

Development of Herbal Mosquitoes Repellent Candle

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Abstract

Citronella oil and essential oil are commonly used for their insect-repellent properties. They're important for creating natural insect repellents, candles, and sprays, offering a safer alternative to chemical-based products. Citronella oil is particularly effective against mosquitoes, making it invaluable for outdoor activities and protecting against insect-borne diseases like malaria and Zika virus. Its pleasant scent also adds to its appeal as a natural air freshener. In a mosquito repellent study, citronella extracted from lemongrass was found to be 100% repellent for 11 hours against the Anopheles mosquito parasite. Farmers in Ahmednagar region cultivate plants like citronella, lavender, or eucalyptus, which are rich sources of essential oils. Plants are processed after harvest to extract essential oils. Several methods can be used to achieve this, including filtration, steaming, and cold pressing. For preparation citronella oil was obtained from local market of Ahmednagar & evaluated by Flammability test along with the public study of the product. It does not pose the same risks of skin irritation or toxicity associated with some chemical repellents. Its aromatic qualities contribute to the overall appeal of herbal mosquito repellent candles, making them enjoyable to use. This versatility enables manufacturers to produce candles suitable for different settings, such as outdoor gatherings, camping trips, or backyard relaxation. This long-lasting effect enhances the practicality and value of herbal mosquito repellent candles for consumers.

Keywords: Citronella oil, Essential oils, Natural insect repellent, Mosquito repellent, Lemongrass extract, Herbal candles, Flammability test, Outdoor activities, Plant cultivation, Steam distillation

INTRODUCTION

Citronella oil and Essential oils are extracts from plants of the genera Sally and Citronella (Poaceae) are commonly used as ingredients in herbal mosquito repellents, but are commercially available primarily in Europe and North America. This is Cymbopogon naldus, which is sold as a preparation for use. The repellent effect of citronella has been recorded in several studies where citronella was described as an essential oil obtained from the stems and leaves of various species of lemongrass (Cymbopogon spp.) [1]. In a mosquito repellent study, citronella extracted from lemongrass was found to be 100% repellent for 11 hours against the Anopheles mosquito parasite [2]. Recently, several studies have also reported that citronella can repel various Anopheles species. 8 to 6 hours [3–5]. Various concentrations of citronella essential oil (100 µl to 0.1 ml) have also been shown to provide significant protection against nearly all human mosquito vectors, ranging from 4 to 0.8% of the 100% protection time, in many studies (field and laboratory studies). It shows a repellent effect worldwide [6–8]. However, the concentration of extracts and the species of mosquitoes studied influence the repellency of Citronella, ranging from 52 to 85%. Several studies have analyzed the effectiveness of essential oils from citronella in terms of protection against arthropods [9]. While citronella-based repellents only protect users from house-hunting mosquitoes for about two hours, repellent ingredients are important. The findings suggest that citronella—containing limonene,

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pinene, geraniol, citral, and citronellol—are as effective as DET. However, citronella oil is highly volatile, which reduces its effectiveness and protective power.

Herbal mosquito repellent candles often contain essential oils such as citronella, lemongrass, clove oil, rose oil as there is insect-repelling properties. These oils release fragrances that mosquitoes find unpleasant, helping to keep them away, Unlike synthetic repellent it helps in keeping the mosquitoes and insect away [10].

MATERIAL AND METHOD

Collection of Material

- *Sourcing:* Farmers in Ahmednagar region cultivate plants like citronella, lavender, or eucalyptus, which are rich sources of essential oils.
- *Extraction:* After harvesting, the plants are processed to extract their essential oils. Several methods can be used to achieve this, including filtration, steaming, and cold pressing.
- *Production:* Local distilleries or small-scale producers often handle the extraction process. They use traditional or modern equipment depending on the scale of production.
- *Quality Control:* The extracted oils undergo quality checks to ensure purity and potency. Producers may adhere to local or international standards to maintain product quality.
- *Distribution and Packaging:* The oil is extracted and confirmed for quality and placed in bottles or other containers suitable for sale. These products then make their way to local markets in Ahmednagar and nearby regions for sale.
- *Market Availability:* Local markets in Ahmednagar may offer a variety of essential oils including citronella, lavender, tea tree, and others sourced from nearby farms and producers.

INGREDIENTS & THEIR ROLE

Citronella oil serves as a crucial ingredient in herbal mosquito repellent candles due to its potent natural properties. That's why it's so important: Citronella oil is widely recognized for its anti-fly properties. Its strong scent masks the attractant cues that mosquitoes use to locate humans, thereby reducing their presence in the area where the candle is burning [11].

Clove oil is often used in herbal mosquito repellent candles due to its potent insect-repelling properties. It contains compounds like eugenol, which mosquitoes find repulsive. Additionally, clove oil has a strong, pleasant aroma, making it a popular choice for candle makers aiming to create effective and appealing natural insect repellents.

