

Formulation and Evaluation of Herbal Anti Mosquito Repellent Agarbatti: A Research

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Submitted: 10-07-2023

Accepted: 20-07-2023

I. INTRODUCTION

With over many species of mosquitoes believed to be responsible for spreading diseases such as yellow fever, dengue hemorrhagic fever, epidemic polyarthrititis, encephalitis and malaria. According to the world Health Organization (WHO) such diseases causes more than 3 million deaths annually. There are many treatments for Malaria and other mosquito transmitted diseases but it is always better to prevent the disease. Hence, the term mosquito and other repellent came in existence. Topical or other application of mosquito repellent repels the mosquitoes to bit. Mosquito repellent can be prepares synthetically or naturally.

Mosquitoes are among the most disturbing blood sucking insects afflicting human beings. Several mosquito species belonging to genera Anopheles, Culex and Aedes are vectors for the pathogens of various diseases like Dengue fever, Malaria, Yellow fever, Japanese Encephalitis and several other infections. Mosquitoes alone transmit diseases to more than 700 million people and over one million deaths are reported annually across the globe. Malaria which is caused by Plasmodium parasites transmitted through the bites of female Anopheles mosquitoes continues to impart a major disease burden on infants and young children in endemic regions. In there were about 207 million cases of Malaria and an estimated 627,000 deaths all around the globe. A. Chemical Sensors: The studies have proved that the mosquitoes have the tendency to sense the lactic acid, carbon dioxide, and the propen-3-ol upto many yards away. On breathing or perspiration, humans and the animals release these compounds. This is the reason that a person who sweats more becomes the target of the species and the one who sweats less don't get as many bites. B. Heat Sensors: The mosquitoes also have the ability to detect heat and hence can target the warm blooded animals very fast once they get close enough. C. Visual Sensors: It's been recorded that the mosquitoes are the intelligent insects as they can easily detect you by looking at your clothing if it contrasts with the background. You

are easily detected by them as anything that moves is alive and hence full of blood. Control of Mosquito Borne Diseases Mosquito control and personal protection from mosquito bites are currently the most important measure to control this disease. Prevention of this type of disease involves protecting yourself against mosquito bites. Mosquito control methods are habitat change, biological control, physical control and chemical control including individual safeguards from the mosquitoes. Among the approaches for control of these mosquito-borne diseases is the interruption of the disease transmission by killing or preventing mosquitoes from biting a human being. This can be achieved by use of repellents. What is a mosquito repellent? A mosquito repellent is a substance applied to skin, clothing, or other surfaces which discourages mosquitoes from landing on that surface. It is a substance that is synthesized in such a manner so that it makes the surface unpleasant and unattractive to mosquitoes so as to reduce the human mosquito contact. Mosquito repellents repel insects but do not kill them. Therefore, they are not technically insecticides nor pesticides. They help prevent and control the outbreak of mosquito borne diseases such as Dengue fever, Malaria, Yellow fever, Japanese Encephalitis, etc.

HISTROY

The mosquito repellent are used from the ancient period. Different types of plant oils were used to kill mosquitos .oil of citronella is one of the mostly used repellent from those days. in 1937 dimethyl phthalate , was discovered later several other compound have been evaluated . aftercitronela oil DEET is the most widely used mosquito repellent . it has less toxic effect . Attempt have been made to find out new active ingredient , those derived from natural plants to replace synthetic pyrethroid.

PROBLEMS WITH MOSQUITO REPELLENTS

Majority of the respondents complain

about the problems faced by them in using mosquito repellents. The problems faced by the respondents was compiled .

Mosquito repellent incense coils: Only 40 per cent of the respondents use mosquito repellent incense coils, out of which 50 per cent experienced breathing problems, 33 per cent experienced chocking from fumes, 16 per cent felt irritation with coils, 08 percent experienced headache, nose irritation and sneezing. Whereas 48 per cent of the respondents experienced multiple problems like breathing problems and chocking from fumes where as 25 per cent of the respondents were not experienced with any kind of problem in using coil as repellent.

