A STUDY ON HERBAL MOSQUITO REPELLENT SOLUIONS: A GREEN APPROACH TO PEST MANAGEMENT

Project Proposal Reference No.: *48S_MBA_0168*

College : Nagarjuna College of Management Studies, Chikkaballapura
Branch : Department of MBA
Guide : Mrs. Kavitha C
Students(s) : Ms. Shravani M
Ms. Anusha N
Mr. Chandan K M

Keywords:

Herbal, Repellent, Green Approach, Pest Management.

Introduction

The World Health Organization (WHO) estimates that malaria, one of the common mosquito-transmitted diseases, kills about 3 million people worldwide each year. This disease which are only transmitted to human by mosquito bites is one of the most important ways to prevent or lessen the spread of these disease. Treatment for malaria and other diseases carried by mosquitos are numerous, but preventing illness together is always preferable. Consequently, the world “mosquito repellent” was created. Compound known as repellent work by making surfaces uncomfortable for mosquitoes. To prevent mosquitoes from landing on skin or other surfaces, apply it on. The majority of the world’s population still uses synthetic chemical larvicides to keep mosquitoes under control, but many of these chemicals are poisonous to people, animals and plants and resistance to them can make control difficult. In order to inhibit mosquito larvae or act as repellants for the same, researcher is now utilizing natural compound, the main pesticides used against mosquitoes.

Objectives:

- To analyze the effectiveness of the herbal mosquito repellent solutions
- To evaluate the environment benefits
- To assess the cost-effectiveness
- To explore the potential health advantages

- To identify the consumer preferences
- To compare the performance of herbal mosquito repellents efficiency
- To assess the safety and health impacts of herbal repellents

Methodology:

Research Design: This study adopts a mixed methods approach integrating quality and quantitative research methods.

The Research Design includes the following stages:

Exploratory Research: In this study it identifies potential herbal ingredients and analyze the existing literature on mosquito repellents solutions.

Experimental Research: This study is to formulate, test and evaluate the effectiveness of herbal mosquito repellent solutions.

Survey-Based Research: This study helps to gather consumer perception, preferences and feedback.

Data Collection Methods:

Primary Data Collection: Conduct Survey with consumers to understand their perception and preferences regarding the mosquito repellents. Survey is conducted suppliers to get the information about the availability of herbal ingredients. For the collection of data structured questionnaire and schedule for collection of data.

Secondary Data Collection: Secondary data is collection from literature review of research papers, and herbal mosquito repellents.

Sample Design:

Target Population: Households, Offices and Institutions

Sample Size: 300 respondents are selected from urban and rural regions for data collection.

Sampling Techniques: Stratified Random Sampling Method is used for the collection of data from respondents. (Simple Random Sampling)

Data Analysis:

Quantitative Analysis: By using the statistical tools to analyze experimental results and survey data.

Qualitative Analysis: Qualitative Data is analyzing consumer feedback and preferences to guide product design and marketing strategies. It uses thematic analysis for open-ended survey responses.

Ethical Consideration:

Obtain informed consent from all human participants. It ensures compliance with environmental and safety regulations. Conduct the study in line with institutional and governmental ethical standards.

Stakeholders Collaboration:

Collaboration with Government Institutions for funding, policy, support and dissemination of findings.

Collaboration with Communities for ingredient sourcing and real-world testing.

Collaboration with Academic Institutions for Conducting experiments and analyzing data.

Materials: Materials used for preparation of Mosquito Repellents are: Lemongrass, citronella, Neem oil, Eucalyptus, Lemon Eucalyptus, Tulsi, Peppermint, Thymol, Garlic and Camphor.

Prepared in the form of: Sprays, Creams/Ointments, Incense sticks/coils, Candles

Result and Conclusion:

Findings

- Herbal ingredients used are exhibit strong mosquito-repellent.
- Few ingredients (Citronella and Neem oil based) are oil-based formulations which shows the highest effectiveness repelling up to 90% of mosquitoes in controlled conditions.
- Some Ingredients (Tulsi and Eucalyptus) provides moderate repellency, effective and shorter durations.
- Few ingredients combination enhanced overall performance. (Combining Lemongrass oil with carrier oils enhanced overall performance)
- All herbal repellents were non-toxic, skin-friendly, eco-friendly without any side effects. (with no harmful side effects)
- Compared to chemical repellents, herbal solutions were less persistent but significantly safer for human and environment.
- This mosquito repellents are environmentally friendly solution

Observations

- The type of plant extract utilized and the formulation technique have an impact on the effectiveness.
- Citronella and neem oil consistently showed the highest mosquito repellent efficiency, especially when combined with a suitable carrier oil like coconut oil.
- Tulsi and eucalyptus oil proved effective for short-term protection, especially in enclosed or low-wind areas.
- No harmful effects on human skin or the environment were noted throughout the testing period; nevertheless, user preferences and application frequency were influenced by the odor and consistency of certain herbal preparations.

