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STUDY OF LARIVICIDAL ACTIVITY OF PHYTOTOXIN FROM *LASIOSIPHON ERIOCEPHALUS* PLANT AGAINST MOSQUITO *AEDES AEGYPTI* AND *ANOPHELES STEPHENSI*

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ABSTRACT : Insecticidal and pharmacological properties are recognized in the plant *Lasiosiphon eriocephalus.* Different concentrations such as 175, 200, 225,250, 275 and 300 ppm of extract of leaves of plant *Lasiosiphon eriocephalus* are prepared. The 4th instar larvae of mosquito *Aedes aegypti* and *Anopheles stephensi* are exposed to the concentrations 175, 200, 225,250, 275 and 300 ppm for 48 hrs. to study the mortality of larvae for 2,4,8,12,24 and 48 hrs. From the mortality table the values of 'a' and 'b' are calculated and with the help of these values the LC50 values of phytotoxin *L. eriocephalus* to the larvae of mosquito *A. egypti* are calculated and these LC50 values are observed as 288.63, 283.47, 240.81, 213.07, 202.06 and 184.13 ppm respectively for 2,4,8,12,24 and 48 hrs where as LC50 values of this phytotoxin to the larvae of *A. stephensi* are observed as 318.71, 240.08, 224.06, 210.14, 198.62 and 187.25 ppm respectively for 2,4,8,12,24 and 48 hrs. There results revealed that phytotoxin from plant *L. eriocephalus* can be used as efficient source in the control of mosquito *A. aegypti* by destroying the larval stage.

Key words :- Phytotoxin *, L. eriocephalus, A. aegypti* and *A. stephensi.*

INTRODUCTION:

Mosquitoes *A.aegypti* and *A. stephensi* transmit diseases like dengue and chicken guinea in human being (Ghosh *et al.,* 2012). Hence to prevent the proliferation of mosquito diseases has became vary essential to control the mosquitoes. Use of synthetic insecticides, organophosphates and organochlorides is a common and major practice of human being to control the mosquitoes (Ghosh *et al.*, 2012). But because of uncontrolled technical and operational practices the use of synthetic chemicals became unsuccessful. Use of synthetic chemicals also not accepted due to high cost of synthetic chemicals, concern of environment, harmful effects on human health and non target population, biodegradable nature and increasing resistance in insects (Brown,1986 and Russel *et al.*, 200**9**).

Due to the concern of environment and human health the most effective alternative is a use of phytotoxin. Because of degradable nature and no effect on non target species. Hence it is used as a sustainable method to control mosquitoes. Different scientists such as Wiseman and Chapagain (2006), Mathew *et al.*, (2009), Patil *et al.,* (2010), Remia and Logaswamy (2010), Ghosh *et al.*, (2012) Yenkanchi *et al.,* (2014) and Mullai and Jebanesan (2017) were studied the potential of plant extracts in the control of mosquito species.

Efforts have made in this work to study the potential of phytotoxin from extract of leaves of *L. eriocephalus* in the control of mosquito *A. aegypti* and *A. stephensi.*

MATERIALS AND METHOD :

Use of Plant *Lasiosiphon eriocephalus* (Meissn) Decaisne of family Thymeleaceae are used as a phytotoxin where as 4th instar larvae of *A. aegypti* and *A. stephensi* are used for the experiment.

a) Preparation of Plant extracts :-

i. The plants *Lasiosiphon eriocephalus* identified by expert botanist for their selection.
ii. Matured leaves and fruits of related plant were collected, washed with water and dried at room temperature in a shed.
iii. Dried leaves and fruits of related plant were powdered with mechanical device.
iv. Dried powder was extracted in acetone (100 gm in 300 ml acetone) for 12 to 15 hrs with the help of Soxhlet's apparatus.
v. Solvent powder was evaporated with help of vacuum evaporator and stored in airtight desiccators.

