



## Community Empowerment Through Socialization of Making Natural Mosquito Repellent Spray from *Lemongrass* and Basil Leaves

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### ABSTRACT

The village of Summersari faced an increase in dengue fever cases, while residents still relied on chemical insecticides that were harmful to health and the environment. The lack of knowledge about the use of natural ingredients such as lemongrass and basil prompted the implementation of socialization, education, and practical training for PKK mothers. Activities included providing materials, discussions, pre-tests and post-tests, as well as hands-on practice in making natural sprays. As a result, residents' understanding increased from 75% to 95%, and their independent production skills also improved. This program has successfully empowered the community through safe, environmentally friendly, economical solutions that support healthy lifestyles and sustainable dengue fever prevention.

#### ABSTRAK

Desa Summersari menghadapi peningkatan kasus demam berdarah, sementara warga masih bergantung pada insektisida kimia yang berisiko bagi kesehatan dan lingkungan. Minimnya pengetahuan tentang pemanfaatan bahan alami seperti serai dan kemangi mendorong pelaksanaan sosialisasi, penyuluhan, dan pelatihan praktik kepada ibu-ibu PKK. Kegiatan meliputi pemberian materi, diskusi, pre-test dan post-test, serta praktik langsung pembuatan spray alami. Hasilnya, pemahaman warga meningkat dari 75% menjadi 95% dan keterampilan produksi mandiri pun berkembang. Program ini berhasil memberdayakan masyarakat melalui solusi yang aman, ramah lingkungan, ekonomis, serta mendukung pola hidup sehat dan pencegahan DBD secara berkelanjutan.



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## A. INTRODUCTION

Mosquitoes are a type of ectoparasite that can potentially transmit various diseases to humans. In Indonesia, one of the most commonly found species is *Aedes aegypti*, known to cause diseases such as malaria, dengue fever (DBD), and filariasis or elephantiasis. Factors that support mosquito breeding include the presence of open irrigation channels, poorly maintained living environments, and unkempt public areas (Noor *et al.*, 2025). The prevalence of dengue fever continues to increase in the general population due to high humidity levels and air pollution, which contribute to an increased risk of dengue transmission among the community (Rasjid *et al.*, 2024). Menurut Kementerian Pendayagunaan Aparatur Negara dan Reformasi Birokrasi 2024, As of June 2024, there have been 621 deaths and 88,593 cases of dengue fever in Indonesia. Meanwhile, these cases have occurred in 456 districts/cities, while the deaths have occurred in 174 districts/cities in 28 provinces.

Based on data from the Lamongan District Health Office, dengue fever (DBD) remains a recurring public health problem, especially during the rainy season. In 2023, around 178 cases of DBD were recorded in Lamongan (Pergiwati, 2023). This number increased to 553 cases between January and October 2024 (Sudjarwo, 2024). Rose again to 671 cases between January and June 2025 (Yanuar, 2025). The significant rise in 2025 indicates that as many as 671 Lamongan residents were infected within just six months, particularly in the second quarter (January–June 2025). In Summersari Village, several cases have also been reported among school-age children, emphasizing the importance of preventive education through community empowerment activities to reduce dengue incidence in the area.

Insecticides are still considered the main solution for people dealing with mosquito bites, and are available in various forms such as lotions, electric repellents, incense, and sprays (Utami & Cahyani, 2020). Although chemical insecticides are effective in controlling mosquito populations, repeated application over a long period of time can have adverse effects on the environment and human health (Kahfi *et al.*, 2023). As a result, there has been increased interest in measures that are highly effective and environmentally friendly, such as natural insect repellents that can control mosquito populations without the risk of harmful side effects. One innovation that could be developed is the creation of natural mosquito repellent sprays, with basil and lemongrass as the main ingredients (Ningsih *et al.*, 2024). The use of sprays is more practical because they utilize materials and equipment that are easily accessible to the public, with a simple manufacturing process that makes them easier to use (Sa'ad & Saryanti, 2023).

