# THE EFFICACY OF REPELLANT ACTIVITY OF VARIOUS ESSENTIAL OILS AGAINST THE MOSQUITO

DR.T.Elizabeth Thangamani Sunitha and L.AnnieHelan

Department of Zoology, St, Xavier's college, Palayamkottai 627002, Tamilnadu, India.

#### ABSTRACT

Repellant in humans are unattractive to a mosquito so that it will avoid areas of the body that have been treated with the produce. Repellant do not kill mosquitoes. The repellant will be provides protection from biting for a long period of time just one application. Essential oils from plants an provide the safe and biodegradable alternatives to synthetic repellants, but plant based repellant formulations available in the market are not effective. Though the essential oils are total protection against mosquito bite. The intervals between the time of repellent of application and the landing of first mosquito for biting is consider as the protection time.

The protection time was recorded in essential oils like Nochi, Manathakali, Thuthuvalai, Arukampull, Thulasi, Neem, Kuppimani, Citrus, Curry, and Drumstick leaves it shows that there is a variation among them against the mosquito. Among these leaf extract of Neem , kuppaimeni, Arugampull, showed very effective when compared to other essential oils. However the neem showed more effective in indoor areas.

From this investigation study found that neem (85,7%), citrus( 84%), kuppaimeni(78.9%) exhibited more effective than the control. The result showed that the mean protection time against the mosquito bite was high in neem followed by Kuppaimeni with repellant in indoor and Neem proved to be efficacious among all essential oils.

An insect repellant of plant origin is well defined and harmless to human and the non target. Thousands of plants have been tested as potential sources of insect repellants. Therefore usage of these repellants to control mosquito instead of synthetic insecticides could reduce the cost and environmental affects.

Keywords: Repellant, Protection time, Insecticides, Essential oil, Efficacious

# **INTRODUCTION**

Mosquitoes are a group of about 3500 species of small insects that are a type of fly(Order Diptera). Within that order they constitute the family Culicidae. The word 'Mosquito' is Spanish for 'little fly'. Mosquitoes have a slender segmented body, a pair of wings, three pairs of long hair-like legs, feathery antennae and elongated mouthparts. Mosquitoes diverged from other insects about 226 million years ago. Fossils of primitive mosquitoes have been found that are over 90 million years old; fossils similar to modern mosquitoes, 79 million years old; fossils identical to modern mosquitoes, 46 million years old. The life cycle consists of the egg, larva, pupa and adult. Eggs are laid on the water surface; they hatch into motile larvae which feed on aquaticalgae and organic material; pupae are breathing non-flying primitive adults.

#### © 2020 JETIR November 2020, Volume 7, Issue 11

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 insect repellents. Plant based products have been used as repellent either as topical applicant or fumigant and many plant species have been screened for their repellent and insecticidal property against mosquitoes.

Interest in anti – mosquito products of plant origin is being revived because of the associated with the continued application of synthetic compounds, some of which have let to widespread development of insecticide resistance. Some people mainly in rural area burn plant materials using charcoal to produce smoke which repels or kills mosquitoes.

Bio waste mosquito repellent are pest management tools that are based on the 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 waste products were designed to play an important role in providing pest management tools in area where mosquito resistance, niche markets and environmental concerns limit the use of products.

The present work has been designed to evaluate the mosquito repellent activity of leaves extract from different medicinal plants against the mosquito.

# **MATERIALS AND METHODS:**

# SYSTAMATIC OF THE MOSQUITO:

The mosquito comes under the order: diptera and because of the possession of a pair of wings and under the family, culicidea, which includes the slender flies with elongate proboscis.males have plumose antennae and female have pilex antennae. The larvae reach its pupal stage within 5 days of preparation. The female mosquito feed on human beings and also vector. The outtake of blood meal is essential for the development of eggs. Population density increase during the winter months due to continuous breeding and this has facilitated by the availability of adequate amount of water breeding.

# STUDY AREA AND REPELLENT FOR ASSESSMENT

Sites on front of hostel in st.xavier's college has been selected for the study.

# Protection time:

The method adopted by Pandian and Chandra Sekaran (1980) was used to record the biting activity cycle of mosquito. The time intervals between the time of repellent application and landing of the first mosquito fo biting is considered as the protection time. The repellency, exposed as protection at each concentration was calculated from ten samples. % of protection = [( No. of bites received by control – No. of bites received by treatment area) /No. of bites received by control] X 100

**Nochi (vitexNegundo):** Vitexnegundo commonly known as the Chinese chaste tree. Five- leaved chaste tree or horeshoevitex is a large aromatic shrub with quadrangular densly it is widely used in folk medicine.vapours from boiled leaves are inholed to relived from running nose and headache.

**Manathakkali** (Solanum nigrum)- It is a species in the genes solanum native to Eurasia and introduced in the Americas, Australasia and introduced in the south Africa. It is also knows as black nightshade.parts of this plant can be toxic to lives tock and humans. The plant prepared in the form of soup is taken for stomach ulcer and past of the leaf is used internally to

cure rabies.

