



Plant-induced thallium isotope fractionation

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Here, we tested the degree of plant-induced thallium (Tl) isotope fractionation in white mustard grown hydroponically at different Tl doses. Thallium isotope signatures in plants indicated preferential incorporation of the light ^{203}Tl isotope during Tl uptake from the nutrient solution. Negative isotope fractionation was even more pronounced in dependence on how much the available Tl pool decreased. This finding corresponds to the concept of isotope overprinting related to a high contamination level in the growing media (solution or soil). Regarding Tl translocation in plants, we observed a large Tl isotope shift with an enrichment in the heavy ^{205}Tl isotope in the shoots relative to the roots in treatments with low/moderate solution Tl concentrations (0.01/0.05 mg Tl/L), with the corresponding $\alpha_{205/203}\text{Tl}$ fractionation factors of ~ 1.007 and 1.003 , respectively. This finding is probably a consequence of specific (plant) reactions of Tl replacing K in its cycle. The role of the S-coordinated Tl(I) complexes in the total process of Tl accumulation and Tl isotope fractionation in plants, however, still remains unclear, since we do not have indication for that on the basis of X-ray absorption spectroscopy, suggesting that Tl was mainly present as free/hydrated Tl^+ ion or chemically bound to O-containing functional groups.

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