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Formulation of Keruing (*Dipterocarpus grandiflorus*) Oleoresin Aromatherapy Candles

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Abstract

Aromatherapy is an alternative treatment method that utilizes essential oils and volatile components, such as terpenes and aromatic compounds. The active compounds of keruing oleoresin are phthalic acid, namely phthalic acid di(3-methoxybenzyl) ester and phthalic acid, 5-ethyl-1,3-dioxan-5-yl octyl ester causing keruing oleoresin to have a distinctive fragrance. The purpose of this study was to formulate keruing oleoresin in aromatherapy candle preparations. This research method includes base optimization, formulation of keruing oleoresin aromatherapy candles with concentrations of 0%; 2.5%; 5%; 7.5%; and 10%, and evaluation of aromatherapy candles including organoleptic testing, melting point, and burning time. The results of organoleptic testing of aromatherapy candles in shape, aroma, and color showed that F4 with 10% oleoresin concentration had a more dominant aroma and color. Melting point and burning time tests showed F1 with a concentration of 2.5% had a higher melting point of 54.6°C and a longer burning time of 144 minutes.

Keywords: Dipterocarpus grandiflorus, oleoresin, aromatherapy candle

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1 Introduction

Aromatherapy candles in their manufacture use several ingredients and one of them uses essential oils that have aromatherapy fragrance. Aromatherapy itself has calming properties and also has a refreshing aroma [1]. Aromatherapy works by stimulating the nerves of the nose and brain, when inhaling aromatherapy fragrances, the aroma will enter the nasal cavity and then stimulate the nervous system in the brain which plays a role in emotional regulation. Physiologically, the therapeutic content of aromatic ingredients will correct imbalances that occur in the body system. The odor response that creates a sense of calm will stimulate the brain region to restore memory and reduce depression [2].

It is known that aromatherapy utilizes the power of essential oils and their volatile components, such as terpenes and aromatic compounds [3]. Essential oils are the main components used in inhalation therapy and have been widely investigated for their therapeutic effects. Evidence suggests essential oils can successfully relieve symptoms of depression, such as anxiety and dementia [4].

Keruing, which contains essential oils, is native to Kalimantan. So far, keruing is one of the exudate-producing plants with active compounds in the form of terpenoid and ester groups that have benefits in its essential oil. One of the active compounds of keruing oleoresin is the phthalic acid group, namely phthalic acid di(3-methoxybenzyl) ester (14.74%) and phthalic acid, 5-ethyl-1,3-dioxan-5-yl octyl ester (15.92%). The ester group of phthalate compounds owned by keruing oleoresin has a distinctive fragrance and can be used in the perfume industry and the basic ingredients of cosmetic products [5]. Based on these data, keruing oleoresin will be formulated in aromatherapy candle preparations.

2 Methods

2.1 Tools and materials

The tools used in this research are analytical balance, hotplate, porcelain cup, beaker glass, dropper pipette, capillary tube, stirring rod, and candle mold. The materials used in this study were stearic acid, beewax, paraffin, keruing oleoresin, and candle wicks.

2.2 Preparation of aromatherapy candles

The aromatherapy candle preparation formula used in this study can be seen in Table 1.

Table 1. Formulation of aromatherapy candle preparations

Materials	Function	Formula (%)				
		F_0	F_1	F_2	F_3	F_4
Oleoresin	Aromatherapy compounds	0	2,5	5	7,5	10
Beewax	Base	20	20	20	20	20
Stearic acid	Base	Ad 100	Ad 100	Ad 100	Ad 100	Ad 100

Stearic acid and beewax were heated separately in a porcelain cup on a hotplate at 70°C. Next, stearic acid and beewax were mixed while stirring. Added keruing oleoresin according to the predetermined concentration, stirred until homogeneous. Poured into a container that has been lubricated with paraffin oil and has placed a wick in the center. Let stand for 2 hours until the wax solidifies.

2.3 Evaluation of aromatherapy candle

2.3.1 Organoleptic test

Organoleptical testing of aromatherapy candles includes observation of the shape, aroma, and color produced in aromatherapy candle preparations [6].

2.3.2 Melting point test

Melting point testing uses the drop pipette method. The melted wax is sucked into a drip pipette, then stored in a refrigerator at a temperature of 4 to 10°C for 16 hours. The drip pipette is tied to a thermometer and inserted into a 600 mL beaker glass containing half of the water. The beaker glass was heated. When the wax in the capillary pipe moves for the first time, the number seen on the thermometer is recorded as the melting point of the wax. The melting point of candles based on SNI 06-0386-1989 regarding candles ranges from 50 - 58°C [7].

2.3.3 Burn time test

This test is carried out by burning the candle wick so that a flame forms on the candle. The burn time is obtained from the difference between the initial time of combustion and the time when the candle wick burns out (extinguished) [7].

