



Afr. J. Agric. Res.

[Vol. 2 No.4](#)

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African Journal of Agricultural Research Vol. 2(4), pp. 191-199, April, 2007
ISSN 1991- 637X© 2007 Academic Journals

Full Length Research Paper

Application of para-wood charcoal as the media of the vertical-flow constructed wetland for treatment of domestic wastewater

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Accepted 26 February, 2007

Abstract

The research aimed to observe the efficiency of vertical flow constructed wetland (VFCW) system using Para-wood charcoal as the media and *Typha* sp. as the cultivating plant to treat domestic wastewater. The removal efficiency was increased with the increase of HRT or decrease of hydraulic loading. And the size of Para-wood charcoal media (1, 3 and 5 cm in diameter) did not show any effect to the system efficiency under the lowest hydraulic loading of 0.05 m³/m²d. The microbial degradation of organic matter was promoted by the activity of the cultivated plant (*Typha* sp.) due to the transferring of oxygen from the atmosphere to the root system of cultivated plant. Nitrogen and phosphorus compounds of the wastewater were assimilated into the cultivated plant tissue with the highest level as 1.34 – 1.51 and 0.12 – 0.15 g/100 g plant tissue with the lowest plant-growth rate of 1.42 – 2.0 kg/m² under the lowest hydraulic loading of 0.05 m³/m²d. Para-wood charcoal was most suitable for using as the media due to the low reduction of infiltration rate of only 1.4% after 3 months operation. However, this VFCW system with small size media (1.5 cm in diameter) at lowest hydraulic loading of 0.05 m³/m²d showed the highest biological oxygen demand (BOD₅), total nitrogen (TN), total phosphate (TP) and suspended solids (SS) removal efficiencies of 95.5 ± 1.7, 92.1 ± 2.3, 95.5 ± 2.7 and 94.5 ± 1.6%, respectively.

Key words: Constructed wetlands, vertical flow, para-wood charcoal, *Typha* sp., domestic wastewater.

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