The Poaceae family, or grass family, is the source of lemongrass. This plant is often found in Java, especially in lowland areas at an altitude of between 60 and 140 meters above sea level (Purnobasuki, 2024). Lemongrass contains essential oils, including compounds such as citral, which repel mosquitoes (Wijayanti *et al.*, 2024). Lemongrass contains citronella, which acts as a powerful insect repellent (Pongsapan *et al.*, 2021). Citronella and geraniol are natural ingredients found in lemongrass plants. These plants can kill mosquitoes and have a strong odor that mosquitoes dislike. Lemongrass is easy to grow, cultivate, and process into mosquito repellent spray products (Idrus *et al.*, 2024).

Basil contains various active ingredients, including geraniol, eugenol, cineol, linalool, and methyl chavicol (Herdiana *et al.*, 2024). The compounds mentioned above can be used as botanical insecticides to repel insects, as they have a distinctive pungent aroma that does not bother humans but repels insects, and can ultimately be used to reduce mosquito populations (Ninda *et al.*, 2024). Linalool, geraniol, and eugenol are examples of phenolic compounds that repel mosquitoes. These compounds produce a distinctive aroma or odor. When detected by



a mosquito's sense of smell, the compound disrupts the mosquito's mouthparts, and the mosquito fails to stimulate its sensory organs as a result of its inability to evaluate food and fly away. Basil is safe and can be used quickly and effectively to cover large areas, thereby reducing the mosquito population in a short period of time (Permada *et al.*, 2024)

Mosquito repellent sprays made from lemongrass and basil offer a safe solution to protect public health while minimizing the environmental risks typically associated with chemical-based products. However, in Summersari Village, lemongrass and basil can actually be very useful as natural mosquito repellents, but their use is still limited because the community has not yet fully mastered how to process them into products that can be used immediately. Therefore, consistent and well-structured training and education programs are very important to improve the community's ability to develop lemongrass and basil-based mosquito repellents.

The socialization and introductory training held in Summersari Village aimed to equip the community with practical knowledge and skills in utilizing basil and lemongrass for the production of mosquito repellent solutions. Through this training, residents are encouraged to optimize the natural resources available in their area as an alternative means of controlling the mosquito population. Not only that, this program is expected to foster public awareness of the benefits of using pure ingredients that are safe for the environment and have a high level of safety in daily activities.

The purpose of this agenda is not only to raise public awareness about the risks of dengue fever, but also to provide a practical and environmentally friendly alternative by creating mosquito repellent sprays made from natural ingredients. This product is designed so that it can be made and used independently by the community, as well as providing support for a sustainable and effective dengue fever prevention strategy.

## B. METHODS



**Picture 1. Flowchart**

Based on the flowchart above, the approach applied in the mosquito repellent spray innovation program includes educational and practical training sessions, as well as live demonstrations. The information session took place on August 25, 2025, at 1:00 p.m. Western Indonesian Time, where mothers from the PKK were invited to participate in a discussion forum at the Summersari Village Hall. The session was led by a speaker who explained the material using educational posters and distributed them to introduce the product and its production process. In addition, a special practical session was provided for the participating mothers, intended to equip them with knowledge and skills that could be directly applied.

The approach and methods used in this training are intended to help writers explain the material in greater depth and comprehensively, as well as provide accurate answers to participants' questions or concerns. With this approach, the dissemination is expected to be more effective and capable of producing maximum results in line with the program's objectives.



Next, we present several methods used to introduce and teach how to make mosquito repellent sprays made from lemongrass and basil:

1. **Preparation for Socialization:** Researchers must first make preparations before the activity begins so that the socialization process runs smoothly. These preparations include creating materials to be given to participants and collecting the necessary materials and tools. Some of the tools prepared include spray bottles, product labels, lemongrass stalks, basil leaves, water, 70% alcohol, stoves, pots, knives, strainers, and containers such as bowls or tubs. All of these preparations are made so that the activity runs smoothly and information can be conveyed effectively to the community.
2. **Socialization Implementation:** The purpose of this socialization activity is to have a direct positive impact on participants, especially the community of Summersari Village. This program is designed so that residents can utilize and process lemongrass and basil optimally, with an emphasis on the role of these two plants as a preventive measure against dengue fever (DBD).
3. **Training:** Innovative, interactive, and enjoyable Creative Learning methods are used in training on how to make mosquito repellent spray from basil and lemongrass. With this approach, participants not only listen to the material but also actively engage in practice, discussion, and question and answer sessions. This method helps participants understand the steps of making mosquito repellent spray more easily, encouraging them to apply it in their daily activities while building confidence in utilizing natural ingredients. In addition, this training contributes to increasing public understanding of the importance of disease prevention through simple yet effective methods.

