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### An In Vitro Control Study To Test The Fungus *Trichoderma Harzianum* Strain T 22 For Contaminated Soils Bioremediation

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The estimated costs for the soil remediation are very high, so it is need to test economic and ecofriendly technologies. The soil bioremediation using bacteria, fungi and plants was used since long time with exstremely variable results. Aims of our study was to evaluate the ability of *Trichoderma harzianum* T22 to uptake heavy metals using an in vitro study and to assess its applicability for environmental reclamation. Our study was conducted with both microbiological and chemical approach. The potato dextrose broth was used for carried out our study. The uptake capacity of *T. harzianum* was evaluated with 4 increasing concentrations, respectively of Ni (120; 150; 225 and 262 mg/300 mL of broth), Cd (3.6; 4.5; 6.75; 7.88 mg/300 mL) and Cu (144; 180; 270 and 315 mg/300 mL) by performing 3 replicates for each concentration and one control constituted by the culture broth not fortified. The analyses were performed with Elan DRC-e Perkin Elmer ICP-MS. The mycelium *T. harzianum* is able to absorb, to the increasing of exposure doses of Ni and Cd. In particular was calculated a range of 7.5-19% of uptake for Ni and 0.03-0.2% for Cd. For Cu, instead, we observed a uptake capacity respectively of 20-21-36-33%. The % uptake was calculated as average of the values obtained from the three independent replicates. *T. harzianum* grows in the culture broth singularly fortified with Ni, Cd and Cu and shows a good ability to uptake the heavy metals. However, the mycelium exposed to Cu shows a nonlinear uptake respect to Ni and Cd. So, it is probable that a possible saturation mechanism for the highest dose, (315 mg) of Cu, can interfere lowering the uptake capacity. The *T. harzianum*, therefore, represents an interesting organism to remove heavy metals in soil remediation. Next step will be to evaluate the ability of bioremediation of *T. harzianum* exposed to a mix of three metals selected.

