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Carbon dynamics on microarthropods: The detrital food web of two beech forests in Italian apennines

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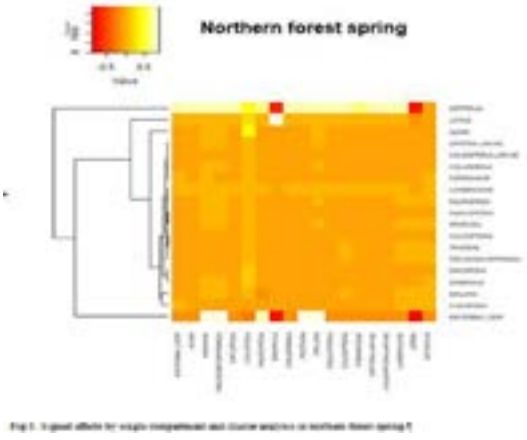
Soils are a fundamental reservoir of biodiversity. Moreover, the structure of the soil community is one of the main drivers that shape the biogeochemical processes occurring in soil via trophic interactions as well as indirect relationships among taxa (eg. mutualistic interactions). In the current global change context, soil community plays an important role considering the large contribution of soils to greenhouse gases productions (CO_2 and CH_4). One key issue concerns the possibility to quantify these annual fluxes from soil and the role of soil microflora and fauna on carbon dynamics. On the one hand, fungi and bacteria get the highest portion of metabolized carbon, but on the other hand, they are influenced by the whole soil community feeding on them and consequently, their consumption, assimilation rates and respiration fluxes. Thus, our research aims to: (1) quantify the ratios of metabolized carbon from soil organic matter by soil microflora and meso fauna communities in two beech (Fagus sylvatica L.) forests located on north and south of the Italian Apennines; (2) identify the trophic effects among the whole considered taxa in each study site, with a special focus on microarthropods; (3) compare the soil communities sampled on different soil and seasonal meteorological conditions (spring and autumn). Ecological Network Analysis approach was chosen for the construction of ecosystem models representing the detrital food web for each site and season. Our results suggest that climatic stressors shape soil communities increasing respiration ratios, recycled matter and enhancing the robustness of the networks causing a loss of resilience. Moreover, trophic interactions and efficiencies varied with seasonality loosing effectiveness on higher trophic levels on warmer conditions. Unexpectedly, Collembola taxa got a very low trophic effect over the whole of the network as well as low values of metabolized carbon.



Recent Publications:

1. Menta, C., F. D. Conti, S. Pinto, A. Leoni, and C. Lozano-Fondón. 2014. "Monitoring Soil Restoration in an Open-Pit Mine in Northern Italy." Applied Soil Ecology 83:22–29.

2. Innangi, M., Schenk, M. K., D'Alessandro, F., Pinto, S., Menta, C., Papa, S., & Fioretto, A. (2015). Field and microcosms decomposition dynamics of European beech leaf litter: Influence of climate, plant material and soil with focus on N and Mn. Applied Soil Ecology, 93, 88–97.

3. Rocchi, M., Scotti, M., Micheli, F., and A. Bodini 2017. Key species and impact of fishery through food web analysis: A case study from Baja California Sur, Mexico. Journal of Marine Systems, 165: 92–102

4. Magri, M., Benelli, S., Bondavalli, C., Bartoli, M., R. Christian, R., Bodini, A., (2017) Benthic N pathways in illuminated and bioturbated sediments studied with network analysis: Network analysis of benthic N processes. Limnology and Oceanography. DOI: 10.1002/lno.10724.

5. Gardi, C., Visioli, G., Conti, F.D., Scotti, M., Menta, C., and Bodini, A (2016). High Nature Value Farmland: assessment of soil organic carbon in Europe. Frontiers in Environmental Sciences.

Biography

Carlos is a Spanish student who has recently won a PhD fellowship on Evolutionary Biology and Ecology at University of Ferrara, Italy. He is interested on models of soil food webs and how they vary in a climate change context. He has worked on this argument during his Master's Degree dissertation and on soil biodiversity in his Bachelor's degree dissertation. His PhD project is about interactions among above-ground and below-ground communities and their roles on soil biogeochemical cycles in semi-arid grasslands.He got the Bachelor's degree on Forestry Engineering at University of Extremadura with Third class of Honors (2014) and the Master's degree on Environmental Sciences at University of Parma with First Class of Honors (2016)

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