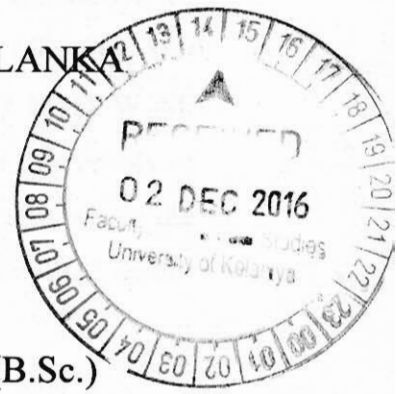


RARE

PERFORMANCE OF *APLOCHEILUS PARVUS* (SUNDARA RAJ,
1916) AND *POECILIA RETICULATA* PETERS, 1859 IN
CONTROLLING ANOPHELINE LARVAE IN RELATION TO THEIR
DIET AND TOLERANCE TO AGRO CHEMICALS IN SOME
SELECTED WATER BODIES IN SRI LANKA



Submitted by

ACHINI WATHSALA FERNANDO (B.Sc.)

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Abstract

Malaria is one of the greatest health problems, responsible for over millions of deaths each year, in many parts of the world. Eradicating malaria requires an understanding of all potential breeding sites. Conventional chemical controlling, due to harmful effects, is less appreciated. An alternative is the use of fish, as biological control agents. Current study identified three previously ignored potential habitats; quarry and brick pits and agro wells, and their mosquito population dynamics were studied. From a desk based study to screen the potential larvivorous fish, two species, *Aplocheilus parvus* and *Poecilia reticulata* were selected for the introduction to said habitats on a pilot scale, at a density of 5 fishm⁻². Quarry and brick pits in Pannala and agro wells in Horowpathana MOH areas were mapped using ARC GIS software. The spatio-temporal variation in malaria and other mosquito larvae were recorded during period of four months before the introduction and for six months after the introduction of fish. Brick pits were not stocked with fish due to floods. The diet composition was estimated using 24 hour gut analysis technique in a brick pit and a reservoir for *A. parvus* and in a canal and a stream for *P. reticulata*. Also, 96 hour acute LC₅₀ was calculated for insecticide Carbosulfan and weedicide Bispyribac Sodium. As results, in total, 41 quarry pits, 38 brick pits and 132 agro wells were mapped. In quarry pits, brick pits and agro wells ten, nine and eight anopheline larvae were identified respectively. *A. parvus* and *P. reticulata* introduction did not result in a significant reduction in mosquitoes in quarry pits and agro wells. Diet of *A. parvus* in the brick pit and the reservoir mainly consisted of adult or larval stages of class Insecta, class Maxillopoda and class Malacostraca. In both habitats, *A. parvus* selectively fed on insect parts and insect larvae. The diet of *P. reticulata* mainly consisted of filamentous algae, diatoms and detritus. The highest number of average food items in the gut for *A. parvus* was detected during mid-day around 1230 hours in the brick pit but no peak feeding time could be identified in reservoir. *P. reticulata* had their peak feeding time around 1200 to 1300 hours in both the habitats. The 96 h acute LC₅₀ value of Bispyribac-Sodium to *A. parvus* and *P. reticulata* were 1.28 mg/L and 2.3686 mg/L respectively. LC₅₀ value of Carbosulfan to *A. parvus* and *P. reticulata* were 0.315 mg/L and 0.028 mg/L respectively. Upsides down, straight, rolling the body against its own axis and body freezing postures and erratic swimming were identified as stress responses. Lamellar fusion, filament and lamellar epithelium proliferations, curling of secondary lamellae, hypoplasia and necrosis in gills were observed in treated fish. The percentage of damaged nuclei in the liver of treated *A. parvus* to Bispyribac Sodium indicated a significantly higher number of damaged nuclei in all treatments except in the lowest concentration when compared with control ($P < 0.005$). *P. reticulata* which was exposed to Carbosulfan resulted in a significantly higher percentage of damaged nuclei in all treatments compared to control group ($P < 0.005$). Native *A. parvus* emerged as a potential biological control agent for mosquitoes; however, ensuring minimum chemical pollution to water bodies will be a prerequisite for sustainable use of fish as biological control agents due to their sensitivity.

Keywords: Anopheline larvae, *Aplocheilus parvus*, Larvivorous fish, Malaria, *Poecilia reticulata*