Next, the material was presented by displaying educational posters to the PKK mothers in Summersari Village. This was followed by a simulation session on making sprays, which was led by the speaker and other assistants. The event was held at the Summersari Village Office located in Sambeng District, Lamongan Regency. The PKK mothers showed great interest in this socialization, as seen from their enthusiasm and positive responses.

### **C. RESULTS AND DISCUSSION**

The community agenda was organized to realize the three pillars of higher education. The series of events provided to residents included counseling, pre- and post-activity testing, and practical training on making natural mosquito repellent sprays from basil and lemongrass. The work program is focused on providing education on dengue fever prevention to the residents of Summersari. The main target of the activity is the members of the Summersari Village PKK, with the hope of encouraging entrepreneurship, health, skills, environmental management, and community knowledge and expertise in utilizing lemongrass and basil as raw materials for mosquito repellent sprays that are cost-effective, environmentally friendly, and have high utility value.

The socialization stages carried out by students began with pre- and post-tests conducted on the community, accompanied by the delivery of material on the benefits of mosquito repellent sprays made from pure basil and lemongrass, explanations of the components needed, and safe production procedures. During the practical activities, the community was given step-by-step instructions, starting from the provision of raw materials, the manufacturing process, to product marketing strategies.

To assess the effectiveness of the outreach and increase participant understanding, a comparison was made between the pre-test (before the activity) and post-test (after the activity). The results of this comparison are presented in the following table:



**Table 1. Comparison of Pre-test and Post-test Results of Participants' Understanding**

No	Assessment aspects	Pre-test (%Benar)	Pos-test (%Benar)	Improvement	Description
1	Knowledge about dengue fever and its prevention	76%	95%	+19%	There was an increase in knowledge after socialization
2	Understanding the benefits of lemongrass and basil as mosquito repellents	72%	94%	+22%	Understanding has increased significantly
3	Knowledge of spray-making materials and tools	75%	96%	+21%	Participants were able to list materials and tools
4	Knowledge of manufacturing steps	74%	95%	+21%	Participants understand the production process
5	Awareness of using natural ingredients	79%	95%	+16%	Awareness is increasing
	Average	75%	95%	+20%	Significant improvement

Based on the findings, it is clear that the outreach program has successfully increased the knowledge of PKK members in Summersari Village, as evidenced by the difference between the pre-test and post-test results. The program presented approximately ten questions to forty participants. After the program was implemented, the correct answer score increased by 20 percentage points. The pre-test recorded 75% correct answers, while the post-test, following the training on making mosquito repellent spray from lemongrass and basil leaves, increased to 95%.

From these activities, it was evident that there was an increase in the community's knowledge and awareness of the importance of using natural sprays as an alternative to minimize the negative effects of chemical-based products. This socialization is also an effort to address the issue of the spread of mosquitoes that cause dengue fever, with the hope of reducing dengue fever cases in Summersari Village. Furthermore, it is hoped that this program can be continued by the PKK through educating the community about making mosquito repellent sprays, while also encouraging awareness of preserving the environment as a long-term goal.





**Picture 2. Socialization and Demonstration of Making Mosquito Repellent Spray from Lemongrass and Basil**

The mosquito repellent spray socialization activity is scheduled for August 25, 2025, with two main agendas, namely the delivery of educational material and practical training on product manufacturing. During the information session, the community will be provided with an understanding of dengue fever, including its causes, indications, early warning signs, and stages of development. The main objective of this agenda is to raise awareness among residents and their families about the dangers of dengue fever. Participants will also be introduced to various natural ingredients that can be used to prevent dengue fever, particularly basil and lemongrass, which are the basic ingredients of mosquito repellent sprays. In the final stage of the workshop, the community was trained to select clean and dry raw materials, then practice production techniques independently so that they could be applied at home. The spray products produced were also distributed to local residents to help reduce the risk of mosquito bites that cause dengue fever.



