How climate change modulates interactions between plants and soil fauna

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Abstract

Biotic interactions are a major driver of key ecological and evolutionary processes. Even if we know that the influence of environmental changes on species interactions is a major determinant of community structure and function, little is known on how climate change may modify the nature and magnitude of biotic interactions. This is a crucial point to understand how ecosystems will respond to the fast rates of current warming. Within this framework, most studies focused on the aboveground compartment, however above-belowground linkages are of prime importance on determining ecosystem fate. Recently, we have shown that flowering of *P. annua* was promoted by the presence of Collembola, through an increase in soil nutrients availability. We wanted to further explore how climate change may modify those interactions between soil fauna and plants, by hypothesizing that action of Collembola on nutrients availability will increase with elevation of temperature. For 3 months in a lab experiment, we studied the development of *P. annua* according to 2 different factors: presence or absence of Collembola and two different temperatures: ambient and elevated (mimicking the global warming). Collembola affected biotic (fungal biomass), abiotic (nutrients) soil properties, morphological (number of leaves, root biomass) and chemical (C:N, K, Mg, N) traits of *Poa annua*, providing experimental evidence that soil microarthropods can affect the reproduction strategy and phenology of a plant. In agreement with our hypothesis, the magnitude of these effects was much stronger under elevated temperature, showing a strong regulatory function of climate change on biotic interactions outcome.

Keywords: Above, belowground linkages, plant performance, biotic interactions, soil fauna, soil properties

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