

# Herbal Mosquito Repellent Cream

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**Abstract:** Malaria is a principal cause of illness and death in countries where the disease is endemic. Personal protection against Mosquitoes using repellents could be a useful method that can reduce and/or prevent transmission of mosquito-Borne diseases. The available repellent products, such as creams, roll-ons, and sprays for personal protection against mosquitoes can be used. Medicinal plants contain numerous biologically active compounds which are helpful in improving the Life and treatment of diseases and these are the primary source of synthetic and traditional herbal Medicine. The presence of various life sustaining constituents in plants made scientists investigate these plants for their uses. The present study was conducted to determine the mosquito repellent activities of some selected plant materials in order to obtain safe and efficient herbal mosquito repellent Formulations by combinations of the selected plant materials. *Azadirachta indica* seeds were soaked in hexane overnight and extract was filtered and the filtrate was concentrated by rotary evaporator. Essential oils of *Cymbopogon* leaves, *Eucalyptus globules* leaves and *Syzygium aromaticum* buds were purchased from a reliable source.

**Keywords:** Mosquito repellent activity, Plant extract, Essential oil, herbal mosquito repellent cream

## I. INTRODUCTION

Mosquitoes are among the most vexing Blood-sucking insects that humans must contend With several mosquito species belonging to the Genera Anopheles, Culex, and Aedes serve as a Vector for diseases such as Dengue fever, Malaria, Yellow Fever, Japanese Encephalitis, and a variety Of other infections, Mosquitoes also transmit Diseases to approximately 700 million people Worldwide, resulting in over one million fatalities Each year, As a result. Mosquito management is a Major public health concern all over the world, the Goal of this study is to produce effective plant-Based mosquito repellent products because the Majority of mosquito repellent creams and devices On the market are considered to have detrimental Harmful effects on human This homing system, located on the antennae of the organism possesses a number of chemical Receptors.

Carbon dioxide, excretory products and lactic acid present in sweat in warm-blooded Animals act as an attractive substance for female mosquitoes. The chemical receptors are activated by lactic acid, which naturally evaporates from the skin of warm-Blooded animals. However, when a repellent ingredient containing the active repellent such as DEET (n- diethyl meta toluamide) is applied to the skin, it also evaporates. The repellents block the lactic many health problems such as headache, breathing difficulties, heart attack, etc. are the result of long Term use of DEET either directly or indirectly.

What is a Mosquito repellent?

A mosquito repellent is a substance put on skin, clothing, or other surfaces which discourages mosquitoes from landing or crawling on that surface.

**Main ingredient in essential oil which act as mosquito repellent: Para- Methane 3,8 Diol (PMD).**

It is found in small amount in the essential oil. PMD is a plant based ingredient that acts as an alternative to toxic mosquito repellent, this essential oil is then refined to increase PMD up to 70% for use as a mosquito repellent.

**Kingdom:** Animalia

**Phylum:** Arthropoda

**Class :** Insecta

**Order :** Diptera

Nowdays, people are looking for mosquito repellents which are safer and preferably herbal based. There occur several plants around us containing certain Essential oils, often found to be effective insect repellents. According to the past researches, the essential oils of the leaves of *Cymbopogon nardu* (Citronella), *Cymbopogon citratus* (Lemongrass), *Cymbopogon winteriness* (Citronella), *Ocimum basilicum* (Sweet Basil), *Ocimum sanctum* (Tulsi), *Ocimum Americanum* (Hairy Basil), *Eucalyptus citriodora* (Eucalyptus), *Eucalyptus globulus* (Eucalyptus), *Rosmarinus officinalis*, *Melissa officinalis*, *Curcuma longa* (Turmeric) rhizomes, *Citrus sinensis* (Sweet Orange) peels, *Citrus limonum* (Lemon) peels, *Syzygium aromaticum* (Clove) buds and *Pinus roxburghii* resins Have shown very high mosquito repellent activity. Moreover, the extracts of *Azadirachta indica* (Neem) seeds, also have been studied as possible mosquito repellents. The selection of these Plants was based on their availability as raw materials, scientific evidence and folk oil Use as mosquito repellents.(1,2)