**Thuthuvalai (Solanum procumbens):** Solanum procumbens also called as thoothuvalai is a herb that can be consumed by mildly frying it in oil then grinding it. The plant is full of thorns including the leaves it is important to remove these thorns before cooking as the thorns are considered to be mildly toxic The leaf juice is taken in the form of soup for cough and cold

**Arukampul (cynodon dactylon)**: Cynodon dactylon also known as vilfa stellate is a grass that ariginated in Africa Although it is not native to Bermuda . It is an abundant invasive species there it is presumed to have arrived in North America from Bermuda resulting in its common name cilation needed The whole plant juice is used for reducing the body heat and blood

pressure.

**Thulasi (ocimum tenuiflorum):** Ocimum tenuiflorum (synonym ocimumsanctum) commonly known as holy basiltulasi sometimes splledthulasi or thulasi is an aromatic perenaial plant in the family lamiaceae. It is native to the indion subcontinent and widespread as a cultivated plant throughout the southeastAsiatrpics. Infusion of leaves is consumed forcold and cough.

Neem (Azadirachta indica) : Azadirachtaindica commonly known as neem ,neemtree or indian lilac is a tree in the mahogane family meliaceae . It is one of diro species in the genus Azaderachta and is native to the indian subcontinent. Neem is used for leprose, eye disorters, bloody nose ,intestinal , stomach upset, loss of appetite, skin ulcers problem.

**Kuppimeni**(Acalypha indica): Acalypha indica is an herbacesous annual that has catkin-like inflorescences with cup-shaped involures surrounding the minute flowers it is mainly known for its root being attractive paste of the leaf is mixed with common salt and applied over the affected area to cure eczema.

**Citrus (Citrus limon)**: Citrus is a genus of flowering tree and shrups in the citrus family Rutaceae plant in the genes produce citrus fruits including important tree crops like orange lemons grape fruit, pomelo and limes fruit juice mixed is taken two times a day for dissentery.Curry (Murraya koenigii): is a variety of dishes leaves are used in the indian subcontinent that use a complex combination of species of herbs. Curry leaves contain various antioxidant properties that maintain optimum cholesterol balance.

**Drumstick**(**Moringa oleifera**) :Drumstick a tool for playing drums. Drumstick vegetable drumstick a brand of frozen dairy dessert drumstick the leg of a bird. Drum stick a chewy candy by swizzelsmatlow. Regulates blood sugar levels helps improved digestive health. Helps purifying blood.

# PLANT EXTRACT PREPARATION:

### **DECOCTION METHOD:**

Collect fresh and healthy leaves of kupaimeni, neem, curry leaves, citrus, thulsi, thuthuvalai, drum stick, manathakali, nochi, arugampull etc., from near by places. Clean it by water and weigh the required quantity (10 gm) of leaves. Leaves are boiled in a beaker containing 250 ml of water. Stop boiling when the extraction turned greenish brown. Similarly the leaves can be also grinded and filtered with filter paper. The leaf extract are kept in water bath, so that the extraction gets concentrated upto 50 ml. take 3 gm of camphor, crush it and add 1 ml of kerosene to dissolve it. Then this extract is filled into empty liquidator. The repellency of freshly prepared extract was evaluated in small room condition in 6 hours. The media protection time (6 hours) was used as a repellency time of freshly prepared extracts against the mosquito species. (Sukhdev Swami Handa et.,al 2008)

## RESULT

Essential oil has a great benefit to help protect over bodies and home from any diseased. It also can be used as an insect repellant. A large number of essential oil extracted from different families has been shown to have high repellence against anthropoid species. The protection time were recorded essential oils (Table- 1and figure-1) it shows that there is a variation among them against the mosquito during December 2018 to February 2019. Among these leaf extract of neem, citrus, and Kuppaimeni showed very effective when compared to other essential oils. However neem showed more effective in indoor area (table -2).

From this investigation study found that neem (85.7%) ,citrus (84%) Kuppaimeni (78.9%) exhibited more effective than the control (table-3 and figure-2)).The results showed that the meanprotection time against the mosquito bite was high in neem followed by citrus with repellence in indoor and neem proved to be efficacious among all essential oils.

Table-I	Mosquito repellent	activity in E	ssential oils	during I	December2018-l	February2019
---------	--------------------	---------------	---------------	----------	----------------	--------------

13		100					
Denellent	Protection time (mins)						
Kepenent	Exp. 1	Exp-2.	Exp. 3	Total			
Neem	50	53	51	154			
	6						
Citrus	44	48	47	139			
Kupaimeni	40	46	45	131			
Thuthuvalai	40	42.5	29.5	112			
Curry leaf	38	32	33	103			
Arukampul	36	40	27	103			
Drumstick	39	41	34	114			
Thulasi	36	42	38	116			
Nochi	35	44	37	116			
Manathakili	38	40	43	121			

Figure-1 Number of Mosquitoes alighted in Experimental bites after the application of essential oils in December 2018-February -2019



