Long-term and realistic global change manipulations had low impact on diversity of soil biota in temperate heathland

In a dry heathland ecosystem we manipulated temperature (warming), precipitation (drought) and atmospheric concentration of CO2 in a full-factorial experiment in order to investigate changes in below-ground biodiversity as a result of future climate change. We investigated the responses in community diversity of nematodes, enchytraeids, collembolans and oribatid mites at two and eight years of manipulations. We used a structural equation modelling (SEM) approach analyzing the three manipulations, soil moisture and temperature, and seven soil biological and chemical variables. The analysis revealed a persistent and positive effect of elevated CO2 on litter C:N ratio. After two years of treatment, the fungi to bacteria ratio was increased by warming, and the diversities within oribatid mites, collembolans and nematode groups were all affected by elevated CO2 mediated through increased litter C:N ratio. After eight years of treatment, however, the CO2-increased litter C:N ratio did not influence the diversity in any of the four fauna groups. The number of significant correlations between treatments, food source quality, and soil biota diversities was reduced from six to three after two and eight years, respectively. These results suggest a remarkable resilience within the soil biota against global climate change treatments in the long term.

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