### **Safety of Plant Based Repellent:**

Because many conventional pesticide products fall into disfavor with the public, botanical- based pesticides should become an increasingly popular choice as repellents. There is a perception that natural products are safer for skin application and for the environment, just because they are natural and used for a long time compared to synthetic non-biodegradable products. In contrast to DEET, some natural repellents are safer than others, and plant- based repellents do not have this strictly tested safety evidence, and many botanical repellents have compounds that need to be used with caution. PMD has no or very little toxicity to the environment and poses no risks to humans and animals. PMD has been developed and registered for use against public health pests and is available as a spray and lotion. Not much is known about the toxicity of eucalyptus oils.

PMD is the only plant-based repellent that has been advocated for use in disease-endemic areas by the Centers for Disease Control (CDC), due to its proven clinical efficacy to prevent malaria, and is considered to pose no risk to human health

PMD demonstrated no adverse effects apart from eye irritation. It is safe for both children and adults as the toxicity of PMD is very low.

The safety of neem is extensively reviewed; azadirachtin is nontoxic to mammals and did not show chronic toxicity. Even at high concentrations, neem products were neither mutagenic nor carcinogenic, and they did not produce any skin irritations.

Using unprocessed and aqueous neem-based products should be encouraged if applied with care. The pure compound azadirachtin, the unprocessed materials, the aqueous extracts, and the seed oil are safe to use even as insecticides.

With few exceptions, the oils themselves or products based on them are mostly nontoxic: The cytotoxic capacity of the essential oils, based on a prooxidant activity, can make them outstanding antiseptic and antimicrobial agents for personal uses, that is, for purifying air, personal hygiene, or even internal use via oral consumption and for insecticidal use for the preservation of crops or food stocks. Some EOs acquired through diet are actually beneficial to human health they can be irritating to the skin, and their repellent effect is variable, dependent on formulation and concentration. The previously mentioned safety and advantages designate that EOs could find their way from the traditional into the modern medical, insecticidal repellent(2)

### **Herbs Used In Mosquito Repellent:**

Tulsi  
Citronella oil  
Eucalyptus oil  
Lemongrass oil  
Neem oil  
Cinnamon oil  
Clove oil  
Haldi  
Sweet orange peel

**Cintronella** :(Cymbopogon nardus )



**Kingdom:** Plantae

**Order:** Poales

**Family:** Poaceae

**Genus:** *Cymbopogon*

*Cymbopogon nardus* or Citronella grass (S. Pengiri) is a coarse and clump-forming Tropical grass native to Sri Lanka. Citronella grass can grow up to 1.5-1.8 m tall and Citronella stems are like canes. Citronella essential oil is extracted by steam-distillation of citronella leaves. Citronella essential oil is used as an insect repellent and it can be Found in dozens of registered pesticide products such as sprays, lotions and candles. Due to its antifungal properties, citronella oil is also used to treat insect bites. Additionally, Citronella essential oil is one of the most common oils used in aromatherapy as it has an Ability to treat and Prevent fever and headache.

The oil of citronella is also widely used in fragrances and personal care products. Because of citronella oil's antiseptic properties, it is used in soaps, household cleaners and detergents. Moreover, citronella oil is added As a food and beverage flavouring, such as in alcoholic drinks and frozen Dairy .The main components of citronella essential oil are monoterpene hydrocarbons And alcohols such as geraniol (18-20%), citronellal (5-15%), citronellol (6.4-8.4%), Limonene (9-11%) and geranyl acetate (2%).Additionally, methyl eugenol, camphene,

Nerol, borneol, citronellic acid and citral are also present in citronella oil. (3)

