

Potential of aquatic carnivorous plants; *Utricularia vulgaris* and *Utricularia reticulata* as biological control agents for the larval stages of dengue vector, *Aedes aegypti*

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Species in the genus *Utricularia* are aquatic carnivorous plants that are known as bladderworts. They have the potential to trap a wide range of prey, causing the prey die due to anoxia. This study was conducted to assess the effectiveness of bladderworts as controlling agents of *Aedes aegypti* larvae. *Utricularia vulgaris* and *U. reticulata* species were collected from natural water bodies in Dankotuwa and Kandy, respectively. The experiment was set with 10 larvae of *Ae. aegypti* (early [i & ii] and late [iii & iv] instars, separately) in 250 mL of water with bladderwort containing approximately 100 bladders. The experiment was repeated 50 times for both plant species to achieve a total sample size of 500 mosquito larvae each from early and late instars. A control test was performed without plant species at each setup. The survival of larvae was recorded daily until death or adult emergence and only the larvae found whole or partially inside the bladders were attributed to predation. The cox-regression and Mantel-Cox log-rank test was used to assess the larval survival probability. The highest predation by both *U. vulgaris* (97.8%; n= 489) and *U. reticulata* (82.8%; n= 414) was observed in early instars. The mortality due to predation by *U. vulgaris* was significantly higher (HR=60.71, CI; 5.69–999.25, $P<0.05$) than *U. reticulata*. The mortality rates of late instars were low in both *U. vulgaris* (82.6%) and *U. reticulata* (74.8%). The highest predacious efficacy was detected from *U. vulgaris* (HR=45.02; CI: 5.96– 850.51, $P<0.05$) even in late instar stages. Overall, >70% of cumulative predation was evident within 72 hours of exposure for early and late instars in both species. Hence, the adults emerge from the breeding site could be minimal. Therefore, *U. vulgaris* and *U. reticulata* can be used as potential bio-control agents for *Ae. aegypti* larvae.

Keywords: *Aedes aegypti*, carnivorous, *Utricularia*, predator, larvae, control