

Development of a health risks assessment model-based tool for users of contaminated vegetable gardens in Wallonia (Belgium)

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Vegetable gardening in urban soils increases food security and offers a wide range of social and ecosystem benefits. However, elevated soil trace metal element concentrations in urban and industrial areas may pose a health hazard, limiting the development of urban gardening. Such a situation is encountered in Wallonia where former industrial activities have substantially increased trace metal topsoil content. To provide appropriate recommendations for users of contaminated vegetable gardens in Wallonia, we developed a web tool, called SANISOL, which is described in this work.

SANISOL provides recommendations concerning (1) the health risks posed by the presence of As, Cd, Cr, Cu, Hg, Mn, Mo, Ni, Pb and Zn in soil and (2) the products that can be cultivated safely in the vegetable garden. The recommendations concerning health risks are provided from a health risks assessment model. The gardener's exposure is estimated based on the gardener's profile (age, garden products consumed, etc.) and the garden's soil trace metal contents. If there is a potential health risk, SANISOL tool reports information on the health risk causes and provides recommendations to reduce the gardener's exposure. The quality of garden produce is provided for 14 fruits and vegetables based on the expected trace metal content in the products calculated from soil-to-plant transfer models. SANISOL tool indicates if a specific garden product is likely to have trace metal contents higher than a commercially purchased product, or than the maximum level in foodstuffs.

In conclusion, while this work demonstrates that it is possible to develop a tool that provides appropriate and tailored recommendations for gardeners living in areas with high trace metal content in soil, it also highlights the uncertainties and progress that needs to be made to properly manage the human health risks associated with soil trace metals such as As, Cd and Pb.