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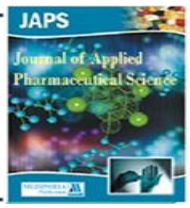

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Larvicidal Activity of *Tephrosia purpurea,* (L) Against the Larvae of *Culex quinquefasiciatus*

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ABSTRACT

The aim of this work was to study the larvicidal activity of *Tephrosia purpurea* (L) Pers. against the larvae of *culex quinquefasiciatus*. The preliminary laboratory trail was undertaken to determine the efficacy of petroleum ether and ethyl acetate extract of dried whole plant of *Tephrosia purpurea* belonging to the family Papilionaceae at various concentrations against the late third or early fourth instar larvae of *culex quinquefasiciatus* by following the WHO guidelines. The results suggest that 100% mortality. Petroleum ether and ethyl acetate extract of *Tephrosia purpurea* (L) Pers. was observed at 250ppm and 300ppm respectively. The results suggested that use of plants in insect control as an alternative method for minimizing the noxious effect of some pesticide compound on the environment. Thus the extract of *Tephrosia purpurea* delivers promising more selective and biodegradable agent.

Keywords: Larvicidal activity, Whole plants of *Tephrosia purpurea*, *culex quinquefasiciatus*

INTRODUCTION

Mosquitoes are one of the most medicinal significant vectors and they transmit parasites and pathogens which continue to have a devastating impact on human beings. (Maheswaran *et al*, 2008) The vector borne diseases caused by mosquitoes are one of the major health problems in many countries. Several numbers of species belonging to genera *Culux, Anopheles, Aedes*, and vectors for the pathogens of various diseases like *Filariasis, Malaria, Dengue, Yellow fever, Japanese encephalitis, Chickungunya* are some of the deadly diseases spread by mosquitoes. *Culex quinquefasiciatus* is an important vector of *Brancaraftian Filariasis* in tropical and subtropical regions. According to WHO (1984) about 90 millions people worldwide one infected with *wochereia bancrofti*, the lymphatic dwelling parasite and ten time more people are at the risk of being infected. In India alone 25 millions people suffer from filarial diseases manifestations (Maheswaran *et al*, 2008). Thus one of approaches for control of these mosquitoes born diseases in the interruption of transmission by killing or preventing mosquito bite (Das *et al* 1989) Herbal products which have proven potential as a instectides or replicants can play an important role in the interruption of the transmission of mosquitoes born diseases both at individual and community level.

However the discovery development and uses of synthetic organic insecticidal chemicals with persistent residual action not only over shadowed the use of herbal products as insecticides of choice against mosquitoes but also become the major weapon for mosquito control (Sakthivadivel *et al*, 2008). But the extensive use of synthetic organic insecticides during the last decades has resulted in environment hazard and also in the development of physiological resistance in most vector species. This has necessitated the need for research and development of environmentally safe, biodegradable low cost indigenous method for vector control, which can be use with minimum care by individual and communities in specific situation (Singh *et al*, 2006). The plant *Tephrosia purpurea* is described in Ayurveda and siddha as a potent drug. Used as Laxative, asthma, syphilis, gonorrhea, chronic fever, anthelmintic, seeds are useful in skin diseases and Filariasis (Yoganarasimhan *et al*, 2000, Singh *et al*, 2005 & Retnam *et al* 2006)

MATERIALS AND METHODS

Collection of a Plant Material

The plant was collected during flowering stage in the month of July-August from Nilgris. Then their identification was established with the aid of an expertise botanist Dr. S. Rajan and compared with herbarium sheets of the authentic sample. Many of defensive components are biodegradable with non-residual effect on the biological environment hence; an attempt has been made in present investigation to identify plant with potential to control vector mosquitoes.

Extraction

The dried whole plant of *Tephrosia purpurea* (L) Pers. plant was powered and extracted by soxhelt with petroleum ether and ethyl acetate. The extracts were concentrated under reduced pressure to obtained a semisolid mass. These extracts were used for determining the larvicidal activity against mosquito larvae of *culex quinquefasiciatus.*

Larvicidal Bioassay

Larvicidal activity was evaluated in accordance to WHO for the evaluation of new larvicidal agents (WHO 1985). The larvae of *culex* was obtained and reared from the neonates in National Institute of Communicable diseases, Southern India branch field station located at Mettupalayam (District Coimbatore of Tamil Nadu state), at 28 ± 2˚ C with a photoperiod of 12 hours light and dark and 80 ± 10% RH. A brewer's yeast powder mixed with an equal quantity (W/W) of ground dog biscuit is used in laboratory as a food for larvae. The late third or early fouth instar larvae were collected according to larval size and degree of chitinization of respiratory siphon (Cheng et al., 2003). Different concentrations of the extracts were prepared in 1 ml of acetone for each experiment. All experimental exposure was done in 500 ml glass beaker in triplicate. 25 larvae were collected with a pasture pipette, placed on a filter paper for removal of excess of water and placed in 250ml dechlorinated tap water containing various concentrations of crude extracts. Three controls in triplicate were setup, one with acetone (1ml), the other with distilled water (250ml). The beakers were covered with muslin cloth avoid to entry of any foreign material. Sufficient control was also kept for each extracts (Finnely, 1971). The observed mortality (Crude mortality) was recorded at 24 hours of exposure to test solution. From this crude mortality, percentage crude mortality was obtained. Subsequently control mortality if any was recorded and percentage crude mortality was obtained. The percentage crude mortality was corrected by Abbot's formula. The corrected probit mortality and expected mortality was also obtained. But no control mortality recorded during the experiment so I have not used of Abbot's formula.

