

## Training and Making Anti-Mosquito Lotion Made from Lemongrass and Clove Oil for the North Inderalaya Community

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### ABSTRACT

Controlling the vector of dengue fever spread such as *Aedes Aegypti* and *Ae. Albopictus* mosquitoes is very necessary because of the increase in dengue fever cases every year, so far mosquito control using synthetic chemicals, causing environmental and health problems, the use of DEET (N-N Diethyl Metyl Toluenmide) mosquito repellent has the effect of triggering skin cancer, especially in children. The use of botanical insecticides that work as repellents against mosquito bites is very necessary. The essential oil content in cloves and lemongrass leaves functions as a mosquito bite repellent. The purpose of this activity is to increase the knowledge and skills of making anti-mosquito lotion from natural ingredients. The method of this activity includes counselling by transferring knowledge about the topic of the activity and demonstrating the making of anti-mosquito lotion made from lemongrass and cloves.

## **INTRODUCTION**

The community, particularly mothers and young women, are constantly actively involved in PKK operations at Rukun Tetangga (RT) 3, which is situated in the Timbangan village of the Inderalaya Utara district. Each household also owns a sizable piece of land that is covered in helpful plants, like lemongrass. There is still a lack of community understanding on the importance of keeping the environment clean. Static water is common during the rainy season and provides mosquitoes, which are carriers for the transmission of diseases like chikungunya, malaria, elephantiasis, and Dengue Fever (DF), with a place to reproduce. Numerous diseases are conveyed by at least 2,500 different species of mosquitoes. One of the most prevalent mosquitoes in the home is *Culex tarsalis*, which itches when bitten.

The disease known as Demam Berdarah Dengue (DBD) is caused by the A. al. virus and is spread by the *Aedes aegypti* mosquito. About three, four, four cases of DBD have been reported in 2016 (Yuni et al., 2022). DBD is still a health issue that cannot be adequately addressed, particularly in Indonesia. Penyebaran penyakit DBD is pursued in a variety of ways, one of which is using vector-based. Currently, the use of chemical insecticides to manage the DBD disease vector is leading to a number of new issues, such as contamination of the environment, non-target insect death, target insect resistance, and human and pet deaths. Finding substitute insecticides that can eradicate the desired insects without endangering the environment or public health is therefore necessary. One alternative insecticide that can be used is rapelan (Hallem et al., 2020)

Currently, the public generally uses mosquito repellent products containing the active ingredients N,N-diethyl-m-toluamide, or N,N-diethyl-3-methylbenzamide (DEET), and permethrin, which can pose a risk to human health (Ode et al. 2016). because only those chemical formulations are available on the market. Therefore, alternative materials to replace these chemicals have been developed, and the current trend or tendency is back to nature, which is the use of natural materials for human needs, including for medicine and mosquito repellent cream (Stiani et al., 2018; Oktari et al., 2022).

Lotion is the most widely used type of mosquito repellent by the public, according to research. Besides being the most widely used, lotion is also considered the safest, most practical, easy to use, and easy to carry when traveling. Lotion is a liquid emulsion preparation consisting of oil and water phases, which results in a semi-solid form (Ambari and Sena, 2019; Naiggolan et al., 2023). Making mosquito repellent lotion from natural ingredients is not difficult and does not require many expensive materials and equipment. Various types of plants that are easy to find around the house, such as lemongrass, lavender flowers, tembelekan, kenanga, cloves, oranges, and rosemary, can be beneficial in controlling mosquitoes because these plants have a distinctive and pungent aroma that can repel mosquitoes from biting the surface of human skin (Lestari et al., 2014., Halli and Fitri., 2020).

Controlling mosquito vectors using natural repellents, such as using natural repellents, such lemongrass leaves (*Cymbopogon citratus*) and cloves (*Syzygium aromaticum*), can be used to control mosquito vectors. contains active ingredients such as essential oils, including citronellal, citronellol, and geraniol ( Zulaika ell., 2019.,Siskayanti et all., 2021) If these compounds are consumed by the larvae, the larvae's digestive organs will inhibit the taste receptors located in the larvae's mouth. This results in the larvae failing to receive taste stimulation, causing them to be unable to recognize their food and ultimately leading to their death. This plant also contains active compounds such as flavonoids, saponins, and tannins that are toxic to larvae.(Yuni et all., 2022)

