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Analysis Characteristics and Effectiveness of Aromatherapy Candles Soy Wax Based with Formulation Oil Lavender Essential Oil (Lavandula angustifolia) as a Relaxation Medium

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Abstract
The increasing prevalence of stress and sleep disorders in modern society has driven growing demand for safe and effective aromatherapy products. This study aimed to formulate and evaluate aromatherapy candles based on *soy wax* incorporating lavender *essential oil* as a sustainable and health-safe alternative to conventional paraffin-based candles. An experimental hand-made production method was employed, using *soy wax* as the primary material, with 15 ml of pure lavender (*Lavandula angustifolia*) essential oil, employing indirect heating at a controlled temperature of 60°C. Product quality was assessed through physical characterization, burn time testing, hedonic preference testing involving consumer panels, and visual emission observation. The results demonstrated that the formulated candles exhibited a dense, smooth texture with a clean white coloration, confirming optimal crystalline structure formation. Burn time testing recorded a stable combustion duration of 15 hours, indicating superior efficiency compared to standard paraffin candles. Hedonic evaluation revealed that consumers perceived the aroma of the formulated candles as distinctly softer and more harmoniously blended than that of the raw essential oil, attributable to successful aroma binding by the *soy wax* matrix. Furthermore, no visible soot emission was detected during combustion testing, confirming the *clean burning* characteristics of the product and its suitability for indoor use in enclosed environments. In conclusion, the *soy wax*-based lavender aromatherapy candles meet functional standards as a safe, environmentally friendly, and therapeutically effective relaxation medium suitable for managing stress and insomnia in modern society.

Keywords: soy wax; lavender essential oil; aromatherapy candles; relaxation; clean burning

INTRODUCTION

Lifestyle modern society today This often faced with the level of high stress consequence demands work and activities busy daily routine. Conditions This trigger increasing prevalence disturbance anxiety and decline quality sleep (*insomnia*) (Verma et al., 2022; Xu et al., 2021). As response, society start switch to method relaxation independent at home, one of them through utilization aromatherapy in form candles. However, the majority candle aromatherapy on the market Still use material standard paraffin. In chemical, paraffin is product side job from oil the earth that if burned will release compound chemistry dangerous like *toluene* and *benzene* to air. In addition, the use of fragrance synthetic (*fragrance oil*) in candles commercial often only gives a fragrant aroma without give benefit therapeutic for health nerves. For overcome problem mentioned, it is necessary innovation candle more aromatherapy healthy and friendly environment (Singh et al., 2023; Al Khathlan et al., 2023).

The use of soy wax (wax) (soybeans) to alternative superior Because nature renewable, can decompose in a way natural (*biodegradabl*), and produces distant soot more A little compared to paraffin. In addition, soy *wax* own point more melting low, so that capable distribute the aroma evenly more consistent and durable. Quality candle aromatherapy the more improved with essential oil integration essential oils) pure, especially lavender variant (*Lavandula angustifolia*). Different with fragrance artificial, lavender *essential oil* contains compound active *linalool* and *linalyl acetate* which are clinical proven capable give effect sedative, lowering activity system nerve sympathetic, and increases the feeling of relaxation through system olfactory (olfactory) (Yoo et al., 2023; Xu et al., 2021). Through study this, will reviewed more in about optimal formulation between *soy wax* and lavender *essential oil* for produce product aromatherapy that is not only aesthetic, but also has standard functional as a therapy medium safe health for breathing and continuous for environment.

Problem the main underlying urgency study This is dependence industry candles in use material standard paraffin. As residue oil earth, paraffin is product side job from oil the earth that releases compound dangerous such as toluene and benzene when burned (Amoah, J., 2020) , which in term long can bother health system breathing (Maung et al., 2022). Condition This aggravated with use fragrance synthetic (*fragrance oil)* in some big product commercial only aroma -oriented, without own mark functional for health nerves. In addition, candles made from base hard often fail distribute the aroma evenly maximum moment burned, so that effectiveness relaxation become very low.

