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Kinetic And Hydrodynamic Study Of Horizontal Subsurface Flow Constructed Wetlands Under Tropical Conditions.

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Extended Abstract

Constructed wetlands technology is widely used for wastewater treatment technology. However, some design criteria still need to be adjusted, especially in the context of tropical regions. Behavior hydrodynamic of horizontal subsurface flow constructed wetlands in environmental conditions of the northern Colombian was studied. Kinetics degradation constants of COD, NH_4-N, and PO_4-P were calculated using two horizontal subsurface flow constructed wetlands (HSSF CW) pilot scales were used. One of these units was planted with *Echinochloa colonum* and another unplanted unit worked like a control. Both units operated continuously with a flow of 30 Ld^{-1}. Residence Time Distribution (RTD) tracer curves were made applying the Li pulse method. The volumetric (K_v) and area (K_A) kinetic constants were calculated based on hydraulic models plug-flow reactor (PFR), stirred tank reactor (STR), and dispersion plug-flow (DPF) using both traditional and KC* methods. Hydraulic Retention Time (HRT) was 3.95 d for the planted unit and 4.14 d for the unplanted units. The hydraulic behavior of wetlands was adjusted to STR reactors. The removal efficiencies obtained in the planted wetland for COD, NH_4-N, and PO_4^{3-} were 88%, 80%, and 79% respectively, while for the non-planted system were 81%, 74 %, and 60%, respectively. K_A and K_v values were affected by temperature and evapotranspiration phenomena with values between 0.06 and 0.8 with K-C model; and 0.09-1.5 with K-C* model. These results suggest that the used kinetic models to calculate the area based on the kinetic reaction rate constant (k) must consider the type of contaminant and specific local environmental conditions.

Keywords: HRT, kinetic constants, evapotranspiration, efficiency