Geophysical Research Abstracts
Vol. 14, EGU2012-12887, 2012
EGU General Assembly 2012

Evaluating the potential use of Tamarix gallica L. for phytoremediation practices in heavy-metal polluted soils

R. Abou Jaoudé (1,2), A. Pricop (3,4), I. Laffont-Schwob (3), P. Prudent (4), J. Rabier (3), V. Masotti (3), G. de Dato (1), and P. De Angelis (1)

(1) DIBAF, University of Tuscia, Viterbo, Italy (raj@unitus.it), (2) DESA, University of Sassari, Sassari, Italy (rajaoude@uniss.it), (3) IMBE, UMR CNRS 7263/IRD 237, Aix-Marseille University, Marseille, France, (4) Laboratoire Chimie Environnement, FRE 3416, équipe Développement Métrologique et Chimie des Milieux (DMCM), Aix Marseille-CNRS University, Marseille, France

The rapid growth of population, the increased urbanisation and the expansion of industrial activities have provoked an augmented occurrence of soil contamination by heavy-metals. Important sources of contamination are industrial, mining and military infrastructures, which are often abandoned without performing the appropriate reclamation work. In the Mediterranean Basin, where coastal areas are largely affected by human overexploitation, the use of species able to tolerate heavy-metals and other abiotic stresses may represent a low-cost solution for phytoremediation in these harsh environments. Tamarix gallica L. is a widespread species in coastal Mediterranean areas, showing a high adaptability to different environments and a high tolerance of adversity. With the objective of testing local species as candidates for phytoremediation practices in heavy-metal contaminated coastal soils, cuttings of T. gallica from a wild population around Marseille (France) were planted in pots containing: 1) control soil (loamy soil and sand (2/1)), 2) half-polluted soil (loamy soil, sand and heavy-metal polluted soil (1/1/1)), and 3) polluted soil (sand and heavy-metal polluted soil (1/2)). The contaminated soils were collected in the surrounding of a former lead industry of Marseille littoral and characterised by the presence of Fe, Pb, Zn, As and Al. After three months from planting, leaf functionality was evaluated by measuring leaf gas exchanges, leaf chlorophyll fluorescence and, chlorophyll, phenols, flavonoids and anthocyanins contents. SEM observations coupled to EDXS analysis were used to determine elements (Pb, As and Al) presence and location on the leaf surface and in leaf and root tissues. T. gallica was moderately affected by the presence of heavy-metals in the soil treatments. In fact, a reduction in stomatal conductance was only observed in plants grown in the polluted soil. This reduction did not cause a significant decrease in CO_2 assimilation rates. Moreover, the presence of Al on the root surface was observed in plants grown in polluted soils; this element was not detected in leaf tissues or in the leaf extruded material, suggesting a phytostabilization effect for this element. In conclusion, T. gallica could be a potential candidate for phytoremediation practices. Nevertheless, field experiments will be necessary to assess growth performances and phytoremediation potential of this species in heavy-metal polluted areas.