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AN OVERVIEW OF HERBAL PLANT'S ABILITY TO REPEL MOSQUITOS

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ABSTRACT

With over 3,500 species, mosquitoes are a widespread flying bug found all over the world. Among other ailments, mosquitoes transmit dengue, malaria, yellow fever, and filarial infections. Repellents for mosquitoes are essential for avoiding mosquito bites. Mosquito repellents come in a variety of forms, including synthetic substances, aromatic oils, and plants. Compared to plant-based repellents, chemical repellents offer an exceptional protective profile but are more harmful. The most popular chemical mosquito repellent is DEET (N, N-Diethyl-3- methyl benzamide). DEET is dangerous but acts more quickly. To repel mosquitoes, one can use aromatic essential oils instead of DEET, which is entirely chemical-based. Essential oils with fragrances have health advantages. In addition to their ability to keep mosquitoes away, essential oils derived from lavender, basil, pine, peppermint, lemongrass, lemon, eucalyptus, thyme tea tree, camphor, neem, etc. also provide health benefits. It has been discovered that natural repellents are safer and better for skin. repellents derived from plants are chemical free and offer a number of benefits over those derived from chemicals. There is numerous plant- based mosquito repellent options on the market. Furthermore, mosquito repellent compositions made with natural substances found in the kitchen are simply to make. Easy -to-find household ingredients like garlic, neem, cloves, camphor, cinnamon, bay leaves, and lavender are used to make chemical- free, safe, and efficient mosquito repellents.

KEYWORDS: Mosquito, Repellent, DEET, Natural, Plant.

INTRODUCTION

One of the most unsettling bloodsucking insects that humans encounter is the mosquito. Several species of mosquitoes from the genera Anopheles, Culex, and Aedes. microorganisms that cause diseases like Dengue fever, malaria, yellow fever, Japanese encephalitis, and numerous other infections can act as vectors for these diseases. A substance used on the skin, clotting, or other surface to deter mosquitoes from landing or breeding is known as mosquito repellent. mosquito repellents often operate by disguising human scent or by employing. A scent that mosquitoes inherently dislike.

Typically, chemical repellent substances have certain unfavorable outcomes. Due of their ability to cause cancer, synthetic poisons have also lost some of their significance. New repellents and insecticides that are generated from natural sources and don't cause cancer are being considered by scientists. Natural herbal insecticides can be found there. They are the most effective insecticides and repellents. Because they have little toxicity to humans, animals, and the environment and possess repellent and pesticide qualities Deet (N,N-diethyl-3-methylbenzamide), despite being the most popular mosquito repellent now on the market, has demonstrated outstanding protection against mosquito bite.

Chemical Sensors: Research has shown that mosquitoes can detect propen-3- ol, carbon dioxide, and lactic acid up to many yards away. These substances are released by both humans and animals when breathing or perspiration. This explains why a person who sweats more attracts the species' attention whereas a person who sweats less doesn't experience as many bites.

Heat Sensors: Mosquitoes can also sense heat, which enables them to attack warm-blooded creatures relatively quickly once they get close enough.

Visual Sensors: Mosquitoes have been said to be intelligent insects because they can quickly identify you by glancing at your clothing if it stands out against the background.

You can avoid contracting this kind of illness by taking precautions against mosquito bites. Techniques for preventing mosquitoes include personal protection from them, habitat modification, biological control, physical control, and chemical control. One method for controlling these mosquito-borne illnesses is to stop the spread of the illness by killing or

discouraging mosquitoes from biting people. Repellants can be used to achieve this.

