ABSTRACT

Water pollution has become an important concern due to the shortage of water resources in Pakistan for the last few years. Among industries, tanneries contribute the major proportion of this pollution load. Floating Wetland System (FWS) is a promising technology that utilizes the concept of phytoremediation for the treatment of waste water. It uses the interaction of plants and microbes to take up the contaminants from their surrounding environment. A FWS, planted with *Eichhornia crassipes* was prepared for the removal of chromium from synthetic wastewater, including control and treatments applied in replicate. Control was fed with tap water whereas tap water was contaminated with 2mg/L of chromium (Cr) in the treatments. A six days experiment, with regular sampling of treated effluent on daily basis, was done. Atomic Absorption Spectrophotometry (AAS) was used to assess the concentration of chromium in treated effluent. Results showed the steady removal of chromium throughout the week. The concentration of chromium was recorded as 0.805 mg/L and 0.990 mg/L in the samples collected on Day 7 (144 hours) from treatment 1 (B) and treatment 2 (C), respectively. The maximum removal percentage of chromium was found to be comparatively more in treatment 1 (60%) than in treatment 2 (50.5%) that signifies the efficient metal uptake by the selected plant species. Microbial Fuel Cell (MFC) was also incorporated in the FWS with a vertical distance of 0.25 meters in between the electrodes. The current density (CD) and power density (PD) consistently increase up to 96 hours, and maximum level of CD was recorded as 0.156 mA/m^2 whereas maximum PD was recorded as 0.626 mW/m^2. Later on, decrease in the generation of current and power was observed due to the depletion of substrate to be oxidized. The study also compares different conventional technologies with phytoremediation. Technologies used in previous studies for treatment of tannery effluent were reported to have various drawbacks such as high cost, sludge production, and poor efficiency. Therefore, the current study found that phytoremediation is the feasible approach for remediation of tannery effluent with low cost, easy maintenance, and use of natural components instead of synthetic chemicals. Moreover, the use of MFC in the system generates electric current with the reduction of chromium, simultaneously. However, further studies are required to make this approach feasible to be used on pilot-scale.