Advantages

- They are cheap [They are economical].
- They are less harmful to the human beings and more effective against pest .
- They are more stable and can be kept for prolonged period [Degradation is less] .
- They can be used to control the carriers of vector borne dieases like malaria , sleeping sickness and dengue fever.

Disadvantage

- The onset of action is slow.
- The quantity of pesticide required may be more due to crude components.

Application

- The mosquito repellent can be used in apparels and also in home textile industry.
- In the mosquito prone areas these textile find their application in well coverings a and tents .
- The insect repelling textile find their application in approaches and home textiles too.
- Apart from these application these textile materials can also be used for manufacturing bags used for storing , eatables , textile good and all other goods prone to damage by insects*

Mosquitoes are among the most disturbing blood sucking insects afflicting human beings. Several mosquito species belonging to genera Anopheles, Culex and Aedes are vectors for the pathogens of various diseases like Dengue fever, Malaria, Yellow fever, Japanese Encephalitis and several other infections . Mosquitoes alone transmit

diseases to more than 700 million people and over one million deaths are reported annually across the globe . Therefore, the control of mosquitoes is an important public health concern around the world.

As most of the mosquito repellent products and devices available in the market are reported to have harmful effects on human beings, the objective of the present study is to develop effective plant-based mosquito repellent products .

Although chemical mosquito repellents available in the market have been formulated so that they have remarkable safety profile, but their toxicity against the skin and nervous system can cause rashes, swelling, eye irritation and other serious problems to children. Hence it was felt that bio-based natural mosquito repellents would be preferred overchemical mosquito repellents.

Bio based mosquito repellent are pest management tools that are based on safe, biologically based active ingredients derived from plants. Benefits of bio-products include effective control of mosquito as well as human and environmental safety. These bio based products were designed to play an important role in providing pest management tools in areas where mosquito resistance, niche markets, and environmental concerns limit the use of products. Mosquito repellents from natural sources are not new. Some of these mosquito repellent are derived from the following--Basil (*Ocimum basilicum*), oils of Castor, Cedar, Clove, Fennel, Citronella, Eucalyptus, Neem, Rosemary and Catnip oil of Nepeta species having nepetalactone, Celery extract (*Apium graveolens*) as well as *Solanum villosum* berry juice. These natural resources are good for the environment and also have added benefit of smelling goods.

North East India, having tropical climate is infested with several diseases such as malaria, dengue, etc. caused by mosquitoes. The mosquitoes act as a vector for the transmission of these deadly diseases. The need to protect ourselves from their bites seems more important. Much of the literature about mosquitoes provided by government agencies recommends regular use of mosquito repellents most often containing DEET as the major chemical component. Many health problems such as headache, breathing difficulties, heart attack, etc. are the result of long term use of DEET either directly or indirectly. Now-a-days, 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 affective insect repellents.

Mosquito borne diseases are major human health problem and controls of such serious diseases are becoming increasingly difficult because of the high rate of reproduction and development of resistance to insecticides in mosquitoes. Synthetic pesticides/repellants have been extensively used for mosquito control by either killing, preventing adult mosquitoes to bite human beings or by killing mosquito larvae at the breeding sites of the vectors. However its deleterious impact on non-target population and the development of resistance prompted for the search of alternative, simple and sustainable methods of mosquito control. The need for development of effective insecticides/repellents should be taken into consideration due to the toxicity problems, together with the increased incidence of insect resistance. In most parts of the world, Synthetic chemical larvicides continue to be applied for controlling mosquitoes but many of these chemicals are toxic to human, animal and plant life and resistance can be problematic in regulating the control of the same. Therefore, researchers are currently exploiting natural substances to be used as insecticides for controlling larval mosquitoes or repellants for the same. According to a recent WHO pesticide evaluation, the main insecticides used against mosquitoes in the Americas are pyrethroids and organophosphates. Common chemical-based insect repellents used for mosquitoes are DEET (N, N diethyl- m-toluamide) which is a registered pesticide, but possible side effects and warnings include: skin and eye irritation, insomnia etc. Permethrin, resmethrin and sumithrin are also other synthetic pyrethroids commonly used in mosquito control programs to kill adult mosquitoes.

