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## **Study On Lantana Camera for Mosquitoes Larvicidal Potential and the Formulation of Larvicidal Sachet**

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### **ABSTRACT**

Lantana camera is used traditionally in Indian system of medicines for various diseases. The present study is focused on natural products of plant origin with insecticidal properties for control of insect vectors. Aqueous, ethanol, methanol, extracts of Lantana camara were evaluated against larvae. Phytochemical screening of the leaves showed the presence of phytochemicals such as tannins, alkaloids, flavonoids, anthocyanin, quinines, triterpenoids, flavonoids, saponin and steroids. The resistance to chemical insecticides among mosquito species has been considered as a setback in vector control. The present study is focused on natural products of plant origin with insecticidal properties for control of insect vectors. The methanolic leaf extract of this plant showed potent larvicidal efficacy and can be considered for further investigation. Objective: control and prevention of larvae for social health.

**Keywords:** Medicinal plants, Lantana camara Linn, Ethnobotany, Phytochemistry, Pharmacology

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Received 11 June 2020, Accepted 28 June 2020

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## INTRODUCTION

The plant *Lantana camara* Linn. Family- Verbanaceae is commonly known as wild sage or red sage and lantana weed. The different parts of plant extract were useful in various diseases like anthelmintic, diaphoretic, febrifuge, carminative, rheumatism, skin diseases, adulticidal activity, larvicidal, biological control. The leaves are broadly ovate, opposite, and simple and have a strong odour when crushed<sup>1</sup> Mosquitoes are the major public health problem throughout the world. Among the 3492 species of mosquitoes recorded worldwide, more than a hundred species are capable of transmitting various diseases in human and other vertebrates<sup>2</sup>. Dengue fever can manifest as the classic form of the diseases, which debilitates the patient for a week or more, or as the haemorrhagic form which, in many cases leads to death<sup>3</sup>. Natural products are best option because they are less harmful to environment and non-target organisms. Several extracts and compounds from different plants families have been evaluated for new and promising larvicides<sup>4</sup>. In recent years, the top priority in finding a new insecticide is that, they must be of plant origin and should not have any ill effects on the ecosystem. Due to increasing resistance of mosquitoes to the insecticides Lima *et al.*,<sup>5</sup> has focussed interest on alternative compounds for mosquito control. Plants, being a natural source of various compounds are known to contain larvicidal agents, which may act in combination or independently. According to Ghayal *et al.*<sup>6</sup> phytochemicals act as general toxicants both against the adult as well as larval stages of mosquitoes, while others interfere with the growth and development, reproduction, produce olfactory stimuli action as a repellent or attractant. The extract of *L. camara aculeata* roots has been reported to exhibit antimalarial activity against *Plasmodium falciparum*<sup>7</sup> and as a potent source of oleanolic acid a hepatopancreatic agent<sup>8</sup>. Studies conducted in India have found that *Lantana* leaves can display antimicrobial, fungicidal and insecticidal properties. *L. camara* has also been used in traditional herbal medicines for treating a variety of ailments, including cancer, skin itches, leprosy, rabies, chicken pox, measles, asthma and ulcers.

## MATERIALS AND METHOD

### **Plant Collection and extraction:**

Fresh and disease free leaves of *Lantana camara* were collected from various places in Junner region of district of pruned. The leaves were collected separately and shade dried for 5 days. Finely powdered leaves were then dissolved with 100ml distilled methanol and was kept undisturbed for 72 hours after extraction with Whatman No.1 filter paper<sup>9</sup>.

### **Collection of mosquito larvae:**



Mosquito larvae are aquatic and adapted to a wide range of habitats including swamps, marshes, free hole, pools, etc. Larvae are settled on the surface of water to get oxygen for respiration. The larvae were drained from the water surface, using a long handled tea-strainer causing least disturbance to the larval population in order to avoid their scattering.

#### **Bioassay test:**

Three groups of each containing 100 ml of methanol with 0.20 mg, 0.40 mg and 1 mg of the lantana camera extract were prepared. To each group, 10 number of mosquito larvae were added and the beaker were covered with net at room temperature ( $25 \pm 5^\circ\text{C}$ ) in the laboratory. Mortality of the mosquito larvae was recorded at 24 hr and 48 hr intervals.

#### **Larval susceptibility tests:**

The larval susceptibility tests were carried according to standard WHO procedure<sup>10</sup>. The extract solutions of different concentrations were prepared and the larvae, were placed in each test solution to observe the larvicidal property as per the following procedure. Group of 10 larvae were placed in 80 mL of the extract solution. The larvae in each solution were then left for 24 hr and numbers of dead larvae were counted after 24 hr of exposure, and the percentage mortality was reported from the average of four replicates.



