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Larvicidal Potential of Nine Common Medicinal Plants of Tamilnadu, India

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Abstract: Mosquito are one of the most disturbing and blood sucking organisms that disturbs Homosapiens. Mosquito species included in the genera Anopheles, Aedes and culex are vectors for the various disease pathogens like malaria, dengue fever, yellow fever, encephalitis etc., for control of larval stages of mosquito herbal plants extracts are being tried. Nine medicinal plants extracts were collected dried and extracted with ethanol and used for the present study. The successful attempt is made to kill the larvae the premature stage of mosquitoes by using safe and socio-economical herbal plant mixtures. Azadirachta indica+Mentha spicata+ Coriandrum satium, Azadirachta indica + Ocimum tenuiflorum + Lawsonia inermis and Ocimum tenuiflorum +solanum procumbens +Phyllanthus niruri showed highest larvicidal activity. The medicinal plants were easily biodegradable than the synthetic insecticides, the plant products are less hazardous, they afford a rich store house of chemicals of diverse biological activity

Keywords: Aedes Aegypti, Culex Sp., Medicinal Plants Extracts, Larvicidal Activity.

1. INTRODUCTION

There are about 3500 different types of mosquitoes onthe globe, and tropical and subtropical areas are home to the vast majority of them. Only 10% of these, however, are relevant to medicine and animals[10].Due to their role acarriers of numerous dangerous pathological illnesses and their ability to cause excruciating pain when they bite, mosquitoes are thought to pose a substantial threat to public health [1] [11]. Aedes, which transmits chikungunya, zika, dengue, and yellow fever; Anopheles, which transmits malaria and filariasis, and Culex, which transmits Japanese encephalitis, West Nile virus, and filariasis, are the three most common mosquito species that transmit human diseases[2]. Recently, the Zika virus has caused harm in many regions of the world, including Southeast Asia, Brazil, Africa, and the

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Pacific Islands. The Pan American Health Organisation (PAHO) [13] reports that over 40 nations or territories in the Americas reported an outbreak of the Zika virus in 2015-2016, with over 500,000 suspected and confirmed cases.

Today's resistant mosquitoes necessitate the development of alternate mosquito control strategies. One must examine a repellent's toxicity issue to ensure that it will work effectively in light of the rising prevalence of insect resistance. The population of mosquitoes is also controlled with chemical larvicides, but these compounds are poisonous to people, plants, andanimals. Pyrethroids and organophosphate insecticides are the most commonly used insecticides in the Americas, according to a WHO pesticide study. DEET (N,N-diethyl-mtoluamide) is an example of a chemical-based insectrepellent that is used to keep mosquitoes away. It is a licenced pesticide, although it may cause skin and eye irritation, sleeplessness, and other adverse effects.

Plants are a rich source of bioactive organic molecules and create a variety of secondary metabolites that can serve as defence chemicals against an attack. These compounds may operate as oviposition inhibitors, repellents, growth inhibitors, mimics of juvenile hormones, moulting hormones, and insecticides, among other behaviours [7].The botanicals are superior to synthetic pesticides because they are less toxic, degrade more quickly, and are less prone to cause resistance. There may be more than 4,000,000 secondary metabolites, despite the fact that only 10,000 have been chemically identified [4].

An environmentally beneficial alternative to synthetic insecticides for controlling mosquitoes, especially larvae, is to use botanical compounds [4].Around the world, many plant species have been used to suppress mosquito populations [8]. Controlling mosquitoes is a particularly successful use of medicinal plants. Numerous plants are said to have insecticidal substances [3].

Plants produce a wide variety of bioactive chemicals, which makes them a great source for numerous medications. The resurgence of interest in medicinal plants across the globe is evidence that many conventional statements about the benefits of natural medicines are true. Both the general public and national health care institutions are being encouraged to investigate plant medicines due to the significantly lower incidence of adverse reactions to plant preparations compared to contemporary conventional pharmaceuticals, as well as their lower cost.

