The Removal of Aqueous Heavy Metals by Hyperaccumulating Plants

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The accumulation of heavy metal ions in rivers can have detrimental effects on the ecosystem. My project investigates the possibility of using an invasive aquatic plant called the water hyacinth (Eichhornia crassipes) ,which possesses the ability to remove heavy metals from the water, to remove enough of the metallic ions in polluted water to make the water potable. Three apparatuses to hold four 26.5 liter tubs each, were assembled. Each tub was filled with 22.68 liters of water containing one of three heavy metals in a 1000 ppb solution. Three of the four tubs in each group were filled with 3.18 kg of legally collected water hyacinths. Each apparatus tested copper, magnesium and zinc. The three tubs that were void of hyacinths acted as a control. Every two days the concentration of each tub was measured using test strips. After six days, the heavy metal concentration in each experimental tub had fallen to less than 10 ppb while the control tubs remained at 1000 ppb. I discovered that the plants decontaminated the water at a rate of -166.7 ppb/day. A formula that relates the amount of days, mass of water hyacinths needed, volume of contaminated water, and the heavy metal concentration decrease desired was then calculated. I have concluded that water hyacinths can remove a sufficient amount of heavy metals from water to make it safe for consumption. Future applications of my project could include the decontamination of polluted rivers using confined populations of water hyacinths to hyperaccumulate heavy metals.

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