

Treatment of Domestic Wastewater by a Combined Constructed Wetland System

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Abstract

Laboratory scale combined constructed wetland system composed of a subsurface vertical flow unit connected to a floating macrophyte unit was used to treat domestic wastewater. Hydraulic loading rates (HLR) of 5 and 8 cm/day were operated to evaluate the efficiencies of the system. *Canna*(*Canna indica* Linn.) was planted in a subsurface vertical flow unit and *Lettuce*(*Pistia stratiotes* L.) was planted in a floating macrophyte unit. Domestic wastewater from Chiang Mai University campus was fed to each unit with every 7 hours for 1 hour. The removal efficiencies for COD, TKN, $\text{NH}_4^+\text{-N}$, SS and TP were dependent on the hydraulic loading rates and the removal efficiency was higher at lower HLR due to longer retention time. Mass removal rate for COD, TKN, $\text{NH}_4^+\text{-N}$, TP and SS were 5.0, 0.38, 0.32, 0.02 and 9.7 $\text{g/m}^2\text{.day}$, respectively at HLR of 8 cm/d. For HLR of 5 cm/day the mass removal rate for COD, TKN, $\text{NH}_4^+\text{-N}$, TP and SS were 3.7, 0.33, 0.21, 0.015 and 5.3 $\text{g/m}^2\text{.day}$, respectively.

Keywords: combined constructed wetlands, domestic wastewater, floating macrophyte, removal rate, subsurface vertical flow.