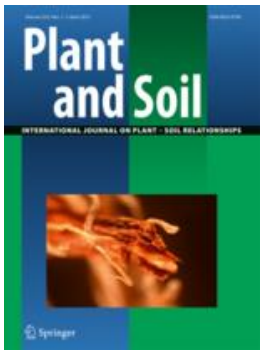

The rhizosphere microbiota and plant health

It is all happening underneath our feet. The complex interactions of plant roots with their associated microbiota significantly affect the functioning of plants, especially under conditions of abiotic or biotic stress. The importance of the bacterial rhizosphere microbiota for plant growth and health has been studied for decades. *Plant and Soil* have published many articles on the effects that beneficial microorganisms, so-called plant growth-promoting rhizobacteria (PGPR) (Vessey 2003), can have on the growth and health of plants. Rhizodeposition of carbon compounds dramatically increases microbial activity and biomass in soil closely associated with the roots (Hartmann et al. 2009). In this so-called rhizosphere, interactions between members of the microbial communities are important determinants for plant growth (Raaijmakers et al. 2009). Historically, studies on PGPR have focused on the isolation, identification and characterization of bacteria and fungi, and some well known traits involved in such benefits. Examples of such studies include phosphate solubilisation (Hariprasad and Niranjana 2009), production of phytohormones (IAA) (Khan and Doty 2009), production of siderophores, chitinases, and the involvement of induced systemic resistance against pathogens (Ramos-Solano et al. 2010) and root-colonizing ability (Zhang et al. 2011). The effects of complex soil amendments, for example composts, on plant health have been reported as well (Kavroulakis et al. 2010). Screening strategies for new PGPR have been refined based on the wealth of information available (Pliego et al. 2011). State-of-the-art molecular tools are now commonly available to unravel the nature of interactions between members of rhizosphere microbial communities (Sorenson et al. 2009). Thus we appear to be beyond the stage of 'inventory, descriptive research' and *Plant and Soil* now aims to publish results of studies enhancing our insights into mechanistic aspects of such interactions. In the following articles that were recently published in *Plant and Soil*, new and exciting research questions are posed that will help us to gain significant insight in rhizosphere microbiology. DNA fingerprinting of bacterial and fungal rhizosphere communities was used to address the question whether apple rootstock tolerance to apple replant disease is linked with effects on microbial consortia (St. Laurent at al. 2010). Interference with pathogen communication in the rhizosphere is an exciting approach to control diseases (Crepin et al. 2012). Research questions have expanded to interactions with nematodes and aboveground pathogens and pests (López-Martínez et al. 2011; Menjivar et al., 2012; Thamer et al. 2011). Plant responses to specific biotic stimuli are now determined in more detail and better understood (Ling et al. 2011; Medeiros et al. 2011; Tortora et al. 2012; Walker et al. online first). Integrated disease management to be implemented in modern sustainable crop production systems (López -Escudero and Mercado-Blanco 2011) will undoubtedly benefit from the knowledge generated in these studies.

Peter A.H.M. Bakker (section editor)
Jesús Mercado-Blanco (section editor)

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