



Feasibility of *Brassica juncea* as a Hyperaccumulator in Phytomining of Cu and Zn

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Affordable environmentally friendly solutions are essential for the remediation of waste sites globally.

Phytoremediation is an increasingly popular environmentally friendly method to help remediate waste

sites and offset costs of waste site remediation. A greenhouse experiment was set up using to determine

uptake of metallic zinc (Zn) and copper (Cu) solution by known hyperaccumulator *Brassica juncea*. With

treatments (T)1- 4, having final added soil concentrations of 100, 200, 310, and 330 mg kg⁻¹ elemental Zn

and Cu respectively. At 8 weeks, samples were harvested, weighed, and measured for atomic emission

spectrometry (Agilent Technologies 4210 MP-AES). Phytotoxicity was determined based on visual observation, biomass, and chlorophyll measurements. The results showed no significant difference

between the root mass of control, T1, and T2, whereafter T3 and T4 showed a 52.6% and 73.7% decrease in mean root mass. There was no observable significant difference in leaf or stem mass among

control, T1-T3, though the mean average of leaf mass decreased across all treatments. T4 showed significant difference in average leaf mass from control with a 46.1% decrease in average mass. At the

highest concentration levels, T4 showed a 62.3% decrease in stem mass when compared to the control.

AES measurements revealed pools of Zn and Cu in root, leaf, and stem material. The highest concentrations of Zn and Cu were to be found in the stem material, with highest observed concentrations (T4) being 11,700 mg kg⁻¹ of Zn and 3,116 mg kg⁻¹ of Cu. AES measured leaf material also

showed large pools of both Zn and Cu with highest observed values (T4) being 5,813 mg kg⁻¹ for Zn and 2,901 mg kg⁻¹ for Cu. It can be determined from this experiment that *B. juncea* shows the ability to grow

in heightened levels of Zn and Cu, as well as associate excess free Zn and Cu ions into plant tissues.

