Predatory Potential of Larvae of *Toxorhynchites Splendens* on the Larvae of *Aedes* sp.

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Larvae of *Toxorhynchites splendens* mosquito are predaceous on immature stages of other mosquito species (Toma and Miyagi, 1992). Adults of these mosquitoes feed on nectar and other naturally occurring carbohydrate sources. In nature, *T. splendens* larvae are commonly found in tree holes, coconut husks and bamboo stems that hold water. These sites are also often excellent larval developmental sources for pest mosquitoes like *Aedes* species which are capable of transmitting yellow fever, dengue fever, chikungunya and other diseases in human beings (Jones and Schreiber, 2002). The increasing resistance of mosquitoes populations to the current commercial insecticides has hampered the efforts to control mosquitoes effectively. There has been an increasing interest in the development of biological control of mosquitoes. The present study was undertaken to test the predatory potential of larvae of *T. splendens* on larvae of *Aedes* species.

**Materials and Methods**

One hundred, fourth stage larvae of *T. splendens* were procured from Centre for Research in Medical Entomology (CRME), Madurai, Tamilnadu, India. The larvae were identified based on morphological characters using the standard keys (Horio et al., 1990). Each fourth stage larva was placed in separate vial (14 x 10 cm) containing clean water and daily feeding was given with the larvae of *Aedes* species.

Adult live mosquitoes were collected manually by collection net and were identified as *Aedes* sp. using the standard keys. They were transferred to a large glass container (30 X30X 30 cm.) containing water. The egg laying was observed within 24 hours and the larval stages were developed after four days. The mature larvae were collected manually and used for feeding to the larvae of *T. splendens*.

For a single fourth stage larva of *T. splendens*, 50 or 100 fourth instar larvae of *Aedes* species were given as prey in a 500 ml beaker for 24 h and the number of prey killed / eaten was noted. 10 replicates were made for each prey density with or without predators (control) separately. Using the same predator individual, the rate of predation was observed for five consecutive days. The prey density was set to same value after every 24 h. The data obtained on predation were put to the following equation to calculate the predatory impact (Aditya et al., 2006).

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PI = \frac{PE}{T}
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where, PI – Predatory Impact (nos. of prey larvae per day), PE – Number of prey eaten / killed and T – Time in days (5)
Results and Discussion

A single fourth stage larva of *T. splendens* consumed $32 \pm 1.28$ to $40 \pm 1.49$ prey larvae per day depending on the prey density. When the prey density was 50, a total of $126 \pm 3.14$ prey larvae were consumed in five days. A total of $178 \pm 2.08$ prey larvae were consumed in five days when the prey density was 100. Further, the rate of predation also varied between the days significantly. It was also observed that no single prey larva died in the control group. The predatory impact (PI) values for *T. splendens* ranged between 26.34 and 30.52 larvae per day at a prey density of 50 and the PI values were between 36.82 and 40.57 larvae per day at a prey density of 100.

Choochote et al. (2002) demonstrated that the fourth stage larvae of *T. splendens* consumed an average of $61.30 \pm 10.62$ *Aedes togoi* larvae as prey. Aditya et al. (2006) evaluated the predatory potential of the larvae of *T. splendens*. They observed that a single fourth instar larvae of *T. splendens* consumed the prey larvae of *Culex quinquefasciatus* at the rate of 34 larvae per day depending on the prey and predator densities. Further, they demonstrated the predatory impact (PI) value ranged between 7.0 and 11.0 larvae per day. Wijesinghe et al. (2009) observed that the mature larvae of *T. splendens* consumed an average of $58.0 \pm 6.43$ larvae of *Aedes aegypti* as prey. Nyamah et al. (2011) demonstrated the efficacy of *T. splendens* as a biocontrol agent against *Aedes albopictus* larvae. Further they reported that there was a negative correlation between *Aedes albopictus* larval population and *T. splendens* larval population in ovitraps placed in the study area. Based on the results, it is evident that the larvae of *T. splendens* consumed a good numbers of larvae of *Aedes* species. Variation in consumption rate by the larvae to *T. splendens* between the days can be attributed to its development characteristics. As a fourth instar larvae of *T. splendens* proceeds pupation, the predation rate drops. The duration of fourth instar larva of *T. splendens* lasted for 5 days till pupation. However, certain general rules guide the pattern of arthropod predation related to body size, prey density and other factors pertaining to the biology of predators. Field evaluation on the predation in respect to varied prey types, space availability and habitat variation would prove the efficiency of *T. splendens* as predators of mosquito larva more appropriately. (Collins and Blackwell, 2000).

Summary

In this study, the predatory potential of larvae of *T. splendens* was assessed using the larvae of *Aedes* sp. Based on the results, it was concluded that single fourth stage larvae of *T. splendens* consumed $32 \pm 1.28$ to $40 \pm 1.49$ prey larvae per day depending on the prey density. The predatory impact (PI) values of *T. splendens* were between 26.34 and 30.52 larvae per day and between 36.82 and 40.57 larvae per day at a prey density of 50 and 100, respectively. Since, the larvae of *T. splendens* has high predatory potential, it could be used as an effective tool for mosquitoes control programme.

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References


