

## Comparison of methods used in evaluation of mobility and bioavailability of trace elements in soil

Porównanie metod stosowanych w ocenie biodostępności i mobilności pierwiastków śladowych w glebach

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Research carried out in recent years on the mobility and availability of the elements in the soils involved many single and sequential extraction procedures, which often leads to difficulties in comparison of the results. The aim of this study was to compare the world's most widely used methods in mobility and availability assessment of elements on the basis of physico-chemical properties of the soil.

The copper, zinc and lead extraction by 0.1N HCl, 0.11M CH<sub>3</sub>COOH, 0.01M CaCl<sub>2</sub>, 1M MgCl<sub>2</sub>, 1M NH<sub>4</sub>NO<sub>3</sub>, 0.005M EDTA, 0.005M DTPA and deionized water were applied. Also the total content of metals was determined after mineralization in a mixture of concentrated acids – HF and HClO<sub>4</sub>.

The total content of copper ranged 16.94–47.26 mg·kg<sup>-1</sup>, zinc 102.93–532.09 mg·kg<sup>-1</sup>, and lead 16.32–74.15 mg·kg<sup>-1</sup>. The results determined in the applied analysis showed a large variation between the studied metals. The highest content was determined using solutions of DTPA and EDTA for copper and lead (20.09 and 22.58%, and 9.57 and 17.85% on average), whereas for the zinc these extracts were acid solutions - 0.1N HCl and 0.11M CH<sub>3</sub>COOH (15.51 and 8.72% on average of the total Zn). It is important that at the same time in all of the other extractions, Zn values were much lower, not exceeding 1% in the unbuffered salt solutions on average. Besides of water extraction (0.86% Cu, 0.04% Zn, 0.36% Pb), it is precisely in these solutions of 0.01M CaCl<sub>2</sub>, 1M MgCl<sub>2</sub>, and 1M NH<sub>4</sub>NO<sub>3</sub> concentrations of all analyzed metals were the lowest. Only in the case of percentage of available Cu forms determined in a solution of 0.1M HCl (average 0.53%) were the lowest. The results do not indicate any of the analyzed methods as a universal and characterizing the mobility and bioavailability of investigated metals.