Phytoremediation potential of vetiver grass (Vetiveria zizanioides) for treatment of metalcontaminated water

ABSTRACT

Phytoremediation using vetiver grass (Vetiveria zizanioides) has been regarded as an effective technique for removing contaminants in polluted water. This study was conducted to assess the removal efficiency of heavy metals (Cu, Fe, Mn, Pb, Zn) using vetiver grass (VG) at different root lengths and densities and to determine metals uptake rate by plant parts (root and shoot) between treatments (low and high concentration). Removal efficiency for heavy metals in water by VG is ranked in the order of Fe>Pb>Cu>Mn>Zn. Results showed that VG was effective in removing all the heavy metals, but removals greatly depend on root length, plant density and metal concentration. Longer root length and higher density showed greater removals of heavy metals due to increased surface area for metal absorption by plant roots. Results also demonstrated significant difference of heavy metals uptake in plant parts at different concentrations indicating that root has high tolerance towards elevated concentration of heavy metals. However, the effects were less significant in plant shoot suggesting that metals uptake were generally higher in root than in shoot. The findings have shown potential of VG in phytoremediation for heavy metals removal in water thus providing significant implication for treatment of metal-contaminated water.

Keyword: Vetiver grass; Heavy metal; Phytoremediation; Removal efficiency; Contaminated water