Prevention of man mosquito contact is indispensable for protection from mosquito-borne diseases and uses of repellents have been advocated for the same. Insect repellents date back to ancient times, with the use of tars, smokes, plant oils and other modalities (Peterson and Coats, 2001). In recent years, new synthetic repellents have been formulated and advocated. However, continuous and indiscriminate use of these synthetic repellents causes adverse effects on the user (Mandal, 2011). There has been a paradigm shift towards botanicals to overcome the problems associated with the use of synthetic compounds. Plant products have been used traditionally to repel and kill mosquitoes in many parts of the world. Thousands of plants have been tested as potential sources of insect repellents.

In terms of disease transmission and public health importance mosquitoes are considered as a very important group of insects. In tropical and subtropical countries, mosquito borne diseases are main problem. Major cause for the chikungunya and dengue is *A. aegypti* that act as a vector for the disease and affect the 2.5 million people every year. Most important reason for the increase of dengue fever are increased breeding places for the *Aedes* mosquitoes, less effective control of mosquito, more urbanization and enhanced growth of population. The phytochemicals derived from plant resources can act as larvicides, insect growth regulator, repellents and ovipositional deterrent. In southern India, leaves of *Vitex negundo* are burned to repel mosquitoes from houses. Fumigants evaporated using heat or mosquito coils containing the plant may repel and kill mosquitoes. In general, chemical or natural compounds can produce a range of insect responses, contact, irritancy, spatial repellency, knock-down and toxicity.

There are numbers of health associated problems developed by constant use of synthetic mosquito repellents. To solve these problems, in present work, anti-mosquito products of plant origin are being rejuvenated. The leaf extracts of Neem (*Azadirachta indica*), Tulsi (*Ocimum sanctum*), Rui (*Calotropis gigantea*), Durva grass (*Cynodon dactylon*), Ashoka (*Saraca asoca*) and additional to this Cow urine (*Gomutra*), cow dung, Neem oil, distilled water, wax and Whatmann filter paper-1 were used. By using this material, 'dhoop stick', 'extract cards' and 'candles' etc. were prepared and their anti-mosquito activity was determined. The burning of these aids not only controlled mosquitoes but also reduced air microflora from surrounding area.

Background

- The plant compound are used in preventing attack from phyto phagous
- The repellency of plant material has been exploited for thousands of year by man, most simply by hanging bruised plants in houses.
- Plants have been used in the from of fumigants where plants were burnt to drive away mosquitos and later as oil formulation applied to the skin.
- Natural smelling repellents are preferred because plants are perceived as a safe and trusted.
- Many plant extract and oils repel mosquitoes, with their effect lasting from several hours.

- Their active ingredient tend to be highly volatile , so although they are effective repellent for a short period after application , they rapidly evaporate leaving the user unprotected.



