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HALOPHYTES PRESENT NEW OPPORTUNITIES IN HEAVY METAL PHYTOREMEDIATION

E. Manousaki, N. Kalogerakis*

Department of Environmental Engineering, Technical University of Crete, Chania, Greece

Abstract

Halophytes are of significant interest since these plants are naturally present in environments with an excess of toxic ions and research findings suggest that these plants also tolerate other environmental stresses, especially heavy metals as their tolerance to salt and to heavy metals may, at least partly, rely on common physiological mechanisms. Therefore, halophytic plants have been suggested to be naturally better adapted to cope with heavy metals compared to glycophytic plants commonly chosen for heavy metal phytoremediation research. Under these considerations, halophytes are potentially ideal plants for phytoextraction or phytostabilization applications of heavy metal polluted saline and non saline soils. Furthermore, a novel process for the phytoremediation of heavy metal contaminated soils termed phytoexcretion has been recently introduced based on findings that some salt-excreting halophytes use their excretion mechanism in order to remove the excess of toxic metal ions from their sensitive tissues and on the idea of using plants as biological pumps for heavy metals.

At the Laboratory of Biochemical Engineering & Environmental Biotechnology several Mediterranean halophytic and salt tolerant plants *(Atriplex halimus, Halimione portulacoides, Limoniastrum monopetalum, Limoniastrum cornariarum, Tamarix parviflora, Tamarix smyrnensis, Nerium oleander*) are under investigation for the remediation of Pb and Cd contaminated saline and non saline soils. The results confirm that halophytes are able to tolerate high concentrations of metals in soil and in some cases also accumulate the metals providing promising opportunities for phytoextraction and phytostabilization applications. Moreover, salt-excreting halophytes such as *H. portulacoides, L. monopetalum, T. parviflora* and *T. smyrnensis* were found to excrete the metals from the leaf tissues on their leaf surfaces in order to adapt to the metal burden presenting new opportunities for phytoexcretion purposes.