

The role of neutralizing substances in ameliorating effect of cobalt pollution on the content of trace elements in soil

Znaczenie dodatków neutralizujących w ograniczaniu wpływu zanieczyszczenia kobaltem na zawartość pierwiastków śladowych w glebie

Milena Kosiorek, Mirosław Wyszowski

*Department of Environmental Chemistry, University of Warmia and Mazury in Olsztyn, Poland
e-mail: milena.kosiorek@uwm.edu.pl*

The objective of the research has been to determine the effect of cobalt pollution on the content of trace elements in soil in a situation where neutralizing substances had been added to the soil. The study was based on a pot experiment conducted in a greenhouse at the University of Warmia and Mazury in Olsztyn, using soil of acid reaction. The influence of soil contamination with cobalt in the doses of 0, 20, 40, 80, 160 and 320 mg Co · kg⁻¹ of soil was tested on spring barley (*Hordeum vulgare* L.) as the main crop and white mustard (*Sinapis alba* L.) as the successive crop. The soil was enriched with substances inactivating the effect of cobalt: manure, loam, charcoal, zeolite and CaO. These substances were added in doses equal 2% of the soil mass per pot, while calcium oxide was introduced in an amount corresponding to 1 hydrolytic acidity (Hh). Additionally, the soil in all pots was enriched with identical quantities of nutrients, adjusted to requirements of the crops. Cobalt was introduced to the soil as cobalt chloride. Soil was transferred to polyethylene pots and seeded with the crops. During the plant growth, the soil moisture was maintained at 60% of field capacity of water. The plants were harvested at the inflorescence stage and soil samples were collected for analyses.

The content of trace elements in soil showed some dependence on the soil contamination with cobalt and addition of neutralizing substances. In the series where the latter were not added, the cobalt soil pollution resulted in an increase in the concentrations of cobalt, zinc, nickel, chromium and lead in soil. All the neutralizing substances caused some decrease in the content of cobalt, iron and manganese in soil. The highest decline in the cobalt content of soil was observed in the series with manure, whereas the highest decrease in zinc occurred in the pots with charcoal added to soil. The decrease in the soil content of the other metals (except nickel and lead) was verified in the pots with added CaO and zeolite. The influence of the other neutralizing substances depended on the type of an element. Reverse relationships were noticed regarding some trace elements, for example the soil content of lead increased under the influence of all the tested neutralizing substances.