Fig. No. 1- Formulation of herbal anti mosquito repellent agarbatti

II. LITRATURE REVIEW

- **Agrawal S et al [2018]²** – Was studied the formulation of hrbal anti mosquito repellent agarbatti 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.
- **Trivedi A et al [2018]** - was studied the formulation of herbal anti mosquito repellent agarbatti, Mosquitoes control and personal protection from mosquito's bites is one of the serious ways for preventing of contagious diseases proliferation. In recent years, interest in plant based products has been revived because of the development of resistance, cross-resistance and possible toxicity hazards associated with synthetic insecticides and their rising costs. Presently most of the mosquito repellents available in markets are based on chemical and they are toxic against the skin and nervous system like rashes, swelling, eye irritation, and other health problems. Most of the people still dislike the smoke of the synthetic pyrethroid containing mosquito coils. Hence herbal mosquito repellents were preferred than chemical based mosquito repellents. Essential oils belonging to various plant species and their mixtures have been seen to act as effective repellent against various mosquitoes and pests.
- **Shukla D et al [2017]⁶** - Was studied the formulation of anti mosquito repellent agarbatti ,All over the developing countries in the tropical region mosquito menace has been very acute leading to many diseases. Many chemicals have been used for the purpose of Mosquito repellency or killing, however they are extremely harmful for human beings as well. Recently, commercial repellent products containing plant-based ingredients have gained increasing popularity among consumers, as these are commonly perceived as “safe” in comparison to long-established synthetic repellents. Our paper describes Plant-based repellents for mosquitoes for personal protection measures. Based on the knowledge on traditional repellent plants obtained through ethnobotanical studies, development of new natural products is the need of the hour.
- **Injal AS et al [2017]** - Was studied the formulation of herbal anti mosquito repellent agarbatti,All over the developing countries in the tropical region mosquito menace has been very acute leading to many diseases. Many chemicals have been used for the purpose of Mosquito repellency or killing, however they are extremely harmful for human beings as well. Recently, commercial repellent products containing plant- based ingredients have gained increasing popularity among consumers, as these are commonly perceived as “safe” in comparison to long-established synthetic repellents. Our paper describes Plant-based repellents for mosquitoes for personal protection measures. Based on the knowledge on traditional repellent plants obtained through ethnobotanical studies, development of new natural products is the need of the hour.
- **Remia KM et al [2017]** – Was studied the formulation of herbal anti mosquito repellent agarbatti , A laboratory study was conducted to evaluate the efficacy of repellency of Hyptissuaveolens and Ocimumgratissimum against the adults of Aedesaegypti. The methanol extract of H. suaveolens at 0.03, 0.05, 0.075 and 0.1 mg/cm² offered 50.00, 66.67, 71.43 and 75.00 percent protection against the mosquito bite. The percent protection against the mosquito bite was 33.33, 50.00, 57.14, 60.00 and at 0.03, 0.05, 0.075 and 0.1mg/cm². Synergistic action was

observed when the plant extracts were mixed in equal quantity and the percent protection was extended up to 83.33. Mosquito coil made with the extracts of *H. suaveolens* and *O. gratissimum* provided 75.31 and 70.37 percent protection from mosquito bite. Combined use of plant extracts increased the percent protection than with individual plant extracts

- **Baruah PS et al [2016]⁷** – Was studied the formulation of herbal anti mosquito repellent agarbatti, The present paper deals with formulation of a mosquito repellent product prepared using four plant materials viz, *Homalomenaaromatica*, *Ocimumbasilicum*, *Ageratum conyzoides* and *Litseaeglutinosa* based on traditional knowledge in prevalent among the ethnic groups of Assam.
- **Ranasinghe MSN et al [2016]⁵** –Was studied the formulation of herbal anti mosquito repellent agarbatti, 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. Same procedure was carried out for *Vitex negundo* leaves using hexane and ethanol solvents. Hydro- distillation process was performed for *Ocimum sanctum* leaves, *Curcuma longa* rhizomes and *Citrus sinensis* peels using Clevenger-arm apparatus in order to obtain the essential oils. Essential oils of *Cymbopogon nardus* leaves, *Eucalyptus globulus* leaves and *Syzygium aromaticum* buds were purchased from a reliable source.
- **Chavare SD et al [2015]** - Was studied the formulation of herbal anti mosquito repellent agarbatti, Today's market is flooded chemical based mosquito repellent which were proved harmful & poisonous by the most researchers. In present investigation an attempt has been made to prepare herbal based mosquito repellent several formulations like cake, jellies, coils, and liquids were prepared. Ingredients used in almost all of the formulation were herbal based & ecofriendly. Since, it has no side effect on inhalation. Same formulations were evaluated for texture, efficacy, and stability etc.
- **Bhide SS et al [2014]¹** –Was studied the

formulation of herbal anti mosquito repellent agarbatti, Essential oils has been reported to have many pharmacological activities, one of which is their property to repel the mosquitoes and insects. The marigold infused oil is reported to be antibacterial, astringent, antifungal, used in insect bites etc. Mosquito repellent cream of different concentrations i.e. 5% and 7.5% , a combination of marigold oil with two essential oils i.e.

