A STUDY ON

NUTRIENT AND TOXIC METABOLITE LOADINGS FROM SHRIMP PONDS TO THE ENVIRONMENT.

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ABSTRACT

Present study investigates the nutrient loading (in terms of nitrate and phosphate), toxic metabolite loadings (in terms of nitrite, ammonia and sulphide), suspended solids (TSS), dissolved solids (DS) and Biochemical Oxygen Demand (BOD) from the shrimp ponds, culturing the tiger shrimp *Penaeus monodon* under the semi-intensive culture method. The stocking density of the ponds study ponds were 5 - 6 PL m^{-2} and the Food Conversion Rate (FCR) was found to be 1.42:1.

The total loadings during one culture cycle to the environment were found to be 10.33 kg ha^{-1} nitrate, 16.56 kg ha^{-1} phosphate with respect to nutrients and 0.82 kg ha^{-1} of nitrite, 22.02 kg ha^{-1} of ammonia, and 9.33 kg ha^{-1} of sulphide with respect to toxic metabolites. The suspended and dissolved solid loadings were 19,515.30 kg ha^{-1} and 145,945.88 kg ha^{-1} respectively. The BOD loading to the environment was 322.26 kg ha^{-1}.

During the analysis of effluent, through out the culture period, it was found that the concentration of nitrate varied between 0.2577 mg l^{-1} to 0.860 mg l^{-1}, concentration of phosphate varied between 0.216 mg l^{-1} and 0.742 mg l^{-1}, concentration of nitrite varied between 0.0295 mg l^{-1} and 0.0136 mg l^{-1}, concentration of ammonia ranged from 0.262 mg l^{-1} to 3.802 mg l^{-1}, concentration of sulphide ranged from 0.156 mg l^{-1} to 0.76 mg l^{-1}. Suspended solids concentration varied between 324.3 mg l^{-1} and 3144.5 mg l^{-1}, dissolved solids concentration varied between 20.281 g l^{-1} and 37.017 g l^{-1}. BOD concentration varied between 7.0 mg l^{-1} and 44.0 mg l^{-1}.

Significant correlations were found between intake and effluent water quality for nitrate, ammonia, sulphide, BOD, total suspended solids and dissolved solids. Also phosphate, nitrite, suspended solids and dissolved solids further showed positive correlation between time (culture period) and loadings. Statistically significant increase between the buildup of first half and second half of the culture period was evident for nitrate, nitrite and dissolved solids.

Although the interaction between aquaculture and the environment involves many issues those fall into two categories; the output and consumption of products by the culture practices, and the impact that those products have on the physical and biological environment. It is widely acknowledged that the nutrient and organic wastes influence the quality and quantity of effluent discharged from shrimp farms and the subsequent impact on the external environment. It was evident from the study that the existing effluent discharge standards promulgated under Environmental Legislations are not effective to control effluent quality of shrimp farms situated in large numbers or their cumulative impacts. eg. in the vicinity of the Dutch Canal.

The study showed that effluent water quality trend to deteriorate through the grow out period as feeding rates increases with shrimp size and biomass. Study also shows that highest quantities and poorest quality of effluent are found during and before harvest time. It was also evident from the study that the intake water quality from the Dutch Canal is sub optimal for shrimp culture. In this regard in order to improve the water quality dredging and increase of opening between Dutch canal and the sea for greater mixing need to be implemented.

From the study it is concluded that treatment of effluent from shrimp ponds should be imposed as part of the environmental protection measure in order to safeguard the shrimp industry from any further catastrophes, which can caused by its own actions.