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Transpiration and transporters: teasing apart passive and active transport of plant silicon

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All plants contain some silicon (Si), but some species take it up passively through the transpiration stream while others additionally actively accumulate Si by producing transporters. Here, we review the literature, both qualitatively and quantitatively, to investigate the importance of transpiration for Si uptake across diverse plant groups with different accumulation capacities. We will use variation among species in terms of phylogeny, habitat (e.g. aquatic vs. terrestrial), and environmental conditions (e.g. water or nutrient stress) to tease apart the roles of transporters and transpiration in controlling rates of Si accumulation, and make use of published manipulative experiments to explore how Si availability impacts the importance of these two uptake mechanisms.