

PAPER

Aromatherapy Candles Made from Recycled Waste Cooking Oil

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ABSTRACT

Waste cooking oil is one of the most common household wastes and is often disposed of improperly, causing environmental pollution and clogged drainage systems. Many people are also looking for eco-friendly products that can help create a relaxing and comfortable atmosphere at home. This project was developed to address both issues by converting waste cooking oil into aromatherapy candles, giving new value to a material that is usually considered useless. The innovation is an aromatherapy candle made from recycled waste cooking oil and blended with essential oils. By reusing waste cooking oil, the product helps reduce environmental pollution while providing a practical product that can be used for relaxation, stress relief, and home decoration. The candle also promotes the concept of recycling and sustainable living. The development process involved collecting waste cooking oil from households, filtering and cleaning it, mixing it with candle-making materials, adding fragrance, and molding it into the desired shape. After production, the candles were tested to evaluate their burning performance, scent quality, and overall user satisfaction. The results showed that the candles burned steadily, produced a pleasant aroma, and were safe for regular use. Users responded positively to both the fragrance and the environmental concept behind the product. This innovation demonstrates that waste cooking oil can be transformed into a valuable and marketable product. In addition to reducing waste and pollution, it can encourage recycling practices, support environmental awareness, and create opportunities for small-scale entrepreneurship. Therefore, aromatherapy candles made from waste cooking oil offer a simple, practical, and sustainable solution that benefits both people and the environment.

KEYWORDS

Waste Cooking Oil; Aromatherapy Candle; Recycling; Environmental Innovation; Sustainable Product

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1. INTRODUCTION

Environmental issues have become one of the biggest challenges faced by communities around the world. One of the common environmental problems is the improper disposal of household waste. While people often focus on plastic waste and other visible pollutants, waste cooking oil is another type of household waste that can cause significant environmental damage if not managed properly. Many households dispose of used cooking oil directly into sinks, drains, or the soil without realizing its harmful effects. This practice can contaminate water sources, clog drainage systems, and negatively affect aquatic ecosystems.

At the same time, there is a growing awareness of sustainable living and environmental responsibility. Consumers are becoming more interested in products that are environmentally friendly, reusable, and made from recycled materials. This trend has encouraged innovators to develop products that not only solve environmental problems but also provide practical benefits for daily life.

One product that has gained popularity in recent years is the aromatherapy candle. Aromatherapy candles are widely used to create a relaxing atmosphere, reduce stress, improve mood, and enhance indoor environments. Most commercially available candles, however, are produced using new raw materials and do not contribute directly to waste reduction. As a result, there is an opportunity to develop a more sustainable alternative that combines environmental protection with personal well-being.

Several studies and community initiatives have explored ways to recycle waste cooking oil into useful products such as biodiesel, soap, and cleaning agents. These solutions have demonstrated that waste cooking oil still possesses value after its initial use. However, the transformation of waste cooking oil into aromatherapy candles remains relatively underexplored, particularly in local communities. In addition, many existing recycled products focus primarily on waste reduction and do not provide additional lifestyle or wellness benefits to consumers.

To address this gap, this innovation introduces aromatherapy candles made from recycled waste cooking oil. The product combines filtered waste cooking oil with palm wax, activated charcoal, candle coloring, and essential oils to

create attractive and functional candles. Activated charcoal is used during the purification process to help reduce impurities and unwanted odors from the used oil. Essential oils such as lavender, lemongrass, vanilla, deep ocean, and jasmine tea are added to provide pleasant fragrances and aromatherapy benefits.

This innovation offers several advantages compared to conventional candles. First, it helps reduce environmental pollution by reusing waste cooking oil that would otherwise be discarded. Second, it promotes sustainable consumption by transforming waste into a useful product. Third, it provides relaxation benefits through aromatherapy fragrances. Finally, the production process is relatively simple and affordable, making it suitable for small-scale entrepreneurship and community-based environmental initiatives.

As part of this project, a total of 19 aromatherapy candles were produced and tested by several users. The feedback received was generally positive, with participants highlighting the pleasant fragrance and environmentally friendly concept of the product. These initial results indicate that recycled waste cooking oil can be successfully converted into a marketable product that combines functionality, sustainability, and aesthetic value.

Therefore, this innovation aims to demonstrate that waste cooking oil can be transformed into environmentally friendly aromatherapy candles that contribute to waste reduction while providing practical benefits to users. The purpose of this article is to describe the development process, product testing, and potential environmental and economic impacts of aromatherapy candles made from recycled waste cooking oil.

