

Constructed Wetlands: A Sustainable Approach for Waste Water Treatment

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Abstract : In the last decade, the hunt for cost-effective, eco-friendly and energy sustainable technologies for waste water treatment are gaining much attention due to emerging water crisis and rapidly depleting existing water reservoirs all over the world. In this scenario, constructed wetland being a “green technology” could be a reliable mean for waste water treatment especially in small communities due to cost-effectiveness, ease in management, less energy consumption and sludge production. Therefore, a low cost, lab-scale sub-surface flow hybrid constructed wetland (SS-HCW) was established for domestic waste water treatment. It was observed that not only the presence but also choice of suitable vegetation along with hydraulic retention time (HRT) are key intervening ingredients which directly influence pollutant removals in constructed wetlands. Another important aspect of vegetation is that it may facilitate microbial attachment in rhizosphere, thus promote biofilm formation via microbial interactions. The major factors that influence initial aggregation and subsequent biofilm formation i.e. divalent cations (Ca^{2+}) and extra cellular DNA (eDNA) were also studied in detail. The presence of Ca^{2+} in constructed wetland demonstrate superior performances in terms of effluent quality, i.e BOD₅, COD, TDS, TSS, and PO_4^- than in absence of Ca^{2+} . Finally, light and scanning electron microscopies coupled with EDS were carried out to get more insights into the mechanics of biofilm formation with or without Ca addition. Therefore, the same strategy can be implemented in other waste water treatment technologies.

Keywords : hybrid constructed wetland, biofilm formation, waste water treatment, waste water

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