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Formulation of herbal mosquito incense sticks by using *Polianthes tuberosa* (tuberose), *Tagetes* (marigold) and *Petunia atkinsiana* (Petunia) flowers oil

Pooja Walmik DahaleDOI: <https://www.doi.org/10.33545/26649926.2025.v7.i6b.360>**Abstract**

The present research was carried out to reduce harmful effects of chemical mosquito repellent products by developing natural mosquito repellent incense sticks. Herbal plants are safe and eco friendly to use for making mosquito repellent products. *Tagetes* (marigold), *Petunia atkinsiana* (Petunia), *Polianthes tuberosa* (tuberose) flowers and *Azadirachta indica* (Neem) oil was used. The plant material was collected and kept for shade drying. Oil was extracted from the marigold, petunia and tuberose flowers. Neem leaves oil was extracted and used as base oil for preparation of mosquito repellent incense sticks of marigold, petunia and tuberose. Different tests were performed to check the results of herbal mosquito repellent incense sticks. Marigold and petunia shown higher effects in repellency. Tuberose also shown high effects in mosquito repellency. However, the present study shown that there were no side effects caused by this herbal incense sticks.

Keywords: Herbal plants, Mosquito repellent, Incense sticks, Marigold, Petunia and Tuberose**Introduction**

Bio based mosquito repellents are pest management tools that are based on safe, biologically based active ingredients derived from plants. Benefits of bio-products include effective control of mosquito as well as human and environmental safety. The attraction of mosquitoes towards human beings is due to the lactic acid and CO₂ which is present in our sweat. The chemoreceptors present in the antennae of mosquitoes perceive the smell of the sweat. The role of natural mosquito repellent is to mask human scent. Controlling mosquitoes is of utmost important in the present day scenario with rising number of mosquito borne diseases (Shukla, *et al*; 2017) ^[6].

There are various marketed preparation available such as cream, citronella oil, DEET and other products but some of those marketed products increases the demand of herbal content repellent because hazardous content in mosquito repellent such as DEET may cause skin allergy, breathing-related disorders and other health disorders. The repellent made from natural sources has the advantages over a synthesis repellent. The repellent stick has advantages such as: economically effective, easily formulated and maintained, least mechanical equipment, hard work and skill, fast responses, reducing bad smells in the environment, disease-causing bacteria and viruses (Bobde *et al*; 2023) ^[4].

A mosquito repellent is a substance that deters mosquitoes from approaching or settling. Repellents are formulated for use on bare skin. They are sold as aerosols, creams, solids (sticks), pump sprays and liquids. Nowadays majority of serious diseases or infections are caused by mosquitoes mainly female anopheles mosquito like Malaria, Dengue, Chikungunya, Lymphatic Filariasis, Zika, etc. (Patil *et al*; 2023) ^[8].

Mosquito bites can cause staph bacteria to enter the skin, especially if the bite is itchy. The bacterium can lead to cellulitis, a skin infection that results in fever, red, inflamed skin and skin swelling. Even though many medicines and formulations are used for these diseases, certain people opt for natural remedies to prevent risk factors. Essential oil (limonene oil) obtained from orange peel has repellent potency against insects such as mosquitoes and shows antimicrobial activity against *Staphylococcus aureus* (Patel *et al*; 2025) ^[7].

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Materials and Method

The raw materials used for the production of the mosquito repellent stick were wood powder, potato starch, gum acacia & natural oils. (Home made oil). *Azadirachta indica* (Neem) oil, as a base was used. All the ingredients have different functions. Wood powder has good binding property.

Marigold, tuberose and petunia flowers has excellent insecticidal antiviral, antibacterial and anti-inflammatory properties. Potato starch is useful in preparation of repellents as it gives proper shape using moulder as rolling by hands. Wood powder is used as a base ingredient and gum acacia acts as an excellent binder.



Extraction of Oil

Fresh flowers of petunia were collected from garden of pune. Petals of this flowers were kept for shade drying. After drying, petals were placed in a vessel. 5 ml of *Azadirachta indica* (Neem oil) was added to it as base ingredient. It was mixed properly so that the petals are covered by oil. It was boiled for few minutes then the mixture was poured into the jar with a tight fitting lid and jar was shaken. Then the oil was strain from petals in clean glass jar. Same procedure was done for extraction of *Polianthes tuberosa* (tuberose) & *Tagetes* (marigold) oil.

