



## Repellent Activity of Essential Oil and Leaf extract of *Lantana camara* L. In Laboratory condition

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**ABSTRACT:** Insect transmitted diseases in tropical countries remain a major health threat causing great morbidity every year. Mosquitoes are animals most of us would rather do without. Several mosquito species belonging to genera *Anopheles*, *Culex* and *Aedes* are vectors for the pathogens of various diseases like malaria, filariasis, Japanese encephalitis (JE), dengue and dengue haemorrhagic fever, yellow fever, etc. the need to protect ourselves from their bites seems even more important. Many plant-based products are widely used for their insecticidal/repellent properties for control of mosquitoes/protection from mosquito bites. Herbal products with proven potential as insecticide or repellent can play an important role in the interruption of the transmission of mosquito-borne diseases at the individual as well as at the community level. Use of repellents seems to be most reliable method of personal protection against annoyance and infections associated with haematophagous insects. We have tested the repellency of essential oil extracted from *Lantana camara* in laboratory condition application of oil to the upper surface of the human forearms at the rates between 0.08 to 3.33 mg / cm<sup>2</sup> of skin. The study provides evidence for the potential of these essential oil in developing new repellents against mosquitoes.

**Keywords:** Synthetic repellents, *Aedes aegypti*, repellency, *Lantana camara*.

### I. INTRODUCTION

*L. camara* (Verbenaceae) is an ornamental garden plant commonly known as *Lantana*. *L. camara* is a gregarious, erect, half climbing and hairy aromatic shrub. It grows up 1.2 meter height and branches are growing all four sided with recurved prickles. Leaves elliptic about 3 inches long and 1.5 inches wide pointed at the tip and rounded in the base and toothed in the margins. Flowers are pink, orange, yellow, white, lilac in color and color usually changes with the age. Seeds germinate very easily throughout the year. In the last decade, this plant has been extensively studied for its medicinal potential by using advanced scientific techniques and reported to possess anthelmintic activity [1], antitermitic [2], wound healing activity[3], Anti-leukemia activity [4], larvicidal activity [5], antioxidant activity [6], antibacterial activity[7], antiproliferative activity [8], anti-inflammatory activity [9], antiulcerogenic activity [10], anticancer activity [11], hemolytic activity [12] antimutagenic activity [13], antitumor activity [14] and antihyperglycaemic activity [15]. Above cited literature represents *L. camara* as an important source of different biological activity.

### II. MATERIALS AND METHODS

#### Plant material and Processing of plant

*L. camara* was collected from the natural population growing in the industrial area Gwalior, India, during August-September 2011. The leaves of *L. camara* was collected and washed thoroughly in tap water followed by distilled water. The leaves were shade dried at room temperature. Dried leaves were uniformly powdered using mechanical grinder to make fine powder. The leaves powder (50 gm) was soaked in sterilized distilled water (10% w/v) and loaded on a shaker at a speed of 120 rpm for 24 hour at room temperature. Mixtures were filtered by using filter cloth followed by Whatman number 1 filter paper. The filtrate was dried in a water bath. Dried extract was collected in air tight container and stored at 4°C up for further use [16].

**Essential Oil Extraction:** The fresh leaves of *Lantana camara* (2000gm) were cut into small pieces and hydrodistilled using Clevenger apparatus for 5 hours. The essential oil (yield 0.25%v/w) was transferred into a stoppered tube, dried over anhydrous Na<sub>2</sub> SO<sub>4</sub> and stored, in a refrigerator at 4°C.

### III. EXPERIMENTAL PROCEDURE

Various scientists have used different procedure for repellency testing of synthetic and natural materials, thereby making it to compare these results are obtained with the same substance, when tested in different way. The most acceptable method as described by **Rao et al.** [17] has used during the present studies. Appropriate quantity of the test material dissolved in ethanol was applied on external surface of the human forearm which has a surface area of nearly 150 cm<sup>2</sup>. 250, 300, 350, 400, 450 and 500 mg respectively. The other forearm of the vehicle acted as control. The treated forearm was exposed to about 5-7 days old 200 starved female mosquito held in female cage, the number of mosquito landed/bitten was recorded for 5 minute. The protection time was worked out by the same procedure. Exposure of hands for 5 minute. At a interval of 30 min. until 5 or more bites were observed less than 5 bites in 5 min. was considered to be indicative of repellency for each formulation at least 3 replicates were taken. The recorded data were subjected to the one way analysis of

variance (ANOVA) and the level of significance was calculated as described by Snedecore [18].

