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SCREENING FOR LARVICIDAL ACTIVITY OF JATROPHA CURCAS PLANT EXTRACTS AGAINST AEDES AEGYPTI.L

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Abstract: *Jatropha curcas* plant is reported to be harmful and resulted as effective insecticide. The different extracts of *Jatropha curcas* plant leaf such as aqueous, methanol and acetone were checked on the 3rd in star larvae of dengue vector *Aedes aegypti* to perform larvicidal activity. Phytochemical analysis was performed to determine active compounds. Phytochemical screening showed active presence of alkaloid, flavonoids and steroids in acetone leaf extract. Different concentrations (0.5, 2.0, 1.0 mg/ml) of the plant extracts were checked against the larvae. Maximum mortality shown in acetone extract, while methanol extract showed significant mortality after 24 hrs exposure. Hence, these active plant leaf extracts may be used to control a growth of larvae which causes dengue fever and other diseases.

Keywords: *Aedes aegypti, Aqueous, Jatropha curcas, Methanol extract, Larvicidal activity.*

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I INTRODUCTION

Mosquitoes are main vector for causing various diseases which are harmful for human beings [1]. The mosquitoes do not transmit only pathogen but also causes reason for several allergic reactions including local skin and systemic sensitivity [2]. The most common diseases occurred due to mosquitoes which are mainly transmitted by *Aedes aegypti* vector are dengue fever, yellow fever, chikungunia and hemorrhagic fever [1]. World Health Organization (WHO) reported that about most of worldwide population are affected by dengue vector and the significant way to prohibit this occurring of dengue virus is to fight against mosquitoes which acquire disease [3].

A most common viral disease is a dengue which causes by transmission of *Aedes aegypti* vector; it affects to humans globally whose symptoms shows mild fever to severer and actively life damaging hemorrhagic disease [4]. The first patient of dengue hemorrhagic fever was recorded in 1963 at Kolkata. Since then dengue has spread in all over the India. The highest outbreak to hit in the capital city Delhi was in 1996 when 10,252 cases with 423 deaths were calculated [5]. In Maharashtra, dengue applied in 209 villages in the state affecting 31,000 people. The large number of patient of dengue virus was reported in Southern India [6].

Considerable instead of using synthetic and chemical insecticide, the use of plant associated compounds in prohibiting mosquito larvae is eco-friendly and relatively inexpensive [7]. However, various plants taxonomic families have been screened for insecticidal activities with positive results obtained by many cases [8-10].

Jatropha curcas plant belongs to family *Euphorbiaceae* and locally known as Erandi, which is found in worldwide. The plant shows significant effect to control insects, different parts such as leaf, seed, stem etc are shown positive results against microorganisms, insects and parasites [11, 12]. Studies have proved that *Jatropha curcas* is rich in bio-active compounds that have significant applications in pharmacy and medicine [13-15].
The main purpose of present study is to analysis the larvicidal activity of different extracts such as aqueous, acetone and methanol of leaves of *Jatropha curcas* plant against dengue vector *Aedes aegypti*.

II MATERIALS AND METHODS

2.1- Plant Sample Preparation

A *Jatropha curcas* plants fresh leaves were collected from Solapur region then washed with tap water and rinsed with distilled water. The plant leaves were shade dried for 4-5 days. After proper drying a plant leaves allowed to cut in small pieces and made fine powder by applying an electric blender.

2.2-Extraction of Plants

Two hundred fifty grams of leaf powder placed in different conical flask poured with water, acetone and methanol 500ml respectively. For aqueous extract, mixture containing water and leaf powder were boiled for 100°C. These all flask kept for 48 hrs and then filtered by Whattaman filter paper. The extracts kept for evaporation and after evaporation semi solid sample used for testing.

2.3-Phytochemical Analysis

The phytochemical analysis was done by the standard procedure referred by Harborne [16]. Abundance of the large quantity of phytochemicals such as alkaloids, flavonoids, tannins, saponins, steroids was conducted.

2.4-Collection of Mosquito Larvae

Mosquito larvae were collected from Entomology Department of National Chemical Laboratory, Pune. The supplied larvae (3^{rd} and 4^{th} instar) were reared under the temperature of 20±1°C. The larvae feed with Vit B tablets.

2.5-Procedure to Identify Mosquito Larvae

The identification of mosquito larva was done by observing it in a compound microscope. A drop of water with a mosquito larva was placed on a slide to observe.

Aedes aegypti larvae separated by other mosquito larvae as it certainly has a single hair, a bunch of three branch hair tufts on every side of the air tube. All branches arise from the same socket when the hair tuft has two or more branches. Other species contains two or more hair tufts and hairs branches on single side of the air tube. From the bulk species after observing in microscope *Aedes aegypti* mosquito larvae were collected and placed in a water-containing plastic container.