Neem oil was extracted by solvent extraction method by using three different solvents ethanol, methanol and acetone. In this process, soxhlet apparatus was used.

Preparation Method

Mosquito repellent sticks has mainly two parts of the ingredients. Part one contains the materials like acacia gum, potato starch, wood powder and part two contains the mixture of natural oils. About 60ml of tap water was boiled and 20% starch powder was poured in hot boiling water. Wood powder 30%, petunia oil 10% and *Azadirachta indica* (Neem) oil 5 % was mixed in boiling water and paste was made which was not so thick & not so thin. Such paste was made so that mixture can be rolled properly with hands to make incense sticks. The mixture were then mixed

uniformly on the wooden rolling board. With the help of hands the mixture was rolled in circular manner by placing the sticks in it. The incense sticks were kept for drying for 2-3 days. After drying, incense sticks were packed properly to disallow the moisture entrapment. This procedure was used for making *Tagetes* (marigold), *Petunia* (atkinsiana) and *Polianthes tuberosa* (tuberose) mosquito incense sticks.



Fig 1: Mosquito repellent herbal incense sticks

Observation

Burning time-To observe the burning time of herbal sticks, the sticks were burnt. The time taken to burn the sticks

completely and the total time of repellence was recorded. It was observed that the sticks were burnt at medium speed and capable to repel mosquitoes for longer time.

Table 1: Primary observation of Herbal Mosquito repellent Sticks

Sr. No	Oil	Burning time (Min/hr)	Irritability	Odour	Smoke Visibility
1	<i>Petunia atkinsiana</i> oil+Neem oil	1 hour 10 min	No	Good	High
2	<i>Polianthes tuberosa</i> oil+Neem oil	1 hour 3 min	No	Good	High
3	<i>Tagetes</i> oil+Neem oil	1 hour 5 min	No	Good	High

It was observed that the 1st & 3rd formulations of *Petunia atkinsiana* and *Tagetes* burnt for longer time.

Mosquito repellence test: Mosquito repellence test was done by simple selecting specific areas in the evening and night

period such as department/ college corners, at house and surrounding corners. The public remarks were noted after burning the sticks and checking if the mosquitoes are present or escaping away from the selected areas.

Table 2: Mosquito repellence test in different areas of department/college, at home and surrounding corners

Sr.no	Areas	Reports given by people	Remarks
1	At house & surrounding corners	No irritation & Mosquitoes escaped	Mosquitoes are repelled
2	Department/ College corners	No irritation & mosquitoes escaped	Mosquitoes are repelled

Result and Discussion

The attempts have been made to prepare herbal repellent sticks product using wood powder, potato starch, acacia gum & natural oils (Home made oils). Neem oil was used as

a base while preparation of repellent sticks. *Tagetes* and *Petunia atkinsiana* herbal repellent sticks were more effective than *Polianthes tuberosa* herbal incense sticks.

Table 3: The biophysico property of sticks

Oils	Composition	Strength of Sticks
<i>Tagetes</i> oil	Wood powder 30%+ Potato Starch 20%+ Acacia gum 3%+ 60 ml. Water + <i>Tagetes</i> oil 10%+ Neem oil 5%	Strong
<i>Polianthes Tuberosa</i> oil	Wood powder 30%+ Potato Starch 20%+ Acacia gum 3%+ 60 ml. Water + <i>Tuberosa</i> Oils 10% + Neem oil 5%	Strong
<i>Petunia atkinsiana</i> oil	Wood powder 30%+ Potato Starch 20%+ Acacia gum 3%+ 60 ml. Water + <i>Petunia</i> Oils 10%+ Neem oil 5 %	Strong