b) Collection of larvae of *Aedes aegypti* and *Anopheles stephensi*:-

i. Species of mosquitoes were identified with standard identification keys.

ii. Larvae were cultured and maintained in the laboratory at 27± 1^{0}C and 85% of relative humidity.
iii. Larval forms were maintained in trays by providing dog biscuits and yeast powder in ratio 3:1

c) Bioassay test :- (WHO, 1981)

i. Different concentrations of plant extracts from 125 ppm to 300 ppm were prepared in 500 ml beakers. These concentrations were decided after taking pre-test.
ii. Different larval stages (instars) of both species were kept in beakers with different concentrations.
iii. Twenty larvae of each species were exposed to above concentrations in beakers/trays for 2, 4, 8, 12, 24 and 48 hrs.
iv. Control set was also maintained.
v. Experiment was repeated for five times.
vi. By counting no. of dead larvae percent mortality was calculated with the help of probit analysis method (Fisher and Yates, 1963) for each exposure period.

RESULTS AND DISCUSSION:-

Mortality study has a key role in the toxicological studies. The potential of the phytotoxin is studied by studying the LC50 of the plant toxin against the target organism. In this study larvae of the *A. aegypti* and *A. stephensi* were exposed to the different concentrations such as 175, 200, 225, 250, 275 and 300 ppm. For 2, 4, 8, 12, 24 and 48 hrs. of exposure period for the study of larvicidal activity of the phytotoxin.

When larvae of *A. aegypti* and *A. stephensi* were exposed to the concentrations 175, 200, 225,250, 275 and 300 ppm for 2,4,8,12,24 and 48 hrs. of exposure period, it is observed that the rate of mortality of larvae of both species increases with increased concentration and time of exposure. Similar type of results were obtained by Choochote (2004) in *A. aegypti*, Mullai and Jebaneesan (2007) in *C. quinque fasciatus*, Patil *et al.,* (2010), in *A. aegypti* and *A. stephensi,* Ghosh *et al.,* (2014) in different mosquitoes and Yenkanchi (2014) in *A. aegypti.*

By using the data of percentage mortality and no. of concentrations the LC50 values were calculated with the help of probit analysis method. LC50 values of plant *L. eriocephalus* to the larvae of *A. aegypti* were found as 288.63, 283.47, 240.81, 213.07, 202.06 and 184.13 ppm respectively for 2, 4, 8, 12, 24,and 48 hrs. whereas LC50 values of *L. eriocephalus* to the larvae of *A. stephensi* were found as 318.71, 240.08, 224.06, 210.14, 198.62 and 187.25 respectively for 2,4,8,12,24 and 40 hrs. (Table No.3) From there observations it can be concluded that the phytotoxin from *L. eriocephalus* is more effective in *A. aegypti* as compared to the *A. stephensi.*

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Table No. 1.1

Numerical data for estimation of 'b' and 'a' relations to plant *Lasiosiphon eriocephalus* to *A. aegypti* for different exposure period

