Geophysical Research Abstracts
Vol. 13, EGU2011-10881, 2011
EGU General Assembly 2011
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Ni and Cd bioavailable fraction in mediterranean soils cultivated with Cynara cardunculus L. and amended with different sewage sludge compost doses

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Contaminated and degraded lands should change their use, firstly to improve their status and secondly to obtain some benefit, reaching a desirable equilibrium. Mediterranean soils are characterized because of its low organic matter content, loss of structure, high erosion rate and, in some cases, salinization processes. To avoid undesirable effects over soil dynamics, compost amendment could supply organic matter, nutrients and protect soil from erosion in the long term. However, solving one problem may cause another one, so the solutions are complexes. In the previous example, compost application implies by-side effects, like the rise in soil heavy metal concentration, which provoke another kind of pollution to the environment, so motorization and extraction of those pollutants is needed. *Cynara cardunculus* L. (*cynara)* is considered an energy crop in Mediterranean environments, characterized because of its high biomass production, high protection from erosion and Cd accumulator traits. This experiment was conducted to study heavy metal bioavailable fraction in mediterranean soils, amended with different sewage sludge compost doses and cultivated with *cynara.*

Two low productive agricultural soils, located in the South East of Spain under semi-arid conditions in a saline area were chosen for the experiment and cultivated with *cynara*. Four compost treatments were applied (D_1=0; D_2=30; D_3=50; D_4=70 ton/ha) at the beginning of the experiment. During a year period, three sampling were carried out (October, April and July), taking four samples from each (top soil layer: 0-15 cm). Soil and sewage sludge compost were analyzed (physical and chemical properties). Bioavailable Ni and Cd were extracted with DTPA and determined by atomic absorption flame technique. Bioavailable/ Total heavy metal content were calculated in percentage.

No differences were found in bioavailable Cd and Ni levels between D_1 (blank) and the other treatments in each sampling, neither for the same treatment through the experiment period. Biovailable/Total heavy metal ratio showed that bioavailable fraction did not increase with compost application or plant cultivation. The data suggest that heavy metals are strongly bound or chelated to soil components, probably because of soil characteristics: high pH (≈8.5), clay texture and organic carbon (endogenous and exogenous). To ensure this hypothesis, longer test time is needed; new data is advisable and more parameters should be included into consideration, like *cynara* root development and Ni and Cd content to establish phyto-extraction potential and mobilisation of soil fractions.

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