### Phytochemical screening:

Phytochemical screening suggesting the numbers of chemical constituents procedure<sup>11</sup>. Phytochemicals like carbohydrates, tannins, saponins, flavonoids, Alkaloids, Betacyaning, Quinones, Glycosides, cardiac Glycosides, terpenoids.

### Formulation of larvicidal sachet containing granules:

The extract of lantana was dried to form a thick wet mass. After drying, the total mass of lantana become 0.30 gram because of evaporation of solvent. For the preparation of granules other ingredient are mixed together as excipient (see table below) to form a wet mass. After that screening of wet mass using a suitable sieve number like 6-12 are taken. Then drying of moist granules in hot air oven for 15-20 min. Result in a improper shape of granules are gotted then again sieving is done through (sieve number 14) to get proper shape of granules.

Ingredients	Quantity taken	Role
1.lantana camera	0.30 gm	API
2. HPC	4.5 gm	Disintegrant
3. Talc	4.7 gm	Disintegrant +binder
4. Starch	0.5 gm	Glidant



**Evaluation of formulation:****Solubility of sachet:**

Take a 5 sachet which containing granules put into a 100 ml of water. after 24 hours, it appreciable released the drug into the water . Released of content is so fast when its mechanical shaken.

**Solubility test for granules:**

Take 0.1 gram of granules and it is soluble in 10ml of water with help of vigorous shaking. After 1-2 min the granules are completely soluble in water.

**RESULTS AND DISCUSSION:**

Larvicidal which is the basic and most important step in the development of an insecticide of botanical source. There are probabilities that the active principle contained in these plant extracts, especially the methanol extracted fractions will be further more potent as mosquito larvicides as compared with their crude forms. The active constituents of lanatana are monoterpenes, triterpenes, flavones coumarin, steroids, iridoid glycosides<sup>12</sup>.The identification of these active components is part of further search for an efficient, eco-friendly, biodegradable insecticide of plant origin and is under consideration in the laboratory. From many more research paper, journals and article paper its concluded that the active constituent is responsible for the larvicidal action. Table 1 show that lantana plant used in present study, with their common name, family, medicinal property and parts used for bioassay. The plant part were selected based on traditional use and previous report of presence of bioactive compounds. The extract is complex mixture which contains many active component. Plants are well known to produce secondary metabolites, which act as defense mechanisms. This characteristic reveals that the natural insecticides play a pivotal role in vector control, and their use represents an excellent alternative to synthetic insecticides. The mechanism of action of secondary plant metabolites against *A. aegypti* larvae is still poorly understood, in particular at the molecular level. Most of these secondary metabolites demonstrated certain interference in the central nervous system via cutaneous or respiratory absorption, leading to death by intoxication, via the inhibition of acetylcholinesterase (AChE), which is similar to organophosphates and carbamate insecticides<sup>13</sup>.Some other mechanisms of action observed for the insecticidal compounds when in contact with the predators involve action on the GABA system, leading to seizures and death; inhibition of mitochondrial activity; action as repellent preventing oviposition; action in the digestive system inhibiting the appetite, among others<sup>14</sup>.mosquito larvae was treated with different concentration viz..., 0.2 mg , 0.4 mg and 1 mg per 100 ml of methanolic extract of lantana camera leaves at different time intervals. The mortality rate increased with increase in concentration and exposure of time 24 and 48 hr. The result indicate that the mortality

rate is proportional to concentration of the extract. But, its was remarkable to note that the mortality rate was maximum in 1mg /100 mL concentration of the extract at just hr in all the Three groups of mosquito larvae. In the present study the mortality rate of the larvae was studied at different concentration with methanolic extract of lantana camera leaves. The methanolic extract of lantana camera leaves showed lethal effect on mosquitoes larvae in all concentrations, and mortality rate increased for every 24 hours continuously up to 48 hrs. But, it was remarkable to note that mortality was maximum in 1mg/100 mL concentration of methanolic extract of lantana camera leaves at 48 hours.

From table 2 observation we concluded that at higher concentration mostly lantana showing their effect. It is remarkable to note that plant extract did not cause any appreciable mortality at a lower concentration after which a steep rise in larval mortality was noticed (1mg/100ml).

From table 2 its noted that as concentration is increases the mortality rate also increases with the increase in time. Highest mortality was found at concentration 1 mg/100 ml.