**Picture 3. Post Test Completion**

The application of post- and pre-activity tests has proven to be an effective way to measure the implementation of work programs in terms of data and information collection. The level of success can be determined by comparing the differences in the results of the post- and pre-activity tests of participants (Hariyanto *et al.*, 2024). Based on these findings, it appears that the outreach activities were able to increase the knowledge of PKK members in Summersari Village, as indicated by the difference in results between the pre-test and post-test. In this activity, approximately ten topics were presented to forty participants. There was a 27-point increase in the correct answer score after the program was implemented. The pre-test results showed an achievement of 75% correct answers, while the post-test results conducted after the counseling on making mosquito repellent spray from lemongrass and basil leaves increased to 95%.



**Picture 4. The Process of Making Mosquito Repellent Spray from Lemongrass and Basil**

The research team used a boiling method to make mosquito repellent spray. The boiling process was relatively short, taking only about 15 minutes, until the boiled lemongrass water turned brown.

### **1. Tools and Materials**

The tools and materials used include: mineral water, basil leaves, lemongrass stalks, spray bottle, stove, pot, knife, strainer, and container (bowl or basin).

### **2. Manufacturing Process**

The methods for making mosquito repellent spray are as follows:

- Prepare basil leaves and lemongrass stalks that have been crushed or chopped into small pieces.
- Wash the ingredients with clean water to remove any remaining dirt or soil.
- Boil the mixture of basil, lemongrass, and water in a 1:3 ratio for approximately 15 minutes, until the volume of water has reduced to one-third of the original amount.
- Strain the mixture to separate the lemongrass and basil pulp, then mix it with 70% alcohol using a 3:1 ratio.
- The alcohol acts as a solvent so that the mixture can be formulated into a spray solution.
- The mixture of alcohol and boiled water is poured into a spray bottle at a ratio of 3:1, making the mosquito repellent spray ready for use.





**Picture 5. Lemongrass and Basil Mosquito Repellent Spray**

The image shows the output of the mosquito repellent spray processing, which is the result of an educational program on the use of lemongrass and basil. The product is then distributed to the community involved in the activity. Through this program, it is hoped that the community can take concrete steps to improve their quality of life, particularly by developing self-control, which is supported by the availability of supporting utilities. (Syarlisjswan *et al.*, 2024).

As an empowerment effort to improve environmental health and hygiene, the community participated in a program entitled “Training on Making Mosquito Repellent Spray from Basil and Lemongrass with the Residents of Summersari Village.” In this activity, residents were actively involved in producing sustainable outputs that can be used daily as mosquito repellents. In addition to contributing to the prevention of diseases that are prone to infect children, such as malaria and dengue fever, this program also encourages harmony, cooperation, and community awareness of environmental sustainability.

## **D. CONCLUSION**

The dissemination and training on making mosquito repellent sprays made from lemongrass and basil leaves successfully educated the community on the importance of utilizing natural ingredients that are easily found in the surrounding environment. The spray product is offered as a more reliable, environmentally safe, and economical alternative to chemical insecticides, allowing for sustainable use without posing risks to health or the environment.

Through interactive learning methods, the community not only gains theoretical knowledge, but also hands-on experience in making mosquito repellent sprays, from processing raw materials to producing ready-to-use end products. Direct participation in this activity also boosts residents' confidence to independently produce and use natural sprays in their homes.

In addition to producing useful products, this activity also plays a role in strengthening community participation, fostering a sense of togetherness, and raising awareness of the importance of utilizing local potential. Therefore, mosquito repellent sprays made from basil and lemongrass are not only a practical solution for repelling mosquitoes, but also represent a simple innovation based on local wisdom that supports the creation of a healthy and sustainable lifestyle.



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## **F. AUTHOR CONTRIBUTIONS**

In the implementation of the Lemongrass-Based Mosquito Repellent Spray Demonstration Program, Suhariyati acted as a group facilitator and event consultant. Muhammad Nurwijaya Saputra was in charge of coordinating the team and developing the overall program concept. Uswatun Khasanah analyzed data and designed relevant educational materials. Erly Nadila was responsible for developing communication strategies to ensure effective socialization. Mellysa Nur Ramadhani organized the event according to the prepared rundown. Nabila Eka Nanda Rosyanto coordinated participant involvement in the pre-test and post-test. Hamka Lukmanul Hakim Adhani directly demonstrated the lemongrass production process.

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