Title: Development of a new plant-based biotest to assess trace element phytoavailability in contaminated soils – Selection of target-plant species for standardisation

Concerning the threat of soil contamination, the assessment of trace element phytoavailability at an operational level still requires the identification, the development and the standardisation of a set of biological methods (i.e. biotest). The present abstract introduces the first step in the development of a new plant-based biotest, the RHIZOtest, focused on the selection of the target-plant species suggested for the standardisation of the RHIZOtest.
The RHIZOtest is notably based on a complete physical separation between plant and soil compartments enabling an easy, fast and clean recovery of the roots. The RHIZOtest was deployed for ten plant species commonly used in agriculture and on three soils exhibiting a broad range of pH and a high concentration in several trace elements. The measurement of trace element phytoavailability was finally achieved as the mean flux of trace element to the plants during the exposure of the plants to the soil.
Seven out of ten plant species exhibited homogenous growth of roots and shoots and consequently can be used adequately in the RHIZOtest experimental procedure. As expected, plant uptake flux of trace elements varied significantly and many-fold among the ten plant species tested. However, trace element phytoavailability also broadly varied among trace elements and soils. Finally, a procedure of ordination and scoring enabled us to select three plant species that maximised trace element phytoavailability according to a precautionary-like principle. This three plant species will be suggested for further standardisation of the RHIZOtest.
This study supports the requirement of biological methods that enable to encompass the biological diversity in the assessment of trace element phytovailability whereas chemical methods are not able to take it into account. Such kind of validation procedure for a biotest is the unique opportunity for achieving operational methods based on a hard scientific background that could be standardised for the assessment of trace element phytoavailability.

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