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Short Communication

Larvaecidal Effects of *Eucalyptus* Extract on the Larvae of *Culex pipiens* Mosquito

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ABSTRACT

Eucalyptus globulus was assayed for their larvaecidal potential against mosquito larvae *Culex pipiens*. Efficacy of *Eucalyptus* extract was examined as an acceptable alternative for chemical control. Both seed extract and leaf extract were screened in laboratory conditions. Applying seed extract and leaf extract at 1000 ppm caused 100 and 80% mortality in larvae of *Culex pipiens*, respectively. Larvicidal activity of extract of *Eucalyptus* was dose dependant. This suggested that the seed and leaf extracts contain toxic compounds to mosquitos' larvae, which can be developed and used in the control of mosquitoes. Further studies of these plants as possible agents for mosquito control are recommended.

Key Words: Insecticides; *Eucalyptus*; *Culex* mosquito

INTRODUCTION

Culex mosquitoes are known as vectors of the pathogens causing human diseases. *Culex pipiens* is a major vector of the human filarial worm *Wuchereria bancrofti*. The well-known hazards of the currently used insecticides stimulated the interest to effective alternative pesticides as plant extracts. Public concern over the spread of disease by mosquitoes increased markedly. The chemical control of this insect pest is difficult. The Eucalyptus, especially *E. globulus*, has been successfully introduced into the south of Europe, Algeria, Egypt, Tahiti, South Africa and India, and has been extensively planted in California and also, with the object of lessening liability to droughts, along the line of the Central Pacific Railway (Brooker & Kleinig, 1990). Many eucalyptus are valued as firewood. These plants are also used as anesthetic, anodyne, antiseptic, astringent, deodorant, diaphoretic, disinfectant, expectorant, febrifuge , fumigant, hemostat, inhalant, insect repellant, preventitive, rubefacient, sedative yet stimulant, vermifuge, for a folk remedy for abscess, arthritis, asthma, boils, bronchitis, burns, cancer, diabetes, diarrhea, diphtheria, dysentery, encephalitis, enteritis, erysipelas, fever, flu, inflammation, laryngalgia, laryngitis, leprosy, malaria, mastitis, miasma, pharygnitis, phthisis, rhinitis, sores, sore throat, spasms, trachalgia, worms, and wounds (Elliot & Jones 1986). In veterinary practice, Eucalyptus oil is administered to horses in influenza, to dogs in distemper, to all animals in septicaemia. The most important constituent is Eucalyptol, present in *E. globulus* up to 70% of its volume. It consists chiefly of a terpene and a cymene. Jang *et al.* (2002) stated that Eucalypt tree drives away mosquitoes from the vicinity it is planted. This study was conducted to test the effect of crude extract of *Eucalyptus* oil on the larvae of *Culex* mosquito.

MATERIALS AND METHODS

Plant extract. Plant leaf and seeds of *Eucalyptus* from Agricultural farm, Suez Canal University, Ismailia, Egypt were collected. Seeds were washed, crushed in a mortar and passed in a series of solvents include Hexane, Ethyl acetate, Chloroform, Methanol and water respectively. To prepare the leaf extracts, fresh leaves were collected, washed and crushed in a mortar into a watery paste. This was then gradually passed along a series of gradual increasing polarity solvents (Hexane, Ether, Ethyl acetate, Chloroform, Methanol and water respectively). Both leaf extract and seed extract were kept until dried from solvents and then both solved in distilled water.

Experimental insect. Mosquito larvae were collected from the surface of water in a plastic jar from a pool of stagnant water at the Agricultural farm, Suez Canal University, Ismailia. Mosquitos' larvae were kept alive in plastic Jars in the Laboratory until usage.

Procedure. Three sets of five petri dishes were prepared with moist filter paper and placed on a laboratory bench. 30 mosquito larvae were transferred from the plastic jar into each of the fifteen petri dishes (30X15) with total number of larvae 450. Each treatment was assayed in 5 dishes, each dish containing 30 larvae. Total larvae for each treatment were 150. In the first set, 20 mL of the seed extract were added into dish a) 5 mL, b) 10 mL, c) 20 mL. Distilled water was added as a control. In the second set of Petri dishes, leaf extract was added as for seed extract in the first set. Counting the number of dead larvae at one-hour interval for 14 h monitored the effects of the two extract. The data tabulated as means ± St. error and were statistically analyzed.