In addition, lemongrass and clove plants contain essential oil compounds such as glycerol, phospholipids, galactolipids, sterols, triglycerides, and sterol esters. Additionally, flavonoids, saponins, and tannins have been found. The presence of these lipid compounds is volatile, forming a hydrocarbon fraction that will prevent mosquitoes from biting (Hallen et al., Helmiyanti, 2019). In addition, flavonoids, tannins, and saponins are also compounds known as antioxidants, thus neutralizing free radicals. Even flavonoids are known to be used as a substitute for vitamin E (Halim and Fitri, 2020). In addition, lemongrass and clove plants contain essential oil compounds such as glycerol, phospholipids, galactolipids, sterols, triglycerides, and sterol esters. Additionally, flavonoids, saponins, and tannins have been found. The presence of these lipid compounds is volatile, forming a hydrocarbon fraction that will prevent mosquitoes from biting (Hallen et al., Helmiyanti, 2019). In addition, flavonoids, tannins, and saponins are also compounds known as antioxidants, thus neutralizing free radicals. Even flavonoids are known to be used as a substitute for vitamin E (Halim and Fitri, 2020).

## IMPLEMENTATION AND METHODS

Community service activities in the form of training and assistance in making mosquito repellent lotion, which consists of a mixture of lemongrass oil and clove oil, for the community in RT 3 Timbangan Village, Inderalaya District. Community service activities in the form of training and assistance in making mosquito repellent lotion, which consists of a mixture of lemongrass and clove oil, in RT 3 Timbangan Village, Inderalaya Utara District, Ogan Ilir, targeting a group of 30 women from the PKK group. This group was divided into 3 subgroups, each accompanied by the Community Service Team from Sriwijaya University, consisting of lecturers and several students.

### **The Activity Method Consists of 3 Stages, Namely:**

- a. Stage 1, Preparation stage for carrying out activities such as coordinating with village officials about the implementation of activities and preparing tools and materials.
- b. Stage (2), Distribution of materials in the form of a package book containing activity materials, demonstration of tools and equipment, introduction of the tools and materials needed for this activity, followed by a demonstration explaining the activity material on how to make a lotion mixture consisting of glycerin, olive oil, 5 drops of lemongrass oil, and cloves, then blended until homogeneous, and finally put into a bottle

followed by a discussion and Q&A session.

- c. Stage 3, Evaluation includes the level of understanding of the material from the target audience, covering: mosquitoes as vectors of dengue fever, the dangers of dengue virus infection, how to deal with mosquito bites, how to make mosquito repellent lotion.
- d. Stage 4. Training, Training is provided to the community consisting of mothers and teenage girls, so they can independently perform formulation techniques, make lotion solutions, heat, and pack mosquito repellent lotion. Pocket books and videos on how to make mosquito repellent lotion are provided.

Making Lemongrass and Clove Oil Lotion The first step in making citronella and clove oil lotion is to melt the oil phase, which includes stearic acid, liquid paraffin, BHT, and citronella oil in a porcelain cup. Then, the water phase, which consists of glycerin, TEA, nipagin, and aquadest, is melted in a porcelain cup, and then a hot mortar is prepared. After the oil phase and the water phase in each porcelain cup have melted, simultaneously pour the oil phase and the water phase into the hot mortar and stir constantly until a lotion mass is formed or until the temperature in the mortar decreases. Place it into the preparation container.

- e. Stage 5. Evaluation and monitoring. After the activities are completed, monitoring is conducted again by evaluating the level of satisfaction with the product. This is done over the course of a week, every three days. The success of this activity is measured by success indicators for the target audience, including the understanding and skills of the community in independently making fish feed, the sustainability of this activity, the benefits of this activity, and whether new SMEs for natural fish feed production will be formed. The stages of the community service activities can be seen in Table 1 below;

**Table 1. Stages of Service Activities**

Preparation	Activities	Evaluation
(1) Coordination with village officials regarding the activity schedule (2). Preparation of tools and materials	Counseling Provision of materials and demonstrations (1). Distribution of pocket books containing activity materials(2). Delivery of material (3). Demonstration in the form of introduction to tools and materials how to make mosquito repellent lotion	(1) The evaluation results from questionnaire in the form of understanding before and after the activity (2). The evaluation results from questionnaire about analysis psychomotor audience target (3). Results of the questionnaire evaluation level of satisfaction target audience against the

		product from This activity is in the form of natural mosquito repellent lotion with added lemongrass and clove oil
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## RESULTS AND DISCUSSION

This community service activity went smoothly, orderly, and well. This was also demonstrated by the participants' enthusiasm to gain knowledge, broaden their horizons, and improve the skills of mothers and young women in Timbangan Village, Inderalaya Utara District, Ogan Ilir, about making lotion from serah and cloves. Before the activity began, questionnaires were distributed to the participants. The purpose of the questionnaire given to the participants of this activity is to enhance their understanding and evaluation of how to make mosquito repellent lotion.

