Utilizing Native Hyper-Accumulators to Determine Efficient Methods for Heavy Metal Phytoremediation

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On regional and global levels, pollution from highways and industrial activities are major sources of environmental damage. Phytoremediation is the process of rehabilitating the quality of soil by transferring contaminants via the usage of plant biomass. After surveying urban land in Birmingham, Alabama using a quadrat sampling technique, inductively coupled plasma-atomic emission spectrometry (EPA 6010B) was used to analyze the severity of inorganic As and Pb2+ concentrations in several exposed soil samples with the goal of identifying a contamination problem. Arsenic levels in topsoil averaged at a composition yield of 7.2 ppm and levels of lead contamination were much higher at a soil composition yield of 64 ppm. The figure for inorganic arsenic exceeds the lethal dosage which is estimated to have an upper reference range of 0.6 ppm/day. In contrast, the level of Pb2+ is under the US EPA's threshold of 400 ppm. Experimentation with southern-abundant plants belonging to the Asteraceae family was used to derive suitable methods for removing these heavy metals from contaminated soil to restore fertility and reduce toxicity without introducing a non-native species. The accumulation capacities of biomass from Rudbeckia fulgida and Echinacea purpurea were analyzed using EPA 6010A after required acid digestion protocols and contrasted after a 120-day growth stage. Experimental growth mediums contained inorganic Pb concentrations up to 445 ppm and inorganic As concentrations up to 66 ppm while control mediums had amounts of each metal under max detected contamination level. Echinacea purpurea was observed to be the best contender for remediation with 95% certainty of an estimated bioaccumulation mean of 21±2. ppm Pb2+ and 6.0±1. ppm As among 22 surviving plant samples.

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