In the present study we report the larvicidal activity of plant extracts of Azadirachta indica, Mentha, Coriandrum sativum, Lawsoniainermis, Ocimumtenuiflorum, Phyllanthus niruri, Solanum trilobatum, Acalypha indica and Abutilonindicum. The findings of the current study will help further research aimed at new mosquito-control agent

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2. MATERIALS AND METHODS

The goal of the current study was to evaluate the larvicidal activity of aqueous extracts from nine different plants that belong to various taxonomic groups. Fresh leaves were gathered from the neighbourhood around Uthamapalayam in the Tamilnadu province of India.The leaf was dried for three weeks in the shade at ambient temperatures of 27 to 37 degrees Celsius during the day. The dried leaves Azadirachta indica, Coriandrum sativum , Mentha, Acalypha indica, Abutilon indicum , Lawsoniainermis , Solanum trilobatum , Phyllanthus niruri , Ocimumtenuiflorum were powdered mechanically using a commercial electrical stainless steel blender and extracted with ethanol (150 ml) in a soxhlet apparatus (boiling point range 60–70 o C) for 8h.The extracts were filtered using Whatman number 1 filter paper and a Buchner funnel.
The plant extract mixture was made in the following ratios: 1:1:1, 1:2:1, and 1:2:3. The amount of the plant extract mixture was chosen after gradually optimising its ratio. They were tested for their safe larvicidal effectiveness. The Aedes aegypti, culex sp. IVth instar larvae were gathered from ponds and pools of still water at Uthamapalayam, Theni District, Tamil Nadu. The study used Aedes aegypti mosquito larvae in their IVth instar, and nine different herbal plant extract mixes were tested. The collected data were tallied and statistically examined.

3. RESULT AND DISCUSSION

According to a study report by Vincent from 2000, the use of plant extracts interfered with Anopheles stephensi's normal feeding process, shortening feeding time and decreasing the amount of food that was digested. Similar feeding reductions were observed in Anopheles, Culex, and Aedes following neem treatment. Azadirachta indica leaf extract in ethanol led to a high larvalmortalityrate of 95%.This finding is comparable to that in [9]'s report.

In present study seven plant species showed excellent larvicidal properties against the IVth instar larvae of Culex and Aedes. The larvicidal activity was performed by counting larval death at the time interval of 10min (Table1). Analysis of variance, SD, T test , Regression analysis the plant extract mixture 1,2,4 showing highest values were found significant and promising larvicides (Table2). From statistical analysis it was found that all plant extracts were having effective larvicidal activity. Azadirachta indica (75%), Ocimium lamiifolium (65%), Ocimium americanum (70%), Moringa olifeira leaf (50%),and Moringa olifeira seeds (50%), were the native plant species most frequently utilised for mosquito control. There have been reports of some of the repulsive plants found in the current study in other regions of Ethiopia [5] and [6].

In this study three medicinal plant extract mixtures of Azadirachta indica+Mentha spicata+ Coriandrum satium, Azadirachta indica + Ocimum tenuiflorum + Lawsonia inermis and Ocimum tenuiflorum +solanum procumbens +Phyllanthus niruri showed highest larvicidal activity.

