The Effects of Brassica juncea vs. Eichhornia crassipes on the Reduction of CrVI to CrIII through Phytoremediation

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Chromium VI is a known carcinogen with numerous studies establishing its link with cancer. It is difficult and costly to remove from the environment particularly in water supplies. Phytoremediation is an inexpensive and effective alternative to common methods such as activated carbon. Chromium III (CrIII) though, is an essential trace dietary nutrient. The purpose of my research was to find if specific plants grown aqueously could reduce the oxidation state of hexavalent chromium (CrVI) to the nutrient, CrIII. I spiked de-ionized water with chromium CrVI at the beginning of my experiment to investigate the effectiveness of two different plants, Brassica juncea (Mustard Greens), and Eichhornia crassipes (Water Hyacinth) in reducing the oxidation state, via rhizofiltration, the uptake of chemicals through living plant matter. The Cr in the water was first measured using an inductively coupled plasma optical emissions spectroscopy (ICP-OES), then the Cr speciation was tested in both the water and the plants using a high performance liquid chromatography (HPLC), coupled with an inductively coupled plasma mass spectrometer (ICP-MS). The data was analyzed using JMP statistical software. My experiment found that Eichhornia had a 75% uptake rate, with the remainder of the CRVI being converted to CrIII, while Brassica merely absorbed the Cr from the water with a 95% uptake rate, rather than converting aqueously. In the plants however, Brassica was significantly ($p < 0.05$) more successful than Eichhornia in converting nearly all the Cr VI. Therefore, I would regard Brassica juncea as an effective remediator for aqueous CrVI.

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