- **Shankar BS et al [2013]** –Was studied the formulation of herbal anti mosquito repellent agarbatti, A preliminary screening was carried out on five plants viz., *Azadirachta indica*, *Citrus medica*, *Murrayakoenigii*, *Ocimumtenuiflorum* and *Ricinuscommunis* for their repellent activity against mosquitoes. The repellent activity was studied under natural conditions in the field making use of the traditional knowledge as background. Field observations were undertaken in houses wherein dried powdered plant leaves each (250 g) burnt on glowing charcoal produced smoke act as a repellent mosquitoicide. Results indicated that among the five plants utilized, *Azadirachta indica*, *Murrayakoenigii* and *Citrus medica* provided repellence with a protection time of six hours followed by *Ricinuscommunis* and *Ocimumtenuiflorum* with four hours. Besides these, the incidence of mosquito bites significantly reduced after usage of plant products.
- **Pohlit AM et al [2011]** – was studied the formulation of herbal anti mosquito repellent agarbatti, Bites of mosquitoes belonging to the genera *Anopheles Meigen*, *Aedes Meigen*, *Culex L.* and *Haemagogus L.* are a general nuisance and are responsible for the transmission of important tropical diseases such as malaria, hemorrhagic dengue and yellow fevers and filariasis (elephantiasis). Plants are traditional sources of mosquito repelling essential oils (EOs), glyceridic oils and repellent and synergistic chemicals. A Chemical Abstracts search on mosquito repellent inventions containing plant-derived EOs revealed 144 active patents mostly from Asia. Chinese, Japanese and Korean language patents and those of India (in English) accounted for roughly 3/4 of all patents.

III. DRUG PROFILE

Neem [*Azadirachta indica*]

Kingdom: Plantae Division: Magnoliophyta Order: Sapindales Family: Meliaceae Genus: *Azadirachta* Species: *A. indica*

Benefits: Neem seed cake performs the dual function of both fertilizer and pesticide, acts as a soil enricher, reduces the growth of soil pest and bacteria, provides macro nutrients essential for all plant growth, and helps to increase the yield of plants in the long run, bio degradable and Eco friendly and excellent soil conditioner.



Fig. 2- Neem leaves [*Azadirachta indica*]

Azadirachta indica is an evergreen and fast-growing tree that can reach a height of 15-20 m. 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 olivelike 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 Figure 8a and Figure 8b. 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 and anti-fertility. Limonoid compounds contained in Neem seed extract seem to have the insecticide and pesticide properties. The main limonoid in Neem seed extract is azadirachtin.

TULSI [*OCIMUM SANCTUM*]

Kingdom :Planta Divison :Magnoliophyta Class :Magnoliopsida Order :Lamiales Family :Lamiaceae Genus :*Ocimum* Species :

Sanctum

Ocimum sanctum or Tulsi is a branched sub-shrub which is 30-60 cm tall, with simple opposite green or purple leaves that are strongly scented. Tulsi leaves have petiole and are ovate, up to 5 cm long, usually slightly toothed. Flowers are purplish in elongate racemes in close whorls. Tulsi is native throughout the tropics and wide-spread as a cultivated plant. It is cultivated for religious and medicinal purposes and for its essential oil. Tulsi essential oil is used as a medicine for fever, headache, lung disorders, heart disorders and many other diseases. Tulsi essential oil has antibacterial, anti-viral and anti-fungal properties as well. Tulsi essential oil is also used in massage oils, perfumes, aromatherapy baths, soap making and candle making. Tulsi leaf essential oil contains methyl eugenol (46-68%), (E)- caryophyllene (17-27%) and β -elemene (16.3%) as the major constituents.



Fig. 3- Tulsi [*ocimum sanctum*]

Properties- Tulsi is pungent and bitter in taste, pungent in the post digestive effect and has hot potency. It alleviates kapha and vatadoshas, but slightly aggravates the pitta dosha. It possesses light and dry attributes. On the contrary the seeds are oily and slimy in attributes and have a cold potency. Tulasi is a stimulant, aromatic herb and effectively reduces the fever.

-MARIGOLD Kingdom : Plantae Order :Asterales Family :Asteraceae Genus :*Tagetes* Species :*erecta*



Fig. 4- marigold

-Garlic

Garlic (*Allium sativum*) is a popular spice, a remedy for a variety of ailments and is also known for its medicinal uses as an antibiotic, anti-thrombotic and antineoplastic agent. It has been used for thousands of years for culinary, medicinal and spiritual purposes.