Statistical Analysis:

The average larval mortality data were subjected to probit analysis for calculating LC 50 and LC 90 values and their 95% confidence limits were estimated by fitting a probit regression model to the observed relationship between percentage mortality of larvae and logarithmic concentration of the substance. Separate probit models were fitted for each extract.[11] All analysis was carried out using the (Statistical Package Social Science) SPSS software version 13.0.

RESULTS AND DISCUSSION

Five different concentrations of test solution ranging from 50-250ppm for petroleum ether extract and six different concentrations of test solution ranging from 50-300 ppm for ethyl acetate extract were subjected to 24 hr bioassay using early 4 th instars larvae of *Culex quinquefasciatus* The estimated LC 50 and LC90 values (95% confidence intervals) with Petroleum ether extract were 152.5(54.8-277.8) and 261.9 (193.9-1015.3) and ethyl acetate extract were70.2 (49.9-88.3) and 205.2 (186.0-231.7) respectively. The median potency of *Tephrosia purpurea* is about 2.2 times lower under Petroleum ether extract than that of ethyl acetate extract. Significantly higher compared to its usage with Petroleum ether extract. The result were considered to be statistically significant given in table no: 1

CONCLUSION

The use of the plants in insect control offers a safer alternative too synthetic chemical and can be obtained by individuals and communities easily at a very low cost. Moreover, these results could be useful in the search for newer, more selective and biodegradable larvicidal natural compounds.

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Table 1: Observed and expected mortality of *Culex quinquefasciatus* larvae exposed to *Tephrosia purpurea* with Petroleum ether and Ethyl acetate extracts. Expected mortality is based on probit regression analysis.

Conc. (µg/ml)	No. of larvae		Mortality (%)		Expected Mortality			Probit (mortality) = a + b x conc	χ^2 D.F P value	LC_{50} (95 % CI)	LC_{90} (95 % CI)
	Exposed	Dead	Crude	Corrected	Probit	Dead	%				
***Tephrosia purpurea* with Petroleum ether extract**											
50	75	14	18.7	18.7	-1.20	8.6	11.5	-1.7867+ 0.0117 x conc	χ^2 = 23.4 D.F.=3 P < 0.001	152.5 (54.8-277.8)	261.9 (193.9-1015.3)
100	75	19	25.3	25.3	-0.62	20.2	26.9				
150	75	31	41.3	41.3	-0.03	36.6	48.8				
200	75	43	57.3	57.3	0.56	53.3	71.1				
250	75	75	100.0	100.0	1.14	65.5	87.3				
***Tephrosia purpurea* with Ethyl acetate extract**											
50	75	35	46.7	46.7	-0.19	31.8	42.4	-0.6659+ 0.0095 x conc	χ^2 = 6.15 D.F.=4 P <0.19	70.2 (49.9- 88.3)	205.2 (186.0-231.7)
100	75	41	54.7	54.7	0.28	45.9	61.1				
150	75	62	82.7	82.7	0.76	58.2	77.6				
200	75	63	84.0	84.0	1.23	66.8	89.1				
250	75	72	96.0	96.0	1.71	71.7	95.6				
300	75	75	100.0	100.0	2.18	73.9	98.5				

D.F. = Degrees of freedom

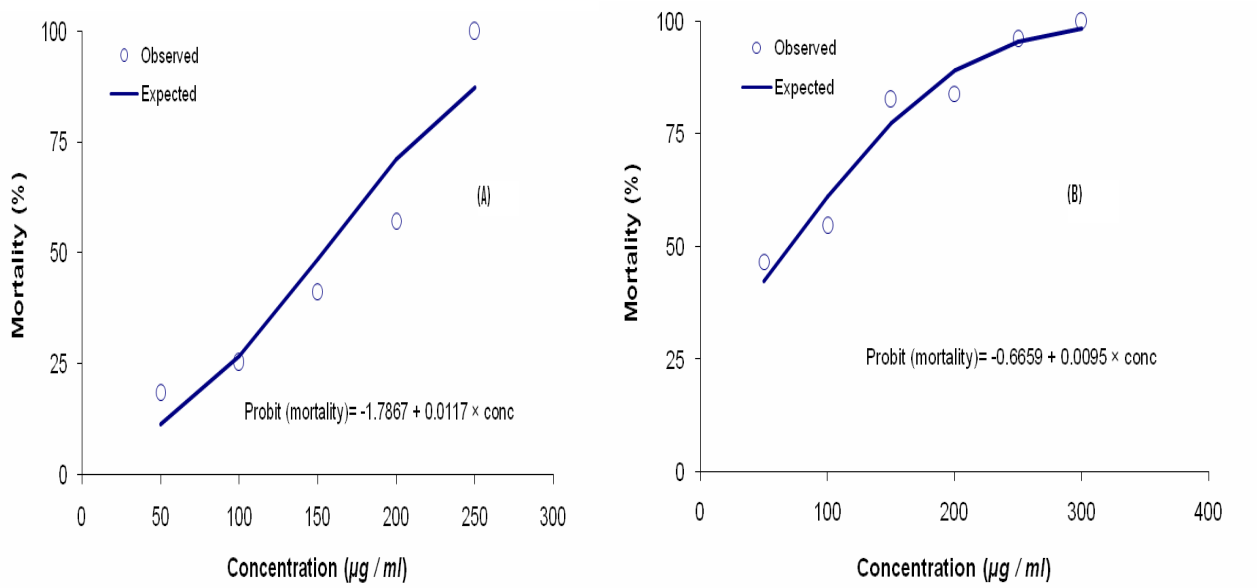

Fig. 1: Showing the relation between *Culex quinquefasciatus* larval mortality and concentration of *Tephrosia purpurea* with (A) Petroleum ether and (B) Ethyl acetate extracts. Expected values are based on probit regression analysis.

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