Geophysical Research Abstracts
Vol. 19, EGU2017-4025, 2017
EGU General Assembly 2017

Rehabilitation of river sediments contaminated by heavy metals from tanning industries using the phytoextraction technique

Juan Carlos Beltrá Castillo (1), Fuensanta García Orenes (1), José Mora Navarro (2), Francisco Jose Murcia Navarro (2), Raúl Zornoza Belmonte (3), Ángel Faz Cano (3), and Melisa Gómez-Garrido (3)

(1) Universidad Miguel Hernández, Avenida Universidad, s/n. Edificio Alcudia, Elche 03202, Spain , (2) Dirección General de Calidad y Evaluación Ambiental de la Consejería de Agua, Agricultura y Medio Ambiente de la Región de Murcia, C/Calle Catedrático Eugenio Úbeda 3,Murcia 30071, Spain, (3) Universidad Politécnica de Cartagena, Paseo Alfonso XIII, 48, Cartagena 30203, Spain (melisa.gomez@upct.es)

Leather tanning is an industrial sector of great tradition in Spain that has progressively evolved until it has reached a high degree of technification in the present. However, in its early days, the leather tanning industry has always been considered a dirty and polluting activity, mainly due to the water spills that ended up in the river channels. The Guadalentin Valley between Lorca and Murcia (SE Spain) is characterised by intensive crop and pig production, and an extensive agroalimentary and leather tannery industry. These anthropogenic sources have released salts and metals such as copper (Cu), zinc (Zn) and chromium (Cr) into Guadalentin river. Up to 2003, wastewater was discharged directly to the dry river, immediately upstream of the urban nucleus of Lorca, without any previous treatment. It contained high concentrations of inorganic salts and heavy metals (Cu, Zn and Cr). Spills, in some events, had a flow of 10 000 m3 d-1, with concentration of Cr over 500 mg L-1. Phytoremediation is a sustainable alternative that allows the environmental rehabilitation of fluvial dry sediments through the transfer of heavy metals from the contaminated soils to the native vegetation present. Atriplex halimus, salsola oppositifolia, suaeda vera and tamarix africana were the most representative autochthonous phytoextractor species that were planted to study the degree of decontamination of dry river sediments before planting and 12 months after planting. The sediments characterization was done by a sampling grid of 40 000 m2 (500 m x 8 m) where samples were taken at 3 depths (0-20 cm, 20-50 cm and 5-100 cm) every 50 m. A vegetation study was carried out by random plots of 10 m x 10 m. The results indicated that after 12 months the vegetation cover increased between 35% and 70%. The degree of contamination of Cu, Zn and Cr of the river dry sediments decreased slightly, being the atriplex halimus the plant specie that presented the highest value of the bioaccumulation factor of all the studied metals. Therefore, the phytoremediation is a sustainable non-destructive technique with the environment that allows the long-term in situ decontamination of locations affected by contamination of heavy metals.