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Follow-up (stable isotope) of rhizodeposition and litter in soil micro-arthropods under 15 grassland species with contrasting strategies

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Understanding soil fauna's role in biogeochemical cycling is of utmost importance in the context of global change. Plant-fauna interactions are a crucial component of organic matter decomposition processes, especially via regulation of microbial populations. However, we still lack knowledge of their relationships with plant acquisition strategies, whose links with biogeochemical cycling are well documented.
The theoretical framework of the "plant economic space" (PES) describes two strategical trade-offs associated with resource allocation: (i) rapid growth sustained by wide exploration and large nutrient uptake opposed to slow growth with limited nutrient absorption and (ii) investment in a plant's own foraging system opposed to externalization to mycorrhizal fungi. Resource acquisition strategy determines quantity, quality and localization of two essential organic matter sources in soil: litter and rhizodeposition. Direct or indirect (via saprotrophic fungi or plant-associated micro-organisms) dependance of micro-arthropods, a major soil fauna group, to these two resources is partially documented. A better understanding of the complex trophic links of these organisms to plant strategies would allow us to better integrate them in biogeochemical cycling models. These issues are particularly interesting with the recent paradigm shift suggesting that stable organic matter is mostly formed from living plant-derived small molecules associated with minerals, not only from complex compounds obtained from recalcitrant litter.
We here studied the relationship between several functional groups of micro-arthropods and these basal resources thanks to an experiment with 15 grassland species with contrasting strategies. To do so, we grew these 15 grassland species in a 3-month pot experiment, with or without litter inputs. By means of isotope labelling, we traced nitrogen (N) fluxes from litter decomposition and carbon (C) fluxes from rhizodeposition in different pools, including microbial biomass, soil organic matter, soil respiration and micro-arthropods.
We expect some functional groups to rely more on one type of resource, and that overall, biomass of micro-arthropods depends most on the availability of organic matter.