MOSQUITO REPELLENT

HISTRORY

Since ancient times, numerous plant oils, smokes, tars, and other chemicals have been utilized as insect repellents, either killing or distancing insects. Before World War II, there were only four primary repellents available: dimethyl phthalate (discovered in 1929), Indalone (patented in 1937), Rutgers 612 (marketed in 1939), and citronella oil (often used as a hair treatment for head lice). At the start of World War II, the latter three elements were mixed to create a military composition known as 6-2-2: six parts dimethyl phthalate, two parts indalone, and two parts Rutgers 612. Other military repellent recipes were developed throughout the war to be applied to clothing, but they were all unable to offer the protection required soldiers stationed. Because of this, by 1956 the US government had looked into over 20,000 potential insect repellent compounds. In 1953, it was discovered that N, N- diethyl-m-toluamide (DEET) possessed insect repellent properties.

In 1956, the first DEET product was created. DEET is still the most widely used repellent for mosquitoes. While it is generally considered safe, there have been reports of side effects, such as decreased heart rate, urticaria syndrome, allergy, encephalopathy in youngsters, and hypotension and slowed heart rate.

NEED OF HERBAL MOSQUITO REPELLENT

Researchers like Tenenbein and records from poison control center telephone data have reported and found only a few cases of dermatitis, allergic reactions, and neurologic and cardiovascular toxicities like seizures following the use, ingestion, and high-concentration use of DEET on children and adults, despite the widespread use of DEET-containing products. Additional adverse health effects, such as tremor, encephalopathy, slurred speech, aberrant behavior, coma, and even death, have been reported.

THE WAY REPELLANT WORKS:

It has been discovered that repellent behavior is frequently the result of a variety of physiological factors.

The DEET-induced mosquito repellency is assumed to be generated by the blockage of lactic acid receptors, which eliminates upwind flight and causes the insect to "lose" the host.

Studies on mosquito physiology after a blood meal provide more support for the idea that lactic acid plays a part in host seeking. Following a blood meal, Aedes aegypti no longer exhibits host- seeking behavior. The sensitivity of lactic acid-sensitive neurons has been reported to decline after a blood meal, and this decline is correlated with the end of host-seeking activity. After oviposition, lactic acid sensitivity returns to normal.

The Indian markets have plenty of turmeric for sale. It has a long history of usage in "ayurvedic medicine" as an antibacterial, chemical for healing wounds, and anti-inflammatory.

Warm-blooded animal perspiration contains lactic acid, carbon dioxide, and other excretory chemicals that attract female mosquitoes. Mosquitoes' antennae include chemo-receptors, which allow them to detect smells. The repellents prevent upwind flight by blocking lactic acid receptors, which causes the mosquitoes to lose contact with their host.

Typically, insect repellents function by disguising the smell of humans or by employing a scent that insects instinctively shun. The distinction with permethrin is that it functions as contact pesticide.

Figure.1 Mosquito.