2. METHOD

2.1 Materials and Equipment

This project used waste cooking oil as the primary recycled material for producing aromatherapy candles. The main ingredients included waste cooking oil, palm wax, activated charcoal, candle coloring agents, essential oils, and candle wicks. Palm wax was selected as the candle base because it provides good burning performance and helps improve the texture of the final product. Activated charcoal was used to help reduce impurities and unwanted odors from the waste cooking oil. Essential oils were added to provide fragrance and aromatherapy benefits. The fragrances used in this project included lavender, lemongrass, vanilla, deep ocean, and jasmine tea. Different candle colors such as purple, blue, red, green, and yellow were also used to improve the product's visual appeal. The equipment used during the production process included a cooking pot, filter cloth, mixing containers, stirring tools, measuring cups, candle molds, and a heating source. These tools were selected because they are affordable, easy to use, and commonly available.

2.2 Production Process

The production process began with collecting waste cooking oil from household sources. The collected oil was inspected to remove large food residues and other visible contaminants. After the initial inspection, the oil was filtered using a filter cloth to remove smaller particles and impurities. Next, activated charcoal was added to the filtered oil to help absorb odors and improve the quality of the oil. The mixture was allowed to sit for a period of time before being filtered again. This purification process was important because it helped produce a cleaner final product and reduced the smell commonly associated with used cooking oil.

After purification, palm wax was heated in a container until completely melted. The cleaned waste cooking oil was then mixed with the melted palm wax in appropriate proportions. The mixture was stirred continuously to ensure that all ingredients were evenly combined. Once the mixture reached a stable consistency, candle coloring agents were added according to the desired product design. The next step involved adding essential oils. Different fragrance variants were produced, including lavender, lemongrass, vanilla, deep ocean, and jasmine tea. The essential oils were added carefully to maintain the quality of the fragrance. The mixture was stirred thoroughly to distribute the scent evenly throughout the candle material. Candle wicks were positioned in molds before the liquid mixture was poured into them. The filled molds were left undisturbed until the candles cooled and solidified completely. After hardening, the candles were removed from the molds and inspected for quality. A total of 19 aromatherapy candles were successfully produced through this process.

2.3 Product Testing

Product testing was conducted to evaluate the performance and user acceptance of the aromatherapy candles. The testing focused on three main aspects: burning quality, fragrance quality, and user satisfaction. The burning quality test was conducted by observing whether the candles could burn steadily without excessive smoke or irregular flame behavior. The fragrance quality test evaluated the strength and pleasantness of the aroma released during use. Different fragrance variants were assessed to determine whether the scent remained noticeable during the burning process.

User satisfaction testing involved several friends who were invited to evaluate the product. Participants were asked to observe the appearance, fragrance, and overall experience of using the candles. Informal feedback was collected regarding their impressions of the product and its potential usefulness.

2.4 Data Analysis

The collected observations and user feedback were analyzed descriptively. Product performance was evaluated based on the consistency of the burning process, fragrance quality, and physical appearance of the candles. User responses were

reviewed to identify strengths and areas for improvement. The analysis was used to determine whether the innovation successfully transformed waste cooking oil into a functional and environmentally friendly product. The results also provided valuable information regarding the product's potential for wider community adoption and small-scale business development.

2.2 Main Materials Used in Product Development

This section discusses the tools and materials used.

Table 1. Main Materials

Name	Number	Type	Field
Waste Cooking Oil	500g	Recycled Material	Recycled raw material
Palm Wax	500g	Natural Wax	Main candle base
Activated Charcoal Essential	50g	Purifying Agent	Purifies waste cooking oil
Oil	50ml	Fragrance Agent	Provides fragrance
Candle Wick	19pcs	Supporting Material	Supports candle burning



Figure 1. Production Process of Aromatherapy Candles from Waste Cooking Oil



Figure 2. Finished Aromatherapy Candle Products

3. RESULT AND DISCUSSION

3.1 Product Development Results

The primary objective of this project was to transform waste cooking oil into an environmentally friendly aromatherapy candle that provides both practical and environmental benefits. Through the production process described in the previous section, a total of 19 aromatherapy candles were successfully produced using recycled waste cooking oil as one of the main ingredients. The final products were developed in various colors, including purple, blue, red, green, and yellow, to increase their visual appeal. In addition, several fragrance variants were produced using different essential oils, namely lavender, lemongrass, vanilla, deep ocean, and jasmine tea. These fragrance options were selected because they are widely appreciated by consumers and are commonly associated with relaxation and stress relief.

