Decentralized two stage vertical flow constructed wetland system for single household

Anant Yadav[1], Florent Chazarenc[2] and Srikanth Mutnuri[1]

1Applied Environmental Biotechnology Laboratory, Dept of Biological Sciences, BITS Pilani K.K. Birla Goa campus NH 17B Bypass Road, Zuarinagar, Sancoale, Goa 403726, India
Email: srikanth@goa.bits-pilani.ac.in, srikanth.mutnuri@gmail.com

2 L'UNAM Université, Ecole des Mines de Nantes, CNRS, GEPEA UMR 6144, 4 rue Alfred Kastler, BP 20722, F-44307 Nantes, France. Email : florent.chazarenc@mines-nantes.fr

Abstract

The aim of our project was to develop a 2 stage vertical flow constructed wetland (VFCW) system to treat raw household effluent in India. The 1st stage VFCW was divided into three cells and the 2nd stage was divided into two cells. The aim was to feed the system with alternating feeding and resting time (based on the French Approach). The surface area of 1st VFCW was of 1 m^2/PE and that of 2nd Stage VFCW was of 0.5 m^2/PE. The wetland plant species selected for growing in constructed wetland was *Typha angustata;* as it is the most prominent species growing in natural wetland of Goa. The wastewater was fed in stage 1 using three batches of 600 L per day and then collected in a tank and pumped on to stage 2. Wastewater was fed 1st day on the first cell, 2nd day in second cell and 3rd day in third cell of 1st stage VFCW; this is repeated in a cycle for the whole working period for both the stages. This would increase the time for the digestion of organic material in each column.
The system was commissioned on 4th April 2015. The sampling was done twice a month for a period of six month starting form 1st week of May till December 2015. The parameters analyzed were Chemical Oxygen Demand (COD), Biological Oxygen Demand (BOD), Total Dissolved Solids (TDS), Total volatile solids (TVS), Total Nitrogen (TN), and Ammoniacal nitrogen (AN). The removal of COD, BOD, TDS,TVS, TN and AN at 1st stage was 64%, 65%, 34%, 54 %, 15 % and 21 % and for the 2 stage reactor it is 90%, 88%, 58%, 71%, 50% and 52% respectively on an average. The performance of the constructed wetlands will be discussed during the conference along with the way the system has been operated and the different optimization tested.