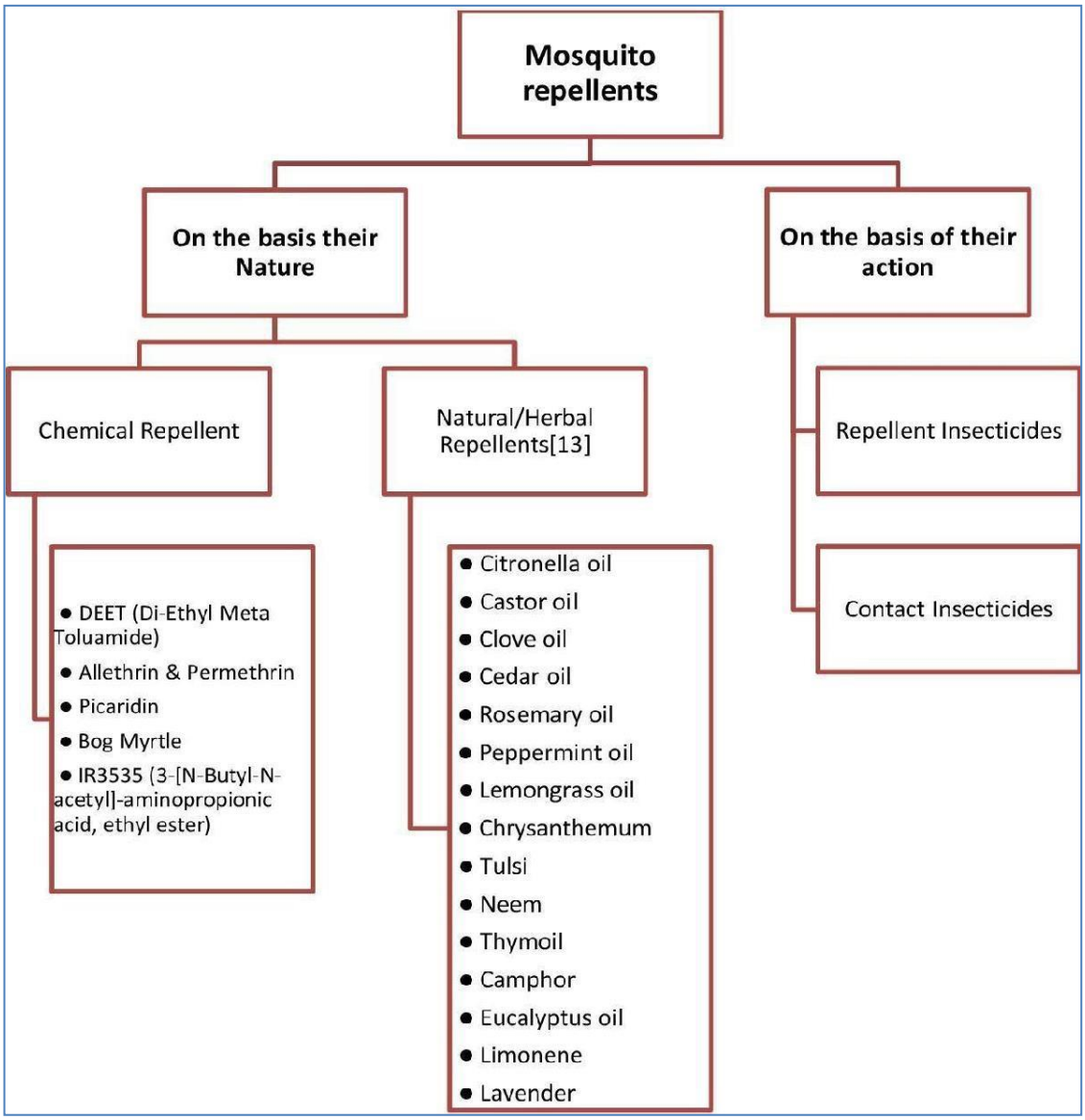
Techniques for controlling mosquitoes

Every year, millions of people worldwide are afflicted by diseases spread by mosquitoes. Any number of things might happen after a mosquito bite, such as skin irritation or malaria. It is obvious that mosquitoes are not only an annoyance but also perhaps dangerous. You can reduce your risk of drawing mosquitoes by adopting precautions like wearing long pants in

forested areas or getting rid of standing water. These precautions, however, are frequently insufficient, necessitating the use of specialized products like insect repellent.

The efficacy of each product used to control mosquitoes varies, and it's vital to understand that some may work better than others.

Classification of mosquito repellant



Herbs with repellency properties

LANTANA [Lantana camara L.] Lantana Many insects, including mosquitoes, can be naturally repelled with lantana oil and crude extract. Triterpenoids, ***Oleanonic acid, Lantadene A, Lantadene B, Lantanilic acid, acerogenin,*** and 4,5-dihydroxy-3,7-dimethoxyflavone-4-o-beta D-glucopyranoside and ***Camaroside*** are the

primaryphytochemical substances found in lantana. The chemicals in question exhibitedrepulsive properties.

Figure 2: Lantana Camara.