2.6-Mosquito Larvicidal Bioassay

Crude extracts of plant leaves were tested against 3rd instar larvae of *Aedes aegypti* at room temperature which was maintained at 28±2ºC. The plant extracts dissolved in Dimethyl sulfoxide (DMSO) for serial dilution. 1 ml of extracts dilution and 249 ml of water which shows final concentrations of 0.5, 1.0 and 2.0mg / ml. of 250 ml of solutions to be tasted. This was placed in to 500 ml glass containers along with 20, 3rd instar *A. aegypti* larvae. For Control only (DMSO) was kept. These all experiments were performed 3 times. Mortality was checked after 24 Hrs by using formula-

$$\text{Percentage mortality (\%)} = \frac{\text{Number of dead larvae}}{\text{Number of larvae introduced}} \times 100$$

2.7-Statistical analysis

Mortality data were observed and corrected mortality obtained by applying Abbotts formula [17]. LC50 and LC95 confidences intervals were checked.

III RESULTS

The activity of three aqueous, acetone and methanol extracts of *Jatropha curcas* plant leaves against *Aedes aegypti* larvae were performed and result presented in Table-1. The results shows maximum mortality in methanol leaf extracts which is 70% in 2mg/ml concentration, 30% in 1mg/ml conc. and no mortality showed in 0.5mg/ml conc. The acetone leaf extracts showed 38% mortality in 2mg/ml conc., 15% in 1mg/ml conc. and 0% in 0.5mg/ml conc. The minimum or low death of larvae observed in aqueous leaf extracts that is 20% in 2mg/ml conc. and 0% in both 1mg/ml and 0.5mg/ml conc.

Table 1: Larvicidal activity of different extracts of J. curcas plant leaves concentrations (mg/ml) against A. aegypti.

Plant leaf Extracts	Mortality(in %)		
	0.5	**1.0**	**2.0**
Aqueous	0	0	20
Acetone	0	30	70
Methanol	0	15	30

It was reported that larvae slowly became inactive in 12 hrs and came to fall towards the containers bottom. In the microscopic examination of dead larvae, it shows that the extract has absorbed into larval digestive system. *Jatropha curcas* leaf acetone extract maximize the time of the very much larval instars and the stage pupation was at very minor concentration and resulted mortality at concentrations containing higher amount.

The accurate data on mortality of the plant leaf extracts were performed by calculating their LC50 and LC95 values which is showed in Table-2. The acetone extract showed increased mortality with LC50 of 0.85mg/ml and LC95 of 2.03mg/ml. The methanol extract showed mortality with LC50 of 1.61 mg/ml and LC 95 of 2.35mg/ml. The aqueous extract does not showed any activity. All the extracts tested shown LC50 less than 2mg/ml while LC95 values ranges from 1.95 to 5.0 mg/ml.

Table 2: LC50 and LC95 with fiducial limits (95%) of tested J. curcas leaf extracts against A. aegypti.

Plant leaf Extracts	Activity (mg/ml) (95% FL)	
	LC50(LCL-UCL)	**LC95(LCL-UCL)**
Aqueous	-	-
Acetone	0.85(0.68-0.99)	2.03(1.67-2.87)
Methanol	1.61(1.50-1.74)	2.35(2.08-2.98)

FL: Fiducial limits, UCL:upper confidence limit, LCL: lower confidence limit.

The phytochemical analysis also performed by using different tests for alkaloids, steroids and flavonoids. The methanolic extract contains high amount of alkaloids and steroids while acetone extract showed active in flavonoids too and aqueous extract contains saponins.

IV DISCUSSION

The three extracts of *J. curcas* plant leaves bio-assayed in present study, performed significant larvicidal activity against

A. aegypti. The concentration dependent effects of extracts shows mosquito larvicidal bio active phytochemicals in acetone and methanolic extracts. The larvicidal activity of extracts may be due to presence of alkaloids, steroids and flavonoids, which are toxic to larvae. The present study showed a process of an insecticide does not shows high percentage of mortality on the specified organism but it demonstrated chances of prevention in breeding process of organism. However, there is no promising solutions occurs till now to control dengue vectors. The trend for controlling growth of vector breed shift from chemicals to biological aspects for environmental management.

V CONCLUSION

From results of present study one can concluded that the acetone and methanol leaf extracts of *J. curcas* plant having significant larvicidal potential against *A. aegypti* vector. However, the acetone extract contains to be more efficient as larvicides, due to its higher contents of bioactive compounds. Therefore, this finding suggests to more work should be occurred on the acetone extract of *J. curcas* plant leaf. The results of this study have provided primary level information that should fast-track and guide the development of cost-effective, eco- friendly larviciding agents for integrated mosquito vector control.

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