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## FORMULATION OF ECONOMICALLY AFFORDABLE HERBAL MOSQUITO REPELLENT CONE.

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### **ABSTRACT :**

Controlling mosquito populations and protecting oneself from mosquito bites are crucial methods of preventing the spread of infectious diseases. As disease carriers, mosquitoes carry a variety of diseases. Generates viruses and parasites. Most insect repellents available today are made of chemicals, which are harmful to the skin and neurological system and can result in rashes, swelling, irritation of the eyes, and other health problems. As a result, natural insect repellent was preferred over repellent with chemicals. Natural components with mosquito-repelling qualities, such neem leaves, were used to make the herbal mosquito stick. Eugenol 80–90% of repellents are as effective as eucalyptus oil. Long-term repellency is demonstrated by Azedarach indica essential oil, and antioxidants can be found in cinnamon powder, lavender oil, marigold powder, lemon grass powder, and other powders. Almost all of the formulations used in the current investigation contain herbal and eco-friendly components. Because there are no negative consequences.

**KEYWORDS:** Mosquito repellent,Neem plant, Lavender and eucalyptus oil,Herbal cones.

**INTRODUCTION :****Fig no .1 herbal mosquito repellent cone**

Among the most upsetting and bloodsucking creatures that harm humans are mosquitoes[1]. Aedes, Culex, and Anopheles mosquito species are vectors of several disease pathogens, such as encephalitis, myiasis, dengue fever, malaria, and yellow fever. The American Association of Mosquito Control reports that in 2018, the death toll rose to one million. The symptoms include chills and a high body temperature [2, 3, 4]. Any deadly illness can be spread by mosquitoes, which can infect animals as well as humans with viruses or parasites [5]. Because mosquitoes reproduce quickly and acquire a tolerance to pesticides, mosquito-borne diseases are becoming more widespread worldwide [6]. Mosquitoes, both male and female, feed on the juice of plants. Male mosquitoes do not bite humans, but female mosquitoes do after mating because proteins are needed for the development of the eggs [7]. Chemical insect repellents are widely used to reduce mosquito populations, either by eliminating mosquitoes altogether, stopping them from biting humans, or even eliminating the eggs of mosquitoes at their breeding grounds [2]. Major health issues affecting humans are caused by mosquito-borne illnesses, which are getting harder to control due to mosquitoes' high rate of reproduction and development of chemical resistance. Synthetic insecticides and repellents have been widely employed to reduce mosquito populations. They work by either killing adult mosquitoes or preventing them from biting humans, or they destroy mosquito larvae at the vectors' breeding grounds. Nonetheless, its detrimental effects on non-target populations and the emergence of resistance led to a search for easy, sustainable, and alternative mosquito control techniques. Because of the toxicity issues and rising rates of insect resistance, it is necessary to develop efficient insecticides and repellents (Mirospicos et al. 2010).

**Advantages of herbal mosquito repellent cone:[10]**

- 1.Non-poisonous,
- 2.inexpensive,
- 3.eco-friendly,
- 4.easily available,
- 5.non-irritant,
- 6.easy to make,
- 7.also act as insect repellent

**Characteristics of herbal mosquito repellent cone:[11]**

- 1.It should be free from contamination.
- 2.Easily available and safe to use.
- 3.Not irritation or any damage to skin.
- 4.No colour change during storage.
5. It should be non- irritating and non-toxic.
- 6.It should have pleasant odour.

**Benefits of herbal mosquito repellent cone:[12]****1.No Harmful Chemicals.:**

The prime benefit of using a natural mosquito killer, as we just mentioned, is that it is free of any harmful chemicals. They don't contain DEET (N, N-Diethyl-3-methyl benzamide, an active chemical found in artificial mosquito repellents. Being chemical-free, you can use them safely in your child's room as well.

**2.Friendly:**

Trying an essential oil, for instance, as a herbal mosquito repellent is good for your skin. It will not only repel mosquitoes and other bugs but will pamper your skin too. Other mosquito repellents in the market often cause allergies to your skin or respiratory issues

**3.Cruelty-Free:**

If you buy an herbal mosquito repellent from the market, then it means you sympathize with animals. It is because no animals are harmed by producing **these herbal products and they are completely vegan**

**4.Environmental-Friendly.**

Using natural mosquito repellents is not just cruelty-free, but eco-friendly too. They release no harmful smoke or carbon that disturbs the greenhouse effect on our planet.

**5.Aromatic:**

Another benefit to reap from herbal mosquito repellents is the double advantage of them turning into your room fresheners. Most of the remedies we recommend to repel mosquitoes make your home aromatic.