Conclusion: This study aims to explore the potential of herbal mosquito repellent solutions as an econ-friendly and sustainable product. With increasing concerns over the health hazards and environmental impact of synthetic repellents, this project emphasizes the importance of utilizing natural ingredients. This study not only supports the traditional knowledge of plant-based pest control but also aligns with the broader goal of promoting green and sustainable living practices. If proven effective, these

herbal solutions could offer a viable, low-cost alternative for rural and urban communities alike, contributing to improved public health and environmental conservation. This green approach to pest management reflects the growing need for innovation in eco-conscious product development and open new avenues for research in herbal science, public health, and environmental sustainability.

Project outcome & Industry Relevance

Practical Implication of the Project

- By investigating environmentally suitable substitutes for dangerous chemical repellents, this study promotes sustainable pest management techniques.
- It contributes to the environment with its nontoxic, biodegradable, and safe solutions for both people and wildlife.
- It encourages research that crosses the fields of public health, chemistry, botany, and environmental science.
- Herbal Mosquito repellent can be used safely at home, especially in household with children, elderly people or allergy prone individuals.
- Mosquito repellent is made with low-cost herbal formulations made from locally available plants can serve as affordable mosquito protection in under resourced areas.
- These solutions can be integrated into public health campaigns to combat mosquito-borne diseases like dengue, malaria, and chikungunya

Industry relevance

- This study supports small scale and cottage industries in developing natural and personal care products.
- It opens scope for startup ventures focusing on organic mosquito repellents.
- It encourages industries to reduce dependence on synthetic chemicals.
- It encourages to shift towards green products lines in response to consumer demand for eco-conscious solutions.

- It promotes biodiversity conservation through the use of native medicinal and aromatic plants.

Working Model v/s. Simulation / Study

The project involved the development of a physical working model, wherein herbal mosquito repellent solutions were prepared using natural ingredients and tested for their effectiveness, highlighting a practical and eco-friendly approach to pest management.

Project Outcomes:

- This study helps to creation of safe, effective and natural mosquito repellent by using herbal ingredients.
- There is a reduction in the use of synthetic chemical and minimizing health risks.
- It is contribution to society in controlling the spread of mosquito-borne diseases in tropical and subtropical regions.
- Enhanced awareness among consumers about the advantages of natural repellents, promoting sustainable lifestyle regions.
- Assessment of market feasibility in paving the way of commercialization of herbal repellents.
- Creation of employment opportunities in farming processing and manufacturing herbal-based products.
- Providing a foundation for future studies on herbal solutions for other pest management challenges.

Project Learnings:

- This project obtained hands on experience creating and evaluating natural repellent formulations.
- Through this project it is realized that how important it is to choose the right components based on their fragrant.
- We learned observation, data collection, and analysis to assess the efficacy of products.

- Improved research documentation, and problem-solving abilities through practical experimentation and scientific literature study.

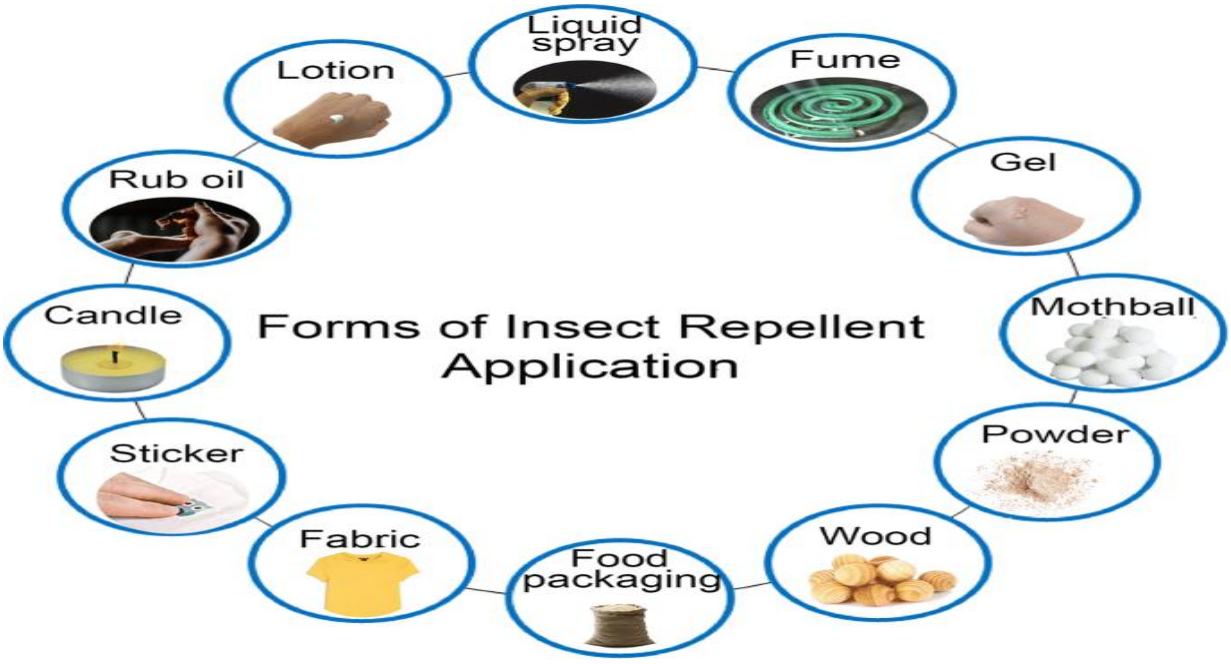
Future Scope:

- This study highlights the potential of herbal mosquito repellent solutions as a safe, eco-friendly and sustainable alternative to chemical repellents.
- Expansion of the herbal repellent solution into various forms to suit different user preferences and environments.
- Additionally, comparative analysis with synthetic repellents in terms of longevity, user safety, and cost-effectiveness can provide deeper insights.
- Collaborating with local startups for sustainable alternatives to chemical-based products.
- Partnership with NGO's and health departments to use these products in rural regions to prevent the disease.
- Adoption of smart biodegradable packaging system and delivery systems.

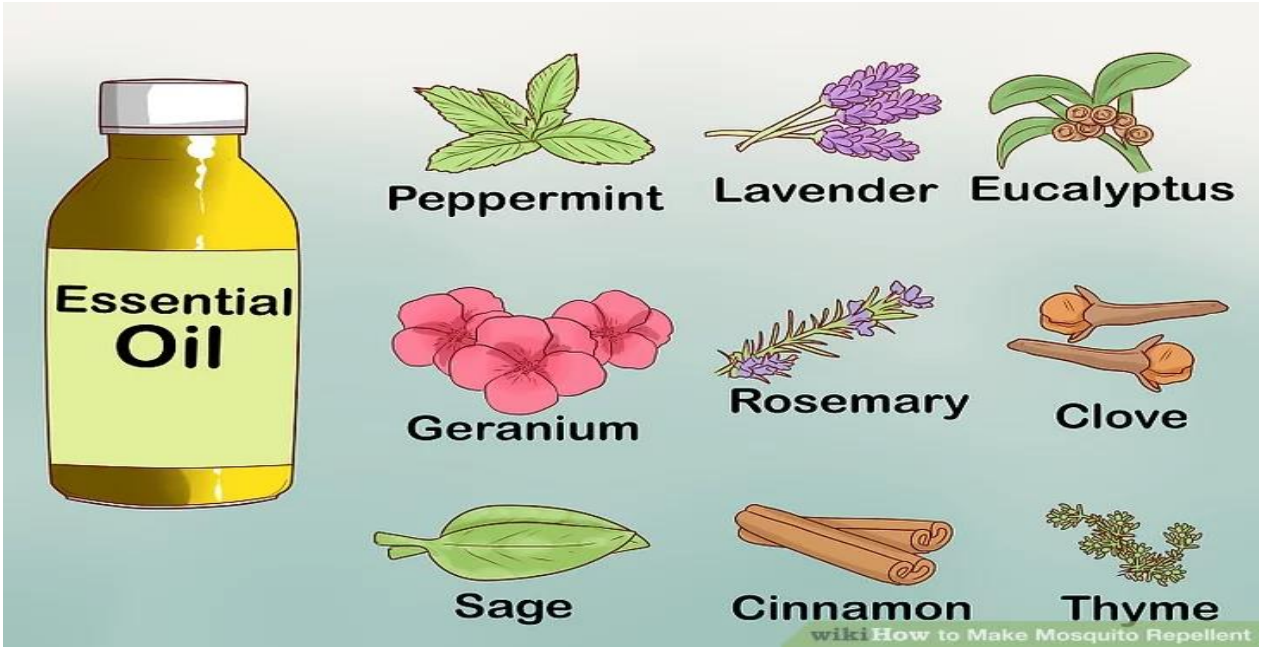
Further Research

- There is significant scope for further research in this field.
- Advanced studies can focus on identifying the isolating more potent bioactive compounds from various medicinal plant to enhance the effectiveness of herbal repellents.
- Conducting the field trials compare the effectiveness of herbal repellents and synthetic one under various climatic and environmental conditions.
- Evaluating the safety of these herbal solutions for children, elderly and allergic individuals.
- Usage of natural ingredients and essential oil combinations to maximize repellent strength while maintaining skill safety.
- Studying the environmental impact and cultivation sustainable of key herbal ingredients to ensure ethical sourcing and ecological balance.

- Herbal Mosquito Repellents can be prepared in this manner



- Ingredients used in Herbal Mosquito Repellents



Picture of Herbal Repellents

1. In the form of liquid vaporizer. 	2. In the form of body spray 
3. In the form of ointment or Gel 	4. In the form of coil 
5. In the form natural repellent 	6. Mosquito Repellent for Babies