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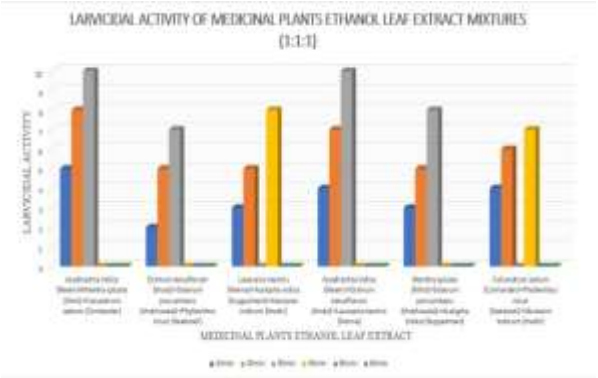
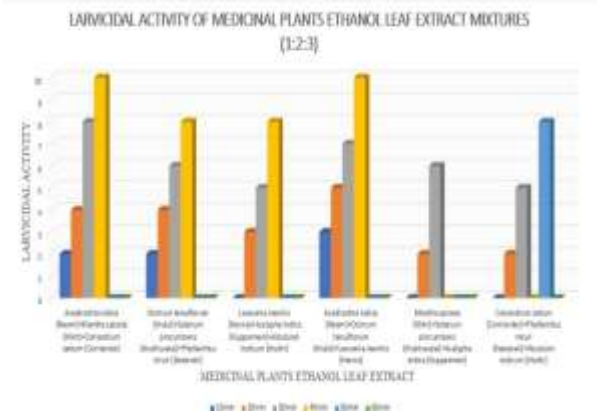
4. CONCLUSION

Through present research paper Azadirachta indica, Mentha spicata, Coriandrum satium , Ocimum tenuiflorum ,Lawsonia inermis , solanum procumbens and Phyllanthus niruri can be developed as eco-friendly larvicides thanks to the current research report. Additionally, our study provides a starting point for future studies on the effectiveness of natural product extracts' larvicidal characteristics.





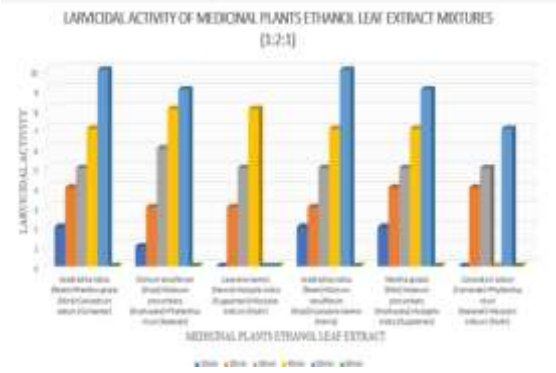


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Table 1: Larvicidal Potential of medicinal plants ethanol leaf extract mixtures

S.No	Extract of Plants	Larval Death (out of 10)																	
		1:2:1						1:2:3						1:1:1					
	Time (Min)	10	20	30	40	50	60	10	20	30	40	50	60	10	20	30	40	50	60
1.	Azadirachta indica (Neem) + Mentha spicata (Mint) + Coriandrum satium (Corriander)	2	4	5	7	10	0	2	4	8	10	0	0	5	8	10	0	0	0
2.	Ocimum tenuiflorum (thulsi) + Solanum procumbens (thuthuvalai) + Phyllanthus niruri (Keelaneli)	1	3	6	8	9	0	2	4	6	8	0	0	2	5	7	0	0	0
3.	Lawsonia inermis (Henna) + Acalypha indica (Kuppaimeni) + Abutulon indicum (thuthi)	0	3	5	8	0	0	0	3	5	8	0	0	3	5	0	8	0	0
4.	Azadirachta indica (Neem) + Ocimum tenuiflorum (thulsi) + Lawsonia inermis (Henna)	2	3	5	7	10	0	3	5	7	10	0	0	4	7	10	0	0	0
5.	Mentha spicata (Mint) + Solanum procumbens (thuthuvalai) + Acalypha indica (Kuppaimeni)	2	4	5	7	9	0	0	2	6	0	0	0	3	5	8	0	0	0

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6.	**Coriandrum satium (Corriander) + Phyllanthus niruri (Keelaneli) + Abutulon indicum (thuthi)**	**0**	**4**	**5**	**0**	**7**	**0**	**0**	**2**	**5**	**0**	**8**	**0**	**4**	**6**	**0**	**7**	**0**	**0**

Table 2: Statistical data for larvicidal activity of medicinal plants ethanol leaf extract mixtures 1:1:1

