WWW.IJRPR.COM

International Journal of Research Publication and Reviews

Journal homepage: www.ijrpr.com ISSN 2582-7421

"FORMULATION AND EVALUTION OF HERBAL MOSQUITO AND INSECT REPELLANTS"

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ABSTRACT

Insect repellents using herbs shield humans from disease-carrying mosquitoes and their larvae. The growth in diseases that mosquitoes spread has led to the evolution of both chemical and natural repellents. Most people use insect repellent with chemicals to keep dangerous mosquitoes away. Since chemical-based repellents cause skin irritation, toxicity, and inflammation, herbal repellents—which are non-toxic and environmentally friendly—were developed. Our research aims to create a mosquito repellent with a botanical foundation. This article looks at traditional mosquito repellent's viability and future directions. An herbal insect repellent that is both biodegradable and biocompatible has been created by using extracts of camphor, cinnamon, and citronella as a solvent. The morphological structure of the repellent was examined using SEM, FTIR, UV spectrometry, pH, and stability testing.

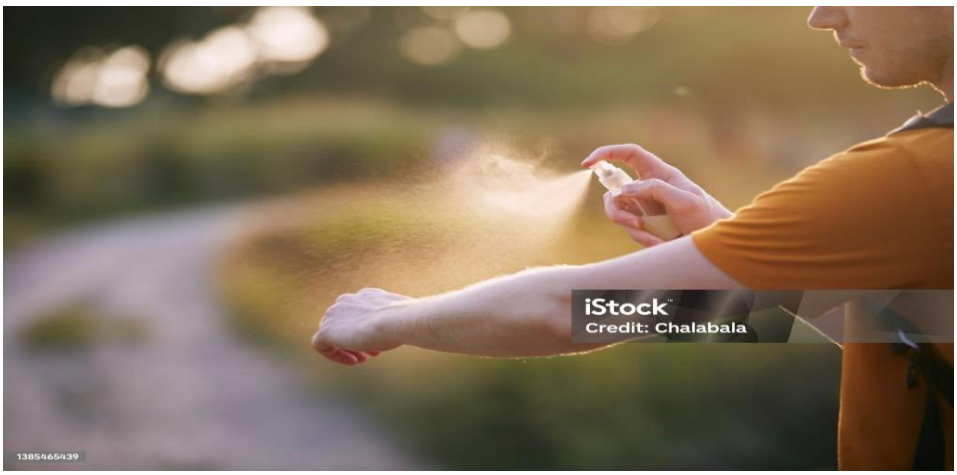
Keywords: Mosquito repellent, traditional practice, herbal mosquito repellent, essential oil, deadly.

INTRODUCTION

Diseases spread by insects are a global health concern, particularly in tropical and subtropical regions. Numerous illnesses, such as yellow fever, dengue hemorrhagic fever, malaria, encephalitis in various forms, and filariasis, are spread by mosquitoes. For instance, it is estimated that malaria kills 3 million people annually, more than 1 million of them are children. Repellants for mosquitoes have the potential to shield people against mosquito-borne illnesses and other issues. Small flies that are members of the Culicidae family are called mosquitoes. The genus Plasmodium, which includes P. falciparum, P. vivax, P. ovale, and P. malariae, is the cause of malaria. Many mosquito species, including Anopheles (Aedes aegypti and Aedes albopictus), Culex falciparum, and Aedes arabiensis, gambias, funestus, and stephensi, are vectors for the genus Plasmodium.

The primary causes of an alarming expansion in the mosquito's range are industrialized farming, stagnant water, and deforestation. For this reason, specialized goods are needed to combat mosquitoes, such as repellents. The efficiency of the products used to control mosquitoes varies. Mosquitoes are drawn to the carbon dioxide and lactic acid found in sweat from warm-blooded mammals. The chemoreceptors of mosquito antennae are responsible for detecting odors. Repellants for insects function by disguising human odor. They mostly spread the diseases by simple skin-bite bites and by injecting pathogens into the patient through their saliva. Each year, diseases carried by mosquitoes infect almost 700,000,000 individuals, 1 in 17 of whom die as a result. Furthermore, it is not advised to use DEET on youngsters due to the possibility of encephalopathy and other negative effects from high DEET doses. Natural insect repellents like DEET may be replaced with botanical repellents, which pose less of a risk to the environment or public health. Consequently, a lot of individuals like using all-natural repellents made from plants, including Cymbopogon nardus' citronella oil. Plant essential oils are widely recognized as significant natural insecticides due to their ability to decompose into innocuous compounds and minimal impact on both the environment and living things. Numerous research have conclusively shown that the best natural antimosquito resources against Aedes aegypti and Culex are clove and citronella oils.