LEMONGRASS (Cymbopogon citrates L.) Leaves contain an essential oil with ***citral*** as its primary constituent—the same compound found in lemon peel—the leaves have a lemon-like scent. Lemongrass leaves are mostly composed of triterpenoids, which include terpineol, ***dipentene, limonene, α-terpineol, citronellol, methyl heptenone, dipentene, geraniol, limonene, nerol, and farnesol.***

Figure 3: Lemongrass.

TURMERIC [CURCUMA LONGA]

One of turmeric's ingredients, curcumin contains mosquito-repelling properties. Additionally, Curcuma longa makes it simple to extract curcumin. According to reports, embelin derived from Embelia ribes may offer insect-repelling properties. In addition to harming the environment irreparably, synthetic insect repellents used to control vectors also include non-biodegradable chemicals. For routine usage, synthetic repellents are pricey, and there are worries regarding their toxicity and safety. Clinical, biochemical, and neurological effects have been linked to prolonged exposure of newborns and young children to insect repellents with pyrethroid bases. DEET, also known as ***N-diethyl-3- methyl benzamide***, dissolves plastic on watches, eyeglasses, and synthetic materials. DEET also has unfavorable odors, sub chronic toxicity, mutagenicity, and toxicities to the nervous system and reproductive system.

Figure 4: ***Turmeric (Curcuma Longa).***

To solve the issue, it is necessary to create efficient non- biodegradable mosquito repellent and DEET substitutes to create repellent. Plant-based repellents are easy to use, efficient, affordable, environmentally benign, and widely accessible in comparison to synthetic repellents. Even though only a small number of them have had their toxicity assessed, they are widely accepted by the general public. This study's goal was to create a mosquito repellent based on isolated phytoconstituents.

BASIL [OCIMUM BASILICUM]

Basil [Ocimum basilicum] is an annual herb belonging to the mint family ***[Lamiaceace].***

The leaves of the forest basil plant (Ocimum sanctum) are one of the herbs that may be used as natural larvicides. This plant has alkaloids, flavonoids, tannins, saponins, triterpenoids, and essential oils, according to research on the genus Ocimum. Therefore, the purpose of this study was to determine whether an extract of forest basil leaves (Ocimum sanctum) might effectively repel Aedes aegypti mosquito larvae in their third instar.

Another herb that has the ability to repel pests is basil. Pests are repelled by the strong scent that basil leaves emit. Additionally, since all varieties of basil repel flies and mosquitoes, feel free to experiment to locate the ideal varieties to incorporate into your garden. This herb prefers full light, good drainage, and a wet environment. An alternate method of managing Aedes aegypti larvae is the application of pesticides derived from plants. An insecticide derived from active compounds of secondary metabolites of plants is known as a vegetable insecticide. It can influence various elements of an insect's physiology and behavior, including its ability to hinder eating and spawning behaviors.

Figure 5: Basil [OCIMUM BASILICUM].

CITRONELLA [Cymbopogon nardus]

Cymbopogon nardus known by its popular name, citronella grass. It is a species of aromatic perennial plant belonging to the Poaceae family that is native to tropical Asia. Citronella, scientifically known as Cymbopogon nardus, resembles lemongrass, scientifically known as ***Cymbopogon citratus,*** however Citronella has a larger leaf blade and a reddish pseudo stem base, whilst Lemongrass has a green pseudo stem base.

Citronella contains geraniol, citral, citronellal, and citronellol chemical constituents. The studies have demonstrated the antiviral, antibacterial, and antifungal activities of these elements. The coarse, clump-forming tropical grass Cymbopogon nardus, often known as Citronella grass (***S. Pengiri***), is indigenous to Sri Lanka. Citronella grass has cane-like stems and can reach heights of 1.5 to 1.8 meters. Steam distillation of citronella leaves yields citronella essential oil. Citronella essential oil is a recognized pesticide ingredient that is used to repel insects. Insect bites are also treated with citronella oil because of its antifungal properties.

