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SFS-H PHYTOTREATMENT OXI-NITRO RATE TESTED IN STEADY-STATE ON ENGINEERING-UNIBO PILOT PLANT

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Abstract

Natural wastewater treatment systems can represent a smart solution in small communities (50-2000 Population Equivalent) as they are very low-cost technologies in terms of energy consumption and maintenance. Moreover, those systems could be implemented as clean processes for wastewater reuse in the frame of circular economy applications. In this context the present study examines the main features of Subsurface Flow System - horizontal (SFS-H) phyto-treatment process. To this aim a pilot plant was built at University of Bologna in School of Engineering campus. The plant was equipped with an inlet water storage tank and two SFS-H tanks in parallel. Tanks are filled with the same sand/gravel medium while only one is equipped by *Phragmites australis*, commonly used in phyto-treatment applications. The study was developed in two main phases: firstly, we analysed the hydraulic behaviours, Hydraulic Retention Time (HRT) and conductivity, in steady state conditions and secondly, we focused on the treatment capacity in various HRT conditions. Measurement campaigns were conducted over around one year in order to compare Summer and Winter conditions. Results show an interesting ammonium removal efficiency (66%) when HRT is 30h, also in worst weather conditions during winter. Finally, we evaluated organic matter and nitrogen compounds removal capacity comparing the Oxygen Consumption Rate (OCR) with similar pilot treatment plants in wetland literature. OCR values result consistent, anyway we noted that they are strongly influenced by initial transitory time (around 3h).

Key words: irrigation, nitrification, SFS-H phyto-treatment, small plants, wastewater reuse

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