

HEAVY METALS IN VEGETABLES CULTIVATED IN SOILS CONTAMINATED BY VARIOUS SOURCES

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Abstract

The present study aimed to assess the levels of heavy metals Pb, Cd, Cr, Cu, Zn and Ni in the leafy vegetables cultivated in soils contaminated by industrial and agricultural activities. This research topic in Albania is generally lacking. The vegetable samples are collected from three sampling sites with different characteristics (industrial, agricultural and reference), which are taken in the normal phase of consumption and are used for personal consumption of farmers. They are prepared in the laboratory, including washing them with tap water and distilled water to remove the surface impurities, air drying, and grinding using a mill. The samples (0.3 g) are digested by the mixture of 8 mL of HNO₃ (69%) and 2 mL of H₂O₂ (33%) in a microwave digestion system at 180°C for 15 min, and the concentration of metals are measured by a Varian model Spectra A-200 Atomic Absorption Spectrometer. The heavy metal concentrations obtained by analysis in mgL⁻¹ are converted into mgkg⁻¹kg⁻¹ dry weight (DW), which are compared and evaluated with the standards of FAO/WHO for heavy metals in plants and vegetables. The results showed that the analyzed metals are present in all samples, except Pb and Cr in two different samples, and the highest contents are observed of Cd, Pb and Zn at the industrial site, highest contents of Cr, Cu at the agricultural site, and highest contents of Ni at the reference site; highlighting different sources of metals in vegetables. The significant correlation between Cu and Pb indicates that they may have a common source. The mean metal contents in vegetables decreased in the order of Zinc > Copper > Nickel > Cadmium > Chromium > Lead in industrial site and Copper > Zinc > Nickel > Chromium > Cadmium > Lead in agricultural site. The respective contents of Cd and Pb in all samples of vegetable, exceed the safe limit set by the Codex Alimentarius Commission for human consumption. While the contents of other metals analyzed are below the safe limits. Therefore, regular monitoring of heavy metals in vegetables cultivated in contaminated soils is necessary.

Keywords: *Heavy metals, contaminated soils, vegetables, FAO/WHO safe limits, Albania.*