Dual-labeling technique to quantify contribution of root nutrient re-allocation to plant regrowth after defoliation

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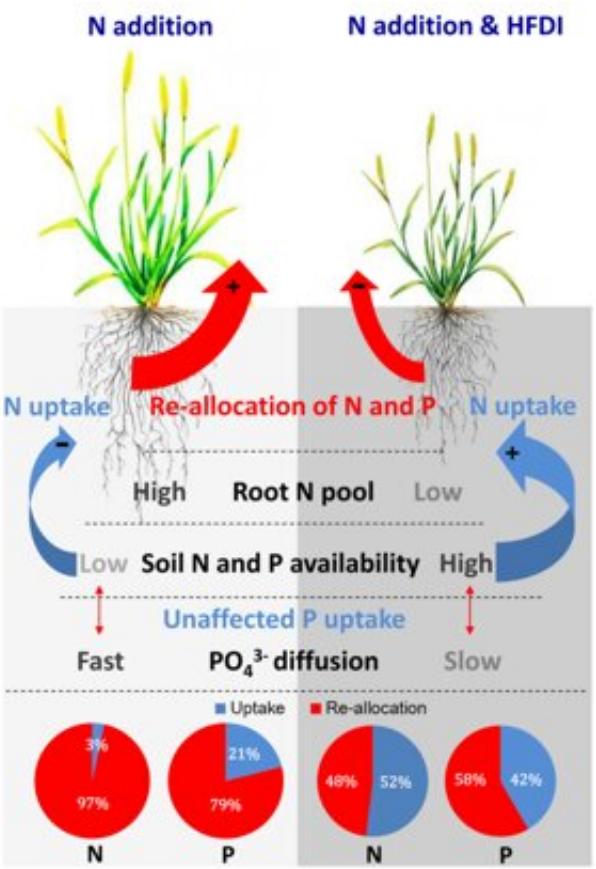

Effects of nitrogen addition and high-frequency deficit irrigation on re-allocation of N and P from plant roots. Credit: WANG Ruzhen

Re-allocation of nitrogen (N) and phosphorus (P) from roots is an important nutrient-use strategy for plant growth when nutrient availability to plants is low or when aboveground parts are removed or damaged (e.g., by grazing and fire). However, quantifying root nutrient re-allocation is quite challenging, and it remained elusive for how root nutrient re-allocation responding to changes in nitrogen and water availability.

Researchers led by Prof. Jiang Yong from the Institute of Applied Ecology of the Chinese Academy of Sciences used a novel dual-labeling approach (^{15}N and ^{32}P) to quantify plant nitrogen and phosphorus re-allocation from roots to shoots during plant regrowth in a perennial grassland.

The researchers found that lower water availability decreased both nitrogen and phosphorus re-allocation in N-rich conditions. This might be derived from the exhaustion of nutrient reserves in roots.

In N-poor conditions, however, lower water availability showed no impact on both uptake and re-allocation of nitrogen and phosphorus. This might be due to unchanged soil nitrogen availability and a greater diffusion barrier of soil available phosphorus. During the first two weeks of regrowth, nutrient re-allocation accounted for 48–97% of nitrogen and 58–79% of phosphorus acquired by shoots.

The study highlights the importance of root nutrient re-allocation to support shoot regrowth.

The study has been published online in *Journal of Ecology*.

More information: Ruzhen Wang et al, Re-allocation of nitrogen and phosphorus from roots drives regrowth of grasses and sedges after defoliation under deficit irrigation and nitrogen enrichment, *Journal of*

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