**6.Repel other Bugs:**

Not just mosquitoes, with an herbal mosquito repellent, you can also repel other pests like ants, houseflies, spiders, and even lizards. So, in short, using a natural mosquito repellent double up as an all-rounder insect repellent for your home.

**7.Peace of Mind:**

Last but not least advantage of a natural product as a mosquito killer for the home is that it offers complete peace of mind. You know it won't harm you, as it is chemical-free. You know it will leave behind a soothing aroma in your house. Moreover, you know it is environmental-friendly. All these plus points of using a herbal composition to keep the mosquitoes away will relax your mind.

**8.Safe for Kids:**

Using natural mosquito repellent for kids means no chances of kids falling sick due to the dangerous emissions from the repellents. Mosquito repellents available in the market are often loaded with DEET chemicals that can affect the lungs of your young ones.

**9.Safe for Pregnant Women:**

For the same reason as above, using organic mosquito repellents is safe for pregnant women. If a pregnant woman inhales the harmful chemicals emitted by other so-called best mosquito killers, the fetus in her womb may show some birth defects in the respiratory system.

**10.Easily Available and Affordable:**

Another top reason to try natural remedies to control mosquitoes is that most of these ingredients are readily available at home. Not just availability, these home remedies to repel mosquitoes are very affordable as compared to expensive mosquito control product.

**AIM AND OBJECTIVES :****Aim :**

The aim of preparing and evaluating affordable herbal mosquito repellent cone is to create a product which is safe and effective to use

**Objective:**

- 1.The objective of preparing and evaluating a herbal mosquito repellent cone.
- 2.To determine the effectiveness of the product in improving the skin health of the Users.
- 3.Herbal mosquito repellent is a natural product that is designed to repel mosquitoes and other biting insects.
- 4.A mosquitoes repellent will help protect you from mosquitoes that spread malaria and other diseases, such as dengue, chikungunya, and Yellow fever.
- 5.The main objective of mosquito control is to reduce human-mosquito contact.

6. Lemongrass also helps deter pests like cockroaches because of its pungent odor.

7. It can be used to repel mosquitoes present at Home.

8. Purifies the air present in the house, kills diseases Causing microbes.

### **INTRODUCTION TO HERBAL INGREDIENTS:**

#### **1. NEEM**

**Synonyms :** Melia azadirachta

**Biological source:** consists of leaves and others aerial part of azadirachta indica

**Family :** meliaceae

**Chemical constituents:** Azadirachtin, glycoproteins, triterpenes, limonoids, flavonoids, phenols, tannins, nimbins, saponins, catechins, azadirachtin and gallic acid

**Uses:** use traditionally as a pesticides and insecticide .



**Fig.no 2**

#### **2. MARIGOLD**

**Synonyms:** mignonette. Cornflower.

**Biological source:** annual herbs of the aster family (Asteraceae)

**Family:** (Asteraceae)

**Chemical constituents:** limonene, terpinolene, (Z)- myroxide, piperitone, piperitenone, piperitenone oxide and b-caryophyllene

**Uses:** Marigolds, an easy-to-grow annual flower, emit a smell that deters mosquitoes.



**Fig no 3**

#### **3. LEMON GRASS**

**Synonyms :** Cochin grass, Malabar grass

**Biological source:** Lemongrass oil is obtained from Cymbopogon flexuosus Stapf.

**Family:** Poaceae

**Chemical constituents:** plant sterols, flavonoids, lignans, carotenoids, terpenoids, saponins, sulfides, and fiber

**Uses:** helps to mask the scents that mosquitoes rely on to target hosts which is carbon dioxide and lactic acid.



**Fig .no 4**

#### **4.CINNAMON BARK :**

**Synonyms :** Ceylon cinnamon, Ceylon cinnamon tree, cinnamon.

**Biological source:** *Cinnamomum zeylanicum*, the source of cinnamon bark and leaf oils, is an indigenous tree of Sri Lanka,

**Family :** Lauraceae family

**Chemical constituents :** cinnamaldehyde and trans-cinnamaldehyde (Cin),

**Uses :** Cinnamon bark essential oil contains eugenol (17,62%), which is able to resist the bite of *Aedes aegypti* and *Anopheles* mosquitoes



**Fig .no 5**

#### **5.LAVENDER OIL**

**Synonyms :** *Lavandula angustifolia* Miller or *Lavandula officinalis* Chaix)

**Biological source :** Lavender oil, obtained from the flowers of *Lavandula angustifolia* (Family: Lamiaceae) by steam distillation

**Family :** Lamiaceae

**Chemical constituents :** linalool, linalyl acetate, 1,8-cineole,  $\beta$ -ocimene, terpinen-4-ol, and camphor.

**Uses:** lavender essential oil has an 80% repellent rate against mosquitoes.



Fig.no 6

## 5. EUCALYPTUS OIL

**Synonyms :** Eucalyptus camphora.

**Biological source :** Eucalyptus oil is made from the fresh leaves and branch tops of the eucalyptus plant

**Family:** Myrtaceae

**Chemical constituents :** globulus constitute Eucalyptol (51.62%) as the main constitute. Other major compounds are  $\alpha$ -pinene (23.62%), p-cymene (10%) and  $\beta$ -cymene (8.74%).