Lemon oil is often used in herbal mosquito repellent candles due to its natural insect-repellent properties. It contains compounds like citronellal and limonene, which mosquitoes find unpleasant. Additionally, its refreshing scent adds to the appeal of these candles, making them a popular choice for outdoor settings where mosquitoes are a nuisance.

Rose oil is well known for its ability to calm and relax the body and mind.

Incorporating it into a candle can enhance relaxation while also repelling mosquitoes, creating a more enjoyable environment. Because synthetic ingredients can pose health risks, many consumers choose natural ingredients over synthetic ingredients. Rose oil offers a natural alternative for those seeking an herbal mosquito repellent option.

Camphor's potent insecticidal properties make it a popular ingredient in herbal mosquito candles. It emits a strong odor that repels mosquitoes and other insects effectively. Additionally, camphor has been used traditionally. Its antimicrobial and antiseptic properties have found benefits in many cultures, making it a natural choice for mosquito repellent, and possibly health benefits.

List of all ingredients were tabulated in Table 1.

Table 1. List of Ingredients.

S.N.	Ingredients	Quality (in drops)
1	Citronella	25-30
2	Rose oil	10
3	Clove oil	10-15
4	Lemon oil	5
5	Camphore	3-5

PROCEDURE

To prepare a herbal mosquito repellent candle using citronella oil and essential oils, follow these steps:

- *Gather Ingredients:* You'll need citronella oil, essential oils (such as eucalyptus, lavender, or peppermint), wax (preferably soy or beeswax), candle wicks, and candle containers.
- *Melting the Wax:* You can use two forks to melt the wax. Direct heat should be avoided as it can cause fire. Stirring is sometimes necessary when the wax is completely dry. Once the wax has melted, remove the heat source and give it some time to cool before adding the essential oils and Centennial oil and then adding your favorite essential oil to the citronella oil. The ratio typically ranges from 5-15% of essential oil to the total amount of wax, depending on the potency desired.
- *Mix Completely:* Give the combination a good stir and make sure the oil is evenly dispersed throughout the wax. Once the wax mixture is wet, place a candle wick between your prepared candle pans. Bricks can be held together with a small amount of glue or melted wax. Gently pour the wax mixture into the prepared candle molds, keeping the bricks in the center of the mold.
- *Let Cool:* Give the candle time to cool and harden. This can take hours to complete.
- *Cut the Bricks:* Once the candles are completely cool and hard, cut the bricks to about ¼ inch above the back of the wax
- *Use and Storage:* Keep candles out of the sun in a cool cool place. When ready to use, light the candles and place them in areas where mosquitoes are likely to be present, such as outdoor patios or near open windows.
- *Safety Precautions:* Always take extra care with hot wax and open flames. Do not use candles near combustible materials and make sure never to burn alone. By following these steps, you can create your own herbal mosquito repellent candles using citronella oil and essential oils. Adjust the ratios and scents according to your preferences for an effective and aromatic solution.

EVALUATION

- *Flammability Test:* The flammability of the prepared candles was tested to determine the mosquito repellent properties and burning quality in terms of burning time and the effectiveness of the subsequent spotting process. Candle flammability testing was conducted to verify apparent flammability in the laboratory [12]. Simply based on the results, the time taken to light the candle and any causative symptoms such as pain or cough were documented and recorded. There is a risk of mosquito establishment at night and outdoors, such as in poultry shops and village houses [13].
- *Final Product Public Study:* The Final Product Public Study is conducted on his 50 volunteers to investigate the safety and effectiveness of the product specifications. The formulation was distributed to all participants and feedback was collected. The study will last 30 days [14]. The data collected were statistically evaluated and explained.

Herbal mosquitoes repellent candle using citronella oil and essential oil were shown in figure 1.



Figure 1. Herbal mosquitoes repellent candle using citronella oil and essential oil.

CONCLUSION

- *Safe Alternative:* Compared to synthetic chemicals commonly found in commercial mosquito repellents, citronella oil offers a safer alternative for people, pets, and the environment. It does not pose the same risks of skin irritation or toxicity associated with some chemical repellents.
- *Aromatherapy Benefits:* In addition to its insect-repellent properties, citronella oil has a pleasant, citrus-like aroma that can enhance the ambiance of outdoor spaces. Its aromatic qualities contribute to the overall appeal of herbal mosquito repellent candles, making them enjoyable to use.
- *Versatility:* Citronella oil can be easily incorporated into candle formulations, allowing for the creation of various candle sizes, shapes, and designs. This versatility enables manufacturers to produce candles suitable for different settings, such as outdoor gatherings, camping trips, or backyard relaxation.
- *Long-lasting Effect:* When properly formulated, citronella oil can provide extended protection against mosquitoes, allowing individuals to enjoy outdoor activities without constant interruptions from biting insects. This long-lasting effect enhances the practicality and value of herbal mosquito repellent candles for consumers.

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