

Citric acid assisted treatment of chromium contaminated wastewater by constructed wetland

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The direct discharge of industrial effluents rich in heavy metals contaminate the water bodies. Tannery effluents mainly comprise of large concentration of chromium i.e. Cr (III) & Cr (IV) along with other heavy metals such as lead, cadmium, copper and nickel. Further, the use of contaminated wastewater cause severe damage to biotic features of ecosystem. For the removal of heavy metal phytoremediation is considered as the most sustainable and budget friendly technique. The present study was performed to evaluate the toxic effects of tannery effluents and performance of citric acid on phytoextraction potential of *Lemna minor* and *Typha Latifolia* in an artificial designed wetland. Different doses of tannery wastewater (0, 25, 50, 75, and 100%) and citric acid (10mM) were applied alone and in combinations to plants. Plants were harvested and the data was recorded regarding growth characteristics, biomass, photosynthetic pigments, antioxidant enzymes, reactive oxygen species, electrolytic leakage and heavy metals uptake and accumulation. The results showed significant decrease in the morpho-physiological and biochemical attributes of *Lemna minor* and *Typha Latifolia* with increasing concentration of applied wastewater. However, the addition of citric acid in combination with wastewater resulted in significant improvement of plant growth, physiological and biochemical characteristics. Further, results depicted that *Lemna minor* and *Typha Latifolia* accumulate higher Cr content under citric acid application as compared to wastewater only treated plants. The metal accumulation was increased by 40 and 62% in *Lemna minor* and *Typha latifolia* respectively under citric acid addition along with growth improvement. Results suggested that under citric acid assistance *Lemna minor* and *Typha latifolia* as potential candidates for the uptake and accumulation of heavy metals from contaminated wastewater. **Keywords:** Lemna minor, Typha latifolia, Phytoremediation, Chromium, Wastewater, Citric Acid, Biochemical attributes