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Concentration and distribution of heavy metals and radionuclides in topsoils from Middle Jiu Valley surface coal exploitations sourrounding area (Gorj County, Romania)

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Middle Jiu Valley is one of the largest surface coal exploitation area in Romania. The coal exploitation area is a dense populated one, along the valleys are villages and the inhabitants produce for their own consumption fruits and vegetables, in their personal gardens, or cereals in the fields, nearby the villages. There was considered to be of great interest to investigate the heavy metals and radionuclides content in gardens and cropfield soils from the villages sourrounding the Thermo Electric Power Plants (TEPP) and coal surface exploitation, as well as in crude /cultivated sterile soil or ash. The topsoil samples (104) were harvested from population gardens (58), cropfields sourronding Thermo Electric Power Plants (24), crude sterile dumps (7), cultivated sterile dumps (9) and ash dumps (6). The content in radionuclides in soil was performed by Duggan (1988) method. Radionuclide activity was expressed in Bqkg-1, confidence level 95%. The total content of heavy metals in soil (Zn, Cu, Fe, Mn, Pb, Cd, Ni, Cr, Co) was measured with flame atomic mass spectrometry. The content in heavy metals was expressed in mgkg-1. Soil analysis revealed the presence of natural radionuclides, beloging from ash and coal dust, as well as of Cs-137, of Cernobal provenance. In the cropfields radionuclides content in topsoil is lower than in gardens, due to the deepper soil mobilisation. Radionuclides content over the normal limits for Romania were registered for Th-234, Pb-210, U-235 and in few locations for Ra-226. The soil content for all analysed metals was over the normal limits in most samples, in few cases with values close to allert limits. Concentrations between allert and intervention limits were registered in samples collected from 15-20 km North of TEPP Turceni, in population gardens.