

Abstract/Synopsis

Studies on the life history of mosquitoes reveal crucial features related to the demography that contributes to the understanding of the mosquito borne diseases. Environment induced variations in the life history traits and strategies can be deciphered through experimental and field studies using different immature and adult stages of mosquitoes. Life history traits and strategies serve as indicators of fitness and adaptation of mosquitoes thriving under heterogeneous environmental conditions. In view of these propositions, the variations in larval development and life history parameters of the mosquito *Aedes (Stegomyia) aegypti* (Linnaeus 1781) of Kolkata, India, were evaluated, to comment on the biology and augment strategies for vector management to reduce the incidence of dengue.

Field sampling of the larval habitats revealed that immature productivity of *Ae. aegypti* and *Ae. albopictus* varied with season and the habitat type and the relative abundance was high during monsoon and post-monsoon season. Body weight of individual pupa varied with the relative density of immature in the habitats. Significant correlations were observed in the life history traits viz. Age at pupation, pupal weight, day of eclosion, longevity adult dry weight, wing length, tarsal length, length of VII abdominal length, fecundity and nutrient reserves, which are suggestive of existence of trade offs that shapes the population of *Aedes aegypti* and balances the fitness levels to combat the environmental uncertainty. The degree of sexual dimorphism was prominent in all the life history traits considered. Comparative data on the life history traits indicate that *Ae. aegypti* requires more time for completion of larval development and yield bigger adults compared to *Ae. albopictus* that grows faster and yields smaller sized individuals with reduced longevity.

Amount of food, initial rearing density of larva and temperature influenced the life history traits of *Ae. aegypti* significantly, indicating plasticity in response to environmental factors. Increase in food amount reduced intraspecific competition resulting in adults with bigger size and extended longevity. Low (18°C) and high temperature (33°C) resulted in respectively in slow and fast development of larva. The larvae of *Aedes aegypti* exhibited differential reaction norms against the environmental factors like food amount, density and temperature expressing phenotypic plasticity in the life history traits. The life history traits considered varied between the males and females significantly indicating that *Ae. aegypti* exhibits sex specific reaction norms. The life table characteristics of immature *Ae. aegypti* varied seasonally under the laboratory conditions, indicating that environmental factors influence the larval development and the resultant fitness of adults. Adults reared with blood and sugar exhibited lower fitness in terms of fecundity, in contrast to individuals fed with blood only.

The present study was a primary effort towards the understanding of the biodemography of any vector mosquito species from India, incorporating the essentials of the life history theory. The results suggest that variation in the life history traits of *Ae. aegypti* can be considered as adaptive phenotypic plasticity incrementing its fitness in correspondence with the environmental conditions. The assessment of the different life history traits and their variation can be utilised in forecasting the population levels of *Ae. aegypti* and its contribution in disease transmission as well as in framing the control strategies with precision. The link between the household wastes and persistence of dengue vectors including *Ae. aegypti* was established as a pioneer effort and calls for improvement of the existing solid waste management regime of Kolkata, and other similar places of India.