

Potential of Sunflower (*Helianthus annuus* L.) for Phytoremediation of Soils Contaminated with Heavy Metals

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Abstract : A field study was conducted to evaluate the efficacy of the sunflower (*Helianthus annuus* L.) for phytoremediation of contaminated soils. The experiment was performed on an agricultural field contaminated by the Non-Ferrous-Metal Works near Plovdiv, Bulgaria. Field experiments with a randomized, complete block design with five treatments (control, compost amendments added at 20 and 40 t/daa, and vermicompost amendments added at 20 and 40 t/daa) were carried out. The accumulation of heavy metals in the sunflower plant and the quality of the sunflower oil (heavy metals and fatty acid composition) were determined. The tested organic amendments significantly influenced the uptake of Pb, Zn and Cd by the sunflower plant. The incorporation of 40 t/decare of compost and 20 t/decare of vermicompost to the soil led to an increase in the ability of the sunflower to take up and accumulate Cd, Pb and Zn. Sunflower can be subjected to the accumulators of Pb, Zn and Cd and can be successfully used for phytoremediation of contaminated soils with heavy metals. The 40 t/daa compost treatment led to a decrease in heavy metal content in sunflower oil to below the regulated limits. Oil content and fatty acids composition were affected by compost and vermicompost amendment treatments. Adding compost and vermicompost increased the oil content in the seeds. Adding organic amendments increased the content of stearic, palmitoleic and oleic acids, and reduced the content of palmitic and gadoleic acids in sunflower oil. The possibility of further industrial processing of seeds to oil and use of the obtained oil will make sunflowers economically interesting crops for farmers of phytoremediation technology.

Keywords : heavy metals, phytoremediation, polluted soils, sunflower

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