



Formulation And Evaluation Of Herbal Mosquito Repellent Candle.

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Abstract

Herbal plants contain various biologically active compounds that are useful for life enhancement and they are the main origins of modern and conventional herbal medicine for the prevention of diseases. The nature of different kind of life supporting voters of plants that have been studied by scientists for their applications. The purpose of the research was to devise a herbal mosquito repellent candle that would include the essential oil of Lavender oil , Rose water and The candle was tested for flammability, time for burning and Checked the repellency of mosquito. It may be attributed to the presence of the Different active constituents of the oils. The test showed that the manufactured poly herbal candle had become more effective, Cheaper and non-poisonous than the candle repellents currently available on the market based on chemical in fighting mosquitoes, scent consistency, etc

Keywords- Mosquitoes, mosquito repellent candle, Essential oil, economical

INTRODUCTION

Mosquito borne disease are major human health problem in all tropical and subtropical countries. The disease transmitted include malaria, ilariasis, yellow fever, Japanese encephalitis and dengue fever Culex quinquefasciatus, the potential vector of lymphatic ilariasis, is the most widely distributed tropical disease with around 120 million people infected worldwide and 44 million people having common chronic manifestation (Bernhardet al, 2003). Controls of such serious diseases are becoming increasingly difficult because of high rate of reproduction and development of resistance to insecticides in mosquitoes (Sukumar et al, 1991). Synthetic pesticides have been extensively used for mosquito control by either killing, preventing adult mosquito to bite human beings or by killing mosquito larvae at the breeding sites of 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 should be taken in to consideration due to toxicity problems, together with the increased incidence of insect resistance (Miro specos et al, 2010). In the most part 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. Therefore, researchers are currently exploiting natural substances to be used as insecticides for controlling larval mosquitoes. These formulations are safe, eco friendly, cheap, easy to use and has maximum repellence against mosquitoes. Hence, an effort was made to prepare cow dung based herbal mosquito repellent.

History of repellent

Traditionally in many parts of the world, some plants were used as repellent against insects in order to prevent biting. These were used as plant oils, cow dung tar and many more. Even though much studies have been made into artificial (synthetic) repellents, less strides have been made in the area of natural (plant) repellents. Citronella oil was the first among four others that were recorded in history to be used as insecticide and at times for the treatment of hair to prevent head lice before the Second World War. The three others are dimethyl phthalate, Indalone and Rutgers 612 were discovered, patented and available respectively in 1929, 1937 and 1939. During the World War II, combined formulation of the later three components in the ratio 6-2-2: dimethyl phthalate, Indalone and Rutgers 612 respectively was quickly prepared for the military yet it could not produce the expected protection of the military personnel across the globe. Synthetic insect repellent made of N, N-diethyl-m-toluamide (DEET) was for military use only and its first product was introduced for civilian use in 1956. DEET currently remains the gold standard for mosquito repellent irrespective of the reported toxic side effects, which include skin rashes and itches, encephalopathy in children, serious allergic response, low blood pressure and reduce heart rate, it has been generally regarded as safe.

Mechanism of action by insect repellents

According to Acree et al. (1968), *Aedes aegypti* is attracted to lactic acid which is a component of human sweat. Studies done by others on the behaviour of mosquitoes indicated that lactic acid was only slightly attractive alone. This therefore proves its synergistic effect with carbon dioxide and other unidentified components of human odour that may be essential. Compounds such as steroids, phenols, carboxylic acids, indoles that exude from animals attracts mosquitoes. Physiological sensory studies on insect gives the impression that mosquito repellent reduce biting rate by interfering with host-enticing signals and change a sensual information to a repulsive one due to activation of many sensory receptors leading to confusion of the mosquito. The mosquito as a result is not able to detect host attractants such as carbon dioxide, lactic acid, ammonia and other compounds hence protecting the host.

TYPES OF REPLENTS

1. Synthetic repellent :

DEET repels insects and does not kill them, and it is considered the gold standard of repellents . Though discovered in 1953, the general public and the United State government accepted it's use in the year 1957 . Over 200 insect repellents products which are in the market contain DEET as their main active ingredients with concentrations starting from 5-100%. People with defected ammonia metabolism are susceptible to the negative effects from DEET exposure . The mechanism of DEET tends to give a vapour barrier that prevents the mosquito from coming into contact with the host's skin.

Permethrin is used in the treatment of mosquito nets and clothing . Another example of synthetic repellent is Picaridin (2-(2-hydroxyethyl)-1- piperidinecarboxylic acid 1-methylpropyl ester) . However, neurotoxicity is the most common reported systemic toxic effects of DEET but unfortunately the mechanism is unknown. Additionally, ingestion of DEET often result in nausea, vomiting, hypotension, seizure, and ataxia. Excessive application on the skin, especially in children has led to loss of body control movement, lethargy, vomiting, bullous eruption, and other negative effects. There has also been report of disturbance of the development of embryo.

