

# Characteristic and taste test of aromatherapy candle from essential oil of *Cananga odorata*

Desy Kumalasari, Ana Husnayanti\*, Auronita Puspa Pratiwi

Department of Pharmacy, Pangkalpinang Health Ministry Polytechnic, Bangka Belitung

\*Corresponding author: Jl. Telaga Biru Komplek Perkantoran dan Pemukiman Pemerintahan Gubernur Kepulauan Bangka Belitung, Desa Padang Baru Kecamatan Pangkalan Baru Kabupaten Bangka Tengah. Email: [mahardhera@gmail.com](mailto:mahardhera@gmail.com)

**Abstract:** Kenanga or ylang-ylang (*Cananga odorata*) is renowned in the pharmaceutical domain for its essential oil, which boasts therapeutic properties. This study aims to investigate the feasibility of utilizing *C. odorata* essential oil in the production of aromatherapy candles. It focuses on examining the oil's characteristics, candle properties, and consumer preferences. The oil extraction employed the enfleurage method, while purification was achieved using a rotary evaporator. We adhered to the SNI 06-3949-1995 standards for analyzing the essential oil and the resultant candle characteristics. Consumer preferences were evaluated through surveys conducted with 30 panelists. The study's results revealed an oil yield of 48.5%, consistent with the established standards. Optimally, the formula with 25% essential oil concentration demonstrated superior performance in aromatherapy candles, exhibiting a burn time of 8 hours, 30 minutes, and 30 seconds, and a melting point ranging from 51°C to 53°C. This concentration also elicited positive responses from participants in terms of the candles' appearance, aroma (both before and after burning), and therapeutic impact. Notably, the candles with a 25% essential oil concentration were most effective in rapidly delivering therapeutic benefits, predominantly inducing relaxation. The study concludes that ylang-ylang essential oil is highly promising for aromatherapy candle production, with the 25% concentration formula demonstrating optimal results in terms of standard compliance, burn time, and user satisfaction.

**Keywords:** aromatherapy candles, essential oil concentration, kenanga (ylang-ylang) oil, SNI standards compliance, consumer preferences in aromatherapy

## Introduction

Indonesia, a nation rich in natural resources, boasts a remarkable variety of plants capable of producing essential oils. These oils are extracted from various plant components such as flowers, leaves, seeds, bark, fruit, roots, or rhizomes. Among these, the kenanga (ylang-ylang) flower is a notable source of essential oil [1].

A preliminary investigation was conducted in Baturusa Village, located in the Bangka Regency of the Bangka Belitung Province. This study involved 20 participants, which a significant majority (85%, n=17) were familiar with the kenanga plant. Notably, 70% (n=14) of respondents cultivated kenanga in their yards. However, a substantial proportion (65%, n=13) reported needing more knowledge regarding using the kenanga flower's essential oil.

The current research focuses on using kenanga essential oil in aromatherapy candles. Aromatherapy candles represent an innovative application of aromatherapy, primarily through inhaling aromatic vapors released from burning candles infused with kenanga essential oil.

The study aims to (i) examine the characteristics of kenanga essential oil, (ii) evaluate the properties of aromatherapy candles formulated with this oil, (iii) assess consumer preferences for aromatherapy candles containing kenanga essential oil at concentrations of 15%, 20%, and 25%.

This research holds value as a source of information on processing essential oils into aromatherapy candles. The expected outcomes include a detailed analysis of the characteristics of kenanga essential oil in compliance with SNI standards and insights into the properties and consumer preferences for aromatherapy candles made from kenanga essential oil extracts.

## Methods

### Plant identification and sample collection

Plant samples of kenanga flowers were collected from Baturusa Village, Bangka Regency, Bangka Belitung Province. Collection occurred at 7 AM, involving manual picking. Approximately 100 grams of flowers were gathered daily for a week. The plant species were identified at the Biology Laboratory,

Faculty of Agriculture and Fisheries, University of Bangka Belitung, to confirm the species as kenanga.

### Essential oil extraction

The kenanga essential oil was extracted using the enfleuration method. Clean kenanga flowers were placed on a fat medium prepared with butter on aluminum foil and incised for better absorption. This setup was left for 24 minutes. The process involved replacing the flowers every 24 hours for seven days. Subsequently, part of the butter was weighed and mixed with heated 96% alcohol at 50°C for 60 minutes, resulting in a homogeneous mixture. The mixture was then cooled and filtered, with the filtrate evaporated using a rotary vacuum evaporator at 35°C-40°C, yielding pure essential oil.