### IV. RESULTS AND DISSION

*Lantana camara* leaf extract was made in different solvent viz. alcohol, ether and hexane and repellency testing against *Aedes aegypti* was carried out. LLAE (*Lantana* leaf alcoholic extract) was not effective at minimum dose of 0.16 mg/cm<sup>2</sup> the protection time increases with increase in dose concentration from 0.33 to 1.66 mg/cm<sup>2</sup> as shown by **Table 1** and **Fig. 1**. The highest protection ( *Lantana* leaf hexane extract) did not show any repellent activity up to dose 0.16mg/ cm<sup>2</sup> but above dose range from 0.33 to 1.66 mg/cm<sup>2</sup> the protection time increases from 26.6 to 120 minutes. Repellency testing of LLEE (*Lantana* leaf ether extract) at dose range 0.33 to 1.66 mg/cm<sup>2</sup> show protection time 38.3 minutes to 178.3 minutes. LLEE has protection as minimum effective dose of 0.16 mg/cm<sup>2</sup>. The **Fig. 1** shows clearly that LLAE is more effective then LLEE and LLHE. The oil was screened as mosquito repellent against *Aedes aegypti*.

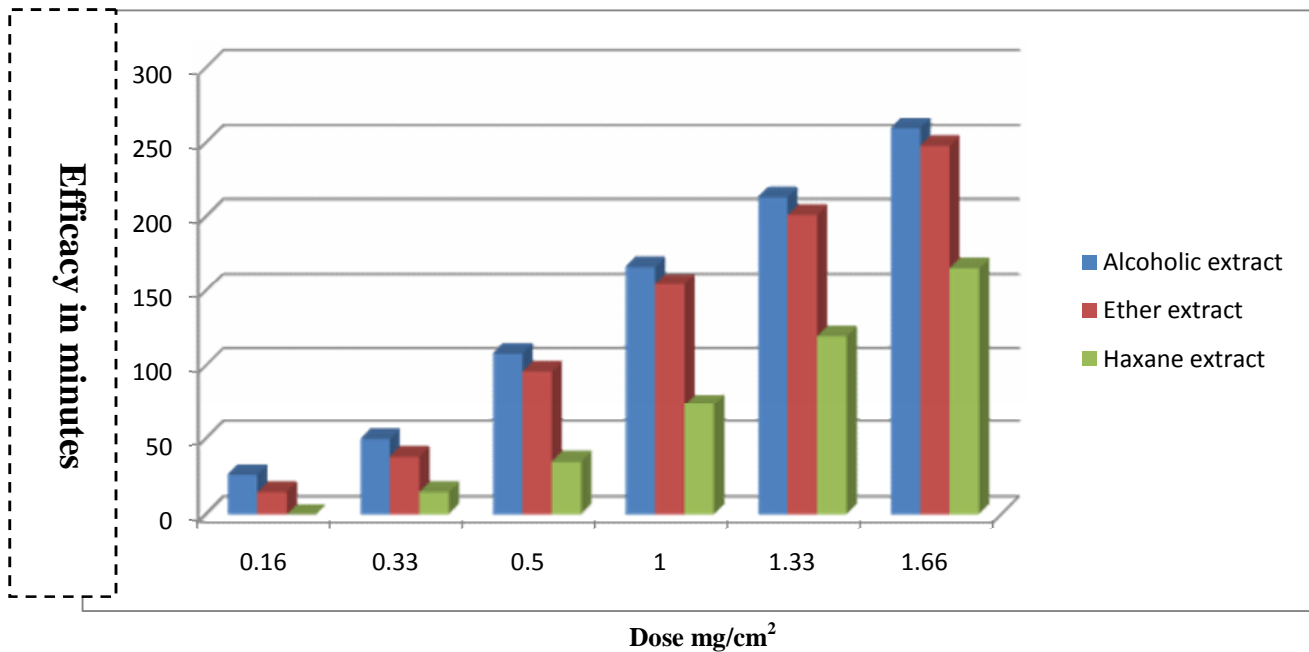
**Table 1. Protection time in minutes of *Lantana camara* leaves extracts in different solvents against the *Aedes aegypti*.**

