



Biological availability and environmental behaviour of Rare Earth Elements in soils of Hesse, Central Germany

M. Loell, R.-A. Duering, and P. Felix-Henningsen

Institute of Soil Science and Soil Conservation, Justus Liebig University, Giessen, Germany
(mareike.k.loell@umwelt.uni-giessen.de)

Rare earth elements (REEs) comprise a group of 17 transition metals with very similar chemical and physical properties. They include the elements scandium (Sc), yttrium (Y) and lanthanum (La) and the 14 elements (cerium to lutetium) that follow La in the periodic table. Their average abundance in the earth's crust varies from 0,01 to 0,02% so they are as common as Cu and Pb. Beside their widespread use in industry, REEs are applied in Chinese agriculture. Their beneficial effects both on crop yield and on animal production are reported in various investigations. As a result – by using microelement fertilisers and manure - REEs enter the pedosphere while their fate and behaviour in the environment up to now remains unexamined.

The first aim of our investigation was to evaluate the concentration of REEs in agricultural used soils in central Germany (Hesse) by ICP-MS. In addition to their total concentration (aqua regia digestion) their bioavailable contents – determined by EDTA (potentially available fraction) and ammonium nitrate extraction (mobile fraction) - were analysed. The occurrence of the three REE fractions in different soils will be discussed and influencing soil properties (e.g. pH-value, content of clay and organic carbon) will be revealed.

Additionally the uptake of REEs by grassland plants was determined and resulting transfer factors will be presented.