Assessment of aeration pond operation in a constructed wetland receiving high nitrogen content wastewater from livestock area

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ABSTRACT

This study was performed to assess the operation conditions in the aeration pond (AP) of the surface flow constructed wetland (CW). The AP was employed to provide oxygen supply to the CW at alternating 3 h on and off. Batch test and prototype lab-scale test experiments were conducted in the laboratory to determine oxygen transfer coefficient ($K_L \alpha$) and oxygen consumption rate ($q_{O2 \cdot C}$) values using samples from the AP. Field test monitoring was also performed to determine the water quality changes in the AP. Based on the field test monitoring, the effluent DO from the AP was increased by almost 20% due to the aeration. The $K_L \alpha$ and $q_{O2 \cdot C}$ values obtained from the field tests were relatively higher in comparison with the values reported from other wastewater treatment technologies signified an increase in oxygen transfer in the AP. Findings showed that the AP is operating with high $K_L \alpha$ and low $q_{O2 \cdot C}$ which resulted to high cost in aeration system operation. Consequently, it is suggested that non-aeration time could be increased more than the aeration operation time of 3 h.

Keywords: Aeration time; Constructed wetland; Livestock wastewater; Oxygen consumption rate; Oxygen transfer coefficient

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