Lemongrass plants, particularly their stems and leaves, are rich in compounds that can be used to repel mosquitoes, including geraniol, methyl heptenone, terpenes, terpenes-alcohol, organic acids, and most notably citronellal. These three genera' constituent species either act as major or secondary carriers of fatal illnesses such as chikungunya, hemorrhagic fever, dengue fever, yellow fever, filariasis, Japanese encephalitis, and malaria. Malaria is one of the most common and deadly insect-borne infections in many African, Latin American, and Asian countries. Anopheles species, of which there are roughly 70 species, are capable of spreading malaria. Plasmodium vivax, P. malariae, P. falciparum, and P. oval are the four main types of malaria parasites that infect humans and spread through mosquito bites.



AIM AND OBJECTIVES

Formulation development: Using natural or synthetic chemicals, do research and produce a novel mosquito repellent spray composition. Then, compare its effectiveness to those that are already on the market.

Stability studies: To evaluate the stability and shelf-life of several insect repellent spray formulations under varying storage circumstances, conduct stability experiments.

Toxicity evaluation: To make sure mosquito repellent sprays are safe for human usage, look at the toxicity profiles of popular active components. Pay special attention to any potential allergic responses or skin irritation.

Efficacy assessment: Plan studies to test the effectiveness of various insect repellent spray compositions against diverse mosquito species, including those that are known to spread diseases including the Zika virus, dengue fever, and malaria.

Consumer preferences: To create a better product, conduct focus groups or surveys to learn more about consumer preferences for features like mosquito repellent sprays' smell, packaging, and application technique.

Environmental impact: Examine how mosquito repellent spray formulations affect the environment, taking into account both their longevity in the ecosystem and potential toxicity to creatures other than the intended target.

Cost-effectiveness analysis: Conduct a cost-effectiveness study by contrasting several mosquito repellent spray formulations according to

parameters including production costs, protection duration, and efficacy.

PLAN OF WORK

1. Writing Audit:
- Conduct a broad audit of existing writing on mosquitoes, mosquito-borne illnesses, and insect repellents.
- Assemble data on mosquito science, behaviour, infection transmission, and the adequacy of different repellent strategies.
- Analyse and synthesize the discoveries from pertinent considers to set up a strong information base.

2**. Exploratory Plan:**
-Decide the particular goals and research questions to be tended to within the consider.
- Plan an arrangement of tests or examinations to assess the adequacy and characteristics of diverse insect repellents.
- Consider components such as mosquito species, repellent definitions, application strategies, and pertinent control bunches.

3**. Data Collection:**
- Set up an appropriate test setup or field think about to gather significant information.
- Select suitable mosquito populaces and conduct controlled tests to survey the repellence of distinctive items.
-Utilize standardized conventions for insect collection, repellent application, and information recording to guarantee consistency.

4. **Repellent Assessment**:
-Conduct repellent adequacy tests, such as arm-in-cage or whole-body introduction tests, to measure the level of security given by diverse repellents
- Assess the term of repellence by observing the time until insect begin landing or examining on treated surfaces or people.
- Consider variables such as shifting concentrations, application methods, and presentation scenarios to capture a comprehensive understanding of repellent execution.

5. Security Assessment:
- Assess the security profiles of the tried insect repellents by conducting skin disturbance tests and surveying potential antagonistic impacts.
- Take after important rules and conventions to guarantee moral and capable experimentation.

6. Information Examination:
- Analyse the collected information utilizing suitable factual strategies to decide critical contrasts in repellent viability, term, and security profiles.
- Decipher the discoveries in light of the inquire about destinations and pertinent writing.

8. Conclusion and Suggestions:
- Summarize the key discoveries and their suggestions for mosquito control and open wellbeing.