**Uses :** Oil of lemon eucalyptus (OLE) has a chemical called PMD that shoos away mosquitoes and other bugs.

Fig no 7



Sr.no	Material	Justification
1.	Neem powder	Neem powder shows insecticidal activity due to The azadirachtin chemical compound.
2.	Lemon grass powder	Geraniol and citral content Lemongrass oil has a strong, earthy, fresh and lemony smell
3.	Cinnamon powder	Cinnamaldehyde exhibitsthe strongest activity.
4.	Marigold powder	Repellent activity
5.	Activated charcoal	Enhanced the combustion process
6.	Starch powder	Good binding property
7.	Eucalyptus oil	20% eucalyptus oil provided more than 94% protection againstmosquitoes for 4 hours.
8.	Lavender oil	Analgesic, Antifungal, andAntiseptic
9.	Distilled Water	Permanent control onmosquito than insecticide

Table no 1 : justification of material used.

### **MATERIAL AND METHODOLOGY :**

**Collection of leaves of plant :** gathering of the plant's leaves The leaves of the plants were gathered in order to make a herbal mosquito repellent cone. From within and around the university the campus of the college. The plant was chosen based on research publications that documented its strong antimicrobial action. Lemon grass, cinnamon bark, marigold flowers, and Azadirachta indica—neem—were the plants employed in the study. The leaves of the plants were weighed, cleaned, and allowed to dry in the shade in a laboratory. Following drying, ethanol was used to prepare plant extract, which was then used to make a herbal mosquito repellent cone. Neem and marigold petals were gathered, dried, and powdered in the Sangamner neighborhood. For upcoming usage. We bought lemon grass and cinnamon bark from the Sangamaner local market.

Fig no 8. powdres of leaves



## Material

### List of ingredients .

Sr.no	Ingredients	Category
1.	Neem powder	Insecticidal agent
2.	Lemon grass powder	Antimicrobial
3.	Cinnamon powder	Anti-inflammatory
4.	Marigold powder	Repellency
5.	Activated charcoal	Burning agent
6.	Starch	Binding agent
7.	Eucalyptus oil	Insecticidal agent
8.	Lavender oil	Perfuming agent
9.	Distilled water	-

Table no.2

### List of processing materials used .

Sr.no	Material
1.	Seive
2.	Mortal and pestle
3.	Paint brush
4.	Weighing balace
5.	Measuring cylinder
6.	Heating mantle

Table no.3

### Methodology:

**Essential oils :** Eucalyptus essential oil and lavender oil were purchased from the market.

### Preparation of lemon grass powder,Neem Powder & Cinnamon powder, marigold powder.

In the shed, fresh neem leaves, cinnamon bark, marigold flowers, and lemon grass were dried for three days or until completely dry. After that, the dried leaves are put in a mortar and pestle and ground into a fine powder. Next, the powder is sent through sieve number 44. The finished product is kept in storage for later use. Using a pestle, the dried cinnamon bark is broken into tiny bits. After that, the finely chopped bark is ground in a blender to create a fine powder. Similarly, cinnamon powder was also made.

### Formula of herbal mosquito repellent cone with respective quantity:

Sr.jo	Ingredients	Quantity
1.	Neem powder	2 gm
2.	Lemon grass	2 gm
3.	Cinnamon powder	1 gm
4.	Marigold powder	1 gm
5.	Activated charcoal	1.5 gm
6.	Starch powder	2 gm



7.	Eucalyptus oil	0.25 ml
8.	Lavender oil	0.25 ml
9.	Distilled Water	10 ml

Table no.4

**Procedure :Preparation of herbal mosquito repellent cone :**

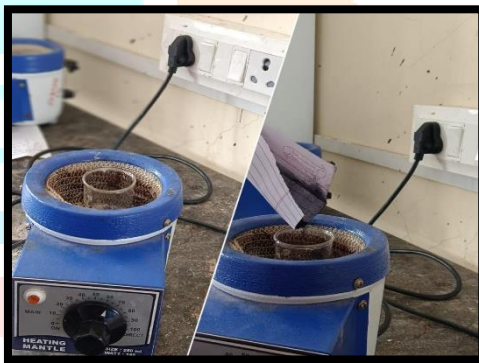
Fig no .9 Mortal Pestele



**Step 1 :** All the powders were weighed According to the formula and were Mixed in a mortar pestle .

**Step 2.:** Powder the shed dried. The Marigold petals were shed dried and Powdered by using domestic Grinder and mixed to the above Powder mixture.