2 hrs						4 hrs						8 hrs					
Morta lity %	Probit (Y)	Conc in ppm (X)	LnX	LnX^2	LnXY	Morta lity %	Probit (Y)	Conc. in ppm (X)	LnX	nX^2	LnX Y	mortal ity %	Probit (Y)	Conc. in ppm (X)	LnX	LnX^2	LnXY
00	--	175	5.16	26.62	--	00	--	75	5.16	26.62	18.32	10	3.55	175	5.16	26.62	18.32
05	3.55	200	5.30	28.09	18.82	05	3.55	00	5.30	28.09	16.70	20	4.16	200	5.30	28.09	22.05
05	3.55	225	5.42	29.37	19.24	10	3.72	25	5.42	29.37	22.55	20	4.16	225	5.42	29.37	22.55
20	4.15	250	5.52	30.47	22.91	15	3.96	50	5.52	30.47	25.45	60	5.25	250	5.52	30.47	28.98
25	4.32	275	5.62	31.58	24.28	30	4.48	75	5.62	31.58	27.37	80	5.84	275	5.62	31.58	32.82
45	4.87	300	5.70	32.49	27.76	55	5.13	300	5.70	32.49	30.72	100	--	300	5.70	32.49	--
	ΣY=20.44 $\overline{Y}$ =4.08	No.of conc. = 06	ΣLnX= 32.72 Ln $\overline{X}$ = 5.45	ΣLnX^2 =178.62	ΣLnXY = 113.01		ΣY = 20.84 $\overline{Y}$ = 4.17	No.of conc. = 06	ΣLnX = 32.72 Ln $\overline{X}$ = 5.45	ΣLnX^2 = 178.62	ΣLnXY = 115.26		ΣY = 22.96 $\overline{Y}$ = 4.60	No.of conc.= 05	ΣLnX = 32.72 Ln $\overline{X}$ = 5.45	ΣLnX^2 = 178.62	LnXY = 124.72

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Table No. 1.2
Numerical data for estimation of 'b' and 'a' relations to plant *Lasiosiphon eriocephalus* to *A. aegypti* for different exposure period

12 hrs						24 hrs						48 hrs					
Mortality %	Probit (Y)	Conc. in ppm (X)	LnX	LnX^2	LnXY	Mortality %	Probit (Y)	Conc. in ppm (X)	LnX	LnX^2	LnXY	Mortality %	Probit (Y)	Conc. in ppm (X)	LnX	LnX^2	LnXY
20	4.16	175	5.16	26.62	26.62	20	4.16	175	5.16	26.62	23.12	45	4.87	175	5.16	26.62	25.13
40	4.75	200	5.30	28.09	28.09	40	4.75	200	5.30	28.09	25.81	55	5.13	200	5.30	28.09	27.19
45	4.87	225	5.42	29.37	29.37	55	5.13	225	5.42	29.37	29.21	90	6.28	225	5.42	29.37	34.04
85	6.04	250	5.52	30.47	30.42	75	5.67	250	5.52	30.47	35.60	100	--	250	5.52	30.47	--
100	--	275	5.62	31.58	31.58	100	--	275	5.62	31.58	--	100	--	275	5.62	31.58	--
100	--	300	5.70	32.49	32.49	100	--	300	5.70	32.49	--	100	--	300	5.70	32.49	--
	ΣY = 19.82 $\overline{Y}$= 4.96	No.of conc. = 04	ΣLnX= 32.72 Ln $\overline{X}$ =5.45	ΣLnX^2 =178.62	ΣLnX Y= 106.39		ΣY = 20.71 $\overline{Y}$= .17	No.of conc. = 04	ΣLnX = 32.72 Ln $\overline{X}$ =5.45	ΣLnX^2 = 178.62	ΣLnXY =105. 75		ΣY = 16.28 $\overline{Y}$ = 5.43	No.of conc. = 03	ΣLnX = 32.72 Ln $\overline{X}$ = 5.45	ΣLnX^2 =178.62	ΣLnXY =86.3 6

Table No. 2.1
Numerical data for estimation of 'b' and 'a' relations to plant *Lasiosiphon eriocephalus* to *A. stephensi* for different exposure period