Conclusion

In present study it revealed that *Tagetes* and *Petunia atkinsiana* herbal repellent incense sticks showed strongest mosquito repellent activity. *Polianthes tuberosa* also shown stronger mosquito repellent activity. This could reduce the harmful effects of mosquito on human health. This formulation is easy, cheap and eco friendly to use. It repels maximum number of mosquitoes. No skin irritations or side effects were observed. *Azadirachta indica* (Neem) oil is also strong enough to repel the mosquitoes, so neem oil was used as base oil in preparation. According to Kamble (2022) neem oil formulations also has capacity to kill An. Gambiae larvae at relatively low concentration suggest the possibility of their application as synthetic insecticide alternatives in the management of malaria vectors. *Petunia* is an important medicinal, ornamental plant and has ability to repel mosquitoes. It possesses antibacterial and antimicrobial properties. *Tagetes* (marigold) has insect repellent properties. *Polianthes tuberosa* (Tuberose) flower possess antiseptic, analgesic, anti-inflammatory & anti-spasmodic properties. All the three repellents sticks of *Tagetes*, *Petunia atkinsiana*, and *Polianthes tuberosa* is also beneficial to repel the mosquitoes. This incense sticks are beneficial for business opportunities.

References

- Adeniran OI, Fabiyi E. A cream formulation of an effective mosquito repellent: a topical product from lemongrass oil (*Cymbopogon citratus* Stapf). Int J Pharm Sci Rev Res. 2012;2(2):322-327.
- Bhat S, Shetty H. Formulation and evaluation of herbal mosquito repellent in two forms used in folklore practice. J Ayurveda Integr Med Sci. 2023;8.
- Kalita B, Bora S, Sharma AK. Plant essential oils as mosquito repellent - A review. Int J Res Dev Pharm Life Sci. 2013; ISSN:2278-0238.
- Bobde KS, Devhare LD, et al. Formulation and evaluation of mosquito repellent stick. Int J Drug Deliv Technol. 2023;13(4):1283-1286.
- Phal D, Naik R, Deobhankar K, Vitonde S, Ghatpande N. Laboratory evaluation of herbal mosquito coils against *Aedes aegypti* mosquito. Bull Environ Pharmacol Life Sci. 2012;1. ISSN:2277-1808.
- Shukla D, Wijayapala S, et al. Evaluation of herbal mosquito repellents. Int J Mosq Res. 2017;5(1):19-24. ISSN:2348-5906.
- Patel HB, Jogadiya CN, et al. Citrus shield: Formulating mosquito repellent stick from orange peels. Int J Creat Res Thoughts. 2025 Mar;13(3). ISSN:2320-2882.
- Patil JR, Nalawade SM, et al. Preparation and evaluation of herbal mosquito repellent cream. Int J Herb Mosq Rep Cream. 2023;8(9). ISSN:2456-4184.
- Sharma Baruah P, Borthakur SK. Formulation of an herbal mosquito repellent. Ann Plant Sci. 2016; ISSN:2287-688X.
- Sanoji RY, Zalte A, Guleccha V. Preparation of incense stick using marigold floral waste from Nasik region. J Pharm Sci Res. 2021;13(10):635-7. ISSN:0975-1459.

11. Ranasingh MSN, Arambewala L, Samarsingh S. Development of herbal mosquito repellent formulations. Int J Collab Res Intern Med Public Health. 2016;7(9):3643-8. E-ISSN:0975-8232; P-ISSN:2320-5148.
12. Susilowati RP, Darmanto W, Aminah NS. The effectiveness of herbal mosquito coils “Morizena” against *Aedes aegypti* death. Indones J Trop Infect Dis. 2018;Vol. No.2.
13. Kamble S, Kale V, Nilakhe K, *et al.* Extraction of neem oil with different methods and applications in different fields. Int J Creat Res Thoughts. 2022 Dec;10(12). ISSN:2320-2882.
14. Bhat KS, Aravind G. Evolution, current status and prospects of phyto-repellents against mosquitoes. Int J Pharm Phytochem Ethnomed. 2017;8:54-73. ISSN:2297-6922.
15. Onyema CT, Okonisa OI, Egwuata IC, Ogbuagu AS, Ohaekenyem EC, Ekwueme IJ, Sokwaible CE. Phytocoil production from the leaves of *Azadirachta indica* (neem) and *Hyptis suaveolens* (bush mint). AASCIT J Chem. 2014;1(1).