Kingdom Plantae Subkingdom Tracheobionta
Division Magnoliophyta
Class Liliopsida Subclass Liliidae Order Liliales
Family Liliaceae Genus *Allium*
Species *Allium sativum* L

Uses and Efficacy Garlic has been studied extensively in vitro, in animal and human clinical trials, and in epidemiologic evaluations for its multiple medicinal properties. The quality of human trials has been variable, making comparisons among the trials difficult. Some trials are not well blinded; some are only of short duration; some have only small numbers of patients; and many are not well controlled. In addition, many different garlic preparations have been used, with unpredictable release of active ingredients.



Fig. 5- Garlic [*Allium sativum*]

-Lemongrass –

(*Cymbopogon citratus*, L) the leaves have a lemon like odor because they contain an essential

oil having citral as main constituent, same as what is present in lemon peel. Leading phytochemical compounds in lemongrass leaf are terpineol, Dipentene, Limonene, α -terpineol, citronellol, methyl heptenone, dipentene, geraniol, limonene, nerol, farnesol, mainly (triterpenoids).



Fig . 6- Lemongrass

Citronella oil

Citronella oil is an essential oil obtained from the leaves and stems of different species of *Cymbopogon* (lemongrass). The oil is used extensively as a source of perfumery chemicals such as citronellal, citronellol, and geraniol.

Used medicinally, Citronella Essential Oil eliminates and prevents the growth of fungus on wounds, boosts the healing of wounds, relieves spasms and gas, stimulates and improves circulation, facilitates the healing of eczema and dermatitis, reduces swelling, tenderness, and pain, promotes the body's expulsion of toxins ...



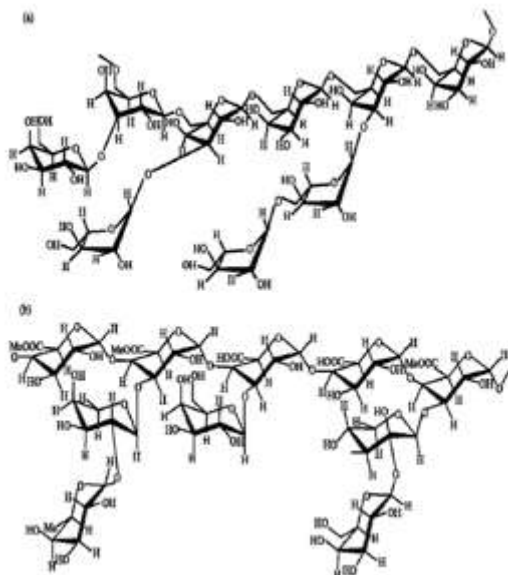
Fig. 7 – Citronella

Excipient profile

Binding agent - Tragacanth

Gum tragacanth, a dried exudate obtained from the stems and branches of Asiatic species of *Astragalus*,

is a very complex heterogeneous anionic polysaccharide of high molecular weight (Weiping, 2000) and consists of two main fractions: a water-insoluble component called bassorin, which has the capacity to swell and form a gel, and a water-soluble component called tragacanthin.



The gum is used in vegetable-tanned leatherworking as an edge slicking and burnishing compound, and is occasionally used as a stiffener in textiles. The gum has been used historically as a herbal remedy for such conditions as cough and diarrhea. Powders using tragacanth as a basis were sometimes called diatragacanth.

Tragacanth is used both for diarrhea and constipation. It is also an ingredient in toothpastes, hand lotions, denture adhesives, and vaginal creams and jellies. In foods, tragacanth is important for stabilizing and thickening ingredients in salad dressings, foods, and beverages.

Camphor-

Camphor is a waxy, flammable, transparent solid with a strong aroma. It is a terpenoid with the chemical formula $C_{10}H_{16}O$. It is found in the wood of the camphor laurel, a large evergreen tree found in Asia and also of the unrelated kapur tree. Camphor has a wide variety of topical uses due to its antibacterial, antifungal, and anti-inflammatory properties. It can be used to treat skin conditions, improve respiratory function, and relieve pain.