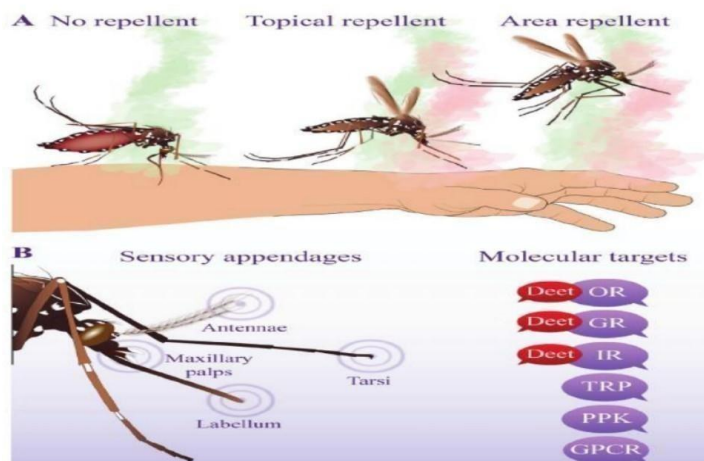
Natural insect repellents:-

Between 1953 and 1974, 872 synthetics and 29 plant-based oil were tested for repellent efficacy on four outstanding species of cockroaches by the US Department of Agriculture (USDA) . Citronella oil was used as active ingredient in insect repellent formulations in the United States . In 1901, the insecticidal properties were discovered and processed into candles and incense, insect repellent and hair control of flea and lice. Even though popular, little studies have been made to assess the effectiveness of such products . Citronella oil used as air freshener showed intriguing results of repellent activity against mosquitoes . Cedar wood, eucalyptus, lavender, cajuput, safrole-free, peppermint and bergamot oils according to a laboratory olfactometer were combined in various proportions but failed to produce repellency effect in olfactometer than DEET . Leaves from the neem tree (*Azadirachta indica*) and herbs from *Ocimum* spp are commonly used as larvicide and repellent as well .

In China, *Artemisia* and *Calamus* species of herbs were burnt to drive away mosquitoes and for treatment of malaria infection in the rural areas . In 1994, a trial was conducted on an insect repellent branded Quwenling which was produced from Eucalyptus oil. The active ingredient in the oil responsible for the repellent effect is p-menthane-3,8-diol (PMD). Outcome of the trial proved Eucalyptus- based repellent very effective, comparable to DEET which led to the popularity and registration of PMD upon further researches .

According to Abdulrahman H., *Ocimum basilicum* (Labiatae) oil was used traditionally in Sudan communities to repel mosquitoes while another research showed it's larvicidal effect . Ethiopia villages were not an exception in using natural repellents in the form of burning. A research conducted by Karunamoorthi and Hailu showed that 70% and 90% of the participants in the survey from Bechobore Kebele in Ethiopia were aware and used plants as mosquito repellent respectively. In South Africa, plant species from two families, Meliaceae and Anacardiaceae were the most used. *Sclerocarya birrea*, *Lippia javanica*, *Melia azedarach*,

magnifera indica, Balanite maughamii, and nine other.



Mosquito repellent mode of action-

It has been observed in many cases that actions which can be categorized as repellence may be the product of any number of physiological or metabolic happenings. The repellence in mosquito triggered by DEET is believed to be due to the blockage in lactic acid receptors, the elimination of upwind flight, which results in the host being "lost" by an insect. Research has also provided

further proof of the function of lactic acid in host searches. Examining the biology of mosquitoes after a meal of blood. Host-seeking activity at *Aedes aegypti* ceases after a meal of blood, the susceptibility of receptive neurons to lactic acid decreases, and this decrease coincides with the termination of host-seeking behaviour. Upon oviposition the immunity to lactic acid returns to normal.

HEARBS SELECTION

Neem tree



- SYNONYM- *Azadirachta indica*, Margosa, *Azadirachta*
- BIOLOGICAL SOURCE- *Azadirachta indica*.
- FAMILY- Meliaceae (Mahogany family)
- USES- Anti-Inflammatory, Analgesic, Antibacterial.

