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Phytoremediation experiments with *Helianthus tuberosus* under different pH and heavy metal soil concentrations

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Abstract

Since the last twenty years, phytoremediation became an emerging remediation technology due to its low costs and high sustainability. In this study, experiments for the investigation of phytoextraction and growth behaviour of *Helianthus tuberosus* under different soil pH values and heavy metal concentrations were performed. Aim of the work was to study the growth and heavy metal accumulation of *H. tuberosus* under these conditions for a subsequent optimization of the growth conditions and for a later improvement of the growth and phytoremediation yields under field conditions. Experiments were performed for the preparation of the remediation of a contaminated mining site with low to medium heavy metal (HM) concentrations.

Plant experiments were carried out in a pH range stepwise from 4.0 – 6.0 and with a combination of different HM (Cd, Cu, Fe, Mn, Ni, Zn, Pb) in three different concentration ranges (slight/ medium/ high); experimental conditions were typical for mining sites with Acid Mine Drainage (AMD) and slight to medium heavy metal impact. Yields of roots, tubers, leaves and shoots under the appropriate conditions were investigated, and the heavy metal accumulation of different plant parts was analyzed.

As results, soil pH and heavy metal concentrations were identified as crucial factors for plant growth and success of phytoremediation. High accumulation of Fe (up to 1.48 g/kg), Mn (up to 1.68 g/kg) and Zn (up to 853 mg/kg) was measured in the roots; shoots accumulated up to 2.6 g/kg Ni, 11.4 g/kg Mn and 6.06g/kg Zn. The accumulation factors for the main heavy metals in the roots were determined.

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