**Eucalyptus** : ( *Eucalyptus globulus* )





**Family :** Myrtaceae

**Genus :** *Eucalyptus*

*Eucalyptus globulus* (S. *Eucalyptus*) is named as “Blue Gum” and it is a medium to very Tall forest tree which may reach 70 m in ideal conditions. However, *Eucalyptus globulus* is more commonly 15- 25 m in height and it has a rough, grayish bark which is shed on the upper trunk and branches in long ribbons. *Eucalyptus globulus* leaves are glossy, Dark green, thick and leathery. The white flowers occur from winter to early summer and they are followed by hard, woody-capsules containing grayish fruits which are named as “Gum Nuts”. *Eucalyptus* essential oil which is extracted by steam-distillation from *eucalyptus* leaves is taken orally for pain and inflammation of respiratory tract mucous membranes, coughs, Asthma and bronchitis. It is also used as an antiseptic, insect repellent and treatment option for wounds. *Eucalyptus* oil is also popularly used as a fragrance in perfumes and cosmetics and it is found in mouthwashes, toothpastes and cough drops as well. The main chemical constituent present in *eucalyptus* oil is 1,8-cineole (60-70%). In addition,  $\alpha$ - pinene (9%),  $\beta$ -pinene (0.4%), limonene (0.04%), terpinen-4-ol (0.3%), Aromadendrene (2.5%), epiglobulol (0.4%) and globulol (2.7%) are also present in *Eucalyptus* oil.(4)

**Citrus Sinesis :** ( Sweet Orange)



**Kingdom :** Plantae

**Family :** Rutaceae

**Genus:** *Citrus*

Citrus sinensis or Sweet Orange is a small shallow-rooted evergreen tree which is about 6-13 m in height with enclosed conical top and spiny branches. Citrus sinensis leaves which are 5-15 cm long and 2-8 cm wide are dark green in colour, glossy and oval- Shaped. Greenish-white Citrus sinensis flower is small and it has five petals. Citrus Sinensis fruits are reddish-green to yellowish- green in colour and consist of a leathery and tightly adhered peel which is 6 mm thick.

Citrus sinensis peel, protects the juicy inner pulp of the Sweet Orange fruit. Sweet Orange peels, leaves and flowers contain fine essences of oils that are used in the Manufacture of cosmetic products and medicines. The main chemical components of Sweet Orange peel essential oil are  $\alpha$ -pinene, sabinene, myrcene, limonene, linalool, Citronellal, neral and geranial. Sweet Orange peels, leaves and flowers contain fine essences of oils that are used in the manufacture of cosmetic products and medicines.

Azadirachta indica is an evergreen and fast-growing tree that can reach a height of 15-20m. The Neem branches are spread widely. The fairly dense crown is roundish or oval. The white and fragrant flowers arise from the junction of the stem and petiole. An Individual flower is 5-6 mm long and 8-11 mm wide. Neem fruit is a smooth olive-Like drupe. The fruit skin is thin and turns yellow when ripe. The bitter-sweet pulp is yellowish-white. The white, hard inner shell of the fruit encloses one, rarely two or Three, elongated seed having a brown seed coat as shown in all parts of the tree such as seeds, leaves, flowers and bark, are used in the preparing of various different medical preparations. Neem products have medicinal properties that Prove to be anti- fungal, anti- diabetic, antibacterial, antiviral.

Limonoid compounds contained in Neem seed extract seem to have the insecticide and pesticide properties. The main limonoid in Neem seed extract is azadirachtin. Additionally, azadiradione, fraxinellone, nimbin, salannin, salannol, vepinin and vilasinin are also present in Neem seed. extract. Bitter property of the Neem oil is due to tannins, flavonoids and sesquiterpene derivatives.(5,6)

**Clove :** (Syzygium aromaticum)



**Kingdom :** Plantae  
**Family :** Myrtaceae  
**Genus :** *Syzygium*  
**Species :** *S. aromaticum*.

*Syzygium aromaticum* (Clove) is a triangular-shaped evergreen tree growing about 12 m tall with a smooth grey bark and about 12 cm long, glossy opposite leaves that resemble bay leaves.

