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Review Paper

A Preparation of Mosquito Repellent Dhoop

Kumari Shikha*[1], Thakur vishakha[2], Devi Poonam[2]

[1]*Assistant Professor, Aakash Institute of Medical Sciences, Nalagarh*
[2]*student, Aakash Institute of Medical Sciences, Nalagarh*

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ABSTRACT

Mosquito-borne diseases remain a significant global health concern, particularly in tropical and subtropical regions. Conventional mosquito repellents often contain synthetic chemicals that may pose health risks. This study explores the formulation of a natural mosquito repellent dhoop using plant-based ingredients such as orange peels, neem leaves, camphor, turmeric, and essential oils2. The preparation involves drying and grinding the raw materials into a fine powder, mixing them with binding agents like charcoal or cow dung, shaping them into cones or sticks, and allowing them to dry. When burned, the dhoop releases aromatic compounds that repel mosquitoes effectively. The results indicate that the herbal dhoop provides protection for up to two hours and offers an eco-friendly alternative to chemical-based repellents. The study highlights the potential of plant-derived ingredients in developing sustainable mosquito control solutions.

INTRODUCTION

Mosquito dhoop-

Mosquito dhoop is a type of incense stick infused with mosquito-repellent ingredients, traditionally used in many Asian households to repel mosquitoes and other flying insects. Unlike chemical sprays, mosquito dhoop emits natural or synthetic fumes that deter mosquitoes through the gradual release of aromatic smoke. Common ingredients include neem, citronella, eucalyptus oil, and sometimes synthetic pyrethroids (Patil et al., 2019). These products are often chosen for their dual role in pest control and aromatic ambiance, particularly in rural and semi-urban areas with limited access to electric repellents or sprays (Sharma & Kaushik, 2021).

Role of plants in mosquito repellents-

Plants play a vital role in the development of mosquito repellents due to their natural production of bioactive compounds that deter insects. Many

***Corresponding Author:** Kumari Shikha
Address: *Assistant Professor, Aakash Institute of Medical Sciences, Nalagarh*
Email ✉: baghelshikha919@gmail.com
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aromatic and medicinal plants produce essential oils and phytochemicals such as citronellal, eugenol, and limonene, which have proven mosquito-repellent properties (Maia & Moore, 2011). For centuries, communities across tropical regions have used leaves, smoke, and oil extracts from plants like citronella (Cymbopogon nardus), neem (Azadirachta indica), tulsi (Ocimum sanctum), and lemongrass to ward off mosquitoes (Isman, 2006). These plant-based repellents are increasingly popular due to their lower toxicity and environmental impact compared to synthetic chemicals like DEET. Essential oils derived from plants are often incorporated into incense sticks (like mosquito dhoop), creams, sprays, and vaporizers. Recent studies have also explored the nano-formulation of plant extracts for enhanced efficacy and longer-lasting protection (Pavela, 2016). However, the effectiveness of plant-based repellents can vary depending on the formulation, concentration, and method of application. While they are generally safer for humans and pets, their repellency may be shorter-lived than synthetic alternatives, necessitating repeated application (Nerio et al., 2010).

Plant with mosquitocidal properties-

Orange- Oranges (*Citrus sinensis*) and other citrus fruits have gained attention in mosquito repellent research due to their rich content of bioactive essential oils. The peels of oranges are particularly valuable, containing high concentrations of limonene, linalool, and citral, which are known for their insect-repelling and insecticidal properties. These natural compounds act by interfering with the olfactory receptors of mosquitoes, making it difficult for them to detect and locate human hosts. The use of orange peel in mosquito repellents is not only effective but also environmentally friendly, offering a sustainable alternative to synthetic chemicals like DEET. (Kumar et al., 2012).

Chemical constituents-

S.No.	Chemical constituent
1.	Limonene
2.	Citral
3.	Vitamin C
4.	Pectin
5.	Hesperidin
6.	Aurantimarin & Aurantimaric acid

Benefits of orange peels-

1. **Natural Mosquito Repellency-** Orange peel contains d-limonene, a terpene known for its strong repellent activity against mosquitoes like *Aedes aegypti* and *Anopheles* species. When burned in dhoop form, the released vapours interfere with the mosquito's ability to locate human scent.

