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Editorial

Plant–Soil Interactions as Drivers of the Structure and Functions of Plant Communities

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Received: 23 November 2020; Accepted: 27 November 2020; Published: 28 November 2020

1. Introduction

Plant–soil interactions play an important role in the structure and function of plant communities and thus in the functioning of ecosystems. Soil properties represent a strong selection pressure for plant diversity and influence the structure of plant communities and participate in the generation and maintenance of biodiversity. Plant communities grow by modifying the physical, chemical, and biological properties of soil, with consequent effects on survival and growth of plants. This process—called plant–soil feedback—plays a key role in water and nutrient availability and the dynamic of soil-borne microbial pathogens, parasite populations, and root herbivores, by globally impacting the vegetation succession and net primary productivity. Plant–soil feedbacks can, however, present contrasting effects on plant community assemblage and ecosystem development [1].

Plant–soil interactions include many biophysical and chemical processes combined with spatial and temporal variations and represent an ecological complexity that still needs to be unraveled. The challenge is to improve knowledge on the role of plant–soil interactions in the plant community structure and functions and their consequences in ecosystem functioning. Functional trait approaches enhance ecological process understanding by characterizing the mechanisms that govern interactions between plants and their environments, and, particularly in this Special Issue, soil–plant interactions [2]. This "plant–soil interactions" Special Issue addresses both soil factor effects on plant communities and the role of ecological complementarity and species diversity of plant communities in soil properties and ecosystem services.

Soil factor effects on plant community structure are addressed by highlighting plant trait selection by degraded habitats in ultramafic soils for mine reclamation [3], by specifying the effect of microorganism supply (AMF, *Frankia* and *Rhizophagus fasciculatus*) on plant community structures and ecological restoration [4], and by reviewing the role of Arbuscular Mycorrhizal Fungi (AMF) to cope with biotic and abiotic stresses and improve plant growth [5]. In addition, a distinct composition of plant-associated core bacterial communities independent of land use intensity is identified [6].

The role of ecological complementarity and species diversity of plant communities in soil properties and ecosystem services is addressed in this Special Issue. Ecological complementarity is demonstrated by the integration of legumes in nitrogen deficiency monospecific tropical grass pasture increasing biomass productivity and N uptake [7].

The non-additive effect of functional diversity (FD) is demonstrated on several soil processes and ecosystem services. The non-additive effect of FD on the hydraulic resistance and thus soil sedimentation is shown and can be explained by the presence of species presenting large stems in the communities with high functional diversity [8]. The effect of plant traits on hydraulic resistance and soil sedimentation process is driven by the community-weighted leaf density and not by the functional diversity of leaf and stem traits at the community level [8]. In another ecological process, species diversity does not show a positive effect on the abundance of fungal pathogens. White mustard

is the only cover crop species associated with the decrease in necrotic root damage and abundance of fungal pathogens in vineyards [9].

This plant–soil interactions Special Issue brings new empirical results and some advances in order to try to unravel the complexity of plant–soil interactions and their role in plant community structure and function.

Funding: This research received no external funding.

Conflicts of Interest: The author declares no conflict of interest.

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