The attractive red and white bell-shaped flowers have four tiny petals surrounded by a long, four-part calyx and numerous stamens. The clove buds, are pink but calyx changes from yellow to deep red after the stamens fall. The fruit, called mother of cloves, is an edible purple berry about 2.5 cm long. The entire *Syzygium aromaticum* plant is extremely aromatic. The major constituent in clove bud oils is eugenol (72.08-82.36%) and eugenyl acetate is the second major component (8.6-21.3%). In addition,  $\beta$ -caryophyllene (2.76-8.64%) and  $\alpha$ -humulene (0.34-1.04%) also see present in clove bud oil.(7)

**Safe Concentrations of Herbs**

<b>Citronella</b>	<i>Cymbopogon nardus</i>	2%
<b>Clove</b>	<i>Syzyguim aromaticum</i>	0.5%
<b>Lemon grass</b>	<i>Cymbopogon citratus</i>	0.1%
<b>Cinnamon</b>	<i>Cinnamonium cassia</i>	0.2-9%
<b>Basil</b>	<i>Ocimum Sp.</i>	0.07%
<b>Citrus oil</b>	<i>Citrus Sp.</i>	16-25%

**Herbs Mosquito Repellency**

<b>Tulsi</b>	97%
<b>Turmeric</b>	89%
<b>Sweet orange</b>	93%
<b>Eucalyptus</b>	100%
<b>Clove</b>	95%
<b>Citronella</b>	100%
<b>Neem</b>	81.25%

**Method of Preparation**

**Ingredients Used**

- Clove oil (0.5%)
- Eucalyptus oil (2%)
- Neem oil (2%)
- Citrus oil (1%)
- Beeswax (12%)
- Coconut oil (q.s.)

**FORMULATION TABLE**

01.	Citronella oil	2 ml.	Mosquito Repellent
02.	Clove oil	0.5 ml.	Mosquito Repellent
03.	Eucalyptus oil	2 ml.	Mosquito Repellent
04.	Neem oil	2 ml.	Mosquito Repellent
05.	Citrus oil	1 ml.	Mosquito Repellent
06.	Beeswax.	12 gm	Cream base
07.	Coconut oil.	Q.S.	Cream base and vehicle

**PROCEDURE**

Melt beeswax in coconut oil using heating mantle while constant stirring.



Mix above mentioned oil and add into beeswax with constant stirring.



Allow the oil mixture to cool and add in the container.



Close the container and label correctly.

**FINISHED PRODUCT**



Fig - 1





Fig - 2

**Evaluation Parameter**

**SPREDABILITY-**

Two glass slides were selected. The formulation was over one of the slide. The other slide placed on the top of the cream such a formulation sandwiched between the two slides , alongside 100 gm weight was placed uniformly to form a thin layer. The weight was removed and the excess of cream adhering to the slides was scrapped off. The two slides in a position were fixed to stand (45° angle) without slightest disturbance. The time taken for the upper slide to separate away from the lower slide under the direction of weight was noted. The results were recorded. The Spread ability is calculated by using ( 7 )

**Formula:  $S = M \cdot L / T$**

Where,

S= Spread ability,

L= Length of glass slide,

M= Weight tied to the upper slide and

T= Time. In present experiment

M= 60 gm and

L= 7.5 cm.

**Extrudability**

Extrudability	Grade
90%	Excellent
80%	Good
70%	Fair
50%	Poor

**Thermal Stability –**

In this test the oil separation from the cream were tested at 60-70% RH and 37±1°C in humidity chamber.

**Viscosity-**

Viscosity of creams was measured by the Brookfield viscometer. The correct spindle was selected (spindle no.61) for the given product then the operating condition was setup. Then the viscosity was measured directly at 10 rpm speed by keeping the torque constant at 25C.



**Skin Irritation**

**Stability by Centrifugation-**

During the centrifugation studies, creams were centrifuged at 3500- 13,500 rpm at interval of 500 rpm for 10 min.22 the formulations were observed for the phase separation.

