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FACULTY OF APPLIED SCIENCES

DEPARTMENT OF APPLIED CHEMISTRY

INVESTIGATION AND DETERMINATION OF SELECTED HEAVY METAL
CONCENTRATIONS IN VEGETABLES GROWN IN UMGUZA IRRIGATION SCHEME
FIVE, KHAMI IRRIGATION AND THE ONES SOLD IN BULAWAYO MARKET (5TH

Avenue).

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*A research project undertaken in partial fulfilment of a Bachelor of
Science (BSc) Honours Degree in Applied Chemistry*

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ABSTRACT

Metal concentrations at elevated levels in soils resulting from wastewater irrigation is a cause for serious concern due to the potential health impacts of consuming contaminated produce. This has drawn much attention to researchers and health experts. In this study, an assessment is made on the impact of wastewater irrigation on vegetables grown at Umguza irrigation scheme 5, Khami irrigation along with the vegetables sold in the Bulawayo market (5th avenue), with particular emphasis on their toxicological implications. Samples of vegetables which included maize, cabbage, carrots, green beans, butternut, potatoes and tomatoes were sampled and analyzed to determine concentrations of Cd, Cu, Fe, Pb, Cr, Ni and Zn. Data obtained showed metal uptake differences by the different vegetables due to differences in vegetable tolerance to these metals. The lead, cadmium and Chromium concentration in all vegetable samples was more than the WHO maximum permitted concentrations, with green beans having high lead concentrations of 26.71mg/kg from Khami, 24.75mg/kg from Umguza and finally 23.14mg/kg from the market. Data showed that Zn, Cu and Ni concentration in all plots were within the WHO limits. Fe concentration in vegetable samples ranged from 185.57-2513.33mg/kg, tomato samples had the highest Fe concentrations, which was way above the permissible limits especially the sample from Umguza which had 2513.33mg/kg of Fe. Findings showed that heavy metal contamination of edible vegetable is higher when fertilizers and manure are used. Treatment of industrial effluents and phyto-extraction of excess metals from polluted environments could reduce health risk by heavy metals.