

Abiotic and Biotic Control of *Argulus sp.* among Goldfish (*Carassius auratus*)

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Abstract

Argulus spp. are branchiuran crustaceans with a direct life cycle, therefore current aquaculture practice with a high density of potential hosts provides ideal conditions for effective transmission of this obligate ectoparasite. Chemicals are usually used to treat parasite infestation of fishes. However chemical treatments result in side-effects including environmental pollution, parasite resistance, alteration of zooplankton ecosystem, changes in certain hematological parameters and contamination of host organs. Thus there is a need for alternative measures to control parasitic diseases in the aquaculture industry. To date, there are no studies reported on biological control of fish lice, in particular the use of Thai silver barb (TSB) (*Pontius gonionotus*) to control *Argulus* population. In this study, the effectiveness of abiotic and biotic control methods for an ectoparasite infestation was examined. Therefore, an abiotic study was designed firstly to examine the effect of water current on parasite abundance and incidence of the fish lice, *Argulus sp.* among captive goldfish (*Carassius auratus*). Secondly, in a biotic study, the effectiveness of using TSB to reduce the parasite number was investigated and thirdly, to compare both the abiotic and biotic control methods in their effectiveness to reduce parasite number. The mean abundance and incidence of the ectoparasite, *Argulus sp.*, on goldfish was measured. In the abiotic study goldfish infected with *Argulus sp.* was mixed with other susceptible goldfish hosts and kept in tanks with fast flowing or stagnant water. There was no difference in the parasite mean abundance and incidence between fast flowing and stagnant water. Thai Silver Barb which is a predator of the *Argulus* was introduced to the parasite infected goldfish for the biotic study. The mean parasite abundance was significantly lowered ($P < 0.05$) after introducing the predator TSB into the tanks. Combination of both control methods did not further improve the effectiveness in reducing *Argulus* population. Hence this study showed that utilizing this method of biotic control among goldfish is definitely a future control solution. This study also showed that water current seemed to reduce *Argulus* transmission and population. The predator effect of TSB was lessened by the fast flowing current. The major finding in this study indicated that TSB was a very effective biological control where with only two TSBs, 96% of *Argulus* was removed in less than 24 hours. The number of TSB used in the biotic control did not affect the predator efficiency. It is suggested that the biological control tested in this study can be used to reduce *Argulus* population among goldfish in aquaculture settings.

Keywords: *Argulus*, biotic and abiotic control, Thai silver barb (TSB), goldfish