Efficacy of *Momordica tuberosa* leaf extract against the larvae of filarial mosquito, *Culex quinquefasciatus*

P. Sethuraman, N. Grahadurai and M. K. Rajan

**ABSTRACT**

The filarial mosquito *Culex quinquefasciatus* is the most common and the most important mosquito among the genus, *Culex* occurring mainly in the urban areas, responsible for the spread of filarial worm, *Wuchereria bancrofti* that causes the dreadful disease called Malabar leg / elephantiasis among human beings. Many methods have been developed to eradicate the mosquito larvae, but often chemicals are being used because of their speedy action. Since they cause so many deleterious effects to environment, many biologically active plant extracts have been studied for their potential efficacy to minimise the extent of pollution caused by synthetic pesticide. Therefore, in the present investigation the efficacy of the leaf extracts of *Momordica tuberosa* on the larval and pupal period, larval, pupal and adult mortality, percentage of adult emergence and growth index of the filarial mosquito *C. quinquefasciatus* was carried out. In the sublethal concentrations, prolongation of larval and pupal period and reduction in the percentage of adult emergence were observed.

**Keywords:** *Culex quinquefasciatus, Momordica tuberosa, bioinsecticide*

**INTRODUCTION**

Among the various groups of invertebrate animals, insects have a very close relationship with the life and existence of mankind (Venkitaraman, 1983). In the insect group, many insects of the Order Diptera act as vectors and play a great role in spreading serious diseases among man and domestic animals. The filarial worm, *Wuchereria bancrofti* and *W. malayi* responsible for human filariasis, is carried by several species of mosquitoes, especially *Culex quinquefasciatus* and *C. pipiens* (Mani, 1982; Kettle, 1984). Many methods have been adopted for the control of the diseases such as, filariasis, malaria, and dengue by controlling the mosquitoes especially in their larval stage, such as, chemical control, genetic control, biological control and integrated control (Evans and Raj, 1988). Both adults and larval forms are effectively controlled by chemical methods. Chemical control methods using synthetic insecticides have been favoured so far because of their speedy action (Kalyanasundaram and Babu, 1982). Use of plant extracts is one of the possible methods of pollution free method in insect control. Promising results have been achieved towards attaining this goal by treating eggs, nymphs and adult insects with extract of whole plants, leaves, roots, fruits and seeds of various species of plants (Shah, 1992). However, there has been no report on the larvicidal action of the leaf extract of *Momordica tuberosa* (Cucurbitaceae) on the *C. quinquefasciatus*. Hence the present work has been carried out.

**MATERIALS AND METHODS**

The fourth instar larvae of *C. quinquefasciatus* have been obtained from Indian Council of Medical Research Centre, (ICMR) Madurai. The egg rafts are transferred to tap water in plastic containers at room temperature. After hatching they were transferred to rearing containers, fed with yeast powder and dog biscuits as suggested by (Roy and Brown 1970). They were allowed to moult up to fourth instar and were used for the experiment.

25 grams of sieved leaf powder was extracted in soxhlet apparatus for 24 hours, over a heating mantle at 55°C using acetone as solvent (Peach and Tracey, 1956). One gram of
Table 2. Effect of the leaf extract of Momordica tuberosa on the mosquito Culex quinquefasciatus larval and pupal period, larval, pupal and adult mortality and percentage of adult emergence and growth index.

<table>
<thead>
<tr>
<th>Parameters</th>
<th>Control</th>
<th>Experimental doses in ppm</th>
</tr>
</thead>
<tbody>
<tr>
<td>Larval period IV instar (in days)</td>
<td>3</td>
<td>3 4 4 4 4 5</td>
</tr>
<tr>
<td>Pupal period (in days)</td>
<td>2</td>
<td>2 2 2 3 3 4</td>
</tr>
<tr>
<td>Larval mortality</td>
<td>0</td>
<td>6 7 8 10 14 16 18</td>
</tr>
<tr>
<td>Pupal mortality</td>
<td>0</td>
<td>0 0 0 0 1 2 2</td>
</tr>
<tr>
<td>Adult mortality</td>
<td>0</td>
<td>0 0 0 0 1 1 0</td>
</tr>
<tr>
<td>Emergence of adult (%)</td>
<td>100</td>
<td>70 60 50 20 5 0</td>
</tr>
<tr>
<td>Growth Index</td>
<td>20</td>
<td>14 15 10 8.33 2.85 0.71 0</td>
</tr>
</tbody>
</table>

M. tuberosa. The emergence of adult and growth index were found to decrease with increasing concentration of leaf extract From this investigation, it has been established that the leaf extract of M. tuberosa is effective only at higher concentrations like 180 ppm, 190 ppm and 200 ppm due to growth disruptive action, hormonal in balance or interference in chitin synthesis (Saxena and Yadav, 1983). The LC₅₀ value of M. tuberosa leaf extract for 24 hours of exposure (196.52). The leaf extract of M. tuberosa used was effective as larvicidal only at higher concentrations. Similar findings were reported in C. quinquefasciatus and Aculifacies treated with Azadirachta indica (Rao et al., 1988). This investigation, the leaf extract of M. tuberosa has the alkaloid momordicine. This alkaloid act as a hypoglycemic agent that leads to mortality of the larvae. Hence it has been recommended to analyse the toxic chemical present in the leaves of M. tuberosa to include this plant extract also in controlling the mosquito larvae in future.

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