

Innovation in Making Aromatherapy Candles Based on Citronella as an Environmentally Friendly Mosquito Repellent

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Abstract

Dengue Hemorrhagic Fever (DHF) remains a significant public health problem with an increasing incidence rate each year. Prevention of mosquito bites can be carried out through various methods, one of which is the utilization of natural ingredients as an alternative mosquito repellent. This community service program aimed to improve the knowledge and skills of residents in utilizing lemongrass (*Cymbopogon citratus*) as the main ingredient for producing eco-friendly aromatherapy candles as mosquito repellents. The methods used included health education, demonstration of candle-making, and evaluation through pre-test and post-test. The activity was conducted in RW 08 with a total of 25 participants. The results showed an increase in participants' knowledge, where before the intervention only 40% were in the good to excellent category, rising to 80% after the intervention. Participants demonstrated enthusiasm and were able to practice the candle-making process independently. In conclusion, this program effectively enhanced community knowledge and provided practical skills in utilizing natural ingredients as an alternative method to prevent mosquito bites and reduce DHF transmission.

Keywords: DHF, aromatherapy candles, lemongrass, community service, natural mosquito repellent

Abstrak

Demam Berdarah Dengue (DBD) tetap menjadi masalah kesehatan masyarakat yang signifikan dengan angka kejadian yang meningkat setiap tahunnya. Pencegahan gigitan nyamuk dapat dilakukan melalui berbagai metode, salah satunya adalah penggunaan bahan-bahan alami sebagai alternatif pengusir nyamuk. Program pengabdian masyarakat ini bertujuan untuk meningkatkan pengetahuan dan keterampilan warga dalam memanfaatkan serai (*Cymbopogon citratus*) sebagai bahan utama untuk memproduksi lilin aromaterapi ramah lingkungan sebagai pengusir nyamuk. Metode yang digunakan meliputi pendidikan kesehatan, demonstrasi pembuatan lilin, dan evaluasi melalui pre-test dan post-test. Kegiatan ini dilakukan di RW 08 dengan total 25 peserta. Hasil menunjukkan peningkatan pengetahuan peserta, di mana sebelum intervensi hanya 40% yang berada dalam kategori baik hingga sangat baik, meningkat menjadi 80% setelah intervensi. Peserta menunjukkan antusiasme dan mampu mempraktikkan proses pembuatan lilin secara mandiri. Kesimpulannya, program ini secara efektif meningkatkan pengetahuan masyarakat dan memberikan keterampilan praktis dalam memanfaatkan bahan-bahan alami sebagai metode alternatif untuk mencegah gigitan nyamuk dan mengurangi penularan DBD.

Kata kunci: DHF, lilin aromaterapi, serai, pelayanan masyarakat, pengusir nyamuk alami

A. INTRODUCTION

Dengue Hemorrhagic Fever (DHF) is a disease that contributes to a relatively high mortality rate to date. This disease is caused by a virus and is spread by the bite of the *Aedes aegypti* mosquito. DHF prevention can be done by controlling mosquito breeding (Espiana, Lestari, & Ningsih, 2022). The number of DHF cases in 2021 was 73,518, this number continued to rise in 2022, with approximately 143,266 cases recorded. Meanwhile, in 2023, it decreased to 114,720 and continued to increase in the second week of 2024 to 119,709 cases, and this number was recorded higher than the previous year (Ministry of Health, 2024).

Dengue hemorrhagic fever (DHF) remains a public health problem in tropical regions, including Indonesia, because the main vector, *Aedes aegypti*, breeds in domestic environments and household stagnant water. Common vector control strategies, such as insecticides and fogging, have proven effective under certain conditions but face challenges such as mosquito resistance and long-term environmental and health impacts (Wiranatha, 2021). In addition, the government is working to prevent dengue fever transmission through *Aedes aegypti* mosquito bites through the 3M Plus National Health Monitoring (PSN) program, larvicides, and fogging to prevent or reduce mosquito growth in areas that could potentially become breeding grounds around homes, such as water reservoirs, drains, gutters, flower vases, etc. (Sutriyawan, 2021). Preventing mosquito transmission is not limited to the 3M Plus PSN program; the use of mosquito repellents such as candles is an alternative method for preventing and eradicating mosquitoes.

