a score of 6 (rather like). Based on the Table 6, it also showed that the texture value interval in the aromatherapy balsam preparation of citronella essential oil was the highest at F4 with a score of 7 (likes), while the smallest texture value was in F1 and F2 with a score of 5 (neutral), while in F3 the score obtained was 6 (rather like).

**Table 5.** Results of hedonic test

Formula	Category		
	Color	Odor	Texture
<b>F1</b>	6	3	5
<b>F2</b>	6	6	5
<b>F3</b>	6	6	6
<b>F4</b>	7	8	7

Thus, the mean value given from 40 panelists, based on the results of the hedonic evaluation that has been done, it can be concluded that F4 from aromatherapy balsam preparations is preferred by the panelists compared to formulas 1, 2 and 3.

## Conclusion

Based on the results of the research and data analysis, it can be concluded lemongrass essential oil can be formulated as an aromatherapy balm.



Also, the best formulation of kitchen lemongrass aromatherapy balsam was F4 with a concentration of 12% based on odor, color and texture parameters. The results of the observation of the organoleptic test, namely the color, have a white color (RAL 9010 pure white) with a semi-solid form and smell like aromatherapy. Homogeneity test showed F1-F4 during storage did not change shape. The pH test of the four formulas ranged from 5.27 to 6.89 which fulfilled the skin pH requirements. The preference test of 40 panelists showed that the panelists preferred the F4 formula with a more basic concentration of 12%, which has a sharper smell of lemongrass essential oil from aromatherapy kitchen.

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