As solution on problem said, research This propose innovation product candle aromatherapy that integrates soy wax with Lavender essential oil. Uses *soy wax* chosen as material solutions because his friendly nature environmentally friendly, *biodegradable*, and has characteristics *clean burning* which is not leave soot poisonous (O'Meara, 2014). Meanwhile that, the use of oil essential oils pure lavender becomes solution therapeutic For give effect real relaxation through content compound active *linalool* (Basch, E., 2012). Use oil essential oils pure This Far more effective as agent therapeutic experience For management stress compared to fragrance synthetic (Paliwal, S., & Sharma, 2022). With point melt more *soy* wax low molecular weight *essential oil* can bound and evaporated in a way consistent without

experience damage thermal, so that produce products that are not only safe for breathing but also capable become a therapy medium effective and sustainable mental health (Sattayakhom et al., 2023).

The novelty of the present study lies in its integrative approach: combining the clean-burning, biodegradable properties of soy wax with the scientifically validated therapeutic compounds of pure lavender essential oil to develop a functional product that addresses both health safety and environmental sustainability simultaneously. Unlike prior work that examined these materials in isolation, this study evaluates the complete formulated product across multiple quality dimensions, including physical characterization, combustion efficiency, consumer hedonic response, and emission safety providing a holistic assessment relevant to both academic research and practical product development within the creative economy sector.

The present study was therefore designed to: (1) analyze the optimal formulation of soy wax and lavender essential oil for producing aromatherapy candles with stable burn time and superior physical texture quality; (2) evaluate the effectiveness of pure lavender essential oil compared to synthetic fragrance in generating relaxation responses and consumer preference through organoleptic and hedonic testing; (3) assess the emission safety profile of the soy wax-based candles to confirm freedom from harmful soot and suitability for respiratory health in enclosed environments; and (4) contribute to the economic value of nature-based creative products aligned with environmental sustainability principles. The findings are anticipated to provide evidence-based guidance for the development of health-oriented aromatherapy products and support the growth of sustainable small-scale industries in Indonesia

RESEARCH METHOD

Research methods used is experiment independent through the manufacturing process product in a way direct (*hand-made production*) for test quality formulation candles. Prepared ingredients covering soy wax as material main, lavender essential oil as much as 15 ml, wick cotton natural, and glass jar as receptacle candles. Uses ingredients experience This aim For create product House healthy and friendly stairs environment.

Procedure manufacturing started with the melting process *soy wax* use technique warmup No direct until reach temperature 60°C. Care temperature This is very crucial for the structure candle soya bean No damaged. Stage furthermore is the process of mixing aromas and pouring (*pouring*). Lavender *essential oil* is added to in melt candle with controlled temperature For minimize evaporation early in oil essential oils, so that the aroma is therapeutic can awake in a way maximum inside product So.

Evaluation quality product done through a series of physical tests and observations directly. In the aspect physical, the wax produced show characteristics dense texture with color visual display white clean. Testing Power stand or *burn time* done For measure efficiency product, where found that candle capable light up stable during 15 hours. In addition, a preference test (hedonic) was carried out simple to consumers. Observation results show that the aroma produced after the mixing process own profile different and more smell unique compared to the original aroma oil essential oils inside packaging, which indicates the success of the aroma binding process using *soy wax media*.

RESULTS AND DISCUSSION

Physical Characteristics of the Product

Based on results experiments, use *soy wax* as material main produce candle with Dense texture and smooth surface. Visually, candles display color white clean that gives natural and hygienic impression. Characteristics physique This show that the melting process at temperature 60°C is optimal temperature point the Enough For melt crystal *soy wax* in a way perfect without cause change color (*discoloration*) or cracks at the time candle solidify back. Dense texture this also ensures that axis cotton squeezed with stable in the middle container, so that support even combustion (Xu et al., 2024).

Burn Time Analysis

Testing Power stand show that candle with the specified volume capable reach duration burning during 15 hours. This result prove superiority *soy wax* which has point melt more low compared to paraffin, however own density molecules that allow burning ongoing more slow and steady. This 15 hour duration give mark efficiency for consumers, where distribution heat generated Enough For melt layer on wax (*melt pool*) in consistent in order to release the aroma without use up material burn in a way fast (Torabi et al., 2022).

