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PAPER

Phytoextraction of Lead and Chromium Using Selected Legumes: A Study of Growth and Germination of Plants under Contaminated Conditions

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Soil pollution has become a major problem in recent times. Heavy metals make a significant contribution to soil contamination. Phytoextraction is a soil cleanup technology that seeks to exploit the ability of some plants to accumulate high concentrations of heavy metals from the environment and continue to grow.

Phytoextraction is an innovative, novel and potentially inexpensive technology and an environmental friendly method. Many studies have been done using plants such as Indian mustard (*Brassica juncea*)¹, maize (*Zea mays*)², vetiver grass (*vetiveria zizanoids*)³. This study was done using a wild plant type locally called “pora wel” (*Pueraria phaseoloides*) instead of plants consumed by animals and humans. The main objective of this study was to determine whether *Pueraria phaseoloides* seeds can grow in contaminated environments and also in different types of soils.

Germination of *Pueraria phaseoloides* seeds takes a long time (approximately two years). Several methods to reduce seed dormancy were tested using different types of solutions; water, hot water, diluted acids and concentrated acids. The *Pueraria phaseoloides* seeds which were treated with concentrated acid method germinated within three days. According to the results, *Pueraria phaseoloides* can tolerate at even higher Pb concentrations up to 4000 mg/kg of dry soil and Cr concentration - 3500 mg/kg of dry soil. All plants died at higher Pb concentrations (8000 mg/kg of dry soil and 10,000 mg/kg of dry soil). Statistical analysis reveals that there is a reciprocal correlation between the tested parameters; the number of plants which survived, average number of leaves per plant and average plant height with the soil in both heavy metal contaminated soil, which indicates the effect of contaminant on the growth of plants. More than half of the plants (13) survived, out of 25 seeds at 3000 mg/kg of dry soil of Pb concentration. At higher Cr concentrations (6000 mg/kg of dry soil and 8000 mg/kg of dry soil) no plants survived. More than half of seeds (16) out of 25 seeds germinated and grew rapidly at 3500 mg/kg of dry soil Cr concentration.

Pueraria phaseoloides plants which were grown in sandy clay loam soil showed higher Pb accumulation compared to plants grown in other soil types tested. The number of plants survived, average number of leaves per plant and average plant height decreased with the increasing of Pb concentration. Soil type did not show significant change on germination and growth of plant. Heavy metal accumulation of *Pueraria phaseoloides* increased with increasing of heavy metal concentration in the soil. But Cr accumulation is very low when compared to Pb accumulation by plant.