Dryer or semiarid regions of Asia and Africa are very suitable for the planting of *Azadirachta indica* from the family *Maliaceae* because it adapts naturally. *Neem* is evergreen tree whose size ranges from medium to large with dark brown to grey bark and straight trunk. It can grow to a height of about 40 meters and at the same time several centimetres in width or diameter. An annual rainfall of between 500 to 1150 mm is usually required. *Neem* is able to accommodate drought but difficult to withstand water-logged and soils that drain poorly [36]. It has dark green pinnate leaves that are brightly coloured with 9-15 serrated leaflets each of 7 cm long. The flowers are small, white, sweet scented and in clusters that are excellent nectar-producing grounds for bees. Trees usually blossom between February and May in India. The fruits are green drupes which are elliptical and smooth with a seed that is covered by a pulp. Upon ripening the fruit turns golden yellow often within the months of June through to August [36, 37].

Studies have been made on the pesticidal properties of six species in the family *Meliaceae* in different parts of the world. The most promising phytochemical pesticides studies in recent studies, however, are those based on extracts of *Azadirachta indica* (*neem*).

Indian scientists were the first to research into the benefits of *neem* even though in the 1920s, there was virtually little global recognition until a German entomologist found out in 1959 that *neem* trees in Sudan were resistant to the attack of migratory locusts. It was from this time that considerable research and commercialization activities on the products of *neem* became visible.

Uses of neem and its leaves

Neem has been the most preferred tree, in different cultures it is referred to as miracle tree in the region of Sahel because it responds to so many needs of the people in the following ways. People take rest under the beautiful canopy of *neem* tree due to its large cover. It also serves as wind-breaks to protect food crops and buildings from winds from the desert. The flower attracts bees that at the end produce a very delightful and delicious honey.

Neem kernels produce oil, which is used in the production of soap and other toiletries, fuels for lighting lamps and heating whereas the left over from the kernels after extraction of the oil could be used as fertilizer. These were commonly known and used by indigenes in India and the tree was planted all over every community. Moreover, the proteinaceous residue from the kernel was also used to feed poultry as well. This indicates that every part of the seed and the whole plant remains useful to humans and animals.

Since ancient times in India, various parts of *neem* tree have been used traditionally as medicine that heals the whole body. Also, the roots, bark, leaf and fruits of *neem* are considered the major constituents in medicine, ailments such as leprosy, intestinal infestation by worms, constipation, cough and respiratory problems were treated with *neem* oil and leaf extract. It is also generally known to promote the health of people. Eczema and many other skin infections were also controlled by the oil in addition to the treatment of rheumatism, chronic sores from syphilis and ulcers.

Work done by Suryawanshi further confirmed the spermicidal effect of neem oil that was speculated traditionally and the research of earlier studies. He realized that within 20 seconds, as little as 3mg of neem oil was able to kill sperms completely in a laboratory experiment conducted without any negative side effect. In another vivo studies conducted earlier in the 1990s exhibited that intra-vaginal use of neem oil before sexual intercourse was able to prevent pregnancy completely. Another revealing discovery from the same study was the reversibility of the antifertility effects of neem.

Also, neem seed and leaf extracts were used as a powerful remedy to some fungal infection of human such as Trichophyton, Epidermophyton, Microsporum, Candida and many others.



NEEM LEAVES EXTRACT

Neem leaves extract is an insecticidal, it is greenish in colour. In herbal mosquito repellent candle it is used as API within the cow dung extract. That's extract added when beeswax is melted and then it added. It works as insecticide or mosquito repellent.

COW DUNG

Cow dung :-

It contains plenty of Menthol, Ammonia, Phenol, Indol, Formalin and specially its bacteriophage eradicate the pathogens and are a recognized disinfectant.

Sometimes cow dung only is used for fumigation after drying under sunlight and sometimes cow dung is used as mosquito repellent in combination with other herbal products.

Plant products are emerging as a potential source of mosquito control and among them neem leaves have special interest due to their insecticidal properties. Here, we are reporting some of the herbal ingredients that we have found in various papers



COW DUNG EXTRACT

Cow dung extract is used as disinfectant and mosquito Repellent, cow dung extract is obtained by the extraction method and it is used to add in beeswax solution to as mosquito repellent. It is used within the neem leaves extract.

MARIGOLDS LEAVES EXTRACT



MARIGOLD

SYNONYM- Genda

BIOLOGICAL SOURCE –*Calendula Officinalis*

FAMILY-Daisy

The researchers intend to use marigold plant (*Tagetes erecta*) parts as suitable components of the mosquito candle, coil/ incense stick to be produced. It does not contain harmful chemical which are present in some commercial products it repels mosquitoes without destroying the environment. It contains a particular smell that many insects find unappetizing. The smell is caused by a chemical known as "α-terthienyl". Which lends a natural insecticidal property in marigold. Other toxic compounds available in all the ingredients are alkaloid, papain, terpenes and cyanogenic glycosides that are objectionable to human health. It also contains pyrethrin a natural compound effective as mosquito killer. Marigold is said to deter some common insect pests, as well as nematodes. Marigold are hence often in companion planting for tomato, chili, potato. Due to antibacterial thiophenes exuded by the roots, marigold should not be planted near any

legume crop.