### Characterization of essential oil

Organoleptic observations included assessing the oil's color and odor. The specific gravity of the essential oil was measured using a 5 ml pycnometer, and solubility in alcohol was tested using a clarity comparison method at 20°C. Compound analysis was performed using GC-MS at the Ahmad Dahlan University Pharmacy Laboratory, following the procedures by Trilaksono (2020) [2].

### Aromatherapy candle fabrication

Candles comprising soy wax and kenanga essential oil were prepared with a total weight of 30 grams. Soy wax was melted, cooled to approximately 50°C, and then mixed with the essential oil in ratios of 15%, 20%, and 25%. This mixture was placed into glass candle molds with a 4 cm wick and hardened.

### Evaluation of aromatherapy candles

Characteristics assessed included overall appearance (SNI 0386-1989-A/II 0348-1980), presence of air bubbles, burn time, and melting point (using AOAC (1984) capillary pipe method).

### Aromatherapy candle favorability test

A one-shot case study was employed with 30 untrained respondents. The inclusion criteria ensured that respondents were willing, able to communicate effectively, had no allergies to the ingredients, and could use a stopwatch. The favorability testing

involved distributing candles and assessment forms to respondents for subjective evaluation.

### Data analysis

Univariate analysis was used to describe each variable, with results presented in tables and statistically analyzed using SPSS. Descriptive statistics calculated averages at the 95% confidence level (National Standardization Agency, 2006) [3].

## Results

### Characteristics of kenanga essential oil

Kenanga essential oil was analyzed for various characteristics, including yield, organoleptic properties, specific gravity, solubility in alcohol, and essential oil content. The yield was calculated at 48.5%, influenced by the efficiency of the fat base in transpiration and absorption processes. Organoleptic observations, conforming to SNI 06-3949-1995 standards, noted the oil as light yellow with a distinctive kenanga aroma. The specific gravity recorded was 0.912, and solubility in alcohol was found to be 1:0.5 ml, both aligning with SNI standards.

Chromatographic analysis revealed that kenanga essential oil, extracted using the enfleuration method, consists of a 100% linalool compound (Figure 1). This concentration of linalool is higher than that obtained using conventional and microwave methods, which the concentrations were 12.79% and 17.05%, respectively [4].

### Aromatherapy candle characteristics

The study further explored the characteristics of aromatherapy candles made from kenanga essential oil. These included overall appearance, bubble presence, burning time, and melting point. Candles with a 25% essential oil concentration met SNI 0386-1989-A/II 0348-1980 standards, showing even coloration and no cracks, defects, or fractures.

They also exhibited no bubbles, attributed to the lower soy wax amount used in this concentration. Notably, the 25% concentration candles had the longest burning time, 8 hours and 30 minutes. Melting point tests revealed that candles with a 15% concentration had a higher melting point (53°C) than those with 20% and 25% concentrations, align with previous study [5], that a higher essential oil concentration results in a lower melting point.