Percentage mortality= Number of dead larvae/Number of larvae tested  $\times$  100



**Table 1: Biological uses of Lantana camera.**

<b>Botanical name</b>	<b>Lantana camera</b>
Common name	West Indian lantana
Family	Verbanaceae
Medicinal properties	Larvicidal, anti-oxidant, antifungal
Plant part used	Leave

**Table 2: Extraction Solution of Lantana Camera**

<b>Drug</b>	<b>Concentration mg/ml</b>	<b>Volume of solution in 100ml of beaker</b>	<b>Number of larvae taken</b>	<b>Mortality percentage</b>	<b>Time (Hr.)</b>
Lantana Camera	0.20	80	10	10%	24
Lantana Camera	0.40	80	10	40%	48
Lantana Camera	1.0	80	10	100%	48

## ACKNOWLEDGEMENTS

The authors are grateful to The Principal and Guidance teacher, Ideal College of pharmacy and Research, kalyan [E], Maharashtra, India for providing infrastructure and research facilities.

## CONCLUSION:

It is evident that the plant products are emerging as a potential source of mosquito control. Crude extract compounds from the plant *L. camara* could be used in stagnant water bodies which are known to be the breeding grounds for the mosquitoes. The *L. camara* extracts showed promising activity in mosquito control and its commercial utilization is very much feasible.

## REFERENCES:

1. Rosacia, W. Z.; et al. (2004). "Lantana and Hagonoy: Poisonous weeds prominent in rangeland and grassland areas" (PDF). Research Information Series on Ecosystems. 16 (2). Retrieved July 27, 2011.
2. Rueda LM. Global diversity of mosquitoes (Insecta: Diptera: Culicidae) in fresh water. Dev. Hydrobiol 2008; 595:477-487.
3. Neves-Filho RAW, Silva CA, Silva CSB, Navarro DMAF, Santos FAB et al. Improved microwave-mediated synthesis of 3-(3-aryl-1,2,4-oxadiazol-5-yl) propionic acids and their larvicidal and fungal growth inhibitory properties. Chemical Pharmaceutical Bulletin 2009; 57:819-825.
4. Ester Innocent, Cosam CJ, Nicholus KG, Manien JM, Mayunga HH, Nkunya Ahmed H. Mosquito-larvicidal constituents from Lantana *Viburnoides varkisi* (A. rich) verde (Verbenacea). Journal of Vector Borne Diseases 2008; 45:240-244.
5. Lima EP, Oliveira Filho AM, Lima JWO, Ramos-Junior AN, Cavalcanti LPG, Pontes RJS. Resistencia do *Aedes aegypti* ao temefos em municipios do Estado do ceara. Journal of the Brazilian Society of Tropical Medicine 2006; 39:259-263.
6. Ghayal N, Padhye A, Dhumal K. Larvicidal activity of invasive weeds *Cassia uniflora* and *Syndrella nodiflora*. International Journal of Pharmaceutical and Bio Sciences 2010; 1:3.
7. Weenen H, Nkunya MH, Brag DH. Anti-malarial activity of Tanzanian medicinal plants. Planta Medica 1990; 56:368-370.
8. Misra LN, Dixit AK, Sharma RP. High concentration of hepato protective oleanolic acid from *Lantana camara* roots. Planta Medica 1997; 63:582.
9. Evans DA, Kaleysaraj R. Larvicidal efficacy of Quasim against *Culex quinquefasciatus*. Indian. J. Comp. Anim.Physiol. 1992; 10(1):46-54.

10. World Health Organization. Guidelines for laboratory and field testing of mosquito larvicides. WHO, Geneva 2005.
11. Harborne JB. Phytochemical Methods a Guide to Modern Technique of Plant Analysis. 2nd Edn, Chapman and Hall, London, 1984, 282-311.
12. Marques, A., C. Kaplan, MA. Active metabolites of the genus Piper against Aedes aegypti: natural alternative sources for dengue vector control. Univ Sci. 2015;20(1):61-82. doi:10.11144/Javeriana.SC20-1.amgp Google Scholar | Crossref
13. Moyes, CL., Vontas, J., Martins, AJ. Contemporary status of insecticide resistance in the major Aedes vectors of arboviruses infecting humans. PLoS Negl Trop Dis. 2017;11(7):1-20. doi:10.1371/journal.pntd.0005625 Google Scholar | Crossref
14. Menezes, ELA . Inseticidas Botânicos: Seus Princípios Ativos, Modo de Ação e Uso Agrícola. Seropédica: Embrapa Agrobiologia; 2005:1-58.



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