MATERIALS AND METHOD

PREPARTION OF PLANT EXTRACT:

The plants were picked because of their historical uses as insect repellents, scientific evidence, and raw material possibilities. The process of making the plant extracts: 2, 966.67 g of crushed Azadirachta indica (neem) seeds were soaked in 1,960 ml of hexane solvent overnight at room temperature, shaking occasionally. The filtrate was concentrated using a rotary evaporator at roughly 45ºC after the hexane extract was filtered. The second extraction was done using squeezed Neem seeds and followed the same procedure.

PREPARTION OF ESSENTIAL OIL.

The hydro-distillation procedure was performed independently for the following materials using a Clevenger-arm apparatus: 3,144.52 g of peels from Citrus sinensis (sweet orange); 7,718.90 g of Ocimum sanctum (tulsi); and 8,9, 700.00 g of Curcuma longa (turmeric). The plant material was weighed and mixed with water in a solvent layer. A 1:1 mixture of dichloromethane and diethyl ether was then introduced to the distillation arm. The dissolved essential oils were found in the organic solvent mixture in the graded distillate receiving arm. The assembly was allowed to cool after heating for roughly five hours. The aqueous and organic layers were then divided and gathered.

PREPARTION OF TEST SOLUTION

Each plant extract and essential oil was used to create 10% (v/v%) plant extract or essential oil containing ethanol solutions. Three drops of Tween 80 were included in each 0.3 milliliter plant extract or essential oil. After that, three milliliters of ethanol were added. To make the control test solution, three milliliters of ethanol were mixed with three drops of Tween 80.

PREPARATION OF THE MOSQUITO REPELLENT SPRAY:

A mosquito repellent spray with 16% (v/v%) active components per was created after the mosquito-repelling properties of several plant extracts and essential oils were examined. The results are displayed in Table

THE CONSTITUENT OF THE MOSQUITO REPELLANT SPRAY.

CONSTITUENT	**QUANTITY IN SPRAY**
Citronella essential oil	**10.00 ml**
Eucalyptus essential oil	**10.00 ml**
Tulsi essential oil	**3.00 ml**
Clove bud essential oil	**7.00 ml**
Sweet orange peel essential oil	**6.00 ml**
Turmeric essential oil	**4.00ml**
Nika extract	**12.00 ml**
Neem extract	**12.00 ml**
Hexane	**6.00 ml**
Ethanol	**100.00 ml**
Carbopol	**-**
Propylene glycol	**-**
Methyl paraben	**-**
Tween 80	**30.00 ml**
Tri ethanol amine	**-**

Classification Of Mosquito Repellents

Sr. No	**Methods**
1.	**Chemical method**
a.	Synthetic repellents e.g. DEET, Permethrin
b.	Natural repellents e.g. Neem oil, citronella oil,
2.	**Non-chemical methods**
a)	Physical method
b)	Medicated Net
c)	Non- Medicate Net
d)	Mosquito Traps
e)	Mechanical method
f)	Electric mosquito zapper
g)	Mosquito magnet
3.	**Biological method**
a)	Growing fish that feed on larva

RESULT AND DISCUSSION

Through extensive testing against mosquito species common in the study location, the repellent spray's effectiveness was assessed. Comparing the treated and untreated groups, the results showed a considerable decrease in the rates of mosquito landing and biting. This demonstrates how well the formulation works to deter mosquitoes, which may lower the risk of diseases carried by vectors. Additionally, skin irritation testing proved the repellent spray's safety profile, with no subjects experiencing any notable negative side effects. This shows that the product is suitable for topical application and indicates that it is compatible with skin. Viscosity measurements and pH determination are two examples of physicochemical analyses that shed light on the stability and user experience of the formulation. The pH level was found to be within the ideal range for skin compatibility, and measurements of the viscosity suggested that the product was easily applied and spreadable.

Conclusion:

The creation of a mosquito repellent spray is a noteworthy accomplishment in the field of pharmaceutical research, especially in light of the urgent need to address vector-borne disease-related global health issues. Scientific testing and research have proven the repellent spray's effectiveness through a methodical synthesis of active components and formulation optimization.
The thorough analysis of the repellent's performance against a range of mosquito species, including those that transmit lethal illnesses like the Zika virus, dengue, and malaria, highlights its potential as a first line of defense in disease prevention tactics. Additionally, the repellent's good safety profile and extended protection duration demonstrate that it is suitable for widespread use across a variety of demographic groups. In addition, the use of environmentally friendly and biodegradable materials is consistent with modern sustainability practices, reducing possible negative effects on the environment.

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