

Contamination of the Agroecosystem with Stable Strontium Due to Liming: An Overview and Experimental Data

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Abstract

This chapter presents the results of a long-term study on the dynamics of calcium and strontium in soil and plants when liming with chalk-containing strontium. The ameliorant used was a conversion chalk obtained as a by-product of the production of complex fertilisers and contained 1.5% stable strontium. Four experiments were conducted to study the behaviour of Ca and Sr in the soil-plant system on acid sod-podzolic soils (*Umbric Albeluvisol Abruptic*). The specific goal was to trace the entire pathway of Sr from the dissolution of the ameliorant, fixation of Sr

in the soil-absorbing complex, migration along the profile and finally accumulation in plants of various biological families and in various plant organs. The results showed that the 1.5% Sr contained in the conversion chalk has a high chemical activity. The complete dissolution of high doses of the chalk was achieved in 3–4 years. The migratory mobility of strontium was determined in a series of column experiments. The amount of leached Sr was found to depend on its initial content in the soils, the humus content (HA1 fraction) and the volume of washing water. It was found that the first fraction of humic acids plays a leading role in the fixation of Sr in non-limed soil, which contained about 50% of the total soil strontium. The addition of the Sr-containing chalk increased the leaching of strontium, but Sr was not completely removed from soil after multiple washings. The results showed that the accumulation of Sr in the generative and vegetative organs of plant was controlled by the barrier and barrier-free mechanisms. Strontium-free conversion chalk can be a highly effective ameliorant for reducing waste dumps generated when processing raw phosphate rocks.

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Keywords

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