



Evaluation of Larvicidal Activity of *Annona Reticulata* Leaves Against Filarial Vector Mosquito, *Culex Quinquefasciatus* Say

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KEYWORDS :

INTRODUCTION

Mosquitoes comprises the most important single group of insects in terms of public health, which transmits a number of diseases, such as malaria, filariasis, dengue, japanese encephalitis, etc. causing millions of deaths every year. Repeated use of synthetic insecticides for mosquito control has disrupted natural biological control systems and has led to resurgences in mosquito populations. It has also resulted in the development of resistance, undesirable effects on non-target organisms and fostered environmental and human health concern. This initiated a search for alternative control measures. Plants are a rich source of bioactive chemicals and they may be an alternative source of mosquito control agents. Natural products of plant origin with insecticidal properties have been tried in the recent past for control of a variety of insect pests and vectors(9).

The mosquito, *Culex quinquefasciatus* Say, is one of the potential vectors of *Wuchereria bancrofti*, the causative agent of human lymphatic filariasis (HFL) all over the world, including India. So, in order to prevent mosquito-borne diseases and improve public health, it is necessary to control them by safe methods such as use of plants and their effective products(7). Herbal products with proven potential as insecticide or repellent can play an important role in the interruption of the transmission of mosquito-borne diseases at individual as well as at the community level.

Annona reticulata is commonly called custard apple (ramphal) in India. It belongs to the family Annonaceae. Its leaves are medicinally used as a vermifuge, as paste on boils, abscesses and ulcers. The leaves have insecticidal and antifeedent properties. Fresh or dried leaves mixed with the produce or placed in layers between the produce gives effective control against rice moth and bruchids for 3-4months.(9)

MATERIALS AND METHODS

Test organism- *Culex quinquefasciatus*:

For the present study, the mosquito species was cultured in the laboratory.

A single gravid female was collected from an urban dwelling, which provided the first egg-raft required to raise the colony. Adult colony for experimental purpose was maintained from the second generation onwards. Chick blood meal was given to the females so as to produce egg-rafts. Larvae, pupae and adult were taken care of separately(2).

Test Plant product -*Annona reticulata*:

The plant leaves were collected from Dumas area Magdalla road, Surat.

They were shade dried and powdered. This powder was subjected to Soxhlet extraction using Methanol as the solvent, for 4-5 hrs for 5 days.

Then the solvent was evaporated and the crude extract was stored in the refrigerator until assayed. These dried extracts were later redissolved in Methanol to prepare stock solution at the time of preparation of test doses.

Test solution for larvae: Larval susceptibility tests were carried out according to the methods described by WHO(10). The fourth instar larvae of *Culex quinquefasciatus* were exposed to various doses ranging from concentration 100ppm to 500ppm. Stock solution was prepared by redissolving Methanol to the dried extract in ratio 1:10 (w/v) and from that various dilutions were prepared. Twenty larvae for each replicate and total four replicates were set. Along with replicates one control with Methanol and one control only with distilled water was also kept to check for 24hrs mortality. In each replicates powdered yeast was added as the food source and Tween 80 –was used as an emulsifier at 0.05% (8).

RESULTS

Toxic effect of the extracts were studied by counting the larval mortality after 24hrs. Mortality was calculated using Abbott's formula(1).

ABBOTT'S FORMULA

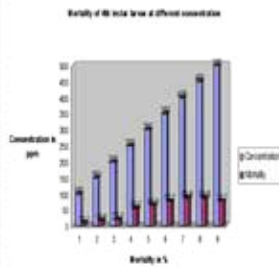
Using this formula mortality percentage for each concentration was calculated and the results are shown in the following Table.



Comparison

between different concentrations of *A. reticulata* on 4th instar larvae of *C. quinquefasciatus*:

Sl. No.	Concentration (ppm)	Observed mortality Test (%)	L.C ₅₀ Value ppm
1.	100	11.1	
2.	150	16.6	
3.	200	22.2	
4.	250	55.5	
5.	300	66.6	225.2
6.	350	77.7	
7.	400	88.8	
8.	450	88.8	
9.	500	77.7	
10.	Solvent Control	10	
11.	Dist. Water Control	No mortality observed	



DISCUSSION :

The present study was conducted to find an environmentally safe and eco-friendly solution for the control of Filial vector *Culex quinquefasciatus*. From the results obtained it was observed that 50% of the larvae are killed at a dose range of 225 ppm which is quite useful. This plant is reported to be non-toxic to vertebrates. It is also used as a medicine to cure diarrhea, dysentery and toothache. It is commonly found, so can be easily available for the experimental purposes. It was reported that *Annona reticulata* leaves have insecticidal and anti-feedent activity against rice mosths and bruchids (Pesticide Post vol-9, March, 2001). Other species of this family Annonaceae are also tried for insecticidal purpose and are found to be equally important. *Annona squamosa* is already being used on this vector and has proved to be quite effective (5). *Annona muricata* is also tried on yellow fever vector- *Aedes aegypti* and was found to be insecticidal(3). Similarly *Polyalthia longifolia* is also found out to be effective against *Culex quinquefasciatus*. All these examples suggest that this family has peculiar secondary metabolites, which are potentially harmful to the mosquito vectors

CONCLUSION:

From the results we can conclude that the present plant has got enough potential to fight against the larvae of *Culex quinquefasciatus* mosquito and can be helpful in reducing their population. This will be a safer and eco-friendly way of controlling the mosquito menace.

The results of this study will contribute to a great reduction in the application of synthetic insecticides, which in turn increase the opportunity for natural control of various medically important pests by botanical pesticides. Since these are often active against a limited number of species including specific target insects, less expensive, easily biodegradable to non-toxic products, and potentially suitable for use in mosquito control programme. The present study clearly suggests the efficacy of *A. reticulata* extract on larvae of *C. quinquefasciatus*. Thus there are all chances of exploring this plant for its pupicidal, antifeedent, adulticidal, mode of action, synergism with the biocides under field condition and various other aspects which can be commercially used instead of the synthetic chemicals found in the market which are tremendously harmful to the whole ecosystem.

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