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Analysis of Hg and Pb by ICP-MS for the study of phytoremediation of Pb and Hg by *Scirpus mucronatus*

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Phytoremediation is a procedure that uses plants to remove contaminants from the environment and it is a better option of recovery technique because of its cost-effectiveness and environmentally friendly especially for hyperaccumulator plants. Since heavy metals such as lead (Pb) and mercury (Hg) have limited bioavailability in the soil, methods to facilitate their transport to the shoots and roots of plant are required for efficient phytoremediation. The objective of this study was to investigate the effects of adding different heavy metal-tolerant bacterial inoculums (*Brevundimonas diminuta* SF-S1-5 and *Alcaligenes faecalis* SF-S1-60) on Pb and Hg accumulation in the shoots and roots of *Scirpus mucronatus*. The experiment was done in a greenhouse by planting acclimatized *S. mucronatus* in crates (52 cm length x 30 cm width x 25 cm height) with 30 kg sand and spiked with 100 ppm Pb and 1 ppm Hg, separately. The bacterial inoculums were added into the soil and the plants were watered using tap water to ensure the growth. The plants and sand samples were collected on day 1, 7, 14, 28 and 42, and the heavy metals in plant samples were extracted by using wet digestion method. The total concentration of Pb and Hg in samples was analyzed using Inductively Coupled Plasma-Mass Spectrometry (ICP-MS) and Atomic Absorption Spectrometer (AAS), respectively, and the phytoextraction ability was assessed in terms of its metal transfer factors; bioaccumulation factor (BAC), bioconcentration factor (BCF) and translocation factor (TF). Experimental results showed that after 42 days of treatment, the highest accumulation of Pb in shoot (265.8 ± 47.3 mg/kg-1 dryweight) was found in control plant (no addition of bacteria), while in root (697.2 ± 8.5 mg/kg-1 dryweight) was found in plant inoculated with *A. faecalis* SF-S1-60. On the other hand, the highest accumulation of Hg (2.21 ± 0.08 and 5.71 ± 0.31 mg/kg-1 dryweight in plant shoot and root, respectively) were obtained in plant inoculated with *A. faecalis* SF-S1-60. In addition, plant inoculated with *A. faecalis* SF-60 showed the highest BAC and BCF values, and the lowest TF value compared to plant inoculated with *B. diminuta* SF-S1-5 and the control plant. This suggests that *A. faecalis* SF-60 can be utilized as an enhancer for accumulation of Pb and Hg in soil by *S. mucronatus*.

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