Fig no.10. Heating mantle



**Step 3 :** Starch and charcoal were mixed into distilled water on heating mantle.

**Step 4. :** The mixture is heated and the Powder mixture is mixed into it.

**Step 5 :** The mixture was completely cooled And made into thick paste.

Fig no 11 Drops of oil

**Step 6 :** next in powder add essential oil in a given quantity after all The ingredients mixed properly.



**Step 7 :** then prepared mosquito Repellents cone by hand roll method and dry at room temperature.



Fig no 12. Herbal cone

## METHODS OF EVALUATION :

Evaluation of Herbal mosquito repellent cone The prepared herbal mosquito repellent cone were evaluated with the following parameters.

### 1.Physical analysis :

Color: Black

Odour: Fragrant (Individually each mosquito repellent cone was burned And its odor was checked.)

**2.Flammability and Burning Time :** The flammability and the burning time of The cone was checked by burning the cone. It was observed that the cone was

Burnt completely creating low smoke and The burning time was 24 minutes.

**3.Repellency test :** Repellency test performed in a net of Cuboidal shape with an opening so that the Mosquitoes can escape through. The cone Was burn inside the net. The times taken by The mosquitoes try to escape or to get Number or to be killed was noted.

	Marketed cone	Formulated cone
No. of mosquitoes	10	10
No. of mosquitoes escaped	9	8
Time (in minute)	20	25
Burning time	30 min	24 min

**Table no.5**

**4.Moisture content :** The initial weight of the prepared cone Was ignited and also the final weight of the Dried cone was noted.

Initial weight of one dhoop-2.560 gm.

Final weight of dried dhoop-2.190 gm.

Moisture content =  $\frac{\text{Initial weight} - \text{Final Weight}}{\text{Initial weight}} \times 100$

=  $\frac{2.560 - 2.330}{2.560} \times 100$

= 8.9%

**5.Ash value :** The dhoop stick was burnt completely and The ash was collected and weighed on weighing machine using Butter paper The weight of ash- 0.143 gm.

**6 .Smoke toxicity test :** Smoke toxicity experiment was conducted In a chamber. The mosquitoes were Attracted by using a pair of socks and the Mosquitoes were exposed to the smoke of Burning incense for 45 min. and the Mortality data was recorded after every 15min.

**7.Evaluation of mosquito repellent activity :** The cone was burnt in the mosquito prone Areas in the evening and night period. For Investigating mosquito repellent activity the Prepared incense cone are checked for Causal effect such as irritation, coughing, And tears was observed and recorded.

Sr.no	Ares	Time	Reports	Result
1	Bathroom	Morning time	Mosquitoes escaped, less irritation,no coughing tears, no Headache	Mosquitoes Repelled
2.	Kitchen	Night time	Mosquitoes escaped, less irritation, no coughing tears, no headache	Mosquitos repelled

**Table no.6**

## RESULT AND DISCUSSION :

A good mosquito repellent should burn steadily, slowly, and completely, producing little smoke and having the ability to keep mosquitoes away for an extended period of time. The number of mosquito deaths should be directly proportionate to the burning time. It is better to use a mosquito repellent cone with a longer burning time and less weight. Because the insect repellent sticks contain less moisture, they burn quickly and produce

less ash. The current study created a mosquito repellent stick using oils and charcoal powder in several layers. The formulation was highly effective and met the aforementioned criteria.

**SUMMARY AND CONCLUSION :** The results of the current study project indicate that neem powder and lemon grass powder have excellent mosquito-repelling properties. Thus, lemon grass alone or in combination can be an excellent way to keep mosquitoes away. To get a more powerful mosquito repellent activity, lemon grass powder and neem powder can be combined to make a variety of products, such as sprays, creams, liquidators, cones, candles, and coils. The harmful effects of synthetic mosquito repellents on human health and the environment can be lessened by encouraging the use of natural repellents. Additionally, natural mosquito repellent exhibits highest repellent activity against mosquitoes and is affordable, user-friendly, and readily available. When compared to commercially available synthetic coils, handmade insect repellent cones are less hazardous to human health. Additionally, the cone was tasted for allergic reactions, and the results showed that no reactions such as coughing, sneezing, or breathing constriction had been noted. Therefore, the activity of repelling mosquitoes signifies the consequence.

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