Efficiency of Water Recirculating-Treatment Pond in an Ecological Balancing Black Tiger Shrimp (*Penaeus monodon* Fabricius) Farm

Jamaree Rakbangleam  
Marine Shrimp Culture Research Institute. Ladyao, Chatuchak, Bangkok 10900

Putth Songsangjinda  
Coastal Aquaculture Research Institute. Kaorubchang, Muang District, Songkhla 90000

ABSTRACT

The objective of this study was to evaluate the qualitative changing of water in shrimp culture and water treatment ponds of the farm using ecological balancing culture system. This farm had the culture pond size of 2400 m² and 2 small water treatment ponds size of 960 and 801 m². A Sea Grape (seaweeds: *Caulerpa lentillifera*) and fishes were used as biological treatment organisms in the treatment ponds.

The results showed that the system with a stocking density 41 PL/m² could be operated for 133 days of culture with a shrimp production of 933 kg/rai (equal to 5.83 t/ha), size of 88 shrimp/kg, survival rate of 75.6%, FCR of 1.6, and average daily growth of about 0.09 g/d. Water qualities were found to vary together with increasing the day of culture. The average values of salinity, water temperature, pH, dissolved oxygen, alkalinity, nitrite, nitrate, dissolved inorganic phosphorus and BOD were similar between water sampled from the locations before and after water treatment ponds and showed non-significantly different (p> 0.05) between the two locations. On the other hand, the average values of total ammonia nitrogen at the locations before and after water treatment ponds (0.059 and 0.26 mgN/l.), particulate organic nitrogen (0.326 and 0.61 mgN/l.), particulate organic carbon (4.13 and 1.61 mgC/l.), total suspended solid (176.3 and 36.2 mg/l.) and Chlorophyll a (49.1 and 11.4 µg/l.) showed significantly differences (p<0.05). The average removal efficiency of these significant water quality parameters were 0.298 mgN/m²/d for total ammonia nitrogen, 0.34 mgN/m²/d for particulate organic nitrogen, 2.50 mgN/m²/d for particulate organic carbon, 149.3 mgN/m²/d for total suspended solid and 38.39 µgN/m²/d for chlorophyll a of the pond water after flow pass through water treatment ponds.

The results of this study suggest that the water treatment pond using Sea Grape and fishes as biological treatment organisms has an efficiency to remove particularly the suspended solid, nutrients bound in the suspended particulate matter and the phytoplankton cell (indicates as Chlorophyll a) in the pond water. This system demonstrates an advantage to use as alternative black tiger shrimp culture method for shrimp farm which is located in the environmental degraded culture area.

Keywords: Efficiency, Water treatment pond, Black tiger shrimp, Water quality