
Formulation Aroma Therapy Balm Preparations Combination Red Ginger Essential Oils (*Zingiber officinale* Roscoe) and Essential Oil Of Leaves Lemongrass (*Cymbopogon nardus* (L) Rendle)

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Abstract

The essential oil combination of red ginger (*Zingiber officinale* Roscoe) and citronella leaves (*Cymbopogon nardus* (L.) Rendle) can be formulated as the most preferred balm and concentration preparation. Method type of experimental research. Experimental research is an experimental activity which aims to determine a symptom or influence that arises as a result of certain treatments. It was found in the organoleptic test that the preparation was in semi-solid form, dark yellow to pale yellow in color, with the aroma of mint and red ginger combined with citronella; the preparation is declared homogeneous; the pH of the aromatherapy balm with a combination of red ginger and citronella essential oils ranges from 5.23 – 5.63; the preparation does not cause irritation; and in the respondent's preference test, the F1 formula is more preferred. The essential oils of red ginger and citronella leaves with concentrations of 2.5%, 5%, 7.5% and 10% can be formulated into balm preparations. Test homogeneity and pH according to standars, there was no irritation in volunteers and the most popular balm preparation is formula F1 (containing 10% red ginger essential oil and leaves citronella concentration 2.5%).

Keywords: Aromatherapy Balm, Essential Oils, Red Ginger, Citronella Leaves

INTRODUCTION

Indonesia is a country that has a diversity of plants that can be used as a source of essential oils. The world's need for essential oils is increasing along with the increasing development of modern industries such as the perfume, cosmetics, food, aromatherapy and pharmaceutical industries (Umar and Jklr, 2021).

Essential oils are one of the results of advanced biosynthesis (metabolism) of the main results of the leaf photosynthesis process. Metabolic processes can take place in all parts of plant tissue such as roots, stems, skin, leaves, flowers, fruit and seeds. Since ancient times, essential oils have been a trade commodity between countries in the world. Therefore, many countries are looking at essential oil production by becoming producers and exporters of various types of essential oils, including Indonesia (Yuliana S, 2012).

The prospects for the essential oil market are very bright, especially now with the increase in countries importing essential oils. Several types of essential oils that Indonesia exports to various developed countries include ylang-ylang oil, vetiver, nutmeg, sandalwood, ginger, patchouli and eucalyptus.

Aromatherapy is a form of complementary and alternative medicine using essential oils. Aromatherapy can trigger changes in the limbic system so that it will affect heart rate, blood pressure, breathing, and the release of various hormones, causing a feeling of calm. Aromatherapy has an effect on reducing pain and anxiety, increasing energy and short-term memory, as well as relaxation (Widnyana, Subaidah, and Hanifa, 2021).

Essential oils are substances that give aroma to plants. Essential oils have volatile components in several plants with certain characteristics. The aroma components of essential oils quickly interact when inhaled, these compounds interact with the central nervous system, then this system will stimulate the nerves in the brain under equilibrium (Yuliana S, 2012). One plant that contains essential oils and has the potential to be developed is the citronella plant. Citronella (*Cymbopogon nardus* (L.) Rendle) is a plant that has many benefits. From the distillation of citronella leaves and stems, essential oil is obtained which is known in the trading world as Citronella oil. The main

compounds that make up citronella oil are citronella, citronellol and geraniol (Umar and Jklr, 2021). Lemongrass is a herbal plant from the Poaceae grass family. Apart from its culinary use, lemongrass also has analgesic medicinal benefits and is used throughout Indonesia. Lemongrass has also been processed to extract its essential oil for various aromatherapy purposes, rubbing oil to reduce pain and improve blood circulation.

