

Transfer of Heavy Metals into the Food Chain from Heavily Polluted Soils of an Irrigation District in Southern Georgia - Extent, Mechanisms and Remediation

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The main goal of our research was to study the impact of the functioning of the ore-dressing complex on the eco-system and health of population in Bolnisi region. Our research has shown that more than half of territory is seriously polluted by copper and zinc, and some parts of the area can be considered catastrophically polluted. Here an expressed technogenesis takes place that points to influence of irrigation. To study the mentioned problem, 128 topsoils were sampled and total content and mobile fractions of Cu, Zn, and Cd concentrations were measure in them. Soil-microbial parameters (enzyme and respiration activity) were measured in 37 selected samples. In soil irrigated with contaminated water, total contents of Cu, Zn, and Cd were elevated by factors of 2.1, 1.3 and 3.3 as compared to the control. Mobile fractions were elevated by factors of 18.5 for Zn and 16.4 for Cd. Our study shows that the heavy metals, first of all copper, cadmium and zinc have active negative effect on the properties of soil, its composition and soil-forming processes taking place in the soil. This is particularly well evidenced by the deterioration of hydro-physical potential of the soil. Balanced correlation among solid, liquid and gas phases is disrupted. In the highly polluted soils the cementing processes takes place and sharply increases bulk density of the soil, the porosity of the soil deteriorates and water permeability is critically low.

Soil fertility and food quality are strongly endangered in the Mashavera valley.