

Original Article

LARVICIDAL ACTIVITY OF ESSENTIAL OIL OF GLIRICIDIA SEPIUM LEAF

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ABSTRACT

Objective: This study focus at the larvicidal activity of essential oil of *Gliricidia sepium* leaf

Methods: Pharmacological evaluation of leaf was carried out for larvicidal activity. Household mosquitoes of fourth instar larvae were used for the study. The study was carried out for 5 different concentrations for aqueous extract.

Results: The aqueous extract shown dose-dependent activity with the maximum larvicidal potential was seen with leaf of essential oil (250 mg/ml).

Conclusion: The study is designed to evaluate the larvicidal activity of essential oil of leaf of *G. sepium*. The relationship between the chemical composition and biological activity of essential oil of *G. sepium* is confirmed by lethal effect.

Keywords: *Gliricidia sepium* leaf, Larvicidal activity, Mosquitoes

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INTRODUCTION

Plants can be alternative sources of effective and safe mosquito control agents. In the past several decades, a number of synthetic chemical insecticides have been developed and effectively used to control mosquitoes. Unfortunately, the application of such chemical insecticides has resulted in long term harmful effects on the environment and non-target organism including human beings. In addition, the management of these disease vectors using synthetic insecticides has failed in part due to their efficiency in attaining physiological resistance. Herbal plants or botanical medicines have been used traditionally by herbalist worldwide for the prevention.

Plants are rich source of bioactive chemical compounds with insecticidal properties. The activity of crude plant extracts is often attributed to the complex mixture of active compounds. Crude extracts of leaves or bark of these plants have been tested earlier by several investigators. The plant *Gliricidia sepium* (fabaceae) traditionally claimed to possess larvicidal activity [1-3]. Therefore, the potential for exploiting these essential oils for vector control, can be taken into account. Plant oils have been used for centuries as fumigants and topical formulations applied to exposed skin. A wide variety of plant oils have been used as toxicants with ovicidal, larvicidal, pupicidal and adulticidal activities to sub-lethal effects including repellent action. Therefore, the present work was carried out to study the larvicidal activity of essential oil of *Gliricidia sepium* leaf [4-5].

MATERIALS AND METHODS

Plant material

Gliricidia sepium leaves were collected from Kasaragod district, Kerala, India. The sample drug has been identified and authenticated from the Department of Botany, Govt College Kasaragod.

Preparation of extract

For the isolation of essential oil from the leaf, fresh leaves are subjected to hydrodistillation at atmospheric pressure for 3 h using Clevenger type apparatus. The distilled oil was collected and dried over anhydrous sodium sulphate [6-7].

Larvicidal activity

Mosquito culture

Mosquitoes were collected from stagnant water areas of different places of Kerala. To start the colony and larvae were

kept in plastic and various pot containing tap water. They were maintained and all the experiments were carried out at 27±2 °C and 75–85 percent relative humidity under 14:10 h light and dark cycles. Larvae were fed a diet of dog or biscuits and algae collected from ponds [8].

Larvicidal assay

Essential oils of *G. sepium* leaf dissolved in dimethylsulfoxide (DMSO) (1% stock solution of essential oil in DMSO) were placed in 500 ml beakers and added to water that contained 50 larvae (fourth instar). With each experiment, a set of controls using DMSO was also run for comparison. Mortality was recorded after 24 h and again after 48 h of exposure, during which no nutritional supplement was added. The number of dead larvae in each beaker was counted after 24 h of contact at room temperature. The number of dead larvae at 0, 1, 2, 3, 4, 6, 12, 24 h was recorded and the percentage mortality was calculated. The study was performed in triplicate and the average of the study is taken. The larvae were considered dead if they were immobile and unable to reach the water surface. The experiments were carried out at 25±2 °C. Dimethylsulfoxide was used as a control [9-10].

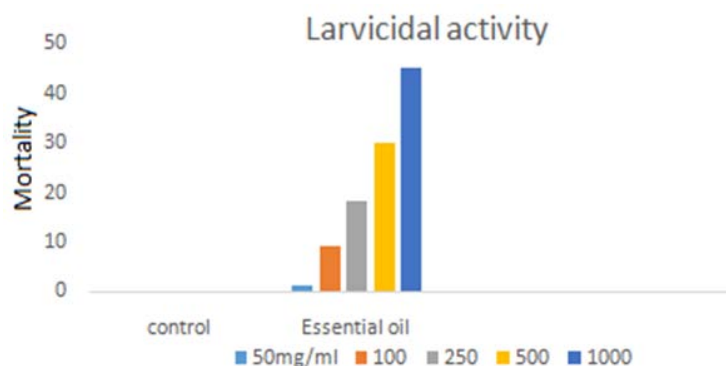
RESULTS AND DISCUSSION

In the present study, an attempt has been made to untap one of the fabaceae family that is *Gliricidia sepium* for its larvicidal potential. In this study the efficacy of the volatile oil from the leaves was evaluated against fourth instar larvae of *Aedes aegypti* at various concentrations of 10, 25, 50, 100, 250 mg/ml. The results were shown in table 1. The essential oil was evaluated at 0, 1st, 2nd, 3rd, 4th, 6th, 12th and 24th hour. The evaluation clearly shows volatile oil exhibits larvicidal property dose-dependently. A dose-dependent effect on mortality was recorded with increasing concentrations of essential oil and compounds increasing the mortality of the larvae. Larvicidal bioassays revealed that 24 h mortality rate of the whole essential oil was 250 mg/ml.

Plant-derived toxicants are valuable source of potential insecticides. They play a major role in mosquito control programs in near future. So, there is always a tremendous need in plant insecticides throughout the globe. These plant-derived insecticides are effective against specific target insects, less expensive, easily biodegradable and to non-toxic products.

Table 1: Results of an evaluation of the larvicidal potential of essential oil of *Gliricidia sepium* leaf

Treatment concentration (mg/ml)	Percentage mortality							
	0 h	1 st h	2 nd h	3 rd h	4 th h	6 th h	12 th h	24 th h
Control essential oil of <i>G. sepium</i>	00	00	00	00	00	00	00	00
10	00	00	00	00	00	00	00	1
25	00	00	00	00	3	5	7	9
50	00	00	00	5	9	12	15	18
100	00	3	10	13	15	20	22	30
250	5	13	15	20	28	35	40	45

Fig. 1: larvicidal activity of essential oil of *Gliricidia sepium*

CONCLUSION

The present study reveals that, larvicidal activity of volatile oil from *Gliricidia sepium* leaf by using mosquito larvae was confirmed. Further works are being carried out to isolate and identify the active principle involved in the larvicidal activity of plant extracts.

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AUTHORS CONTRIBUTIONS

All the author has contributed equally.

CONFLICT OF INTERESTS

Declared none

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