Concentration, Background Values and Limits of Potential Toxic Elements in Soils of Central Serbia

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Abstract

This paper presents the results of a large-scale investigation into the content and distribution of potentially toxic elements in the soil throughout Central Serbia, focusing on soil types and the background limits for the most important trace elements. Pseudo-total forms of arsenic, chromium, copper, cadmium, nickel, lead and zinc were determined in 5022 surface soil samples taken using a grid system (3.3 × 3.3 km) in agricultural soil and forest throughout Central Serbia (as part of the Republic of Serbia's national pedogeochemical research). It has been established that most of the studied territory is unpolluted. Ni, Cr and As have been found to be the largest contaminants (4.2%, 1.8%, 1.9% of samples, respectively, were above the remediation value) with predominant geochemical contamination. The background limits of trace elements in the soils of Central Serbia, calculated by the [Median + 2MAD] method, had the lowest values, between 87 and 90%. With the other two methods, TIF and in particular [Mean + 2Sdev], more approximate values were obtained, commonly between 95 and 98%. The results show that it is necessary to revise the limit values of trace elements in the legislation of the Republic of Serbia, especially for Ni and Cr, which are mainly of natural origin. In areas with a heterogeneous geological composition and with different anthropogenic impacts, a greater number of background limits should be determined for pedochemical units or for homogeneous administrative units.

Keywords

Background limits · Potential toxic elements · Soil type · Pedogeochemical composition

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