The results of the activity evaluation are as follows: knowledge about dengue fever; the benefits of lemongrass and cloves as mosquito repellents. Recognizing the ingredients and materials for making lotion and directly practicing how to make mosquito repellent lotion. The results of the activity evaluation are depicted in Figure 3. Questions posed to the target audience before and after the activity determined the evaluation results of the activity. All answers were collected and tabulated into percentages showing improvement. The results of the evaluation of material understanding before and after the activity show a significant improvement from not understanding to understanding, with an increase of as much as one hundred percent. Therefore, the acceptance of the material by the target audience is quite good. The results can be seen in Table 2 below.

**Table 2. The Level of Knowledge and Understanding of Participants about the Activity Topic Before the Activity is Conducted**

No	Question	Answer (%)	
		Ya	tidak
1	Knowing the formulation of natural ingredient lotion	10	90
2	Knowing the natural mosquito repellent	20	80
3	Knowing the dangers of using harmful chemical lotions	75	25
4	Knowing the benefits of mosquito repellent lotion	10	90
5	Knowing how to pack natural ingredient mosquito repellent lotion	5	95

The extension method in the form of lectures and demonstrations can enhance the knowledge and skills of the participants. This is because the participants in this activity can directly see and practice the process of making mosquito repellent lotion, so the knowledge and skills can be well received by the participants. The results of the psychomotor evaluation or the ability of the target audience based on four criteria (perception, set, following instructions, and mechanism) through observation and scoring show that all participants were able to make mosquito repellent lotion using lemongrass and cloves at a rate of 80%. This is because most of the target audience participants understand the relationship between cognitive and psychomotor aspects. According to Sonmez (2017) and Wulandari (2018), the target audience is motivated to independently and sustainably make mosquito repellent lotion if they have high values in the psychomotor aspect, as seen in Figures 1 and 2. As a result, the target audience is motivated to independently and sustainably make their own mosquito repellent lotion. The guidance from the Unsri community service team, consisting of lecturers and students who provided materials and demonstrations on lotion-making to the target audience, supports this.



**Figure.1 Participants Take the pretest**



**Figure.2 Participants listen to the provided material**



**Figure.3 Delivery of Equipment for Mosquito Repellent Lotion Production**



**Figure.4 The process of Mixing Lotion Ingredients**



**Figure. 5 Mosquito Repellent Lotion Product**

The results of the evaluation of the psychomotor skills of the target audience, based on four criteria (perception, set, following instructions, and mechanism) conducted through observation and scoring, show that most participants in the target audience understand the relationship between psychomotor and cognitive aspects, which will be related to the percentage of skill levels. Figure 3.



**Figure. 6 Percentage of Skills of Participants in the Anti-mosquito Lotion Making Activity.**



**Figure. 7 Level of Participant Satisfaction with the Activity Output**

The target audience is evaluated after the activity is completed and the participants independently make animal feed. The evaluation results from the provided questionnaire aim to determine the level of satisfaction with the fish feed products they made, including preferences for shape, smell, and benefits for the poultry and livestock they raise, as shown in Figure 3. Eighty percent of the respondents really liked the shape, smell, and benefits of making lotion from lemongrass and clove plants.

Because the product they have been making is highly needed to address the increasing cases of dengue fever in their area, the target audience is very motivated to create mosquito repellent lotion. The lotion made from lemongrass and cloves is produced through several steps. One of them is the introduction and chopping of lemongrass and clove plants, the mixing and homogenization of lotion ingredients, and the heating of the lotion mixture and packing of the lotion into bottles. This process will produce an anti-mosquito lotion with a distinctive aroma due to the mixture of several essential oils such as eugenol, citronellal, citronellol, and geraniol (Saputra et al., and Oktari et al., 2022).

It is hoped that mothers and school drop-out teenage girls can carry out this activity sustainably to prevent the spread and increase the cases of dengue fever. According to Sonmez (2017), there are four indicators that can be identified which show a good level of activity: (1) an increase in knowledge about the use of lemongrass and clove plants as natural ingredients for making mosquito repellent lotion; (2) participant engagement demonstrated through effective discussions; and (3) the relevance of the material to the community's needs to increase income through the production of mosquito repellent lotion as an effort to reduce the incidence of dengue fever.

## CONCLUSIONS AND RECOMMENDATIONS

This activity went well, according to the questionnaire evaluation data. As evidenced by the intense discussion and Q&A sessions during the activity, participants showed high enthusiasm and motivation to implement this activity sustainably, as indicated by the results, which show an increase in the percentage of knowledge and understanding of skills regarding the topic of the conducted activity. By making and applying their own mosquito repellent lotion, they are attempting to stop the spread of dengue fever and its cases in the neighbourhood.

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