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Risk Reduction of Metal-Chelate Leaching into Groundwater in Lead Contaminated Soil Using *Festuca ovina* L.

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Abstract

The present study was conducted to increase phytoextraction efficiency of *Festuca ovina* L. in lead contaminated soil in the EDTA-assisted (0, 1.5, 3, 1.5+1.5, 3+3, 6 mmol kg^{-1}), assess the best time of plant harvesting to increase Pb uptake and method of EDTA application to reduce Pb leaching risk. The results revealed that the greatest Pb uptake was observed in 3EDTA treatment. Therefore, 3mmolkg^{-1} was used in the second step for assessing harvest time for 15, 30 and 45 days. Results showed that the concentration of Pb in plant tissues was increased with the passage of time and the best harvest time to achieve maximum removal of Pb was 60 days of the first harvest. In the third step to reduce leaching of Pb-chelate, 3mmolkg^{-1} EDTA in five ways of single, double, triple, quadruplet, quintuplet were added to the soil. The results indicated that under quintuplet application, Pb content reached its minimum concentration in the soil and in the plant organs, the Pb concentration was maximum and metal concentration in the plant organs did not vary significantly when triple, quadruplet and quintuplet dosages were added ($p<5\%$). Overall, optimum phytoextraction of *F. ovina* L. and Pb leaching reduction were achieved when 3mmol kg^{-1} EDTA was added in quintuplet dosage and the plant was harvested at the end of growth stage.

Keywords: *Festuca ovina* L, Leaching risk, Lead, Environmental pollution, EDTA.

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