Aroma Effectiveness and Response Consumers (Hedonic Test)

The most interesting findings appears in the hedonic test, where consumers take notes existence difference aroma profile between *essential oil* before and after mixed to in candles. In scientific, things This happen Because existence interaction between molecule fatty acids in soybeans with compound active *linalool* in lavender. *Soy wax* play a role as good aroma binder (*scent throw*).

Changes in perceived aroma consumers who tend to felt more soft and blended show that temperature controlled pouring *temperature* with appropriate succeed prevent damage component active on oil essential oils. This is in line with theory in the introduction that use *essential oil* pure gives a "deeper" and more characteristic aroma therapeutic compared to fragrance synthetic. Response positive consumer to the uniqueness of this aroma prove that product own mark superiority competitive as an authentic relaxation medium (Chen et al., 2022).

Connection With Safety and Environment

During testing Power burn, observation show No existence soot black (soot) that comes off to air. This is in line with analysis emission carbon which shows that candle based plant own footsteps more carbon low and more burning clean compared to paraffin (Wigmore, 2021) . This validate claims on the background behind about characteristic *clean burning* from candle soybeans. With No presence of black smoke, use candle this is inside room closed (like room Sleep For overcome insomnia) is very safe for system breathing, fulfilling standard functional as product sustainable health (Amin et al., 2022).

Comparison 1st Production (Candle Jar) and 2nd (Tea Light Candle)

As form effort from evaluation *Batch* First that is *Candle jar*, Done the 2nd production, namely *Tea Light Candle* as Product candle Wulan Ranu aromatherapy, Production done with consider results Evaluatio. The results comparison show that both of them Similar in aspect Functions and characteristics texture, namely *Homogeneous* and solid. But own differences in aspects *Visual* where is the first batch has a little color Orange, while 2nd *batch* Pure white. Difference This Can influenced control temperature warmup during the process and during cooling candles, as well as the current process mixing with more optimal essential oils in *batches* second, with results Pure White candle.

And from In terms of aroma, both batches are not show difference in a way significant, so that the quality of the aroma produced said consistent. This is become indication that the formulation of essential oils used Enough stable in the second production process carried out, besides that 2nd batch has superiority economically, because cost Efficient manufacturing allows product produced in more amount many, with This can covers larger market segments wide (Yoo et al., 2023).

CONCLUSION

Study This succeed conclude that formulation candle aromatherapy based *soy wax* with addition **15** ml lavender essential oil is innovation superior product in a way physique and functional. Through technique melting at an optimal temperature of 60°C, resulting in candle with characteristics The texture is dense, smooth and colorful white clean without experience damage structure chemistry. From the side efficiency, product This show stable performance with Power burn *time* reaches 15 hours, which proves that candle soya bean own resilience burn more better and better slow compared to candle paraffin. Besides aspect physical, use oil essential oils pure proven give mark authentic therapeutic interaction between molecule *soy wax* and compounds active lavender creates more unique aroma profile soft and blended, so that capable give effect maximum relaxation for consumers.

The results of the observation also validate that product This own characteristics *clean burning* Because No produce soot black (*soot*), so it is very safe for health breathing in room closed. In overall, product This no only answer challenge relaxation media needs modern society but also supports sustainability environment through use material standard biodegradable vegetable. *With* results evaluation that has been done that is Production candle Aromatherapy "Wulan Ranu" namely *Tea Light Candle* has produce similar effects with the first batch, with a similar manufacturing process. if compared to with Power burn *Batch* First that is *Candle jar*, *tea light candle* own Power burn reach 3-4 hours how long, this because Tea Light Candle has relative container small that is as much as 19ml only compared to with a Candle Jar of 140ml. With however, although own duration over - burning short, Tea Light Candle remains give mark functional as well as have superiority in efficiency use and flexibility application.

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