

Mercury in soils and microbial biomass of the South Kirgizstan subregion of the biosphere

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The purpose of this investigation was to clear up the role of soil microflora in the mercury concentration by microorganisms as they are related to a problem of the soil remediation. To complete the tasks as assigned, 150 samples of both various soils formed over the ore bodies outside the ore occurrence zones and waste dumps have been taken in the areas of South Kirgizstan. Some 45 soil samples (horizon A, 0-20 cm) and dumps were used for microbiological analyses [1, 2]. The soil cover as seen in the work areas is represented by Haplic Calcisols (gray) soils. All the soils are generally calcareous, in some cases salted, and have various compositions. To grow the microbial biomass in order to determine mercury content levels in there, some soil media characterized by natural concentrations, ratios and forms of the compounds of these metals were used.

The results showed that the mercury concentrations in soils of the sampling area varied from 0.028 to 357.3 mg/kg. The highest metal content indices (up to 357.3 mg/kg) were found for soils formed over ores, and waste dumps. The lowest mercury content (0.028 to 0.066 mg/kg) was found for soils of the control area. The data on mercury and/or antimony accumulation by the biomass of soil microorganisms grown in soil media are represented. The soil samples having various mercury levels were collected in the South Kirgizstan subregion of the biosphere. It was established that the accumulation of the metals by soil microflora depends on their content in the soil, the microorganism growth is strongly inhibited at mercury concentration of 300 mg/kg in soil. A direct and reliable correlation between the metal content level in soils and their concentration by microorganisms is found. Within the background sites a tendency of increase in mercury extraction from the soil with 1 M HCl solution, in particular from salted soils is observed. In contrast, in the conditions of an excess of mercury content in soils of ore grounds, a weak negative correlation between the levels of the gross mercury and the mercury as extracted with hydrochloric acid is found.

References

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