RESULTS AND DISCUSSION

The percent mortality of *Culex* larvae after applying the seed extract is presented in Table I. 20 mL of the seed extract at Conc. 1000 ppm (part per mL) killed all the larvae within 14 h. While 10 mL of the same concentration caused 80% mortality within 14 h. Decreasing the amount of the seed extract to 5 mL reduced the mortality to 70% after 14 h. The mortality of the larvae exposed to the extract was significantly higher than the control with distilled water ($\rho < 0.05$). These results indicated that the larval mortality increased with dose and time. Applying the leaf extract to the mosquito larvae significantly killed the larvae. Table II indicates that 80% mortality only was recorded when the larvae were treated with 20 mL leaf extract at concentration of 1000 ppm, while 65 and 55% mortality was recorded after the application of 10 and 5 mL extracts, respectively after 14 h. Seed extract appeared as the most lethal among the other parts tested. The effect of both extracts seem to be time dependent i.e. as the mortality increased significantly from the first hour to the last one. This work demonstrates the potency of *Eucalyptus* in the control of mosquito larvae which in agreement with (Brooker & Kleinig, 1990). Seed extract appeared as more lethal than the leaf extract. The high mortality recorded for seed extract might be attributed to deficiency of dissolved oxygen in the water. This study needs further investigation to isolate and identify the exact components responsible for the insecticidal effect. This study agreed with (Chippendale, 1973), the botanical superintendent, found that after planting the Eucalyptus, one of the most marshy and unhealthy districts of Algiers was converted into one of the healthiest and driest. The rapidly growing Eucalyptus trees are now largely cultivated in many temperate regions with the view of preventing malarial fevers. This study is inagreement with Monzon *et al.* (1994) who found the lethal effect of *Eucalyptus globulus* against *Aedes aegypti*. It also can be used in the biological control of mosquitoes and other pests involve introducing into the environment their natural enemies, such as parasites, disease organisms and predatory animals. They may include insects, viruses, bacteria, protozoa, fungi, and plants, nematode worms.

Table I. Mortality rate of different concentrations of *Eucalyptus* seed oil extract on *Culex pipiens* mosquito larvae

Seed extract conc. (ml)	Time (hours)																
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	Total dead no.	%	Mean
20	10	19	20	10	20	11	10	9	9	11	10	3	5	3	150	100	11
10	7	15	11	9	10	6	9	9	8	9	8	7	7	5	120	80	8.5
5	5	7	10	12	8	7	8	9	7	5	7	7	8	5	105	70	7.5
Control	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Table II. Mortality rate of different concentrations of *Eucalyptus* Leaf extract on *Culex pipiens* mosquito larvae

Leaf extract. (ml)	Time (hours)																
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	Total dead no.	%	Mean
20	10	12	11	9	10	8	9	9	8	9	5	5	7	8	120	80	8.5
10	6	11	6	6	8	7	8	6	4	5	6	7	8	10	98	65	7
5	5	7	7	8	7	8	6	4	6	7	4	4	5	5	83	55	5.9
Control	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Fig. 1. % Mortality caused by different concentrations of *Eucalyptus* seed extract on *Culex pipiens* mosquito larvae (1= 20 mL, 2= 10 mL, 3= 5 mL)

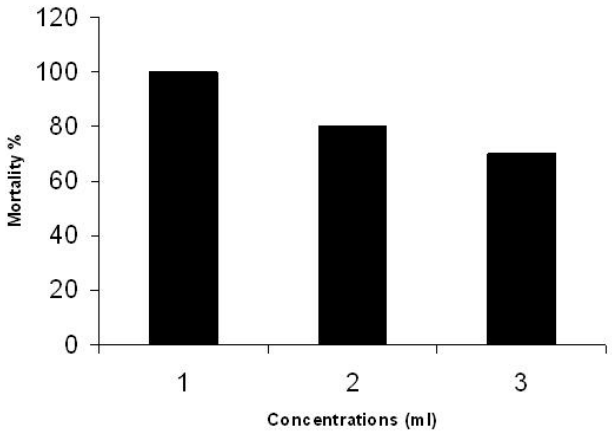
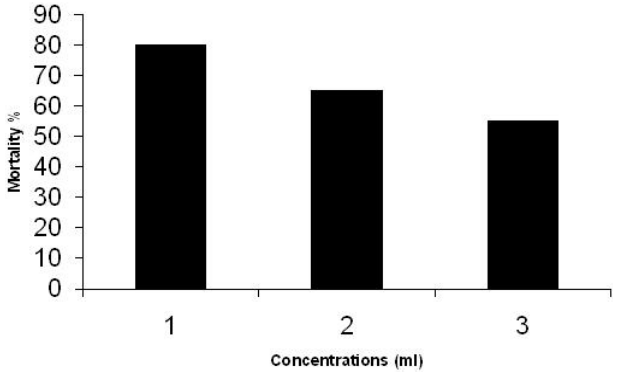


Fig. 2 % Mortality caused by different concentrations of *Eucalyptus* Leaf extract on *Culex pipiens* mosquito larvae (1= 20 mL, 2= 10 mL, 3= 5 mL)



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