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# Variability in the transfer of potentially toxic elements in vegetables grown on urban allotment gardens

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## Abstract

Soil acts as a sink for potentially toxic elements (PTEs- predominantly metals) in urban environments. In particular soil in urban allotment gardens receives increased inputs from the gardening practice and location of the allotment site in relation to other sources of environmental emissions. This has a spatial and temporal context due to the historical use of individual plots, their location in relation to background soil properties and the dynamic relationship to urban infrastructure. Consequently individual plot soil metal inventories are highly variable.

We assessed the nature of uptake from soil to vegetables from a number of plots in allotment gardens from West Scotland and examine factors responsible for bio-availability and uptake. A range of PTEs (As, Cr, Cu, Pb, Ni, Co, Cd, Zn, Mn, V) were targeted and a number of plots at selected allotment gardens studied.

The soil pseudo-total concentration across the sampling sites ranged from 9.9- 14.8mg/kg for As, 0.7- 3.5 mg/kg for Cd, 492- 1204mg/kg for Pb, 104-157mg/kg for Cu, 45-98mg/kg for Ni, 413 -845mg/kg for Zn, the average pH is 6.4 and LOI is 18.66%. On wet weight basis levels (mg/kg) in vegetables, Pb were in the range of 0.8- 8.62, Cu ranges between 2.92 -7.86, Cr ranges between 0.11- 2.24, As ranges between 0.76 - 1.3 and V ranges between 0.18-1.09. The result showed that the concentrations of PTEs in these vegetables were below food safety standards.

Total (aqua regia) data for PTEs uptake and availability to plants (vegetables) was estimated by the EDTA extraction; both correlation and regression analysis were used. There are wide variations in the correlation between parameters linked to both elemental behaviour and management of the individual plots and relationships between these will be explored.

**Keywords:** potentially toxic elements, soil quality, plant transfer, variability, allotment gardens

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