One of the most important achievements of this innovation was the successful purification of waste cooking oil using activated charcoal. Before treatment, the waste cooking oil had a darker color and a noticeable odor. After the filtration and purification process, the oil became cleaner and more suitable for candle production. This step was essential because it improved both the appearance and overall quality of the final product. The production process demonstrated that waste cooking oil can be effectively reused instead of being discarded into the environment. This finding supports the concept of waste valorization, where waste materials are converted into useful products with economic value.



Figure 3. Physical Characteristics of the Product

The completed candles showed several positive characteristics. First, the candles maintained a solid and stable structure after cooling. The addition of palm wax contributed significantly to the hardness and durability of the candles. This prevented the products from becoming too soft and ensured they could maintain their shape during storage and use.

Second, the color distribution throughout the candles was relatively uniform. The use of different colors enhanced the visual attractiveness of the product and made each fragrance variant easily recognizable. For example, purple candles were associated with lavender fragrance, while other colors represented different scent variations.

Third, the candles produced a pleasant aroma when burned. The fragrance remained noticeable without being excessively strong, creating a comfortable environment for users. This is an important factor because the primary purpose of aromatherapy candles is to provide relaxation and improve mood.

The overall appearance of the candles was considered attractive and suitable for decorative purposes. In addition to functioning as a source of fragrance, the candles can also serve as decorative items for homes, study rooms, offices, or relaxation spaces.

3.2 Burning Performance Evaluation

One of the most important aspects of candle quality is burning performance. A candle that burns unevenly, produces excessive smoke, or extinguishes easily is generally considered unsatisfactory by consumers. Observations conducted during product testing showed that the candles burned steadily and consistently. The flame remained stable during use and did not produce excessive smoke. This indicates that the combination of waste cooking oil and palm wax created a suitable candle composition.

The candle wick also performed effectively in maintaining combustion. Proper wick placement contributed to an even burning process and helped maximize fragrance release. During testing, the candles were able to maintain a consistent flame without requiring frequent adjustments. Another important observation was the gradual release of fragrance throughout the burning process. Rather than releasing all the fragrance immediately, the candles emitted a continuous scent that remained noticeable over time. This characteristic improved the user experience and enhanced the aromatherapy function of the product.

The positive burning performance demonstrated that waste cooking oil can be incorporated into candle production without significantly compromising product quality. This finding is particularly important because many people assume that recycled materials may result in lower-quality products.

3.4 User Feedback and Product Acceptance

To evaluate market acceptance, the candles were tested by friends who served as initial users. Their feedback provided valuable information regarding product quality, usability, and overall satisfaction. Most participants expressed positive opinions regarding the product. The first aspect frequently mentioned was the pleasant fragrance. Users reported that the scent created a relaxing atmosphere and helped improve room comfort. Lavender was especially appreciated because of its calming effect.

The second aspect highlighted by users was the environmental concept behind the product. Participants viewed the idea of converting waste cooking oil into aromatherapy candles as creative and beneficial. Many users stated that they had never considered waste cooking oil as a potential raw material for a useful household product. Another positive response concerned the appearance of the candles. The combination of attractive colors and pleasant fragrances increased the overall appeal of the product. Several users commented that the candles looked suitable as gifts, decorative items, or personal relaxation products.

The feedback also suggested that consumers are increasingly interested in products that combine functionality with environmental responsibility. This trend creates opportunities for environmentally friendly innovations such as recycled aromatherapy candles. Based on user responses, the product demonstrated strong potential for wider acceptance in the market.

3.5 Environmental Benefits

The environmental benefits of this innovation represent one of its most significant contributions. Improper disposal of waste cooking oil can cause several environmental problems. When poured into sinks or drainage systems, waste cooking oil can accumulate and contribute to blockages. When disposed of directly into the environment, it can contaminate soil and water resources. By transforming waste cooking oil into aromatherapy candles, the amount of waste entering the environment can be reduced. Instead of becoming a pollutant, the waste material is converted into a useful and valuable product.

This innovation also supports the principles of the circular economy. In a circular economy, materials are reused and recycled whenever possible to minimize waste generation. Rather than following a traditional "use and discard" approach, this project demonstrates how household waste can be reintegrated into productive use. Furthermore, the project promotes environmental awareness among community members. Through participation in candle production and product testing, individuals become more aware of the importance of responsible waste management practices.