# Table-2 MEAN PROTECTION TIME EXHIBITED BY VARIOUS ESSENTIAL OILS TESTED AGAINST MOSQUITOES

Repellent	Protection time (mins)			Mean	Standard	Standard
	Exp. 1	Exp. 2	Exp. 3		deviation	error
Neem	50	53	51	51	1.58	0.91
Citrus	44	48	47	46	2.12	1.22
Kupaimeni	40	46	45	43	3.13	1.80
Thuthuvalai	40	42.5	29.5	37	6.91	3.98
Curry leaf	38	32	33	34	3.24	1.87
Arukampul	36	40	27	34	6.67	3.85
Drumstick	39	41	34	38	3.6	2.07
Thulasi	36	42	38	39	3.08	1.77

#### © 2020 JETIR November 2020, Volume 7, Issue 11

Nochi	35	44	37	39	4.74	2.73
Manathakili	38	40	43	40	2.54	1.47

Table-3 Number of mosquitoes collected in the control and Experimental bites after the application of essential oils .

Renellent	No. of most	% of Protection		
Repenent	Experiment	Control	time	
Neem	3	21	85.7%	
Citrus	3	20	84%	
Kuppaimeni	4	L _19	78.9%	
Arugampul	4	17	76%	
Thuthuvalai	4	16	75%	
Thulasi	6	20	70%	
Nochi	10	28	64%	
Drumstick	19	31	61%	
Manathakali	13	29	55%	
Curryleaf	18	28	36%	

#### Figure-2 Protection time in Percentage for essential oils



# JETIR

#### DISCUSSION

Plant products have been used traditionally to repel and kill mosquitoes in many part of the world ,thousands of plants have been test their potential sources of insect repellent ,plant based products have been used as repellents either as topical applicant or fumigant and many plant species have been screened for their repellent and insecticidal property against mosquitoes.

Ashwin Trivedi *et. al.*, (2018), said that essential oils belonging to various plant species and their mixtures have been seen to act as effective repellent against various mosquitoes and pests. The easy availability and less adverse environmental impact have led to the increased interest in plant origin repellents which are safe and biodegradable alternatives to synthetic chemical repellents for use against mosquitoes.

Ranasingh and samarsinle(2015) developed safe and efficient herbal mosquito formulation by mixing hexane extract of *Azadirachtra indica* hexane/ethanol extract of vitex negundo leaves, essential oil from osmium sactiu leaves ,common long rhizomes and citrsieses leaves Eucalyptus globules leave and syzugium aromaticum extract essential oil containing that oil solutions prepared using each plant extract was tested for mosquito repellent activity. I n the present work extract of neem afford high protection time in indoor area.

Azadirachtin a complex tetra nor terpenrod limuloid compound from the neem leaf is the maincomponent respondsidle for the toxic effects in injects neem essential oil in appropriate amount when smeared on the surface of the hand showed excellent repellent action against mosquitoes. The study confirms that neem have mosquito repellent potential. In present work neem extract showed have high protection time in experimental than control(85.7%).

A many plant essential oils display mosquito repellent activity the essential oil of acalypha indica leaves obtained by stream distillation was also used during the mosquito repellent assess. In the study found that acalypha leaf extracts showed moderate protection time than other essential oils (78.9%)

#### © 2020 JETIR November 2020, Volume 7, Issue 11

#### www.jetir.org (ISSN-2349-5162)

Mosquito repellent and larvicidal activities of leaf extract of acalypha indica were investigated against *Aedes aegypti*. Leaf extracts at acalypha indica was prepared using maceration, soxlet extraction, sonication and stream distillation. Hexane, acuteness, ethyl aceticmethanol and water were used as solvents the highest mosquito repellent activities were obtained by maceration in hexane and sonication in ethyl acetates and vary from 60% to 20% in an a period of three showy. In the present work kupaimeni showed moderate in experimental than control.

Tariwari set.al (2014)Reported that vector borne diseases are the major public health problems in developing countries particularly in tropics. Essential oils from plants can provide the safe and biodegradable alternatives to synthetic repellents, but plant based repellent formulations available in the market are not effective.

#### **References:**

1. Pandian ,R.S and Chandrashekaran, M.K ., (1980) Rhythms in the biting behavior of a mosquito *Armigeres Subalbatus*. Oecologia (Berl) 47:89-95.

2. Sukhdev Swami Handa, Suman Preet Singh Khanuja, Gennaro Longo, Dev Dutt Rakesh, 2008.

Extraction Technologies for Medicinal and Aromatic Plants, International Centre for Science and High Technology.

 Rana singhe and Samarsinghe (2016). Development of herbal mosquito repellant Formulations. International journal of collaborative Research on Internal Medicine and Public health Page (341-380).

4. Tariwari C.N.Angaye ,Elijah I., et.al (2014).Biocidal activities of solvent extracts of *Azadirachta indica* some endemic Tropical vector borne diseases.

5. Ashwin Trivedi, Pawan Rai and Jitendra Kumar. Formulation of low smoke herbal mosquito repellent sticks by using different essential oils. The Pharma Innovation Journal 2018; 7(4):173-17.