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Biological treatment of shrimp pond effluents using macroalgae and bivalves

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Treatment of shrimp pond effluents before release to the environment is essential in other countries, and although not practiced, is a need in Sri Lanka too. The use of biological treatment methods reduces further environmental problems from chemical treatments.

The present study investigated the use of macro algae species in treating waste water from pond effluents, as used in other countries for the same purpose. The selected species was *Gracillaria edulis* as it was readily available and is adapted to the conditions of the area. Trials were carried out using two methods. In the first, *Gracillaria* was used directly in effluent collection ponds and in the second, bivalves, *Crassostrea madrasensis* and *Meretrix meretrix* were used in the effluent collection ponds; while *Gracillaria* was used in the canals leading out of the effluent collection ponds. Effluents were retained for 24 hours in the collection pond before being sent to the discharge canal containing *Gracillaria.*

The results indicated that when *Gracillaria* was used directly in the treatment ponds the survival of the species was low (survival rate 12 20 %). When the results were compared using ANOVA no significant difference was observed ($p < 0.05$) in the nutrient levels entering and leaving the collection pond. However, the effluents after the bivalve treatment showed no significant difference with respect to nutrient levels but, showed a reduction of nitrogen compounds after the *Gracillaria* treatment at the end of the canal at the discharge point, which was not significant statistically ($p < 0.05$) when analysed using ANOVA. The survival of *Gracillaria* improved (up to 50%) when used in the canals originating from the effluent retention pond. The level of total suspended solids showed a significant difference ($p > 0.05$) in effluents entering and leaving the effluent retention tank in both experiments (using *Gracillaria* or molluscs in the retention tank). This could be the result of the sedimentation of suspended particles during the retention period and utilization of suspended particles by the molluscs.

The study concluded that the use of *Gracillaria* alone in effluent retention ponds is not suitable for treatment of shrimp pond effluents. However an integrated treatment system using bivalves and *Gracillaria* can be used to treat shrimp pond effluents to reduce the suspended particles and nutrients prior to release to the environment.

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