2. **Eco-Friendly and Biodegradable-** Using orange peel helps reduce waste from citrus processing industries and provides a biodegradable alternative to synthetic chemicals in mosquito repellents.

3. **Aromatherapeutic Effects-** Besides repelling mosquitoes, the pleasant citrus **aroma** of orange peel smoke contributes to a calming indoor environment. This makes it preferable in homes where harsh chemical smells from conventional repellents are undesirable

4. **Non-Toxic and Safer for Humans-** Unlike synthetic repellents that may cause skin or respiratory irritation, orange peel-based dhoop is non-toxic and generally safe for children and pets when used in well-ventilated areas

5. **Cost-Effective and Readily Available-** Orange peels are inexpensive and widely available, making them an ideal ingredient for low-cost mosquito control products, especially in rural or low-income settings. (Murugan et al., 2012)

Turmeric- Turmeric (*Curcuma longa*), is a medicine used as mosquito repellents. Its active compounds, particularly curcumin and ar-turmerone, exhibit significant insecticidal and repellent properties, making turmeric an attractive

option for eco-friendly mosquito control. (Ali et al.,2015)

Benefits of using turmeric-

1. **Natural Mosquito Repellent**: Turmeric contains compounds like ar-turmerone, curcumin, and turmerone, known for their insecticidal properties
2. **Long-Lasting Protection**: When combined with vanillin, turmeric oil has been shown to repel mosquitoes for up to eight hours, comparable to the synthetic repellent DEET.
3. **Synergistic Effects**: Combining turmeric oil with other essential oils, such as those from *Pogostemon heyneanus* and *Zanthoxylum limonella*, enhances mosquito repellent efficacy.
4. **Eco-Friendly and Sustainable**: Utilizing turmeric in dhoop production promotes sustainability by reducing waste and minimizing the need for synthetic chemicals.
5. **Pleasant Aroma**: The natural fragrance of turmeric adds a refreshing scent to the dhoop, creating a pleasant atmosphere while repelling mosquitoes (Das et al., 2015)

Material used in formulating mosquito dhoop-

S.No.	Ingredients	Quantity
1.	Limonene oil	4ml
2.	Activated charcoal	2gm
3.	Camphor	2gm
4.	Turmeric	2gm
5.	Water	Quantity sufficient

Activated Charcoal- Charcoal plays a crucial role in mosquito dhoop sticks or coils, acting primarily as a base material and fuel that supports combustion. In traditional and herbal mosquito repellents, charcoal is preferred for its ability to burn steadily and release smoke over an extended period. Charcoal is valued not only for its burning efficiency but also for its relatively low toxicity and smoky aroma, which helps mask human scent—making it less likely for mosquitoes to detect and target people. Moreover, activated charcoal is sometimes added to absorb unwanted odors and enhance the effectiveness of natural repellents.

Camphor: Camphor is a natural compound derived primarily from the wood of the camphor tree (Cinnamomum camphor) or synthesized from turpentine oil. In mosquito dhoop formulations, camphor is widely used for its strong insect-repellent and antimicrobial properties.

In herbal mosquito dhoop sticks, camphor is often blended with other natural ingredients like neem powder, lemongrass oil, and charcoal. It not only enhances the efficacy of the repellent smoke but also contributes to a more pleasant fragrance and faster ignition during burning. Due to its low toxicity in small quantities and high vapor pressure, camphor remains a popular and efficient natural repellent in dhoop and other traditional formulations.

RESULT

The preparation of mosquito repellent dhoop from orange peels has shown promising results in providing a natural and eco-friendly alternative to chemical-based repellents. Studies indicate that orange peels contain limonene, an essential oil with mosquito-repelling properties. The process involves drying and grinding the peels into a powder, which is then mixed with ingredients like charcoal, camphor, turmeric, and essential oils to form a dough. This dough is shaped into cones or sticks and left to dry. The resulting dhoop has demonstrated significant anti-mosquito capabilities, offering protection for up to two hours. Additionally, using orange peels as a raw material is affordable, readily available, and environmentally friendly. This method reduces exposure to synthetic chemicals, making it a safer option for households, especially for children and pregnant women.

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