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EFFECT OF BIOCHANIN – A AGAINST FILARIAL VECTOR

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ABSTRACT: *A successful attempt of using sodium salt of a water- insoluble larvicide, as an alternative to the use of solutions of such larvicides in acetone and water, for the larvicidal studies is made, in the present study biochanin – A an isoflavone isolated from the flowers of Dalbergia sissoides (grah) when assessed for larvicidal study as its sodium salt on the fourth instar larvae of Culex quinquefasciatus (Sa) showed significant larvicidal activity [LC 50 308.238ppm, LC90 1889.926 ppm].*

INTRODUCTION

Stagnated water is a major environmental hazard which is inevitable in the modern society. It poses a serious problem supporting the breeding of *Culex quinquefasciatus* and other related species of mosquitoes, which have been identified as vectors of filarial worms and are word's number one nuisance pests as well. Control of these mosquitoes have been vigorously undertaken around the world resulting in identification of a number of synthetic and natural pesticides.

A majority of synthetic insecticides cause environmental pollution, enhance development of resistance among insects and cause harmful effects on humans and animals[1]. In the search of safe and congenial alternatives, plant derivates have been expensively examined [2-5] and it as been found tat the secondary metabolites of these plants affect survival, growth and metamorphosis of the invects[6]. Moreover, they are biodegradable, leave no poisonous residues and do not pollute the environment.

Flavonoids, which constitute a major portion of the secondary metabolites of the plants, have been found to affect the physiological systems in higher animals, insects microbes, fungi, etc[7-10]. However, much work on the role of flavonoids as potential pesticudes is not found in literature.

Acetone is commonly used as solvent for screening of plant derivatives for basic toxicological investigations and insecticidal activities, as acetone has good solvency for a majority of natural and synthetic pesticides and also acetone by itself, has very little effect on the pests[11]. in such studies where acetone is used as solvent for dissolving the water insoluble compound before mixing with water, there is always the risk of acetone to get evaporated leaving a deposit of the water insoluble compound at the bottom of the water body, hence, an alternative method is employed in the present stud wherein the water insoluble test substance is converted into its sodium salt thereby making it water soluble.

The present study involves the evaluation of sodium salt of biochanin-A, (an isoflavone isolated from the flowers of *Dalbergia sissoides*[12]) [(1)] as a larvicides on the fourth instat larva of *C. quinquefasciatus*. The study is the first report of the use of sodium

salt of a larvicide in the place of acetone-water solutions of larvicides for larvicide studies.

METHODS

Biochanin – A (115 mg) was dissolved in 7 l if 0.2 N aqueous sodium hydroxide and made up to 100 ml to obtain a 1150 ppm stock solution of the sodium salt of Biochanin- A, (an isoflavone isolated from the folwers of Dalbergia sissoides12) (1) s a larvicide's on the fourth instate larvae of *C. quinquefasciatus* were obtained from the centre for research in medical Entomology (ICMR), Madurai from which the laboratory colonies of the vector used in this study were developed and maintained at 28 ±2o, 75-85% RH and under 14 L: 10 D photoperiod cycle.

Solutions of sodium salt of Biochanin – A of various concentrations (50,100,150,200 and 250 ppm) were prespared, each in 150 ml of distilled water, from the stock solution. There replicates of each concentration were maintained through out the experimental period, twenty larvae of the fourth instar of *C. quinquefasciatus* were introduced into each of the test solutions of different concentrations. The larvae were fed with a diet of yeast and dog biscuits (3:1)

Statistical evaluation of data was carried out by probit analysis 13. The results were compared with the control (12.7 ppm Na+) equivalent to the highest concentration of Na+ in the test solutions.

