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Silicon isotopes: linking soil Si availability and plant Si strategies

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One of the most puzzling properties of silicon (Si) is its differential absorption by plants. Depending on the plant species, water and soil Si availability, environmental factors such as grazing and temperature, plant Si contents can vary from 0.1 % to 10 % (on a dry weight basis). Advances in genomics improved our understanding of biochemical and molecular mechanisms underlying plant Si uptake providing a framework to explain the variability of Si in plants and its distribution. Yet complex Si roles in plant strategies, its dependence on environmental factors and in mediating interactions with their environments and other organisms remain misunderstood. How is plant Si uptake affected by soil Si availability and how is Si distribution between tissue types controlled? It is hard for us to answer those questions even if Si plant traits are an indicator of the soil Si status. For example, a few studies showed that Si content and phytolith distribution are mainly controlled by Si availability. In this study, a pot experiment was conducted in a greenhouse where wheat (*Triticum turgidum* L.) was grown on three different soils: an aric podzol, an andosol and a calcosol. These soils are contrasted in term of clay size distribution, SiO₂ concentrations and organic matter content and are presumed to reflect French soils variability in term of Si dynamics. Here, we focus on how plant Si patterns, both Si content and Si isotopes, are linked to soil Si availability leading to new insights to the mechanisms underlying the different Si uptake and translocation strategies. This work is supported by the BIOSiSOL project (ANR-14-CE01-0002).