Figure 6: ***Citronella [Cymbopogon nardus].***

Peppermint [Mentha piperita]

Mentha piperita is a medicinally significant perennial herb belonging to the family ***Lamiaceae.*** The hybrid species of peppermint (Mentha × piperita) is a cross between spearmint and water mint. Originally from Europe and the Middle East, the plant is now widely grown throughout the world.

By crossing spearmint (*Mentha spicata*) and water mint (*Mentha aquatica*), peppermint, a hybrid mint with high levels of menthone, menthol, and methyl esters, is produced. Originally from Europe, the plant is now widely cultivated all over the world.[66] Three research looked into the impact of peppermint on Anopheles.

The aroma of peppermint keeps mosquitoes away! The menthol found in peppermint leaves a strong scent. Similar to other natural oil repellents, this one overwhelms mosquitoes' senses to the point where they become "nose blind" to the wearer! This implies that there are no humans for mosquitoes to attack.

Figure 7: Peppermint *[Mentha piperita].*

Eucalyptus [Eucalyptus globulus]

Eucalyptus globulus, a species of flowering plant in the Myrtaceous family, is sometimes referred to as blue gum or southern blue gum. It is a tall, native tree to southeast Australia that is evergreen. The Victorian eurabbie, Tasmanian blue gum, Maiden's gum, and Victorian blue gum are the subspecies. 1, 8-Cineol, or eucalyptol, is the main ingredient in Eucalyptus globulus and has been shown to have strong ovipositional and mild feeding repellent properties against mosquitoes. Essential oils are notconvenient for long-term use because to their poor water solubility, volatility, oxidation propensity, and chemical instability.

Figure.8 *Eucalyptus [Eucalyptus globulus].*

Eucalyptus is directly working as natural repellent with their minimal toxicity effect. Sometimes it provides a wide spectrum of biological activity against the bacteria and microorganism it having the role of alternative pest control.

Neem [Azadirachta indica]

Neem, [Azadirachta indica] fast growing tree of the mahogany family [***Meliaceae***], valued as a medicinal plant, as a source of organic pesticides, for its timber. The neem tree, or Melia azedarach, grows between 15 and 30 meters tall, with a stem diameter of 30 and 90 centimeters. Originating in South Asia, this tree can be found extensively throughout India, Pakistan, Sri Lanka, Thailand, Malaysia, and Indonesia.

Azadirachtin is the most significant active ingredient; the others are quercetin, sodium ***nimbinate, gedunin, salannin, nimbin, nimbidin, and nimbidol***. Ingredients found in leaves include ascorbic acid, ***n-hexacosanol, nimbin, nimbanene, 6-desacetylnimbinene, nimbandiol, nimbolide, 7-desacetyl-7- benzoylazadiradione, 7-desacetyl-7- benzoylgedunin, 17-hydroxyazadiradione,and nimbiol.***

Figure 9: ***Neem [Azadirachta indica].***

Due to its low level of harmful off-target effects in the environment, this insecticide is considered healthy. It is also crucial for integrated pest management (IPM2). Azadirachtin has physiological effects that include anti- nutritional effects that impede cellular activities,

growth, and reproduction.

However, in every examined species, it results in aberrant peeling and a rise in mortality. Azadirachtin's growth inhibitory and endocrine effects are mostly responsible for the later problems. By getting inside the cells, azadirachtin stops protein synthesis and cell division. These consequences also contribute to cell death and muscular paralysis. For instance, it prevents the release of enzymes inthe digestive system.

CONCLUSION

The results of this study showed that some plants have a potent ability to repel mosquitoes, specifically Anopheles spp. While certain plants have demonstrated repellent qualities, few natural products have been created in the previous 20 years despite researchers' pursuit for new natural repellents. The purpose of this review is to provide information about the potential role and use of plant-derived repellents in disease control for entomologists and other professionals involved in mosquito-borne disease research.

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