Effect Of Plant and Baffle on Ammoniacal Nitrogen and Orthophosphate Removals from Aquaculture Effluent by Oil Palm Shell-based Constructed Wetlands

ABSTRACT

Although constructed wetland has been used to treat freshwater aquaculture effluent, there were data gaps on the applications of ornamental plant and baffle on its treatment performance. The objectives of this work were to study the application of ornamental plant baffle on the removal performances of ammoniacal nitrogen (AN) and orthophosphate (OP). Four lab-scale oil palm shell based constructed wetland units, namely, BC (baffle applied, Canna austria planted), C (Canna austria planted), T (Typha angustifolia planted) and U (unplanted as control) were experimented outdoor under actual tropical condition for a continuous 180 days with the hydraulic retention time of five days to treat AN and OP in freshwater aquaculture effluent. The mean AN and OP removals by the BC, C, T and U were 98.82%, 98.63%, 98.62% and 66.12%, and 99.01%, 98.47%, 98.37% and 83.40%, respectively. Although there was no significant difference ($p > 0.05$) in the C and T removal performances, both C and T significantly ($p < 0.05$) outperformed U. The insertion of baffle extended the flow path in BC and enhanced its removal performances significantly ($p < 0.05$) compared to C. Thus, it can be concluded that although baffle insertion and plant presence enhanced the removal performances, ornamental and common emergent constructed wetland plants both performed equally well. These findings indicated potential cosmetic and performance enhancement in future constructed wetland.