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Poster Abstract – I.05

PHYTOREMEDIATION AND BIOTECHNOLOGY FOR RECLAMATION OF POLYMETALLIC SOILS

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Within the last two centuries the industrial production, mining industry and different urban activities caused environmental contamination on a large scale. Populations of hyperaccumulating plants can be found in naturally occuring metal-rich sites. These plants are not ideal for phytoremediation. They have an extraordinary tolerance for one metal but the growth rate is very low. Moreover most metal contaminated soils are enriched by more than two metals (polymetallic soils); such conditions strongly affects the efficiency of hyperaccumulators because the resistance to each of the metals is genetically regulated.

Assisted phytoextraction, is the use of high yielding crop plants that can take up relatively large amounts of metals responding to those management practices that increase the bioavailability of elements by the application of chemical agents and maximize the efficiency of metal uptake by the plant.

The possible future application of large scale phytoremediation must combine the high metal tolerance of hyperaccumulator genotypes and the high biomas yield of crops. This can be achieved by genetic manipulation of plants.

At the Department of Agriculture and Environmental Science, University of Udine two complementary approaches are under study . At the agronomic level the biomass yield and phytoextraction efficiency were observed for plants of *Helianthus annuus* and *Sorghum bicolor*, grown in a soil having the following concentrations of heavy metals: As 149, Cd 2.50, Co 29.3, Cu 801 and Zn 625 mg kg^{-1}. The evaluation of the potential of phytoremediation of our plants compared to other crops in terms of metal removal, was positive. *S. bicolor* performed better than *H. annuus* removing from the soil 220, 820 and 1944 g ha^{-1} of respectively As, Cu and Zn.

At the biotechnological level specific genetic constructs coding for poly-histidine tags with chelating properties were designed to enhance the efficiency of assisted phytoextraction. The comparison of genetically modified lines of tobacco with control plants showed an increase of resistance and good growth in polymetallic contaminated soil. Further experiments to improve the chelating action of transgenes are in progress.