1:1:1						
S.no	**Plant Extract**	**SD**	**Variance**	**SE**	**T test**	**Regression Analysis**
1.	**Azadirachta indica (Neem) + Mentha spicata (Mint) + Coriandrum satium (Corriander)**	4.49	20.2	1.83	0.00906	±128.99
2.	**Ocimum tenuiflorum (thulsi) + Solanum procumbens (thuthuvalai) + Phyllanthus niruri (Keelaneli)**	3.01	9.1	1.22	0.0057	±167.97
3.	**Lawsonia inermis (Henna) + Acalypha indica (Kuppaimeni) + Abutulon indicum (thuthi)**	3.32	11.1	1.35	0.0055	±78.5
4.	**Azadirachta indica (Neem) + Ocimum tenuiflorum (thulsi)**	4.27	18.3	1.74	0.0081	±122.05

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	+ Lawsonia inermis (Henna)					
5.	**Mentha spicata (Mint) + Solanum procumbens (thuthuvalai) + Acalypha indica (Kuppaimeni)**	3.32	11.1	1.35	0.0063	±161.65
6.	**Coriandrum satium (Corriander) + Phyllanthus niruri (Keelaneli) + Abutulon indicum (thuthi)**	3.25	10.6	1.32	0.0061	±132.49

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5. REFERENCES

1. Ali M, Ravinder E, Ramachandran R. A new flavonoid from the aerial parts of Tridax procumbens. Fitoterapia 2001; 72 : 313-5
2. Ghosh D, Basu A. Japanese encephalitis—a pathological and clinical perspective. PLoS Negl Trop Dis 2009; 3 : e437
3. Grainge, M. and S. Ahmed, 1998. Handbook of Plants and Pest Control Properties. John Wiley and Sons, New York, pp: 470
4. Ignacimuthu, S., 2000. The role of botanicals in combating mosquitoes. Recent Trends in Combating Mosquitoes. John William, pp: 63-69.
5. Irungu, L.W. and R.W. Mwangi, 1995. Effects of a biologically active fraction from Melia volkensii on Culex quinquefasciatus. Inst. Sci. Applied, 2:159-162.
6. Karunamoorthi K, Hailu T. Insect repellent plants traditional usage practices in the Ethiopian malaria epidemic-prone setting: an ethnobotanical survey. J Ethnobiol Ethnomedicine.2014; 10:22.
7. Karunamoorthi K, Ilango K. Larvicidal activity of Cymbopogon citratus (DC) Stapf. and Croton macrostachyus Del. against Anopheles arabiensis Patton (Diptera: Culicidae), the principal malaria vector. Eur Rev Med Pharmacol Sci. 2010;14 (1):57–

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62.
8. Murugan, K., D. Jeyabalan, N. Senthilkumar, R. Babu and S. Sivaramakrishnan, 1996. Antipupational effect of neem oil and neem seed kernel extract against mosquito larvae of Anopheles stephensi (Liston). J. Entomol. Res., 20: 137-139.
9. Muthukrishnan, J., E. Pushpalatha and A. Kasthuribhai, 1997. Biological effects of four plant extracts on Culex quinquefasciatus larval stages. Insect Sci. Appl., 17: 389-394.
10. Okumu FO, Knols BGJ, Fillinger U. Larvicidal effects of neem (Azadirachta indica) oil formulation on the malaria vector Anopheles gambiae. Malar J. 2007; 6:63.
11. Reiter, p. (2001).Climate change and mosquito-borne disease. Environmental health perspectives, 109 (suppl 1), 141-161. https://doi.org/10.1289/ehp.01109s1141
12. Rueda, L.M. (2008). Global diversity of mosquito (Insecta:Diptera:Culicidae) in fresh water. Hydrobiology, 595,477 – 487. https://doi.org/10.1007/s10750-007-9037-x
13. Vincent, I., 2000. Cycling to the finish. Neurobiol. Aging, 21: 757-760.
14. WHO (2016). Mosquito-borne diseases, World Health Organization.