One alternative that is beginning to be widely researched is the use of essential oils from plants, such as lemongrass (*Cymbopogon citratus*), as mosquito repellents. A study by Dewi (2020) showed that lemongrass extract had a significant repellent effect against *Aedes aegypti*. Furthermore, Gaudet (2024) reported that lemongrass essential oil was able to inhibit mosquito attraction and demonstrated a potential protective mechanism worthy of further investigation. This suggests that natural ingredients could be a relevant option for community-based mosquito control. The use of natural ingredients such as lemongrass, which are easily found and utilized in the home

environment, and are chemical-free, is an easy alternative that can be used to make aromatherapy candles with lemongrass mosquito repellent. Lemongrass (*Cymbopogon Citratus*) contains compounds that mosquitoes dislike, such as geraniol, citronellol, citronellal, and citral (Santoso et al., 2024). Compounds such as citronellol and geraniol in lemongrass are important components that produce a distinctive aroma. This aroma can stimulate and interact with receptors in insects, which can alter their behavior. The lemongrass stem used can be utilized in making mosquito repellent candles with natural and environmentally friendly ingredients (Leto, Sya'bania, Nisa, Sunarwin, & Gleko, 2022). To increase practical application in households, innovative forms such as aromatherapy candles containing essential oils are an attractive solution.

Aromatherapy candles made from lemongrass have a calming aroma and create a comfortable atmosphere at home, due to the various benefits of lemongrass such as antidepressant, mosquito repellent, maintaining cholesterol levels, pain relief and easing flu symptoms, and as a kitchen spice. Ginting, Rudang, & Andry (2024) for example formulated aromatherapy candles with citronella and cloves, and reported promising results of mosquito repellent effectiveness tests. Additional research by Ahmad (2025) also tested a combination of lemongrass oil and orange peel in aromatherapy candles, showing that the combination formulation has more protective potential than either oil alone.

Based on this, making anti-mosquito aromatherapy candles from lemongrass can be an alternative and useful solution in preventing the transmission of dengue fever in the community with the aim of increasing insight, knowledge, and utilizing natural materials around the community environment.

B. METHODS

This community service activity involves providing education on how to make anti-mosquito aromatherapy candles from lemongrass as an alternative mosquito repellent and dengue fever prevention method. The following methods are used:

1. Community health education, aimed at increasing knowledge about the benefits of lemongrass and aromatherapy candle products.
2. Community empowerment through cultivating lemongrass as the main ingredient in aromatherapy candles.

3. Counseling and skills development through education on how to manage anti-mosquito aromatherapy candle products using the following ingredients: lemongrass, wax/solid paraffin, essential oil (optional), and tools: a pan, cutting board, knife, and candle mold. The steps for making anti-mosquito aromatherapy candles are as follows:
 - a. Prepare the tools and materials.
 - b. Cut the wax and separate the wick.
 - c. Wash the lemongrass and cut off the leaves, using the lemongrass stalks.
 - d. Place the wax/paraffin, separated from the wick, into a pan and melt it over the heat along with the chopped lemongrass.
 - e. Heat the wax until it melts evenly, then add lemongrass essential oil (optional).
 - f. Place the wick, separated from the wax, into a mold and tie it in the center.
 - g. Pour the melted wax/paraffin into the mold with the wick in the center.
 - h. Let the wax set until it hardens..
4. The evaluation stage is carried out by providing residents with the opportunity to discuss the potential use of natural materials to prevent mosquito transmission in the community environment..

This community service activity took place at the mosque with 25 participants, consisting of women and men from the surrounding area. The language used was communicative, making it easy for residents to understand and comprehend the material presented. The attendees appeared enthusiastic about this mosquito repellent candle community service project..

C. RESULTS

A counseling session on "Innovative Anti-Mosquito Aromatherapy Candles" was held on October 19, 2025, for residents of RW 08 at the Al-Muslimin Mosque, with 25 participants. This activity aimed to increase public knowledge regarding the benefits, how to make, and how to use natural aromatherapy candles as an alternative way to prevent mosquito bites.