Fig. 8- Camphor

IV. AIM AND OBJECTIVE

Aim- Formulation and evaluation of herbal anti mosquito repellent agarbatti.

OBJECTIVE -

- These plants can be used as natural mosquito repellent.
- It can be used as a repellent in the household to kill mosquitoes, mice, etc.
- Mosquito repellents are important because they protect an individual from acquiring certain diseases that insects can transmit.
- Mosquito repellents are used to prevent dengue fever, malaria, West Nile virus, Lyme disease, and bubonic plague.
- The researchers wanted to prevent diseases caused by mosquitoes.
- The general objectives of the study were to determine the effectiveness of lemongrass as a natural mosquito repellent.
- The herbal anti mosquito repellent formulation is beneficial to human beings.
- The application of repellent to fight off mosquitoes is one of their most common uses.

V. PLAN OF WORK

- 1) Selection of topic
- 2) Review of literature.
- 3) Selection of drug / excipient.
- 4) Formulation of herbal anti mosquito repellent agarbatti.
- 5) Evaluation of herbal anti mosquito repellent agarbatti.

- Colour .
- Odour.
- Flammability and burning time
- Mosquito repellent test.

- 6) Result & discussion.
- 7) Compilation of data.

VI. EXPERIMENTAL DETAIL

Material or method – Collection of plants Five plants viz., Azadirachtaindica, Citrus medica, Murrayakoenigii, Ocimumtenuiflorem and Ricinuscommunis were collected in and around Tambaram, Chennai, Tamil Nadu, India. The plants were selected based on available literature, abundant availability, medicinal and insecticidal properties. The details of collected plants utilized for the present study are presented in The collected plant leaves were brought to the laboratory, washed with dechlorinated water, shade dried under room temperature and was then powdered individually.

The raw materials used for the production of the herbal mosquito repellent Stick were Saw dust, Bark powder, Camphor, Sea salt, Gum acacia, and essential oil like Tulsi, Lemon grass oil, Neem oil, Eucalyptus oil used in this preparation. Different ingredients were used in this formulation

have different function. The saw dust will enhance the combustion process. Bark powder is a repellent of mosquitoes having good binding property. The fumigation of Camphor is a good has qualities of making soothing atmosphere of calm serenity. Lemon grass and Tulsi are the most generally used medicinal plants and it has excellent antiviral and insecticidal property. Neem has antiviral and mosquito repellent properties.

A small quantity of each plant material, about 5 gm, was weighed and then it was heated in an oven at 105°C for about 5 hours until a constant weight was obtained. Then the final constant weight of the dried plant material was measured and the moisture content was determined. Rotary evaporator which is shown in removes solvents from samples by applying heat to the rotary flask at a reduced pressure. Rotating the flask throws up liquid on the walls of the flask and thus increases the surface area for evaporation. Heat is often applied to the rotating distillation flask by partially immersing it in a heated bath of water. As the machine utilises a lower pressure than the atmospheric pressure, the solvent is evaporated at a temperature which is lower than its boiling point and it ensures that the solutes dissolved in the sample are not decomposed.

Drug extract & Excipient	Initial wt. of the plant material	Wt. of the Extract & After Heating	Percentage Yield
Neem extract	40	30	133.33
Tulsi extract	30	20	150
Garlic	25	20	125
Camphor	Qs	Qs	100%

Table 1- Percentage yield of the plant extract & Excipient

Method of preparation – Mosquito repellent stick have mainly two parts of the ingredients. Part one contains the base material like Saw dust, Sea salt, Acacia gum and Kapoor and part two contain active ingredients or mixture of essential oil. All the required ingredients were taken in a mortar except oil and water. Mixed them properly and added given amount of essential oil as per treatment detail and mixed it uniformly. Add water

as per requirement for binding the stick . All mixed material was filled in the stick mould and kept for drying . After 30 min. took out the stick from the mould and kept it in oven at 50 OCfor 6 hrs. After drying, packed them properly to disallow the moisture entrapment and kept it for further studies .