Based on the research results of Nora Usrina (2018) "Formulation and Physical Evaluation of Balm Preparations from the Essential Oil of Lemongrass Leaves (*Cymbopogon nardus* (L) Rendle) with a 20% concentration of citronella leaf essential oil produces a good balm preparation. Based on research conducted, it was found that some citronella essential oils work as relaxants, sedatives and relieve pain (Usrina, 2018). Likewise with the ginger plant, the ginger plant has long been known and grows well in Indonesia. Ginger is one of the important spices. The rhizome is very widely used, including as a cooking spice, providing aroma and flavor to foods such as bread, cakes, biscuits, confectionery and various ginger drinks. It is also used in the medicine, perfume and traditional herbal medicine industries.

Ginger rhizome contains volatile oil, non-volatile oil and starch. Evaporated oil, also called essential oil, is the component that gives ginger its distinctive aroma (smell). Essential oils are composed of several components which include camphor, cineol, borneol, geraniol zingiberene, and zingiberol (Sofi Makiyah *et al.*, 2021).

Red ginger has benefits and uses that are commonly used, namely as a colic reliever in the stomach (carminative), vomiting reliever, seizure reliever, anti-hardening of the arteries, sweat laxative, anti-inflammatory, anti-microbial and parasitic, antipyretic, anti-rheumatic and pain reliever. Gingerol is a compound that provides a spicy taste which gives the characteristic warm effect of ginger. This compound is contained in the form of a yellowish oil. Gingerol has anti-inflammatory effects and antioxidant properties that are good for the human body. Based on the research results of Sinta Okta Lianda (2021) "Formulation and Evaluation of Stick Balm Preparations from Red Ginger Oleoresin (*Zingiber officinale* Rosc) as a Muscle and Joint Pain Reliever" Formula 3 with 10% (w/v) red ginger extract was chosen as the best formula because produces a better warm feeling. From the analysis test, the effect of ginger on pain produces the same role as mefenamic acid and ibu profen as a pain reliever (Okta Lianda, 2021).

Most Indonesian people use limited essential oils in the form of topical oil preparations (Widnyana, Subaidah, and Hanifa 2021). Therefore, it is necessary to innovate other preparations such as balms to increase user comfort and ease of application. Balm is a topical preparation that gives a warm feeling, this preparation is a semisolid which can give a soft and oily feel to the skin. Balm is an ointment preparation that is easy to apply (Warditiani *et al.*, 2020).

Evaluation of the physical properties of topical preparations needs to be carried out to ensure that the preparations have good pharmacological effects and do not irritate the skin when used. The physical properties of the preparation influence the achievement of the desired pharmacological effect. Parameters for testing the physical properties of the balm include organoleptic test, homogeneity test, pH test, irritation test and hedonic test (Olas Triana, 2019).

Based on the description above, seeing the many benefits of red ginger and citronella plants and the lack of optimal use of these plants, the author is interested in conducting research by combining it with red ginger essential oil with the research title "Formulation and Physical Evaluation of Red Ginger Essential Oil Combination Aromatherapy Balm Preparations (*Zingiber officinale* Roscoe) and Lemongrass Leaf Essential Oil (*Cymbopogon nardus* (L.) Rendle)" the author hopes that the therapeutic effects of these two essential oils can become an efficacious balm preparation, guaranteed quality, and affordable prices.

RESEARCH METHODS

The research method used in this scientific work is a type of experimental research. Experimental research is an experimental activity which aims to determine a symptom or influence that arises as a result of certain treatments. The special characteristic of experimental research is that there is an experiment or trial. The experiment is in the form of treatment or intervention on a variable. With this treatment, it is hoped that there will be changes or influences on other variables (Arief, 2008).

RESULTS AND DISCUSSION

The results obtained from the plant identification process carried out at the Medanese Herbarium, Department of Biology FMIPA USU showed that the plants used were red ginger (*Zingiber officianale* Roscoe) and citronella leaves (*Cymbophogon nardus* (L) Rendle).