**pH-** By pH paper.

**Appearance-** Faint Yellow colored Creame.

**Easy to apply**

**OBSERVATIONS**

01.	Spreadability	Good
02.	Extrudability	Good
03.	Viscosity	90249.67+-139.95Cp.
04.	Skin Irritation	None
05.	Stability	Stable at room temperature
06	PH	6
07.	Color	Faint Yellow
08.	Odor	Aromatic
09.	Ease Of Application	Easily applicable
10.	After Feel	Good
11.	Mosquito Repellency	Present

**EXCIPIENT PROFILING**

Various excipient used in the formulation process, they are

**Beeswax**

**Common Name:** Yellow beeswax,

**Cera-Flava.**

**Biological Source:** It is a purified wax obtained from the honeycomb of the bee species, Apis mellifera.

**Family:** Apidae.

**Physical Properties:**

Beeswax consists primarily of a mixture of esters of fatty acids and fatty alcohols, paraffinic hydrocarbons, and free fatty acids.

Two types of beeswax are marketed – yellow beeswax and white beeswax. Yellow beeswax is a light-brown solid, brittle when cold and presents a characteristic odour of honey. White beeswax is a white or yellowish- white solid having a characteristic, but faint, odour of honey. Yellow beeswax is smooth and soft to touch but breaks with granular fracture. It is insoluble in water, but soluble in hot alcohol and other organic solvents. In hot water, it melts in liquid form and can be made in any required shape and design after cooling. They are partially soluble in cold carbon disulphide and completely soluble in the same solution at temperatures of 30° and above.

Beeswax has a specific gravity of about 0.95

Melting range: 60 – 65°C Acid value: 17 – 24

Peroxide value: Not more than 5

Saponification value: 87 – 104

Ester value: 72 – 79

The composition of beeswax depends to some extent on the subspecies of the bees, the age of the wax, and the climatic circumstances of its production, and hence the physical properties are also varied.

**Chemical properties:**

Beeswax consists of five main groups of components

Free fatty acids, most of them are saturated and have a chain length of C24– C32

Free primary fatty alcohols with a chain length of C28– C38.

Linear wax monoesters and hydroxymonoesters (35-45%) with chain lengths generally C40- C40. The esters are derived almost exclusively from palmitic acid, 15-hydroxypalmitic acid, and oleic acid. 4. Complex wax esters (15-27%) containing 15-hydroxypalmitic acid or diols, which, through their hydroxyl group, are linked to another fatty-acid molecule

**Bees wax uses:**

Beeswax is used as a component in dietary food supplements (soft gelatine capsules and tablets), glazings and coatings, chewing gum, water-based flavoured drinks, and as a carrier for food additives (including flavours and colours) and cosmetics (Lipsticks, face creams). Beeswax is a suitable stabilizer for keeping oil-based capsule contents in suspension as well as in tablet formulations. Beeswax is blended with other oils and is used as a glazing agent for confectionery (including chocolate), in small products of fine bakery ware coated with chocolate, in snacks, nuts, coffee beans, dietary food supplements and in certain fresh fruits.(6,7)

**Adulterants:**

Beeswax is adulterated with paraffin, microcrystalline wax, Jan wax, carnauba wax, tallow and stearic acid. They are identified by saponification values and as well as solubility and melting point which is about 10-20°C lower than other waxes. Beeswax will not give turbidity when boiled with sodium hydroxide and cooled, but other waxes will form turbidity.

**Coconut Oil:**



**Synonyms :** Coconut oil, coconut butter, copra oil

**Biological Source :** Coconut oil is the oil expressed from the dried solid part of endosperm of coconut, *Cocos nucifera* L., belonging to family Palmae.

**Chemical constituent:**

Coconut obtained from the hard, dried endocarp consists of a mixture of triglycerides of saturated fatty acids. The oil contains about 95% of saturated fatty acids with 8 and 10 carbon atoms. It shows the presence of caprylic acid, 2%; capric acid, 50-80%; lauric acid, 3%; and Meristic acid about 1%. Coconut oil is used as dietary products in many areas of the world. In European pharmacopoeia, fractionated coconut oil is known as 'Thin vegetable oil'

**Uses :**

It is useful as a nonaqueous medium for the oral administration of some medicaments. Fractionated coconut oil is used as a basis for the preparation of oral suspension of drugs unstable in aqueous media. Diets based on medium chain triglycerides including preparations made from coconut oil are used in conditions associated with mal - absorption of fat such as cystic fibrosis, enteritis, and steatorrhoea. Abdominal pain and diarrhoe have been reported in patients taking diet based on medium chain triglycerides(7)

**Citronella oil :**



**Kingdom :** Plantae

**Order :** Poales

**Family :** Poaceae

**Genus :** *Cymbopogon*

Citronella oil is derived from two perennial grasses of the Cymbopogon species. As a pesticide, the essential oil is primarily used as a mosquito repellent, but also has other insecticidal, acaricidal and herbicidal activity. It is not considered harmful to humans and pets but may cause skin irritation. Citronella can be toxic to pollinators.