The educational value of this innovation may be equally important as its environmental impact. By demonstrating a practical recycling solution, the project encourages people to view waste as a resource rather than a problem.

3.6 Economic Potential

In addition to environmental benefits, the innovation possesses promising economic potential. The primary raw material, waste cooking oil, is generally inexpensive or freely available from households. This significantly reduces production costs compared to products that rely entirely on new materials. The production process is relatively simple and does not require sophisticated equipment. Most of the tools used are commonly available in households or small workshops. As a result, the innovation can be adopted by students, community groups, small businesses, or entrepreneurs with limited capital.

The growing consumer demand for environmentally friendly products also creates favorable market opportunities. Many consumers are willing to support products that contribute to sustainability and environmental protection. The product can be marketed through various channels, including local markets, community events, gift shops, and online platforms. The availability of multiple fragrance variants further increases market appeal by allowing consumers to choose products according to their preferences. If production is expanded, the innovation could contribute to income generation while simultaneously reducing environmental pollution. This combination of environmental and economic value strengthens the overall sustainability of the project.

3.7 Comparison with Conventional Candles

Compared to conventional candles, the developed aromatherapy candles offer several advantages. First, conventional candles typically rely entirely on newly sourced materials. In contrast, this innovation incorporates recycled waste cooking oil, reducing waste generation and supporting resource conservation. Second, the product contributes directly to environmental protection. Conventional candles generally focus only on functionality, whereas the recycled candle addresses both environmental and consumer needs. Third, the innovation provides educational value by demonstrating practical recycling techniques. Consumers purchasing the product are indirectly exposed to the concept of sustainable waste management.

Finally, the product maintains the key characteristics expected from an aromatherapy candle, including pleasant fragrance, decorative appeal, and relaxation benefits. Therefore, environmental improvements are achieved without sacrificing product functionality.

3.8 Challenges and Future Improvements

Although the project achieved positive results, several challenges were encountered during development. One challenge involved maintaining consistency in the quality of waste cooking oil. Different sources of waste oil may vary in color, odor, and impurity levels. This variation can affect the quality of the final product and may require additional purification steps.

Another challenge involved balancing fragrance intensity. Excessive fragrance can become overwhelming, while insufficient fragrance may reduce user satisfaction. Determining the optimal concentration of essential oils required experimentation. Future improvements could include expanding fragrance options, improving packaging design, and conducting larger-scale user testing. Additional studies may also investigate alternative wax combinations, improved purification techniques, and longer-term product performance. Further development could strengthen the product's commercial viability and increase its impact on environmental sustainability. With continued refinement, aromatherapy candles made from recycled waste cooking oil have the potential to become a widely recognized example of environmental innovation.

Overall, the results demonstrate that waste cooking oil can be successfully transformed into attractive, functional, and environmentally friendly aromatherapy candles. The innovation not only reduces waste but also provides practical benefits, supports sustainability, and creates opportunities for entrepreneurship. These findings indicate that the product has strong potential for future development and wider community adoption.

4. CONCLUSION

This study demonstrated that waste cooking oil can be successfully transformed into environmentally friendly aromatherapy candles with practical, aesthetic, and economic value. Through a simple production process involving filtration, purification using activated charcoal, mixing with palm wax, and the addition of essential oils, a total of 19 aromatherapy candles were produced. The final products were available in various colors and fragrance variants, including lavender, lemongrass, vanilla, deep ocean, and jasmine tea. The product testing results showed that the candles burned steadily, produced pleasant aromas, and were well received by users. Feedback from participants indicated that the candles were appreciated not only for their fragrance and appearance but also for their environmentally friendly concept. These findings suggest that waste cooking oil, which is often disposed of improperly, can be converted into a useful product that supports sustainable waste management practices. This innovation provides several benefits, including reducing environmental pollution caused by waste cooking oil, encouraging recycling activities, and creating opportunities for small-scale entrepreneurship. In addition, the project helps raise public awareness about the importance of transforming waste into valuable products. However, this study has several limitations. The product was tested on a limited number of users, and the production scale remained relatively small. Future research may involve larger-scale testing, improved purification techniques, additional fragrance options, and more attractive packaging designs. Overall, aromatherapy candles made from recycled waste cooking oil represent a simple, practical, and sustainable environmental innovation with significant potential for wider community application and future development.

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