

Heavy metal concentrations of clover and reed collected from Nanakita river mouth area, central Miyagi prefecture, Japan and their relationships to heavy metal abundances in the soil

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Abstract

Heavy metal concentrations (Zn, Cu, Fe, Mn, Mo, Pb) of clover and reed collected from Nanakita river mouth area, central Miyagi prefecture, were measured by PIXE. The heavy metal abundances and their chemical characteristics of the investigated area were previously reported. The purpose of this study is to reveal how much those plants accumulate heavy metals in their bodies and how the chemical characteristics of the heavy metals in the soil have influence on the heavy metal accumulation of the plants. We are also targeting to contribute to phytoremediation that will be dominant method to clean up contaminated soil in near future.

The heavy metals mostly accumulated in the roots of the plants and both stems and leaves have much less heavy metals than their roots. Although total abundances of heavy metals of respective plant depend on the abundances of the heavy metals in the soil, this tendency cannot be recognized in all the samples and elements. Chemical characteristics seem important. According to the previous research, each heavy metal consists of four fractions as follows: absorbed heavy metal to clay mineral (exchangeable phase), easily decomposed heavy metal by weak acid (carbonatic phase), oxidizable heavy metal by oxidizing reagent (oxidizable phase) and heavy metal phase decomposed by strong-acid (residue). The heavy metal abundances of the plant seem to be correlated with the amount of exchangeable phase. In order to precede the study of phytoremediation, the chemical characteristics of the heavy metals could be of vital importance.

Keywords: phytoremediation, heavy metal, PIXE, acid digestion method, adsorption form, clay minerals