Phytorecovery of Heavy Metals Utilizing Hyperaccumulators Grown in Contaminated Soil, a Second Year Study

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There are as many as 350,000 contaminated sites in the United States that require a cleanup over the next 30 years at an estimated cost of $250 billion. Phytoremediation is an effective way to remediate soils at a reduced cost using plants known as hyperaccumulators. The objective of this project was to develop an extraction process in which heavy metals can be recovered from plant tissue. Rice hulls were used as a model crop for this experiment. Rice hull ash (300g) was added to the aqua regia forming a slurry and was left to react for 24 hours. The unreacted portion of the ash was then filtered using a fine glass fiber filter. The remaining filtrate containing acids, excess water, and metal ions was left to evaporate. A sodium carbonate solution was added to neutralize the remaining acid and precipitate non-alkali metals. The remaining portion of the filtrate was evaporated and stored in a desiccator for 72 hours. Finally, it was dried in an oven at 100°C for 2 hours of which 15g of metal salts were collected. Approximately 4g of metal salts were brought to a Soil Testing Lab to determine which heavy metals were extracted from the plant tissue. The results indicate that the extraction process was successful. This newly developed extraction process has an application in quantifying metal content from phytoremediation, but it can also be beneficial in assimilating metals from the soil back into their pure form.