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Trace element distribution in crops grown under industrial stress: a multidisciplinary approach

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The impacts of the trace heavy metals released by different industries on croplands were monitored by different environmental media. All the sampling locations based on a regular monitoring grid network were selected. To all samples collected in area of the smelter complex ($20 \times 20 \text{ km}^2$), one to three locations has to be contributing to each sampling location. The spots were further categorized by groups in relation with the downwind distance from the smelter complex. In the developed approach, trace element concentrations in soil, water, epiphytic mosses and crops were determined. The analyses were carried out on the vegetation pieces and grain fractions $< 2 \text{ mm}$ by using the photon activation analysis and X-ray fluorescence methods. Some of the experimental trace metal values exceeded the threshold established by Romanian and EU regulations to protect vegetation and explain the estimated significant crop losses. Factor analysis of the elemental data showed always the component loaded with specific elements coming from industrial emissions. For example, the survey showed that in the monitored area bordering the oil refinery complex there are zones with significantly elevated concentrations of Ni, Pb and V and other heavy metals as As, Cr, Cu, Fe, Sb and Zn linked to anthropogenic activities in the oil and hard industry.

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