Figure 1. Activity Documentation

To measure the effectiveness of the activity, a pretest was conducted before the outreach and a posttest after the outreach. The assessment used 10 questions with a score range of 0–10. The results of the participants' knowledge levels are shown in the following table:

Score Category	Pretest	Posttest
0-3 (Very Poor)	7	1
4-6 (Poor)	8	4
7-8 (Good)	7	14
9-10 (Very Good)	3	6

Table 1. Results of Pretest and Posttest on Aromatherapy Candle Mosquito Repellent Counseling

Based on the table above, it was found that before the counseling, 15 participants (60%) were in the poor to very poor knowledge category, while only 10 participants (40%) were in the good and very good categories. After the counseling, there was a significant improvement, with the number of participants in the good and very good knowledge categories increasing to 20 (80%), and those in the poor to very poor categories decreasing to 5 (20%).

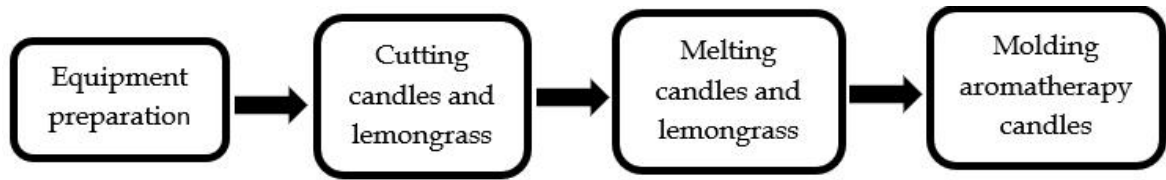


Figure 2. Implementation Scheme



Figure 3. Aromatherapy Candle Making Process

Community service activities related to the innovation of aromatherapy candles made from citronella as an alternative mosquito repellent have successfully had a positive impact on residents of RW 08. The implementation of the activities involved health education, aromatherapy candle making practices, and discussions regarding the use of natural ingredients in preventing dengue fever. Evaluation results showed a significant increase in knowledge. Based on the pretest results, it was known that the majority of participants (60%) were in the category of poor to very poor knowledge. After the education and demonstration, there was an increase in knowledge with 80% of participants in the good and very good categories. This indicates that the community service activities successfully increased public understanding regarding the benefits of lemongrass plants and the process of making them as an alternative medium for preventing mosquito bites.

In addition to increasing their knowledge, participants were also able to effectively practice making aromatherapy candles. Participants were enthusiastic about participating in each stage, from material preparation and the wax melting process to molding. This ability to practice independently demonstrates that the activity provides not only theoretical knowledge but also skills that can be directly applied in everyday life. A visible short-term change was the participants' increased understanding and skills in processing natural ingredients as mosquito repellents. In the long term, this activity is expected to encourage community independence in utilizing local natural resources, reduce dependence on chemical products, and raise awareness regarding dengue fever prevention through environmentally friendly innovations.

These results align with research by Leto et al. (2022) which states that lemongrass has a repellent effect on mosquitoes due to its geraniol and citronellal content, making it suitable for use in natural mosquito repellent products. A similar finding was also found by Saputra et al. (2020) who explained that citronella oil effectively inhibits *Aedes aegypti* bites through disrupting mosquito olfactory receptors. These findings are supported by Halim and Fitri (2020) who reported that citronella oil provided up to 98.3% protection against mosquito bites in laboratory tests. Furthermore, research by Fatina et al. (2021) found that aromatherapy candles made from citronella oil reduced mosquito numbers in the household environment, with 57% of residents experiencing the benefits and motivated them to make their own candles. The implementation of this activity also supports a community empowerment approach based on environmental potential and local wisdom as a preventive health strategy.

Thus, this activity can be concluded as effective in achieving its goal of increasing public knowledge, skills, and awareness regarding the use of natural ingredients in dengue fever prevention. Indicators of success were seen in the increase in post-test scores, practical skills, and positive responses from participants during the activity.

D. CONCLUSION

The community service activity on the innovation of making aromatherapy candles from lemongrass as a mosquito repellent was successfully implemented and received a positive response from the participants. The counseling and candle-making

demonstration succeeded in increasing public knowledge about the benefits of lemongrass as a natural ingredient that is effective in preventing mosquito bites that cause dengue fever. Based on the evaluation results, there was a significant increase in the level of knowledge of participants after the activity, as shown by the comparison of pre-test and post-test results. In addition, participants were able to practice the process of making aromatherapy candles independently with simple and easily obtained materials in the local environment. Thus, this activity not only increased public understanding regarding dengue fever prevention but also encouraged the use of herbal plants as an innovative, environmentally friendly, and applicable solution in everyday life.

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