Table 1. Results of Red Ginger and Citronella Essential Oil Yield

Sample	Fresh Weight (g)	Essential Oil (ml)	Yield Value
Red ginger	5000	8.6	0.17 %
Lemongrass	5000	5.8	0.116 %

In this research, essential oils were extracted from red ginger and citronella leaves using the water vapor method. The distillation process is carried out for > 5 hours and is counted when the first drop comes out (Rusli Ms, 2010). The essential oils of red ginger and citronella leaves can be seen in table 4.1 where from 5 kg of fresh red ginger 8.6 ml of essential oil is obtained and 5.8 ml of citronella leaves are obtained from 5.8 ml of essential oil with a respective yield of 0.17 % and 0.116 %.

Table 2. Results Test the Characteristics of Essential Oils

Test Sample (Essential Oil)	Parameter		
	Color	Specific Gravity	Solubility In Ethanol
Red ginger	Reddish brown	0.884 g/L	1:5 Clear
Lemongrass	Pale yellow	0.849 g/L	1:2 Clear

Based on the characteristic tests carried out, it was found that the color of red ginger essential oil was reddish brown, while the color of citronella leaf essential oil was pale yellow. Based on the analysis results, the specific gravity of essential oils from red ginger and citronella leaves are 0.939 and 0.849 respectively. From the table above, it can be seen that the solubility of essential oils from red ginger is 1:5 and citronella 1:2. The specific weight results obtained in this research are still in the range of specific weights listed in the characteristics requirements of the National Standardization Agency (BSN) for essential oils. Citronella (SNI-2385-2006) has a specific gravity in the range of 0.880-0.922 and ginger (SNI 06-1312-1998) has a specific gravity in the range of 0.872-0.889. The solubility test in ethanol gives an idea of whether an oil is soluble or not. The more easily the oil dissolves in ethanol, the more polar compounds the oil contains (Wibowo, Rustamsyah, and 2016).

Table 3. Table of Balm Organoleptic Test Results

Indicator	Formulas	Observations (Week to)	
		I	II
Texture	F0	Half Solid	Half Solid
	F1	Half Solid	Half Solid
	F2	Half Solid	Half Solid
	F3	Half Solid	Half Solid
	F4	Half Solid	Half Solid
	F0	White	White

Color	F1	Deep Yellow	Deep Yellow
	F2	Bright Yellow	Bright Yellow
	F3	Weak yellow	Weak yellow
	F4	Pale yellow	Pale yellow
Aroma	F0	Mint	Mint
	F1	Weak red ginger combined with citronella	Weak red ginger combined with citronella
	F2	Weak red ginger combined with citronella	Weak red ginger combined with citronella
	F3	Weak red ginger combined with sharp citronella	Weak red ginger combined with sharp citronella
	F4	Weak red ginger combined with sharp citronella	Weak red ginger combined with sharp citronella

Information :

- F0 : Blank without adding essential oil
- F1 : Contains 10% red ginger essential oil and 2.5% concentration of citronella leaves
- F2 : Contains 7.5% red ginger essential oil and 5% concentration of citronella leaves
- F3 : Contains 5% red ginger essential oil and 7.5% concentration of citronella leaves
- F4 : Contains 2.5% red ginger essential oil and 10% concentration of citronella leaves

Based on table 4.3, it shows that each balm has a semi-solid texture, yellow to pale yellow in color. The resulting aroma is a combination of *Oleum menthae* and citronella leaves, sharp to weak. The aroma of red ginger is almost invisible, covered by the sharp aroma of mint and citronella leaves.

Table 4. Aromatherapy Balm Homogeneity Test Results

Balm Formula	Homogeneous Test
F0	+
F1	+
F2	+
F3	+
F4	+

Information :

- (+) :Homogeneous
- (-) :Inhomogeneous

From the results of observing the homogeneity of the balm preparations on table 4.4, it shows that all the substances are mixed evenly in semi-solid form, the color is even, and there are no coarse grains on the glass object so that it can be stated that all the balm preparations are declared homogeneous.

