

LOADING OF SOLIDS AND NUTRIENTS FROM PRAWN POND SLUDGE UNDER SIMULATED RAIN

Ling Teck Yee, Kheirulnizam Abdul Rahim & Lee Nyanti

Faculty of Resource Science and Technology
Universiti Malaysia Sarawak
94300 Kota Samarahan Sarawak
E-mail: tyling@frst.unimas.my

INTRODUCTION

Shrimp culture is a lucrative industry in Malaysia with total export of 3296 metric tons of tiger prawns with a value of 75 million ringgit in the first half of 2004 (LKIM, 2006). Natural conditions in Sarawak are all favorable for the development of shrimp farming. However, shrimp farming is also associated with pollution (Paez-Osuna *et al.*, 2003; Primavera, 2006). One of the sources of pollution is the sludge from the earthen ponds that has to be removed after each production cycle. Sludge is reported to be rich in nutrients and organic matter (Masuda & Boyd, 1994). It could be used as fertilizer or just disposed off on land. However, there is a lack of information on the contributions of solids and nutrients from disposed sludge through surface runoff during rainfall events. Therefore, the objective of this study was to investigate the loading of runoff from soil plots applied with prawn pond sludge.

MATERIALS AND METHODS

The sludge was collected from the middle of the shrimp aquaculture ponds of Lembaga Kemajuan Ikan Malaysia at Telaga Air two days after harvesting. About 21 kg of sludge was applied on the plots covering an area of 2 m x 3 m. A rainfall simulator (Tlaloc 3000, Joern's Inc., USA) (Franklin *et al.*, 2006) was used to produce rain on the rained plots. The simulator consisted of ½ HH-SS 50WSQ nozzle and solenoid, pressure gauge, and pressure regulator. The nozzle of the rainfall simulator was located 250 cm from the ground to achieve terminal velocity. Tap water used was stored in a 520 L fiberglass tank and pumped to the rainfall simulator. Three plots (3 m x 4 m) were setup for each rainfall duration of 4, 8 and 12 minutes with intensity of 73 mm/h. In addition, control plots were setup where no sludge was applied. The simulated rain was carried out in January 2006. Runoff from plots were collected and analyzed for total suspended solids (TSS), biochemical oxygen demand (BOD₅), ammonia-nitrogen (AN), nitrite-nitrogen (NO₂-N), nitrate-nitrogen (NO₃-N), and orthophosphorus (PO₄-P). TSS and BOD₅ were analyzed according to Standard Methods (APHA, 1998). AN, NO₂-N, NO₃-N, and PO₄ were determined using Nessler method, Cadmium Reduction method, Diazotization method and Ascorbic Acid method respectively (Hach, 1996). Statistical analysis was done using SPSS Ver. 11.01. Loading difference was computed according to equation 1 expressed as

$$L = \frac{R(C_a - C_c)}{A} \quad [1]$$

where L is loading difference between plot applied with sludge and control (mg/m²), R is runoff volume (L), C_a is concentration of solids or nutrients (mg/L) in