



FORMULATION AND EVALUATION OF NATURAL MOSQUITO REPELLENT LIQUID

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Abstract : Mosquito repellents may effectively protect humans from vector-borne diseases as well as other problems caused by mosquitoes. Vectors are the organisms that transmit a parasite or pathogens from one infected person to another causing serious infections. According to the WHO, every year deaths due to vector-borne diseases account for over 17% with more than one billion cases and over one million deaths. In the Indian scenario, malaria, dengue, chikungunya, filariasis, encephalitis, and kala-azar are of major concern. National Vector-Borne Disease Control Program data of 2012 indicated that 50% of total malaria cases are due to *Plasmodium falciparum*.

Introduction

The worldwide threat of popular mosquito transmitted diseases yellow fever, dengue hemorrhagic fever, epidemic poly arthritis, encephalitis and malaria, zika virus, west Nile virus a disease that according to the World Health Organization (WHO) causes more than 3 million deaths. Certain diseases including dengue, malaria, and chikungunya, which can have a severe negative impact on health. The human body's immune system develops antibodies and a bite becomes inflamed and itchy within minutes, while others can become hypersensitive with bites causing blistering, bruising and large inflammatory reactions. Multiple chemical and alternative repellent products are marketed to consumers. We determine which natural repellents provide reliable and prolonged protection from mosquito bites. Mosquito bites impact on health due to an increase in mosquito breeding, are spread by mosquitoes. Therefore, it's critical that you lower mosquito concentrations around your house and other living places.

It is effective, cheaper and non-poisonous than presently chemical based mosquito repellents available in the market which contain some harmful chemicals like Palletehrin, Allethrin and DEET. (N,N-diethyl-m-toluamide)

Mosquito-borne diseases are those spread by the bite of an infected mosquito.

MALARIA : Malaria is a mosquito-borne infectious disease that affects humans and other animals. Malaria causes symptoms that typically include fever, fatigue, vomiting, and headaches. Five species of *Plasmodium* can infect and be spread by humans. Most deaths are caused by *P. falciparum*, whereas *P. vivax*, *P. ovale*, and *P. malariae* generally cause a milder form of malaria. The species *P. knowlesi* rarely causes disease in humans. The risk of disease can be reduced by preventing mosquito bites through the use of mosquito nets and insect repellents or with mosquito-control measures such as spraying insecticides and draining standing water.

DENGUE : Dengue fever is a mosquito-borne tropical disease caused by the dengue virus. Symptoms typically begin three to fourteen days after infection. Dengue is spread by several species of female mosquitoes of the Aedes genus, principally Aedes aegypti. A number of tests are available to confirm the diagnosis including detecting antibodies to the virus or it's RNA .

Materials And Methods

Sr. No.	Name	Ingredient	Use
1.	Neem		Mosquito repellent
2	Cinnamon		Resist Anopheles and Aedes Mosquito bite
3	Lemongrass		Mosquito repellent
4	Ethanol		Vehicle
5	Camphor		Fragrance
6	Distilled Water		Vehicle

Formulation Process

1.PLANT COLLECTION:

Fresh cinnamon neem and lemon grass were collected from market and the local botanical garden. Camphor of the all these herbs were purchased from local market.

2. PLANT EXTRACTION:

All the plant material were washed through with distilled water and air dry letter day where grinded into powder using on electric grinder. The extraction of the plant were carried out separately using Soxhlet extraction method. Weigh 40gm of each cinnamon powder, neem powder, and lemon grass powder. Where extracting using 200ml of ethanol for 4hrs. The extract where filter and concentrated for few days and stored at room temperature till further use.

3.PREPERATION OF TEST SOLUTION:

All the three extract and essential oil solution where mixed on a v/v basis and diluted with absolute ethanol as diluents. Test solution containing mixture of plant extract and mixed them together. Same procedure where followed for plant essential oils.

4. FORMULATION OF MOSQUITO REPELLENT :

The mosquito repellent was formulated by mixing all the ingredients in appropriate amount as follows:

	F1	F2	F3	F4	F5	F6	F7	F8
Neem	7.5	7.5	7.5	10	10	10	12.5	12.5
Cinnamon	2.5	5	7.5	2.5	5	7.5	2.5	5
Lemongrass	10	7.5	5	7.5	5	2.5	5	2.5
Distilled water	25	25	25	25	25	25	25	25

Various formulae of natural mosquito repellent

EVALUATION OF MOSQUITO REPELLENT

The evaluation of the above formulation were done by testing 10 ± 2 mosquitoes in different days with time duration of 2hrs by Lessing mosquitoes in a mosquito's net (close room size = 8×9 ft.). The liquid mosquito repellent was kept inside the net, the result were showed in table.

NOTE: The mosquitoes were collected by attracting them towards used socks and cloths and mannitol agar were kept under the net.

RESULT AND DISCUSSION

Repetition	No. Of Mosquito	Neem + Cinnamon + Lemongrass extract %
1	10	20(80)
2	10	17 (90)
3	10	18 (100)
4	10	17 (85)
5	10	20 (90)
average		18 (100)

The results of the study of the number of mortality of *Aedes aegypti* after fogging with lemongrass, Neem and cinnamon extract as a substitute for malathion can be seen in Table below:

Table showed the average mortality of mosquitoes in the use of lemongrass extract was 18 (100%). The highest percentage of dead mosquitoes was in the third repetition (100%) of the lemongrass +neem cinnamon extract.

CONCLUSION

In this study, natural base mosquito repellent was formulated successfully. Therepellent properties of the liquid containing essential oil and plant extract were evaluated and determined. It shows that the formulation is very good. No any harmful effects reported. Thus, it is totally a safe product. The formulation was also ecological and economical.

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