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Toxic elements in vegetables from gold mining sites in Zimbabwe: Implications for human health

Mudimbu, D. [1], Meck, M.L.[1] and Tagwireyi, D.[2]

[1]Geology Department, University of Zimbabwe, MP 167, Mount Pleasant, Harare, deemudimbu@gmail.com.
[3]School of Pharmacy, University of Zimbabwe, P.O. Box MP 167, Mount Pleasant, Harare

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The bioaccumulation of toxic elements by vegetables grown in contaminated soils of mining areas is an area of great interest for researchers especially as plants play a role in transporting toxic concentrations of elements higher up the food chain. Elements such as arsenic, cadmium, chromium, copper, lead, mercury, manganese, nickel and zinc are known to be associated with precious and base metal mineralisation and in several studies these same elements have been linked to variety of human health challenges some of which include: the promotion of cancer of the bladder, lung skin; negative impacts on female reproductive organs; damage to the kidneys and bones; and negative impacts on mental development in children. Previous studies of environmental pollution by toxic elements in Zimbabwe's mining areas have focussed on measuring levels of contaminants in the environment and yet little research has been conducted that relates element uptake by food crops grown by the local communities and the health risk to the consumers. This study focusses on the uptake of toxic elements by vegetables grown in gardens located within a historically heavily mined area within the Kadoma District in Zimbabwe's Midlands greenstone belt. Vegetable samples collected from farms and plots within the Kadoma district were dried, pulverised and analysed through the use of Aqua Regia digestion and Inductively Coupled Plasma – Mass Spectrometer (ICP-MS) to measure the level of concentration of 53 elements. Results revealed all vegetable samples had lead, arsenic and chromium levels well above the recommended maximum levels, with the tomato fruit and pumpkin leaves showing lead levels over 200 times above the FAO/WHO recommendation [1], thus raising serious concerns on the extent of community exposure and the associated health risk.

References:

[1] Joint Codex Alimentarius Commission (FAO/WHO). Food Additives and contaminants standards programme, 2001: ALINORM 01/12A:1-289