

Variability of potentially toxic elements transfer in vegetables grown on contaminated soils.

By Agboola A. Joshua

Supervised by Prof. Andrew Hursthouse and Dr Simon Cuthbert, School of Science
University of West of Scotland

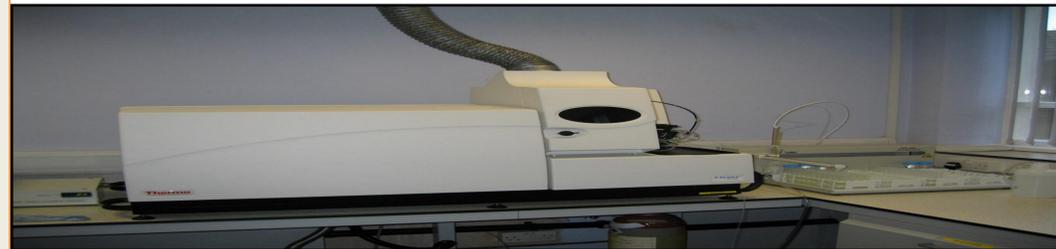
Introduction

Food safety is a major public concern worldwide. The increasing demand for local food production in urban environments safety has stimulated research regarding the risk associated with consumption of food stuffs contaminated by potentially toxic elements. PTEs are the major contaminants of food supply and are important contaminants in urban environments, in particular for allotment soils. Potentially toxic elements in soil can bioaccumulate in plants and can be transferred into the food chain. The mobility and bioavailability of PTEs to plants (vegetables) is important and with changes in consumption patterns in urban gardens, the evaluation of variability within and between sites and for traditional and introduced species is relatively poorly understood.

Methodology and Materials

Soil samples and plants samples will be collected in some contaminated sites across Scotland. The sample spots in each site will be separated by 5m from each other, in order to cover a range of soil metal concentrations. The soil samples will be collected at the contaminated sites with a stainless steel auger at 0 – 10 cm, 15 – 30cm depths.

The pH, cation exchange capacity and organic matter content will be determined. PTEs concentrations will be determined by digesting samples in aqua regia and analysed using ICP – MS.



Aim and Objectives

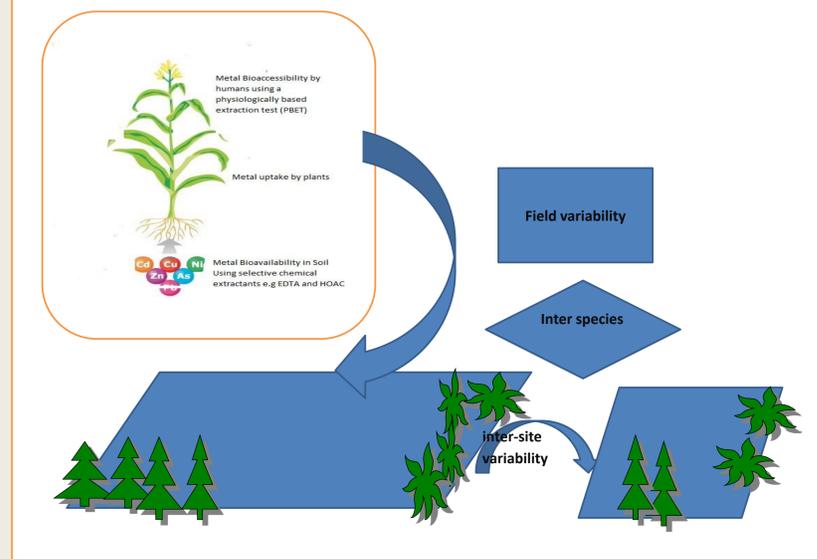
To evaluate the variability and mobility of potentially toxic elements in soil – plant transfer and to examine the factors affecting their uptake in potentially contaminated urban soils.

To compare chemical extraction methods and PTE uptake and availability to plants (vegetables).

To evaluate the implications of uptake on consumption by allotment holders in Scottish urban environments and implications of crop diversity and trends in urban gardening.



Experiments



Conclusion

The results on the bioavailability and variability of 9 metals (Cr, Mn, Fe, Ni, Cu, Zn, Mo, Cd, and Pb) to vegetable crops growing in potentially contaminated soils will be used in the decision support for risk assessment of vegetable consumption.



References

L. Ping, Z. Hai-jaun, W. Li-li, L. Zhao-hui, W. Jian-lin, W. Yan-qin, J. Li-hua, D. Liang and Z. Yu-feng, Analysis of heavy metal sources for vegetable soils from Shandong province, China. Science of the Total Environment 424 (2012) 88-96

Arora, M., Kiran, B., Ranl, S., Rani, A., Kaur, B., & Mittal, N. (2008). Heavy metal accumulation in vegetables irrigated with water from different source. Food Chemistry, 111, 811-815.