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real phytotechnological potential of the proposed system, and before an in situ application, laboratory tests are needed to determine the toxicity level, biomass productivity and possible enhancement strategies for U uptake. The issue of the final disposal of the residues generated also has to be addressed.

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Distribution of Pollutants in the Biosphere

Metal(loid) allocation in the soil-plant system of a *Pinus halepensis* population growing on semiarid mine tailings

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Aleppo pine (*Pinus halepensis* Mill.) is a widely used species for restoring degraded semiarid areas. Nevertheless, its use for the restoration of metal(loid) polluted soils has not been thoroughly investigated. The goal of this study was to evaluate the metal(loid) accumulation and nutrient internal cycling in *P. halepensis* trees growing at a mine tailings disposal site in a semiarid area of Southeast Spain. For this purpose, the metal(loid) (As, Cd, Cu, Fe, Mn, Ni, Pb, Sb and Zn) and nutrient (N, P, K, S, Ca, Mg) concentrations in the foliage (young or current-year needles and one-year-old needles), woody stems and fresh leaf litter of pine trees were analysed. In addition, tailings soil properties below pine litter and bare soil were characterised. Young (current-year) needles showed lower accumulation of metal(loid)s and higher nutrient concentrations (P, K) than older needles. Pine trees showed significant accumulation of Cd, Cu, Pb and Sb in woody tissues (e.g. 4.93 mg kg⁻¹ Cu). By other side, high concentrations of As, Cd, Sb, Pb and Zn occurred at leaf litter (e.g. 87 mg kg⁻¹ Pb). Although it can be hypothesized that metal(loid)s will return to the soil in

soluble forms via decomposition, in this study water-extractable concentrations in the soil below the litter layer did not reveal greater release of metal(loid)s compared to the bare soil. This is probably due to the recalcitrant nature of pine needles and the slow mineralisation typical of semiarid environments. However, these results should be contrasted with long-term studies in order to assess the risk of metal(loid)s leaching and transfer into the food chain. Funding: Fundación Séneca of Murcia (15296/PI/10) and MINECO of Spain and FEDER (CTM2011-23958). Dr. H.M. Conesa thanks MINECO and UPCT for “Ramón y Cajal” programme (RYC-2010-05665). Dr. M.N. González-Alcaraz holds a postdoctoral grant from Fundación Ramón Areces.

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Levels and spatial distribution of organochlorinated compounds and polycyclic aromatic hydrocarbons in fishes from a mediterranean coastal lagoon

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The seasonal input and distribution of organic contaminants in the Mar Menor lagoon have been recently characterized in seawater and sediments, showing the significant impact of flash flood events. Mar Menor is a hypersaline (42-47 psu) coastal lagoon located in the Cartagena Field area at the South East of Spain subjected mainly to intensive agriculture, seasonal tourism and recreational activities. The bioaccumulation of polycyclic aromatic hydrocarbons (PAHs), polychlorinated biphenyls (PCBs) and organochlorinated pesticides (OCPs) has been also determined in bivalves, but up to date no information was available about their accumulation in fishes. In this study the concentrations of PAHs, PCBs and OCPs in golden grey

mullet (*Liza aurata*) and red mullet (*Mullus barbatus*) muscle were determined. Their spatial distribution throughout the Mar Menor lagoon was characterized considering 9 sampling areas and two different sampling periods, spring and autumn in 2010 for golden grey mullet and only one (autumn) for red mullet. PAHs and organochlorinated pollutants were extracted using specific Soxhlet procedures. After cleanup and purification steps the final extracts were analyzed by HPLC for PAHs, and by GC-MS for PCBs and OCPs. The higher concentrations of all pollutants were found in fish sampled close to main urban and port areas of this lagoon and areas under the influence of El Albuñón watercourse. PAHs concentrations (sum of 14 congeners) in both species varied between 1 and 20.7 µg/kg w.w., being pyrene and phenanthrene the most abundant ones. p,p'DDE showed higher concentrations than PAHs in golden grey mullet (concentration range: 0.2-32.7 µg/kg w.w.), specially close to the main navigation channel between this lagoon and the Mediterranean Sea.

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Vertical distribution of PAHs in marine sediments (particulate fraction and interstitial water) from eight iberian mediterranean areas

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Polycyclic aromatic hydrocarbons (PAHs) have been determined in sediment cores from eight Iberian Mediterranean coastal areas (Barcelona, Tarragona, Ebro Delta, Valencia, Castellón, Cartagena, Almería y Málaga), considering both interstitial

water and solid fraction. Three sediment cores were taken in three different sampling sites per area by using a box corer. Cores were cut into 1-cm-thick sections between 0 and 18-cm depth, interstitial water was obtained by centrifugation and samples from every site were pooled. Fourteen polycyclic aromatic hydrocarbons (fluorene, phenanthrene, anthracene, fluoranthene, pyrene, benz[a]anthracene, crysene, benzo[e]pyrene, benzo[b]fluoranthene, benzo[k]fluoranthene, benzo[a]pyrene, benzo[g,h,i]perylene, dibenzo[a,h]anthracene and indeno[1,2,3-c,d]pyrene) were determined in interstitial water by stir bar sorptive extraction coupled to GC/MS and solid fraction by Soxhlet extraction and HPLC with fluorescence detection. As result of PAHs hydrofobicity, their concentrations were several magnitude order higher in sediment (solid phase) than interstitial water. Total PAH concentration in sediment varied from 1 to 1321 µg·kg⁻¹ d.w and from 4.9 to 274 ng·L⁻¹ in interstitial water. Vertical PAHs distributions in sediments were homogeneous in some areas, however, sharp concentration decreases were observed at deeper layers from some sampling sites. However, their maximum concentrations in interstitial water were found mainly in upper or in deeper layers, depending on the specific characteristics of the area and sediments.

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