VII. EVALUATION

- The mosquito repellent activity that prepared cakes were checked in flammability ,burning efficacy and effectiveness.
- Ash produced by cakes were weighed and recorded .
- The cakees were burn in selected mosquito prone areas only. in the evening or nighttime.
- Only the in selected areas only the agarbatti should be born for the first time .
- The agarbatti were conducted to check its combustibility.

Colour - Green.
Odour - Pungent

Flammability test - And burning time: To observe the flammability of the cakes, the cakes were burnt. The time taken to burn the cake completely and the total time of repellence were recorded For a good and consistently burning mosquito repellent cake, it is necessary that the cake should be burnt slowly and completely

producing low smoke and capable to repel mosquitoes to a longer time.

Mosquito repellence test - Mosquito repellence test was done by simply selecting the mosquito prone areas in the evening and night period such as laboratory corners, bushes and shrubs in and around Department premises and cafeteria.

VIII. RESULT & DISCUSSION

For a repellent to be succesful , it must first have to high % protection against mosquito bites. second, it should be toxicologically safe at the rate of application for whichit is intended . third, it should be easy to apply and pleasant on skin. the use of synthetic chemicals to control insects lead to several environment and human health hazards. an alternative solution is to use natural products that process good efficacyand environmentalfriendly. although this method is not fully perfected method of bioassy as several other factors influence the study of efficacy of any repellent.

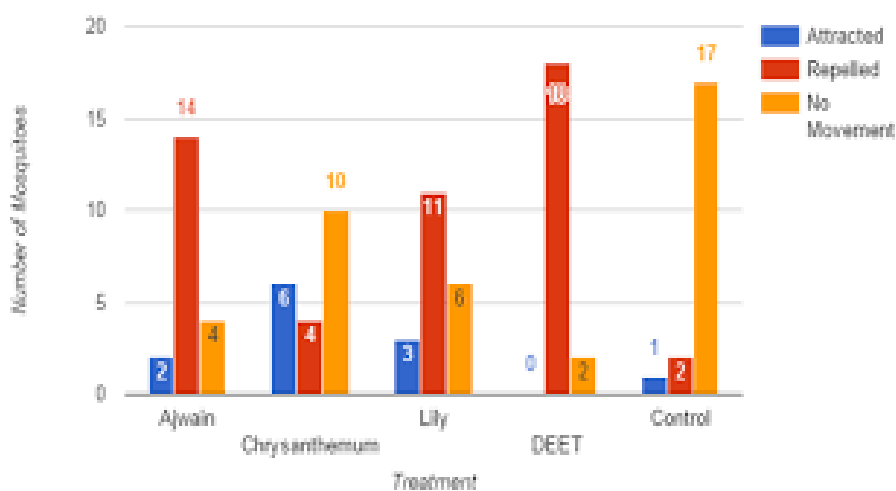


Fig. 9 – Mosquito repellent activity of herbal plant

Sr. No.	Test	F1	F2
1.	Colour	1	NA
2.	Odour	1	NA
3.	Flammibility & Burning Time	1	2
4.	Mosquito Repellence Test	1	2

Table 2- Test parameter result

IX. CONCLUSION

Drug & Excipient

Neem, Tulsi, Garlic, Marigold, Lemongrass, Citronella, Camphor, Tragacanth

Method

- Selection of Raw Material,
- Preparation Of Plant Extract.
- Heated on the Hot Air Oven .
- Combine plant Extract & Excipient.
- Making herbal anti mosquito repellent pest & stick.
- That was formulation of herbal anti mosquito repellent agarbatti

Evaluation

- Colour
- Odour
- Flammibility and Burning Time
- Mosquito Repellence Test.

X. RESULT

For a repellent to be successful , it must first have to high % protection Against mosquito bites.

Natural repellent such as herbal essential oils have been employed as alternative compounds for repelling mosquitos and other insects .there are reports on the insect repellency from mint , citronella, basil, neem and lemongrass. protect the human being from the sting of mosquito and thereby promising safty from the mosquito carried diseases. manymosquito repellents are available in the market to protect people from mosquito and give the length of protection one needed.

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