

# CADMIUM UPTAKE ENHANCED IN *ELODEA CANADENSIS* BY PLANT-INDUCED PH-RISE<sup>1</sup>

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**Abstract:** Acid mine drainage (AMD) from tailing's impoundments caused by mining industry has a low pH and high levels of toxic ions like Fe, As, Cd, and Zn causing environmental problems all over the world. Phytofiltration using *Elodea canadensis* could be used to clean such waters. Since this plant is able to change the surrounding water pH, and thereby influence the metal uptake, the aim was to understand this mechanism and to be able to optimize the use of phytofiltration. The pH change and Cd uptake by *Elodea canadensis* shoots were investigated after cultivation of plants in hydroponics with starting pH of 4.0 and different concentrations of cadmium (0, 0.1, 0.5  $\mu\text{M}$ ). To find out if the pH change arose from photosynthetic activities, *Elodea canadensis* was grown under light, darkness and with a photosynthetic inhibitor, 3-(3,4-dichlorophenyl)-1,1-dimethylurea (DCMU) while having 0.5  $\mu\text{M}$  cadmium in the solution and starting pH of 4.0. The results showed that *Elodea canadensis* increased the surrounding water pH with a maximum of 1.4 pH units at the highest cadmium concentration (0.5  $\mu\text{M}$ ). This pH rise was more pronounced under darkness and with DCMU, showing that the pH increase was not due to the photosynthetic activity. When *Elodea* shoots were grown at fixed pH, a positive linear relationship between shoot cadmium contents and surrounding water pH was observed. We can conclude that *Elodea canadensis* has an ability to increase the surrounding water pH, when the initial pH was low, resulting in increased accumulation of Cd. Such pH increase by *Elodea canadensis* seems to be enhanced by cadmium. These characteristics, increasing the surrounding pH, make it a good candidate for treatment of AMD, since it then takes up more Cd, but probably also decreases the release of Cd from the tailings

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