3 Results and Discussions

The physical properties test of aromatherapy candles in this study aims to determine the different concentrations of keruing oleoresin (Dipterocarpus grandiflorus) as an aromatic compound on the physical properties of aromatherapy candles. Each test conducted can determine the suitability of the test results of the physical properties of candle preparations that have been determined in SNI. In this study, 5 candle formulas were made with varying concentrations of keruing oleoresin.

3.1 Organoleptic test results

Organoleptical testing includes observation of shape, color, and aroma. The organoleptical observation results of each formula can be seen in Table 2.

Table 2. Organoleptic test results of keruing oleoresin aromatherapy candles

Formulation	Form	Colors	Aroma
F0 (Oleoresin 0%)	Solid	White	Not aromatic
F1 (Oleoresin 2,5%)	Solid	White	Mildly aromatic
F2 (Oleoresin 5%)	Solid	White	Mildly aromatic
F3 (Oleoresin 7.5%)	Solid	Yellowish white	aromatic
F4 (Oleoresin 10%)	Solid	Yellowish white	aromatic

Based on the organoleptical test results obtained from F0, F1, F2, F3, F4 have a solid shape. The color appearance of candles in F3 and F4 is dominantly yellowish white compared to F1 and F2 because of the higher concentration of keruing oleoresin used. The results of the observation of the aroma of the candle preparations showed that the aromatherapy candles in F3 and F4 were more dominant in the aroma of keruing oleoresin because the concentration of oleoresin used was higher than the concentration in F1 and F2. This indicates that the concentration of oleoresin affects the color and aroma of the candle. The candles produced are in accordance with the physical evaluation standards of candles according to SNI 0386-1989-A/SII0348-1980, namely white to yellow candles.

3.2 Melting point test results

The melting point test aims to determine at what temperature the wax melts. Melting point is defined as the temperature at which the solid and liquid phases of a substance together are in a state of equilibrium at a given pressure. The melting point test was carried out using a capillary pipe. The results obtained can be seen in Table 3.

Table 3. Melting point test results of keruing oleoresin aromatherapy candles

Replication	Melting point (°C)				
	F0	F1	F2	F3	F4
1	56	54	55	53	53
2	55	55	54	54	53
3	56	55	54	53	51
Average	55,6	54,6	54,3	53,3	52,3

Description:
F0 : Oleoresin 0%
F1 : Oleoresin 2,5%
F2 : Oleoresin 5%
F3 : Oleoresin 7.5%
F4 : Oleoresin 10%

The results of the melting point test carried out on F0, F1, F2, F3, and F4 show that the wax preparations made have a melting point that is in accordance with the wax melting point standard, which is 52.3-55.6 °C. Based on SNI 0386-1989-A/SII 0348-1989, the standard melting point of candles is 50-58 °C. The difference in wax melting point is influenced by the concentration of the base used. F0 has a higher melting point than F1, F2, F3, and F4 because the concentration of stearic acid in F0 is higher than the concentration in other formulations [8].

3.3 Burn time test results

Candle burn time test, which is the time interval for the durability of the candle to burn until it runs out. A stopwatch is used to determine the time interval between the beginning of the candle burning and after the candle burns out [8]. The results of the aromatherapy candle burn time test can be seen in Table 4.

Table 4. Burning time test results of keruing oleoresin aromatherapy candles

Formulation	Time (minutes)
F0 (Oleoresin 0%)	227
F1 (Oleoresin 2,5%)	144
F2 (Oleoresin 5%)	136
F3 (Oleoresin 7.5%)	57
F4 (Oleoresin 10%)	19

Based on the results of the burn time test, F0 which is the base has a burn time of 227 minutes, while F1, F2, F3, and F4 are 144 minutes, 136 minutes, 57 minutes, and 19 minutes, respectively. The composition of the base used affects the length of burn time. Candles that have a higher concentration of stearic acid, have a longer burn time, are hard, and crystalline, so that when burning the candle does not melt quickly. The dense and hard structure of the candle will be penetrated by heating [9]. In addition, factors that also affect the length of candle burn time are the location of the wick, the size of the wick, the composition of the wax, and the wax container. The wick of the candle is in the center, so the wax melt from the combustion is evenly distributed and has good durability. The larger the wick size or the more peripheral the location of the candle wick, the faster the candle burn time will run out.

4 Conclusions

Keruing oleoresin can be made into aromatherapy candle preparations, the results of the evaluation of the physical properties of aromatherapy candles organopetically, melting point, and burning time meet the requirements of SNI candle preparations. Candle preparation F4 with 10% oleoresin concentration has a more dominant aroma and color. The F1 preparation had a higher melting point of 54.6°C and a longer burning time of 144 minutes.

5 Declarations

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5.3 Authors Contributions

The names of the authors listed in this journal contributed to this research.

5.4 Conflict of Interest

All authors declare that there are no potential conflicts of interest with the research, authorship, and/or publication of this article.

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