

Getting to the root of variation and drivers in fine root decomposition

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Abstract

Plant roots and their fungal associates have a dominant role in terrestrial carbon and nutrient cycling. Yet, how different root orders that vary in their production, quality, and function impact ecosystem processes remains uncertain. Across five orders of fine roots taken from forty woody plant species, we found consistently decreasing carbon and nitrogen release during four years of decomposition in the field the finer and more short-lived the roots (i.e., with decreasing root order from 5th to 1st order roots). Differences among root orders were remarkably well predicted by root carbon chemistry and diameter, with mycorrhizal type effects only in the coarsest roots (4th and 5th order roots). Our data shed an entirely new light on how different root orders and associated mycorrhizae contribute to biogeochemical cycling, refining the understanding and predictions of drivers and pathways of soil carbon and nitrogen dynamics.

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