



## Speciation and distribution of cadmium and lead in salinized horizons of antrosols

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The utilization of intensive technologies for the vegetable cultivation in glass houses by the administration of high doses of organic fertilizers, the supra-dimensional irrigation and the maintaining of soil at high humidity state, in special in case of vicious drainage have as result the rapid degradation of morphological, chemical and physical characteristics of soils, concretized by: (i) decrease of structural aggregates stability; (ii) more dense packing of soil; (iii) accumulation of easy soluble salts (in special at superior horizons level); (iv) limitation of organic compounds and micro-elements biodisponibility. All these determined a significant reduction of productivity and of exploitation duration of soils from glass houses. These phenomena modified continuously the dynamic of speciation processes and inter-phases distribution, of heavy metals in soils from glass houses, and can determined a non-controlled accumulation of heavy metals, in special as mobile forms with high biodisponibility.

Ours studied have been performed using soil profiles drawing from Copou-glass house, Iasi (Romania). Has been followed the modification of distribution for speciation forms of cadmium and lead (two heavy metals with high toxicity degree), between horticultural antrosol horizons, and between chemical-mineralogical components of this, with the progressive salinization of superior horizons, in 2007-2008 period. The separation, differentiation and determination of cadmium and lead speciation forms was done by combined solid-liquid sequential extraction (SPE) and extraction in aqueous polymer-inorganic salt two-phase systems (ABS) procedure, presented in some of our previous studies.

After extraction, the total contents of the two heavy metals and fractions from these differential bonded by mineral and organic components of horticultural antrosol have been determined by atomic absorption spectrometry. The specific interaction mechanisms of Cd and Pb with organic-mineral components of soils have been estimated on the basis of Raman and FT-IR spectra, recorded for fractions obtained after each extraction step. These data were correlated with those obtained by chemical analysis and UV-VIS spectrometry, and were used for to establish the type and weight of Cd and Pb speciation forms in studied antrosol.

Our studies have been show that in medium and inferior horizons of horticultural antrosols, the heavy metals have a general accumulation tendency, preferential by binding on organic matter and organic-mineral complexes, components with higher abundance in such type of soils. The selectivity and complexation mechanisms are controlled by speciation forms of the two metals. This phenomenon has two important consequences, the strong fixation of heavy metals in horticultural antrosol and significant modification of structure and conformation of organic macromolecules. A specific phenomenon of horticultural antrosols is that the accumulation rate of heavy metals is higher than leavitation rate, and the mobile forms of these have a higher biodisponibility, being relative easy assimilated by plants. The progressive salinization of superior horizons of soils from glass houses, determined a sever perturbation of equilibrium between Cd and Pb speciation forms. In consequence these will have an accentuated migration tendency in superior horizons, as complexes with inorganic ligands, with a high mobility and biodisponibility. The accumulation of soluble salts in superior horizons, and the formation of frangipane horizon (horizon of geochemical segregation of horticultural antrosols) modified the ionic strength from soil solution and the thermodynamic activity of cadmium and lead species. Under these conditions, the leavitation rate of cadmium and lead is higher than the accumulation rate, which means that the migration of these metals in soil solution occurs fast and in high concentrations.

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