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Potentially toxic elements in foodcrops: Triticum aestivum L., Zea mays L.

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Soil is the basis of the ecosystems and of our system of food production. Crops can uptake heavy metals and potentially toxic elements from the soil and store them in the roots or translocate them to the aerial parts. Excessive content of these elements in edible parts can produce toxic effects and, through the food chain and food consumption, result in a potential hazard for human health.
In this study soils and plants (spring wheat, Triticum aestivum L. and maize, Zea mays L.) from a tannery district in North-East Italy were analyzed to determine pedological characters, soil microbial indicators and the content of some major and micro-nutrients and potentially toxic elements (Al, Ca, Cd, Cr, Cu, Fe, K, Mg, Mn, Ni, P, Pb, S, Zn, V). The soils of the area are moderately polluted; Cr is the most important inorganic contaminant, followed by Ni, Cu and V. Factor analysis evidenced that the contaminants are in part anthropogenic and in part geogenic. Major anthropogenic origin was detected for Cr, Ni (from industrial activities), Zn, Cu, Cd (from agriculture practices).
Biological Absorption Coefficient (BAC) from soil to plant roots and Translocation factor (TF) within the plant were calculated; major nutrients (K, P, S) and some micronutrients (Cu, Zn, Mg, Mn) are easily absorbed and translocated, whilst other nutrients (Ca, Fe) and potentially toxic elements or micronutrients (Al, Cd, Cr, Ni, Pb, V) are not accumulated in the seeds of the two considered species. However, the two edible species proved differently able to absorb and translocate elements, and this suggests to consider separately every species as potential PHEs transporter to the food chain and to humans. Cr concentrations in seeds and other aerial parts (stem and leaves) of the examined plants are higher than the values found for the same species and for other cereals grown on unpolluted soils. Comparing the Cr levels in edible parts with recommended dietary intake, besides other possible Cr sources (dust ingestion, water), there seems to be no health risk for animal breeding and population due to the consumption of wheat and maize grown in the area.