Transfer of metals in soil-grass ecosystems under long-term N, P, K fertilization in Hesse, Germany

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With this study focuses on the influence of long-term (14 years) fertilization on metal transition from soil to plants is presented. Accumulation of metals in plants due to long-term fertilization and predicting the bioavailability and transfer of metals in the soil-plant system is of great importance with regard to human health as plants represent the first compartment of the terrestrial food chain.

Soil and plant (Lolio-Cynosuretum) samples were taken from a 14 years long-term fertilization field experiment which was carried out in Hesse, Germany. Correlation coefficients, transfer factors, and regression analysis was performed for Cd, Cu, Mn, Pb, and Zn to quantify the relative difference in bioavailability of metals to plants or to identify the capacity of plants to accumulate a given metal. Correlation coefficients between metals in soils and in plants show significant relationships ($p < 0.01$) for selected metals. Metal bioavailability from soil to plant based on transfer factor (TF) was observed to decrease in the order Cd>Cu>Zn>Mn>Pb. Results of stepwise multiple linear regression analysis showed that Corg, CEC and bioavailable metal content are the most important predictors for plant metal uptake.