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Dissolved organic nitrogen uptake by plants – an important N uptake pathway?

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Abstract

The direct uptake of dissolved organic nitrogen (DON) by plants has the potential to be a primary factor in ecosystem functioning and vegetation succession particularly in N-limiting environments. Clear experimental evidence to support this view, however, is still lacking. Further, many of the experimental approaches used to assess whether DON is important may be compromised due to the use of inappropriate methods for comparing and quantifying plant available inorganic and organic soil N pools. In addition, experiments aimed at quantifying plant DON capture using dual-labelled (^{15}N , ^{13}C) organic N tracers often do not consider important aspects such as isotope pool dilution, differences in organic and inorganic N pool turnover times, bi-directional DON flows at the soil–root interface, and the differential fate of the ^{15}N and ^{13}C in the tracer compounds. Based upon experimental evidence, we hypothesize that DON uptake from the soil may not contribute largely to N acquisition by plants but may instead be primarily

involved in the recapture of DON previously lost during root exudation. We conclude that while root uptake of amino acids in intact form has been shown, evidence demonstrating this as a major plant N acquisition pathway is still lacking.



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Keywords

Amino acids; Competition; Dissolved organic carbon; Microbial biomass; Nitrogen cycling; Rhizosphere; Root; Soil solution; Uptake

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