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# Selenium speciation across land uses in Swiss soils

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Selenium (Se) is a fundamental micronutrient for human and animal nutrition, however, it has a narrow range of safe intake levels [1]. Soil Se concentrations are generally low, but plant availability of Se does not only depend on total soil Se levels but also on its chemical form, i.e., its speciation. It is therefore crucial to understand the factors controlling soil Se speciation.

Recently, Tolu *et al.* (2022) [2] developed a method enabling the quantification of Se associated with small (organo-)mineral nanoparticles and various organic matter (OM) fractions together with free Se oxyanions in soil extracts, using size exclusion chromatography (SEC) coupled to UV and elemental mass spectrometry (ICP-UV-MS/MS). Here, we applied this SEC-ICP-UV-MS/MS method to NaOH extracts of topsoils (0-20 cm) from Switzerland, targeting the organic Se fraction of soil Se, a dominant pool of soil Se. Our aim was twofold: i) to determine the speciation of Se in these NaOH extracts and to further verify the correlation between NaOH-extractable organic Se and soil organic carbon (SOC) content reported by Tolu *et al.* (2022) [2], and ii) to investigate the effects of land use and related soil parameters on Se distributions among various size and chemical organic fractions and free oxyanions in a systematic way. The studied topsoils were collected at 48 sites belonging to the long-term Swiss Soil Monitoring Network, covering croplands, grasslands, and forests and exhibiting distinct soil parameter gradients, e.g. for pH (3.2 to 7.5) and SOC (1% to 16%).

Here we will present our results, which show that we can improve the characterization of Se-OM associations in agricultural and forest soils with a wide range of soil properties. These insights advance the understanding and predictive capabilities of soil Se speciation and plant availability. Particularly in agricultural soils, organic Se as a source of Se for plants might increase in importance as changes in SOM composition and degradation could change the dynamics of this Se reservoir. Improving our knowledge of this main pool of Se is thus crucial.

[1] Combs (2001) *Br. J. Nutr.* 85, 517–547.
[2] Tolu *et al*. (2022) *Nat. Comm.* 13, 6974.