Geophysical Research Abstracts
Vol. 19, EGU2017-13531, 2017
EGU General Assembly 2017
© Author(s) 2017. CC Attribution 3.0 License.

Metal availability in technosols prepared with composted sewage sludge and limestone outcrop affected by the presence of barley

Alejandro Román (1), José Navarro-Pedreño (1), María Belén Almendro-Candel (1), Ignacio Gómez (1), Manuel M. Jordán (1), and Jaume Bech (2)

(1) Department of Agrochemistry and the Environment, Miguel Hernández University of Elche, Av. de la Universidad, s/n, 03202 Elche (Alicante), Spain , (2) Soil Science Laboratory, Faculty of Biology, University of Barcelona, Barcelona (Spain)

The use of composted sewage sludge (SSC), and limestone outcrop residue (LOR), is a common practice in soil and land rehabilitation, technosol making, and quarry restoration (Jordán et al. 2008). Both wastes are used to improve the physical, chemical, and biological properties of impoverished soils (Karaca 2004; Jordão et al. 2006; Lovieno et al. 2009). However, the use of compost may have some negative effects on the environment (Navarro-Pedreño et al. 2004; Elridge et al. 2009). Moreover, plants cultivated in technosols can produced changes on the availability of essential and harmful metals and, for this reason, is necessary to made studies to evaluate the availability of metals and the effect of plants in their mobility and toxicity.
In this experiment, it has been analyzed the effect of barley in metals availability in four technosols prepared mixing volumes of LOR (100, 98, 95 and 90 %) and SSC (0, 2, 5 and 10%). To determine the solubility and availability, Cd, Cr, Cu, Fe, Mn, Ni, Pb and Zn were measured by Lindsay-Norvell extraction procedure.
For each technosoil, tree pots with barley (three plants) and three without barley were checked after 3 months A of them were irrigated with 1.5 L/week of tap water.
At the end of this time, the metal solubility and availability were higher in soils with the presence of barley than the others. This was especially notorious for Fe and Zn. The presence of root exudates and the reduction of lixiviation due to plant transpiration can explain the highest presence of metals. This result may be considered in rhizosphere related to possible metal toxicity.

Keywords: compost, limestone outcrop residues, heavy metals, barley.

References:
Eldridge SM, Chan KY, Barchia I, Pengelly PK, Katupitiya S, Davis JM (2009) A comparison of surface applied granulated biosolids and poultry litter in terms of risk to runoff water quality on turf farms in Western Sydney, Australia. Agr Ecosyst Environ doi:10.1016/j.agee.2009.07.007
Iovieno P, Morra L, Leone A, Pagano L, Alfani A (2009) Effect of organic and mineral fertilizers on soil respiration and enzyme activities of two Mediterranean horticultural soils. Biol Fert Soils doi:10.1007/s00374-009-0365-z
Jordán MM, Pina S, García-Orenes F, Almendro-Candel MB, García-Sánchez E (2008) Environmental risk evaluation of the use of mine spoils and treated sewage sludge in the ecological restoration of limestone quarries. Environ Geol doi:10.1007/s00254-007-0991-4
Jordão CP, Nascentes CC, Cecon PR, Fontes RLF, Pereira JL (2006) Heavy metal availability in soil amended with composted urban solid wastes. Environ Monit Assess doi:10.1007/s10661-006-1072-y
Karaca A (2004) Effect of organic wastes on the extractability of cadmium, copper, nickel, and zinc in soil. Geoderma doi:10.1016/j.geoderma.2004.01.016
Navarro-Pedreño J, Almendro-Candel MB, Jordán-Vidal MM, Mataix-Solera J, García-Sánchez E (2004) Risk areas in the application of sewage sludge on degraded soils in Alicante province (Spain). In: Martin JF, Brebbia CA, Godfrey AE, Díaz de Terán JR (eds) Geo-Environment. WIT Press, Southampton, pp 293-302