COMPARISONS OF SOLIDS AND OXYGEN DEMAND REDUCTION IN SHRIMP CULTURE WASTEWATER TREATMENTS WITH AND WITHOUT WATER HYACINTH

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ABSTRACT

Shrimp aquaculture pond effluent is known to be high in suspended solids and nutrients. To reduce environmental pollution, shrimp wastewater is channeled into sedimentation ponds for treatment before discharge. Since water hyacinth is commonly used to treat animal farm wastewater, this study aimed to compare solids and BOD\textsubscript{5} reduction of sedimentation pond with and without water hyacinth. Fiberglass tanks were setup outdoor in triplicates at a commercial shrimp farm. The tanks were filled with fresh effluent from pond during harvesting. Water hyacinth was placed in three of the tanks (WH) and the other three tanks were without water hyacinth (WWH). The experiment was conducted for 76 hours. Results showed that temperature were more variable in WWH treatment than in WH treatment. pH in WWH treatment were mostly above 8 whereas in that in WH treatment were between 7-8. In WH treatment, TSS reduced from 125 to 11 mg/L but in WWH treatment, the decrease was significantly less, that is, from 124 to 34 mg/L. For BOD\textsubscript{5}, in the WH treatment, the reduction was 70% but in WWH treatment, there was an increase of 10%. This study shows that shrimp effluent treated with water hyacinth has significantly better water quality in terms of TSS and BOD\textsubscript{5} than that without water hyacinth.

INTRODUCTION

Shrimp culture is an important aquaculture industry as capture fisheries product is not able to meet the demand of the growing world population. However, one of the issues of shrimp farming is the environmental impact of pollution loads from shrimp pond wastewater. Nyanti et al. (2002a) reported that shrimp farm discharged 93 kg/ha of BOD\textsubscript{5}. TSS and BOD\textsubscript{5} of shrimp ponds in Sarawak were monitored from the beginning to harvesting and the range were reported to be 1.8-147.0 mg/L and 1.8-26.2 mg/L respectively (Nyanti et al., 2002b). Major impacts of shrimp pond effluent were reported to be eutrophication, silting, oxygen depletion, and toxicity from sulfide, ammonia, and other chemicals used in shrimp cultivation (Senarath and Visvanathan, 2001). Furthermore, high organic load increases the oxygen demand in water bodies, and eventually reduces the oxygen in the water which results in ecological stress on aquatic organisms. Therefore, shrimp farm wastewater has to be treated before discharge. A common practice is channeling the wastewater into sedimentation ponds before discharge. Nyanti et al. (2002a) reported TSS and BOD\textsubscript{5} improved 55% and 45% respectively after 16 hours of retention in sedimentation pond. Since water hyacinth is commonly used to treat animal farm wastewater (Costa et al., 2000; Sooknah and...