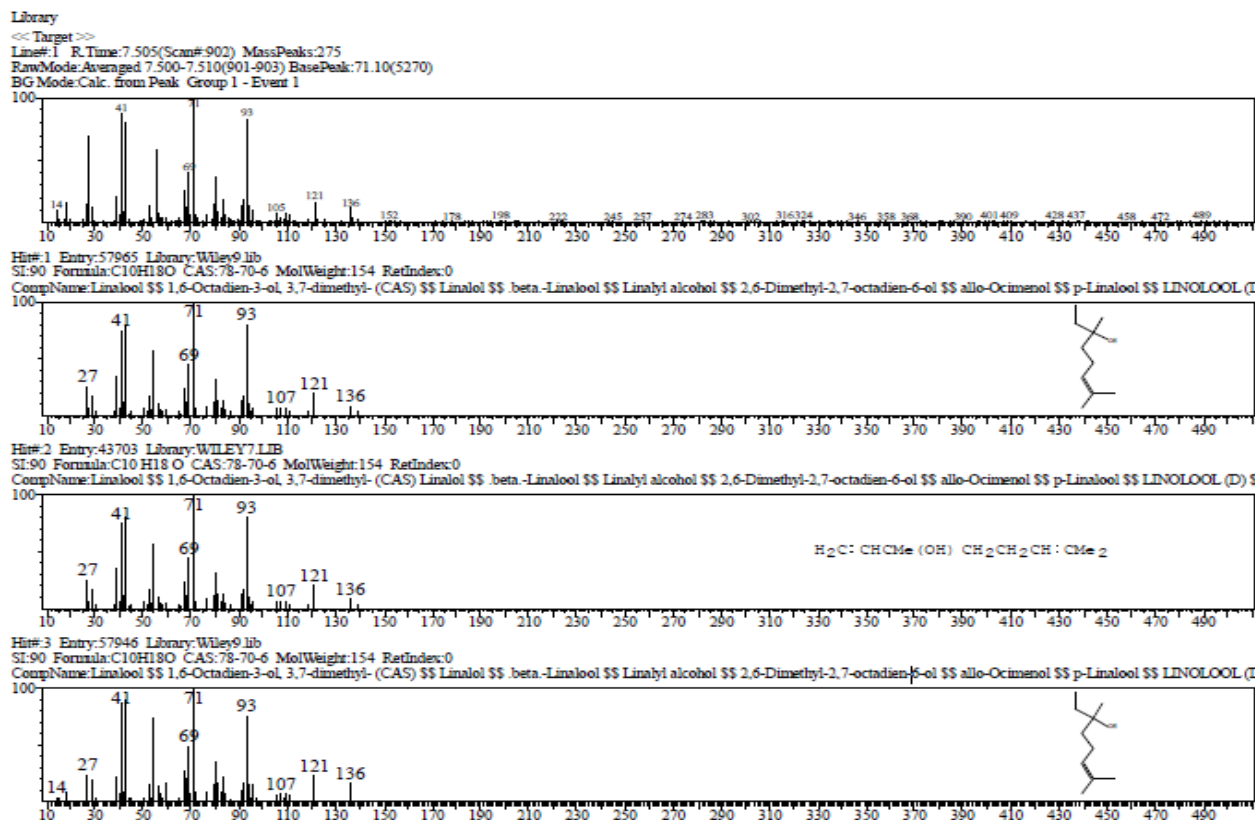


Figure 1. Chromatographic analysis of kenanga essential oil using GC-MS

**Consumer preferences for aromatherapy candles**

The study also examined consumer preferences for the candles. The 25% concentration candles were favored for their overall appearance, scoring an average of 4.07 (66.7% in the like category), likely due to the appealing yellowish color of the wax, which intensifies with higher essential oil concentration. This aligns with previous finding [6], emphasizing the impact of essential oil type on wax color.

Before burning, the 25% concentration candles were liked by 53.3% and very much liked by 33.3% of participants. After burning, these candles maintained high favorability, with 50% liking and 43.3% very much liking them. Siregar (2019) noted that panelists more quickly detected and preferred higher concentrations [7].

In first-time aroma detection tests, the 25% concentration candles were detected fastest, within 0-60 seconds. Similarly, they were the quickest to show therapeutic effects, with 50% of participants perceiving benefits within 0-60 seconds. The 15% and 20% concentrations followed in subsequent time

categories. Relaxation was the most noted therapeutic effect across concentrations, which aligns with the high linalool content in ylang-ylang oil, known for its relaxing properties.

**Discussion**

In this study, yellow butter served as the base due to its high-fat content, which enhances its ability to absorb oil released from flowers [8]. The effectiveness of essential oil absorption is influenced by various factors, including season, geographical conditions, harvesting time, harvest age, preliminary treatments, and the distillation method [9].

Notably, using a 25% concentration in aromatherapy candles significantly reduces the time required for the scent to be detected [6]. This observation aligns with Siregar’s (2019) finding [7], which indicate that higher essential oil concentrations expedite the therapeutic effects experienced by users.

The primary compound responsible for these effects is linalool. It works by entering through the olfactory system and undergoing an inhalation process

that induces relaxation. Linalool influences the adrenal glands in the nervous system, promoting feelings of pleasure and calm while reducing anxiety [10]. This relaxation response activates the parasympathetic nervous system, leading to a decreased heart rate [11]. The resulting physiological changes include a reduction in bladder content and venous return, ultimately lowering the volume of blood returning to the heart.

## Conclusion

In conclusion, this study has successfully demonstrated that the characteristics of the essential oils and the aromatherapy candles produced align with the standards set by SNI. Notably, candles containing a 25% essential oil concentration were particularly favored, as evidenced by their superior performance in preference tests.

## Acknowledgment

None.

## Declaration of interest

The authors declare no competing interests.

## Author contributions

DK, AH, APP conceptualized the study design, DK and AH investigated the data, DK and AP wrote the original draft, AH reviewed and edited the final version, AH supervised all experiments. All authors have read the final manuscript.

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