Table 5. Aromatherapy Balm pH Test Results

Formulas	Standard pH	Test pH for 4 Weeks				Average	Note
		I	II	III	IV		
F0		5.53	5.60	5.58	5.50	5.55	M.S
F1		5.53	5.40	5.56	5.43	5.48	M.S
F2	4.5-6.5	5.50	5.23	5.60	5.53	5.47	M.S
F3		5.47	5.43	5.53	5.63	5.51	M.S
F4		5.53	5.53	5.63	5.60	5.57	M.S

Information :

- M.S ; Qualify
- T.S ; Not eligible

The pH test results for each of the balm formulations F0, F1, F2, F3 and F4 showed that the pH of the aromatherapy balm with a combination of red ginger and citronella essential oils ranged from 5.23 – 5.63. pH testing on preparations aims to determine the resulting pH value. From the data

in table 4.5, it can be seen that the pH of the preparations produced from the five formulas for four weeks is in the range of 5.23-5.6 with an average pH value of 5.47 - 5.57, which is said to meet the requirements because it still meets the skin pH value criteria. around 4.5-6.5. The pH value can affect the skin's absorption capacity which can cause irritation. If the pH value is too low it can cause irritation and if it is too high it can cause scaly skin. It can be concluded that the addition of essential oils and storage time does not affect the pH value (Kurniawati D, Noval, 2021).

Table 6. Balm Irritation Test Results

Formulas	Observation	Volunteer		
		1	2	3
F0	Redness	-	-	-
	Itchy rash	-	-	-
	Swollen	-	-	-
F1	Redness	-	-	-
	Itchy rash	-	-	-
	Swollen	-	-	-
F2	Redness	-	-	-
	Itchy rash	-	-	-
	Swollen	-	-	-
F3	Redness	-	-	-
	Itchy rash	-	-	-
	Swollen	-	-	-
F4	Redness	-	-	-
	Itchy rash	-	-	-
	Swollen	-	-	-

Information:

(+) :Irritation occurs

(-) :No irritation occurs

Irritation testing aims to determine whether the aromatherapy balm preparation with a combination of red ginger and citronella essential oils is safe to use with irritation reaction parameters when applied to the skin. Irritation reactions are characterized by rashes, swelling, itching or lumps in the applied area (Private 2020). Based on the table above, the results of irritation tests on 15 volunteers who were divided into five preparation groups, show that all volunteers gave negative results for irritation reaction parameters, and the parameters observed were redness of the skin, itching, or swelling of the skin. It can be concluded that the formulated aromatherapy balm is safe to use because it does not cause the above irritation parameters.

Table 7. Likeability Test Results

Formulas	Parameter			
	Really like	Like	Do not like it much	Do not like
F0	5	9	1	-
F1	11	4	-	-
F2	10	5	-	-
F3	4	11	-	-
F4	2	13	-	-

Information :

F0 : Blank without adding essential oil

F1 : Contains 10% red ginger essential oil and 2.5% concentration of citronella leaves

F2 : Contains 7.5% red ginger essential oil and 5% concentration of citronella leaves

F3 : Contains 5% red ginger essential oil and 7.5% concentration of citronella leaves

F4 : Contains 2.5% red ginger essential oil and 10% concentration of citronella leaves

The preference test was carried out to determine the opinions of local people regarding the level of preference for the aromatherapy balm preparation, a combination of red ginger essential oil and citronella leaf essential oil in each formula (Umar and Jklr, 2021). From the table above, the results of the respondents' data collection show that the final result is that the F1 formula is more preferred

CONCLUSION

Based on the results of the research and discussion, it can be concluded that: Essential oils of red ginger and citronella leaves with concentrations of 2.5%, 5%, 7.5% and 10% can be formulated into balm preparations. The most popular balm preparation is formula F1 (contains 10% red ginger essential oil and 2.5% concentration of citronella leaves).

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