



Transfer of Cd, Cu and Zn from soil into food crops in the Mashavera Valley, Georgia

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Soil pollution with trace elements resulting from mining activities is a very actual problem in many industrial regions.

The study focuses on the Mashavera Valley, Georgia. It is situated 80 km south of Tbilisi, the capital. It is characterised by a semiarid climate and very fertile, alkaline Chernozems and Kastanozems. The intensive agricultural land use is limited by the aridity of the climate. Due to this, vegetable gardens, grape fields and orchards as well as arable land are intensively irrigated with water supplied by a canal system fed by water from the Mashavera River. As a result of non-ferrous metal mining in the mountainous area of the middle reaches of the Mashavera, the river is loaded with fines containing sulphidic metals (Cu, Zn, Cd), which derive from erosion of mining waste deposits and waste water of a flotation plant.

After decades of irrigation the soils of the Mashavera valley area are highly contaminated with Cu, Zn and Cd to such an extent that German and international threshold values for food production are greatly exceeded. Therefore a high risk of the transfer of these metals into the food chain can be assumed.

In October 2009 and March 2010 135 top soils and related crops were sampled. Elevated concentrations of Cu, Zn and Cd can be measured in crops sampled on soils irrigated with Mashavera water compared to soils irrigated with non-contaminated water (e.g. ground water). Partly Cd concentrations exceed the EU threshold for food crops. Especially in leafy vegetables like *Spinacia oleracea* up to the 2.5 fold. In addition the measured values of Cu and Zn partly exceed the concentrations toxic for crops grown on.