Thiophenes repels aphid, white flies, maggots, and many other pet. Simultaneous steam distillation extractions (SSDE) volatiles isolated from the flower of the erecta species is believed to have higher insecticidal activity. Flower contain pyrethrin an ingredient found in many insect repellents.

BEESWAX



Beeswax is a natural biological polymer containing a mixture of several non-toxic and cheap substances (esters of fatty acids, alcohols, acids, etc.). The number of reported individual components have been contained beeswax exceeds 300 which are from various species of honeybees. Depending on the honeybee species and the geographical zone, the concentrations of individual components and substance classes may have only small differences. In addition, from the view point of chemistry it is a stable and water-repellent substance. Beeswax is a highly crystalline natural product that is used in pharmaceutical, cosmetics, food and other industries. It also is frequently used in the preparation of controlled release drug preparations. It is a natural pesticide and it is also used in the mosquito repellent candle.

LAVENDER OIL



BIOLOGICAL SOURCE- *Levendula Latifolia*
FAMILY-Mint

ROSE WATER

- SYNONYM – Gulab
- BIOLOGICAL
SOURCE-Rosa
- FAMILY- Rosaceae
- USE- antibacterial &Essence

FORMULATION OF CANDLE :-

SR.NO.	INGREDIENT NAME	QUANTITY(ML)	USE
1.	NEEM EXTRACT	8ML	INCECTICIDE
2.	COW DUNG	3ML	DISINFECTANT
3.	MARIGOLD EXTRACT	1ML	REPELLANCY
4.	BEES WAX	225 GM	EMITS THE BRIGHTEST MOST WARM TONED FLAME (INSECT REPELLENT)
5.	LAVENDER OIL	3ML	INSECT REPELLENT
6.	ROSE WATER	1ML	FLAVOURINGAGENT

PROCEDURE

- Take a beeswax and Weigh the beeswax accurately.
- Cut the beeswax in small cuts and Melt the beeswax in beaker with the help of heating mantle.
- After the properly melting Start combining the neem extract & cow dung extract in a beaker.
- After the adding extract then Start the mechanical stirrer slowly.
- Then add the rose water in given quantity for the fragrance.
- After adding all ingredient , Keep stirring upto 15 minutes.
- Pour above mixture in suitable size mould.
- Allow the mould to be cooled at room temperature.
- After ½ hour remove the candle from mould.



FORMULATION OF HERBAL MOSQUITOREPELLENT CANDLE

EVALUATION OF HERBAL MOSQUITOREPELLENT CANDLE :-

Flammable test- The prepared candle was tested for flammability to explore mosquito repelling habits, and burned Quality with respect to burning time and subsequently its Spotting process effectiveness.

Inflammability test for candle was conducted to verify its apparent combustibility in the laboratory.

Simple Thus, on results, the time taken to light the candle and its causal symptoms such as pain, coughing were documented and registered In established vulnerable mosquitoes at night and in the field above Time such as the chicken shops and village houses.

RESULT:-

Every formulated candle was tested in a laboratory in a standard usual room Environment in a confined area with a greater population of mosquitoes, by lightening and contrasting with the same size aromatic herbal candle and flammability rate ,burning efficiency with respect to burning time and overall efficient repellent operation .the test showed greater quality and efficacy than the commercialized candle.

CONCLUSION

One of the active compound of neem extract contain azardiracstin ,which is presumably has the ability to act as natural insecticide. It was reported when mosquito eats azardirhactin, it actively attack its reproductive cycle,its feeding pattern, is bodily development as well as acting as direct toxin.it was observed Than the result obtained.then by using the extract of neem we made the mosquito Repellent candle.

The ingredients of cow dung and phytochemical compounds of plant extract are responsible for mosquito repellence. The mosquito coils available in market creates heavy smoke that can generate respiratory problems especially for patients of Asthma, COPD and other respiratory diseases.

The cow dung provides a herbal repellent with long lasting protection, safe for human life, human and domestic animal skin with no side effect and no feedback of environmental ill effect,as an alternative to synthetic chemical repellents.The marigold is natural repellent it gives repellency as well as fragrance to candle.

The formulation was safe, eco-friendly, cheap, easy to use and has maximum repellence against mosquitoes. Production of these natural repellents Neem with cow dung may help common man in earning more money.

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