2 hrs						4 hrs						8 hrs					
Mortality %	Probit (Y)	Conc in ppm (X)	LnX	LnX^2	LnXY	Mortality %	Probit (Y)	Conc. in ppm (X)	LnX	LnX^2	LnXY	Mortality %	Probit (Y)	Conc. in ppm (X)	LnX	LnX^2	LnXY
0	--	175	5.16	26.62	--	05	3.55	175	5.16	26.62	18.32	10	3.72	175	5.16	26.62	19.19
05	3.55	200	5.30	28.09	18.81	20	4.16	200	5.30	28.09	22.05	35	4.61	200	5.30	28.09	24.43
20	4.16	225	5.42	29.37	22.55	20	4.16	225	5.42	29.37	22.55	45	4.87	225	5.42	29.37	26.39
25	4.33	250	5.52	30.47	23.90	50	5.00	250	5.52	30.47	27.60	55	5.13	250	5.52	30.47	28.32
35	4.61	275	5.62	31.58	25.91	55	5.13	275	5.62	31.58	28.83	95	6.44	275	5.62	31.58	36.19
40	4.75	300	5.70	32.49	27.07	70	5.32	300	5.70	32.49	30.32	100	--	300	5.70	32.49	--
	ΣY =21.4 $\overline{Y}$ = 4.28	No.of conc.=06	ΣLnX = 32.72 Ln $\overline{X}$ =	ΣLnX^2 = 178.62	ΣLnXY =11 8.24		ΣY =27.32 $\overline{Y}$ = 4.55	No.of conc.= 06	LnX= 32.72 Ln $\overline{X}$ = 5.45	ΣLnX^2 = 178.62	ΣLnXY = 149.6 7		ΣY =24.7 7 $\overline{Y}$ = 4.95	No.of conc. = 05	ΣLnX = 32.72 Ln $\overline{X}$ =	ΣLnX^2 = 178.62	ΣLnX Y = 160.3 5

Table No. 2.2
Numerical data for estimation of 'b' and 'a' relations to plant *Lasiosiphon eriocephalus* to *A. stephensi* for different exposure period

12 hrs						24 hrs						48 hrs					
Mortality %	Probit (Y)	Conc. in ppm (X)	LnX	LnX^2	LnXY	Mortality %	Probit (Y)	Conc. in ppm (X)	LnX	LnX^2	LnXY	Mortality %	Probit (Y)	Conc. in ppm (X)	LnX	LnX^2	LnXY
25	4.33	175	5.16	26.62	22.34	30	4.48	175	5.16	26.62	23.12	40	4.87	175	5.16	26.62	25.13
40	4.55	200	5.30	28.09	24.11	45	4.87	200	5.30	28.09	25.81	55	5.39	200	5.30	28.09	28.57
55	5.13	225	5.42	29.37	27.80	65	5.67	225	5.42	29.37	30.73	95	--	225	5.42	29.37	--
80	5.84	250	5.52	30.47	32.24	95	--	250	5.52	30.47	--	100	--	250	5.52	30.47	--
100	--	275	5.62	31.58	--	100	--	275	5.62	31.58	--	100	--	275	5.62	31.58	--
100	--	300	5.70	32.49	--	100	--	300	5.70	32.49	--	100	--	300	5.70	32.49	--
	ΣY =19.85 $\overline{Y}$ = 4.96	No.of conc.=04	ΣLnX = 32.72 Ln $\overline{X}$ =5.45	ΣLnX^2 = 178.62	ΣLnX Y = 106.4 9		ΣY =15.02 $\overline{Y}$ = 5.01	No.of conc.= 03	ΣLnX = 32.72 Ln $\overline{X}$ =5.45	ΣLnX^2 = 178.62	ΣLnXY = 79.66		ΣY = 10.26 $\overline{Y}$ =5.13	No.of conc.= 02	ΣLnX = 32.72 Ln $\overline{X}$ =5.45	ΣLnX^2 = 178.62	ΣLnXY = 53.7

Table No. 3.1

LC50 values of phytotoxin *L. eriocephalus* to the mosquito larvae of *A. aegypti* and *A. stephensi* for different exposure periods.

Mosquito larvae	Time of Exposure	LC_{50} values of phytotoxins in relation to the 4th instar mosquito larvae (ppm)
		L. eriocephalus
A. aegypti	2	288.63
	4	283.47
	8	240.81
	12	213.07
	24	202.06
	48	184.13
A. stephensi	2	318.71
	4	240.08
	8	224.06
	12	210.14
	24	198.62
	48	187.25

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