S.No.	Dosage mg/cm <sup>2</sup>	Protection time (minutes) <i>Lantana</i> leaf Extract		
		Alcoholic extract	Ether extract	Hexane extract
1.	Control	00.00	00.00	00.0
2.	0.08	00.00	00.00	00.0
3.	0.16	10.0 <sup>a</sup>	15.0 <sup>a</sup>	00.0
4.	0.33	26.6 <sup>a</sup>	38.3 <sup>a</sup>	26.6 <sup>a</sup>
5.	0.50	73.3.0 <sup>b</sup>	73.3 <sup>b</sup>	50.0 <sup>a</sup>
6.	1.00	120.0 <sup>c</sup>	108.3 <sup>c</sup>	73.3 <sup>a</sup>
7.	1.33	166.6 <sup>d</sup>	143.3 <sup>d</sup>	108.3 <sup>b</sup>
7.	1.66	213.3 <sup>e</sup>	178.3 <sup>e</sup>	120.0 <sup>b</sup>
Variance ratio 'F'				
For replicate		0.40	1.522	0.285
For treatment		6.052	37.39	16.04
Standard error of Mean Sem		10.26	10.21	9.74
Standard error of difference		14.36	14.30	13.63
Least significance difference		32.00	31.86	31.44

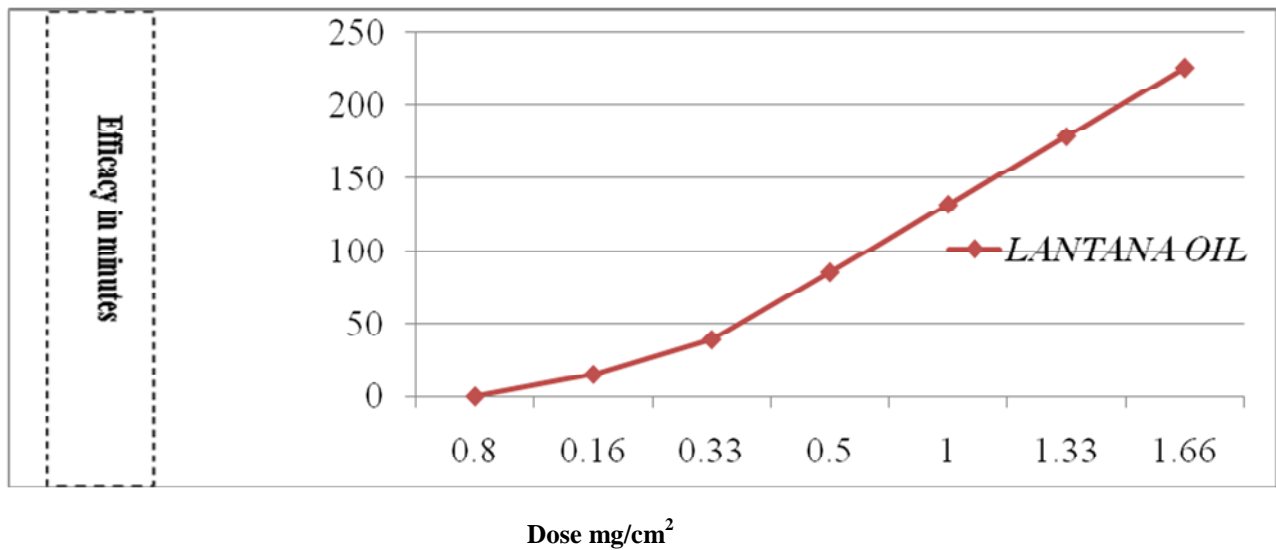
Values shown by the same letter are not significantly different P < 0.001.

