

## **Impact of the *Achyranthes aspera* (Amaranthaceae) Extracts on the Survival and Histological Architecture of the Midgut Epithelial Tissue of Early Fourth Instars of *Aedes aegypti* (Diptera: Culicidae)**

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**Abstract :** *Aedes aegypti* L. is one of the most important insect vectors in the world transmitting several diseases of concern; dengue fever, dengue haemorrhagic fever and yellow fever. Though since ages the control of dengue vector is primarily relied upon the use of synthetic chemical insecticides, the continued and indiscriminate use of insecticides for their control has received wide public apprehension because of multifarious problems including insecticide resistance, resurgence of pest species, environmental pollution, toxic hazards to humans and non-target organisms. These problems have necessitated the need to explore and develop alternative strategies using eco-friendly and bio-degradable plant products. Bio-insecticides, despite being the focus of research nowadays, have not been investigated much regarding their physiological effects on the mosquitoes. Thus, the present studies were carried out to investigate the anti-mosquito potential of the leaf and stem hexane extracts of *Achyranthes aspera* against early fourth instars of *Aedes aegypti* L and their effects on the histological architecture of their midgut. The larvicidal bioassays conducted with the *A. aspera* leaf hexane extracts revealed the respective LC<sub>30</sub>, LC<sub>50</sub> and LC<sub>90</sub> values of 66.545 ppm, 82.555 ppm, 139.817 ppm while the assays with stem hexane extracts resulted in respective values of 54.982 ppm, 68.133 ppm, 115.075 ppm. The studies clearly indicate the efficacy of extracts as larvicidal agents against *Ae. aegypti*, the stem extracts being found more effective than the leaf extracts. When the larvae assayed with extracts were investigated for the modifications in the histo-architecture of the midgut, the studies showed significant damage, shrinkage, distortion and vacuolization of gut tissues and peritrophic membrane causing disintegration of epithelial cells and cytoplasmic organelles; extent of toxicity and damage varied depending upon the concentration and exposure time period. These changes revealed appreciable stomach poison potential of *A. aspera* extracts against *Ae. aegypti* larvae, which may have also caused adverse impact on the growth and development of larvae. These effects were also found to be more pronounced with the stem extract than the leaf extract. Our findings may prove significant suggesting the use of *A. aspera* extract as a bio-insecticide against early fourth instar larvae of *Ae. aegypti*. Further studies are needed to identify the bioactive component in the extracts and to ascertain the use of component in the fields as anti-mosquito control agent.

**Keywords :** *Achyranthes aspera*, *Aedes aegypti*, histological architecture, larvicidal, midgut, stomach poison

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