**Pesticidal Uses:** Repellent of mosquitoes and other biting insects

**Chemical constituent :**

Alcohols such as geraniol (18-20%), citronellal (5-15%), citronellol (6.4-8.4%), Limonene (9- 11%) and geranyl acetate (2%).<sup>32</sup> Additionally, methyl eugenol, camphene, Nerol, borneol, citronellic acid and citral are also present in citronella oil.

**Formulations and Combinations:**

Citronella may be used with other essential oils and botanical insecticides. Those eligible for exemption include cinnamon oil, clove oil, eugenol, lemongrass oil, and cinnamon Oil. Registered products may contain the botanical neem. Paraffin, beeswax and other waxes may be Added when used in insect repellent candles. Citronella in incense sticks may be combined with various Wood powders, binders and other incense base ingredients. Gel formulations are made with vegetable Gums, such as guar, tragacanth and gum arabic. Wetting agents and surfactant including sodium lauryl Sulfate, glycerol and gelatin—may also be used as formulants in exempt products. Registered products May contain other inert ingredients not eligible for exemption.<sup>(5,7)</sup>

**Clove oil**



**Kingdom** : Plantae

**Order** : Myrtales

**Family** : Myrtaceae

**Genus** : *Syzygium*

**Species** : *S. aromaticum*

Clove oil is the essential oil of the clove plant, and may be derived from flower buds, leaves and stems. The principal biologically active component is eugenol. Clove oil may be used as an insecticide, fungicide or herbicide. Because it is a common ingredient in food, the EPA considers risks to human health to be minimal.

**Chemical constituent:**

The major constituent in clove bud oils is eugenol (72.08-82.36%) and eugenyl acetate is the second major component (8.6-21.3%). In addition,  $\beta$ -caryophyllene (2.76-8.64%) and  $\alpha$ -humulene (0.34-1.04%) also see present in clove bud oil/

**Pesticidal Uses:**

Insecticide, acaricide, insect attractant, bait lure, and herbicide. It is used as a direct contact insecticide to kill crawling, flying and stinging insects and arachnids (both indoors and outdoors); as an attractant/lure for Japanese beetles in traps; to kill stored-grain pests; to repel dogs and cats from gardens; and as a post-emergent herbicide.

**Formulations and Combinations:**

Other essential oils, cottonseed oil, sesame oil, 2-phenethyl propionate, octanoic acid, and sodium lauryl sulfate.

Basic Manufacturers: Harga, Indaroma, Indesso, Takasago; Kautilya Commodities; Biolandes; Diveh(7,8)

**Eucalyptus Oil**



**Family** : Myrtaceae

**Genus** : *Eucalyptus*

**Biological source** :

Eucalyptus oil is obtained from distillation of the fresh leaves of eucalyptus globules and other species of eucalyptus. Should not contain less than 65% of cineole

**Synonyms**: Blue gum leaf oil, Dinkum oil

**Color** : colorless to yellow

**Odour** : Aromatic

**Taste** : Pungent

It is also shown to exhibit antibacterial activity against some bacterial species and cough suppressant actions. Eucalyptus oil can be applied directly to the skin for pain and swelling of respiratory tract mucous membranes, joint pain, genital herpes, and nasal stuffiness.