In order to evaluate the effect of alkalinity on the mortality of the larvae, solutions of sodium hydroxide of various concentrations (64,128,192,256 and 320 ppm as Na+) were prepared each in 150 ml of distilled water and the experiments were repeated as above. The mortality of larvae in these solutions was noted upto 24hr the effect of sodium hydroxide on the mortality of the fourth instar larvae *C. quinquefasciatus* was observed upto 48 h also to find out whether sodium hydroxide has some effect on the test organism or not .

RESULTS AND DISCUSSION

The sodium salt of Biochannin – A sowed toxic effect against the fourth instar larvae of *C. quinquefasciatus*. The 24h mortality, LC_{50}^{5} LC $_{90}$ and Chi – square values, regression equation and fiducially limits for LC_{50}^{5} and LC $_{90}$ are shown in Table I. It is observed that the sodium salt of Biochannin – A has significant activities on the lava4e of *C. quinquefasciatus* under laboratory conditions. It is thus found tobe an environment – friendly phytotoxin when compared to synthetic chemical insecticides, which cause environmental pollution.

The alkalinity, due to sodium hydroxide (as Na+), was found to have no mortal effect upto 256 have no mortal effect upto 256 ppm upon the test organisms for 24h. However, further observations made upto 48h show that there is mortality of 5% , 15% and 40$ at 192 ppm and 320 ppm respectively (Table II). As the concentration of sodium hydroxide solution used for the preparation of the sodium salt of the larvicide was only 50% of t test solution used for the control, the observations show that sodium hydroxide, by itself, has no effect upon the larvae in these low concentrations. This shows that the method suggested here can be generally applied to larvicidal studies of water – insoluble plant derivatives, which may easily be converted into their sodium salts b dissolving tem in sodium hydroxide wherever possible.

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Table 1
Effect of sodium salt of Biochannin – A against fourth instar larvae of *Culex quinquefasciatus*

Conc. (ppm)	Larval mortality % (24h)	Log LC_{50} (Log LC_{90})	LC_{50} (LC_{90})	Chi square	Regression equation	95% fiducial effect LC_{50} (LC_{90})
250	68	2.486	306.238	39.995	Y= 0.9682 +	LL189.56
200	24.4	(3.276)	(1889. 926)		1.622X	UL 695.29
150	22.2					(LL 210.37)
100	21.0					(UL 3527.15)
50	20.0					

Table 2
Effect of alkalinity on the fourth instar larvae of *Culex quinquefasciatus* (Control)

Conc. Of NaOH as Na^+ (ppm)	Mortality after 24 h (%)	Mortality after 48 h (%)	Pupal development (%)
64	0	0	6
128	0	0	7
192	0	5	1
256	0	15	2
320	5	40	-

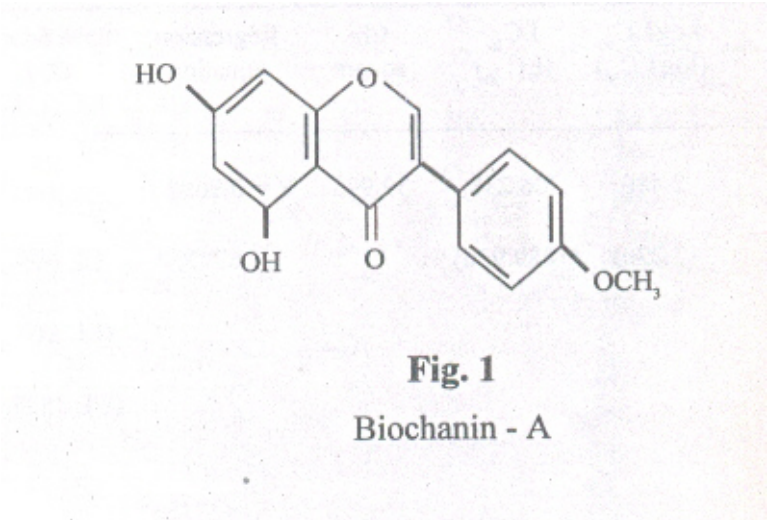

Fig. 1
Biochanin - A

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