The (missing) link between the contaminated soil management strategy and food safety in Portugal

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Various anthropogenic activities during the last century have resulted in substantial increases in our exposure to potentially toxic elements (PTEs) such as Pb, Cd, Hg and As. Such elements are now present in soils, can be transferred into the food chain and exhibit various hazards to animal and human health. Hence, it is crucial to develop tools to characterize the pathways between soil contamination, plant uptake, dietary transfer of contaminants to animals and finally consumer exposure from dietary intake of plant and animal products. Such tools are essential to determine meaningful threshold concentrations of PTEs in soils in order to deliver safe products [1].

In this presentation we discuss case-studies of soil contamination and associated potential risks to animal and human health in Portugal. Furthermore, we will discuss the current Portuguese contaminated soil management strategy as well as the missing link between soil quality and food safety strategies.

In particular, we will use information on concentrations of eighteen PTEs (Hg, As, Cu, Pb, Zn, Cd, Ni, Cr, Co, Ba, U, Fe, Mn, Al, Sb, Se, B and Mo) in a variety of non-contaminated and contaminated soils in Portugal (from rural, mining, industrial and mining areas) and their respective contents in field-grown feed and food crops. Using soil-to-plant (STP) transfer models, exposure of both animals and human to soil contaminants will be quantified for selected food chains [2]. Finally, STP transfer models will be used to derive soil threshold concentrations for various PTEs in view of existing EU food and fodder quality criteria aiming at the protection of animal and human health.

References

[1] de Vries, W., Römkens, P.F.A.M., Schütze, G., 2007. Critical Soil Concentrations of Cadmium, Lead, and Mercury in View of Health Effects on Humans and Animals. Rev. Environ. Contam. T. 191:91–130

[2] Rodrigues S.M., Pereira M.E., Duarte A.C., Römkens P.F.A.M., 2012. Soil–plant–animal transfer models to improve soil protection guidelines: A case study from Portugal. Environ. Int. 39:27–37

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