**Chemical constituent** :

The main chemical constituent present in eucalyptus oil is 1,8-cineole (60-70%). In addition,  $\alpha$ -pinene (9%),  $\beta$ -pinene (0.4%), limonene (0.04%), terpinen-4-ol (0.3%), Aromadendrene (2.5%), epiglobulol (0.4%) and globulol (2.7%) are also present in Eucalyptus oil (7)



**Uses:**

As an active agent, eucalyptus oil has been indicated for relief of the symptoms of catarrhal colds, and/or the relief of the symptoms of minor muscular sprains and cramps Associated Conditions Cough Infection Itching caused by Insect Bites Myalgia Nasal Congestion Pruritis of the skin Rash caused by Insect Bites Infection in minor cuts, scrapes, or burns Minor aches.

**Neem oil**



**Biological source :** Azadirachta indica

**Kingdom :** Plantae

**Family :** Meliaceae

**Chemical constituent :**

It contain glycerides of fatty acids and unsaturated fatty acids . 1 Oleic acid – 50% 2. Stearic acid 20% 3. 2% Bitters Nimbidin, nimbin, nimbidol Neem oil, also known as margosa oil, is a vegetable oil pressed from the fruits and seeds of the neem (Azadirachta indica), a tree which is indigenous to the Indian subcontinent and has been introduced to many other areas in the tropics. It is the most important of the commercially available products of neem and is used for organic farming and medicine

**Colour :** Yellow

**Taste :** Bitter

Soluble in ether and chloroform

**Uses:** Antiviral

Non edible oil for soap making

Pesticides

Spermicidal

Antifungal

Antipyretic

**Toxicity**

The ingestion of neem oil is potentially toxic and can cause metabolic acidosis, seizures, kidney failure, encephalopathy and severe brain ischemia in infants and young children. Neem oil should not be consumed alone without any other solutions, particularly by pregnant women, women trying to conceive, or children. It can also be associated with allergic contact dermatitis(7)

**RAW MATERIAL ANALYSIS:**

**BEES WAX**

Appearance	Yellow
Odour	Bland
Acid valuE	17-22
Density	Approx. 0.96
Saponification no.	87-1021

**COCONUT OIL**

Appearance	White
Odour	Bland
Iodine number	8-9.5
Melting poiny	21-27C
Density	0.903-0.910
Acid no.	Nmt 6
Saponification no.	255- 258

**CITRONELLA OIL**

Appearance	Pale yellow to dark yellow
Odour	Pungent citrus like odor
Acid value	2.00max koh
Density	0.887-0.906
Vapour preesure	1mmhg
Solubility	Alcohol

**NEEM OIL**

Appearance	Pale brown liquid
Odour	Strong
Colour	Yellow to brown colour
Density	0.875g/cm3
Iodine value	122.5gm 12/100gm
Saponification value	206.7mgKOH
Viscosity	33.5mm2/s

**CLOVE OIL**

Appearance	Colourless to pale yellow
Odour	Spicy
Optical rotation	-12.00 TO -2.00
Density	1.04g/MI (25C)
Viscosity	9.12mPa.s(20C)
Iodine value	119.9

**EUCALYPTUS OIL**

<b>Appearance</b>	<b>Colourless or light yellow liquid</b>
<b>Assay</b>	<b>80% as cineol</b>
<b>Density</b>	<b>0.906-0.925</b>
<b>Optical rotation</b>	<b>0 To +10</b>
<b>Solubility</b>	<b>70% ethanol</b>
<b>Saponification value</b>	<b>15.848mg KOH/Gm</b>

**RESULT :**

The formulation and evaluation of herbal mosquito repellent cream was formulated and evaluated successfully for its safety efficacy and convenience as per evaluation protocol and the product complies the specified parameters for safety and efficacy.

**II. CONCLUSION**

Regarding environmental and health concerns, plant-based repellents are better than synthetic molecules. Even though many promising plant repellents are available, their use is still limited; therefore, advance understanding of the chemical ecology of pests and the mode of repellency would be helpful for identifying competitor semiochemicals that could be incorporated into attractant or repellent formulations. There are numerous commercially available formulations enhancing the longevity of repellent, by controlling the rate of delivery and the rate of evaporation. Such formulations are very useful to people living in the endemic areas in the form of sprays, creams, lotions, aerosols, oils, evaporators, patch, canister, protective clothing, insecticide-treated clothing, and insecticide-treated bed nets insectic

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