The result are shown in **Fig. 2**. The protection time at dose 0.16 to 1.66 mg/cm<sup>2</sup> *Lantana* oil gave 15 to 225 minutes protection. *Lantana* oil was not effective at minimum dose of 0.16 mg/cm<sup>2</sup> but the protection time increases in dose concentration from 0.33 to 1.66 mg/cm<sup>2</sup> as evident by **Fig. 2**. The highest protection at

1.66 mg/cm<sup>2</sup> was 225 minutes for *Lantana* essential oil. Comparative protection time shown in **Fig. 3** between the *Lantana* leaf alcoholic extract and essential oil. Protection time of *Lantana* essential oil is slightly better than LLAE.



**Fig. 1.** Protection time in minutes of *Lantana camara* leaf extracts against the bites of *Aedes aegypti*.



**Fig. 2.** Protection time in minutes of *Lantana camara* oil against the bites of *Aedes aegypti*.

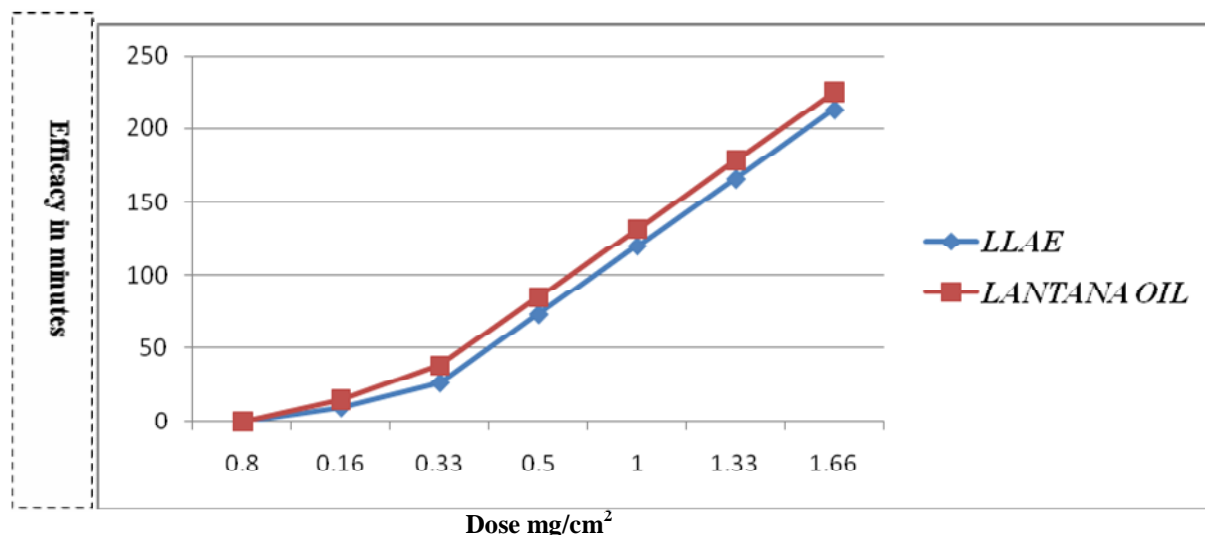


Fig. 3. Comparative protection time *Lantana* leaf alcoholic extract and oil.

## V. CONCLUSION

*Lantana camara* also known as *Lantana aculeate* and *Lantana*, belonging to the family verbenaceae, is a native of tropical America, but more naturalized in many parts of India[18] *L. camara* is a tropical origin plant and widely distributed throughout the world. *L. camara* is an aromatic plant with several traditional medicinal applications in traditional medication system. Selection of *L. camara* for this study was based on its traditional medicinal uses to cure ulcers, cough, mumps, rheumatism, incessant high fever, wounds, malaria, cervical lymph node tuberculosis, influenza, dermatitis, eczema, pruritus, sprains, contusions, tetanus, toothaches and swellings. *Lantana camara*(LLAE) having protection time 3 hrs and 33 minutes as alcohol is a very safe solvent. In this study we have observed mosquito repellent potential of *L. camara* in laboratory condition.

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