Water Quality Of Shrimp Pond Water During Harvesting

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ABSTRACT

Shrimp farming is an important source of revenue for Sarawak. Shrimp farms are usually located at the estuary utilizing brackish water for the growth of shrimps. Due to the excess feed and feces accumulation over the culture period, pond water had to be drained and the pond bottom cleaned during harvesting before the next cycle of culture could begin. It is important to study the quality of the pond water during discharge so that the effluent can be properly managed and nutrient recovered. This study was conducted in a commercial shrimp farm whereby water quality of the effluent was monitored in the outflow drain during harvesting. Results show that turbidity increased from 51 to 92 NTU during draining. Dissolved oxygen was below the minimum recommended for aquatic organism (5 mg/L). Mean total ammonia-nitrogen exceeded 1 mg/L and ortho-phosphorus was 0.06 mg/L. The final portion of the effluent water was the highest in turbidity, nitrate-N, ammonia-nitrogen and ortho-phosphorus. It is recommended that nutrients in the effluent be recovered to avoid polluting the environment and replenish the depleting supply from natural source.

Keywords: water quality; shrimp farm effluent; turbidity; ammonia; phosphorus

INTRODUCTION

Aquaculture is a solution to the increasing need of fisheries products of the world population as capture fisheries is unable to meet the demand (Costa-Pierce, 2002). Shrimp aquaculture flourished in Malaysia as in other parts of the Asia due to available clean water resources, ready market and high profit. Intensive shrimp aquaculture has been reported to bring negative impact on the environment. Among the impacts are excessive nitrogen, phosphorus, suspended particles which lead to eutrophication in the receiving surface water as reported in Sri Lanka and Australia (Senarath and Visvanathan, 2001; Costanzo et al., 2004) and threat of the rich biodiversity in the Gulf of California (Paez-Osuna, 2003). In addition, the polluted water could lead to shrimp disease outbreak which resulted in heavy loss and collapse of the industry as occurred in Sri Lanka (Senarath and Visvanathan, 2001). For Sarawak, high concentrations of Chl-a, ammonia-nitrogen and reactive phosphorus has been observed in surface water near shrimp farming site (Ling et al., 2010). As for the world nutrient scenario, Cordell et al. (2009) reported on the looming reality of depleting phosphate reserves in the rock. Thus, it is important to study the effluent quality for shrimp farms locally as a step towards nutrient recovery and sustainable shrimp aquaculture. The objective of this study was to investigate the water quality of effluent during harvesting of shrimp pond.

MATERIALS AND METHODS

This study was conducted at a commercial shrimp farm that cultures predominantly *penaeus monodon* in Kuching, Sarawak. The stocking density of the pond was 32 PL/m^2 and the culture period was 163 days. During full harvesting, the gate was opened and water was discharged into a drain and water sampling was conducted at the drain. Water quality parameters studied were both *in-situ* and *ex-situ* at three different times at one hour interval beginning with pond draining. *In-situ* parameters