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## Accumulation of germanium (Ge) in plant tissues of grasses is not solely driven by its incorporation in phytoliths

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Until recently it has been generally assumed that Ge taken up by plants is stored in phytoliths together with Si. This assumption is mostly based on the geochemical similarities between Ge and Si, while a scientific proof was lacking. The aim of the present study is to i) compare the uptake of Si and Ge in three grass species, ii) localize Ge and Si stored in above-ground plant parts and iii) evaluate the amounts of Ge and Si sequestered in phytoliths and plant tissues. Mays (*Zea mays*), oat (*Avena sativa*) and reed canary grass (*Phalaris arundinacea*) were cultivated in the greenhouse on soil and sand to control element supply. Leaf phytoliths were extracted by dry ashing. Total elemental composition of leaves, phytoliths, stems and roots were measured by ICP-MS. For the localization of phytoliths and the determination of Ge and Si within leaf tissues and phytoliths scanning electron microscopy (SEM), energy dispersive x-ray spectroscopy (EDX) and laser ablation ICP-MS (LA-ICP-MS) was used. The amounts of Si and Ge taken up by the species corresponded with biomass formation and decreased in the order *Z. mays* > *P. arundinacea*, *A. sativa*. Results from LA-ICP-MS revealed that Si was mostly localized in phytoliths, while Ge was disorderly distributed within the leaf tissue. In fact, from the total amounts of Ge accumulated in leaves only 10% was present in phytoliths highlighting the role of organic Ge species in plant tissues and the necessity for using bulk Ge/Si instead of Ge/Si in phytoliths to trace biogeochemical cycling of Si. Moreover, our results represent important background data for the optimization of a phytomining of Ge.