Virtual Special Issues: A new initiative in providing a service for readers of Plant and Soil

Aim of the new feature

Soil-plant interactions represent one of the most exciting areas of scientific progress. These studies cover a wide range of topics, from chemistry to molecular biology, and from rhizosphere to ecosystems. Soil-plant interactions have been the focus of agriculture-oriented studies worldwide for many years; however, more recently, much attention has been shifted to issues related to global change, such as greenhouse gas emission from soil-plant systems, and soil carbon management. On another front, soil-plant interactions are being increasingly studied at molecular levels; these include using molecular biological techniques to determine the microbial community changes in response to environmental stresses and agricultural practices, gene expression and functions at soil-root interface and within plants under biotic and abiotic stresses as well as symbiotic associations. Physical molecular techniques have also been applied to investigate metal speciation in soils, soil-plant interface and within plants.

In view of the rapid development of studies on soil-plant interactions, we are pleased to announce our new feature: “Virtual Special Issues”. These Special Issues bring together papers that were recently published in Plant and Soil. They provide a service to our readers, who find it increasingly difficult to keep up with the literature.

This first Virtual Special Issue deals with biochar. The science of modern biochar soil management is a relatively recent development and has gained increasing attention only over the past four years. After initial empirical research published in the journal Plant and Soil focusing on plant growth, legume nodulation, inoculation and nutrient leaching (Devonald, 1982; Saito and Marumoto, 2002; Lehmann et al., 2003; MacKenzie and DeLuca, 2006; Steiner et al., 2007), studies published over the past two years have demonstrated that biochar may be more or less effective depending on the crop and soil type (Van Zwieten et al., 2010). Biochars were shown to not only alter crop growth through changes in soil chemical properties, but also through their effects on soil biota (Graber et al., 2010) or through ethylene production (Spokas et al., 2010). These initial greenhouse studies have been expanded to multi-year field experiments (Major et al., 2010), and two Marschner reviews have been published in Plant and Soil, one on the effects of biochar on mycorrhizae (Warnock et al., 2007) and one on the potential for biochar soil management in temperate climates (Atkinson et al., 2010). In this virtual special issue, experiments are compiled that develop a more mechanistic understanding of the effects of specific biochar properties on soils and plants. The plant-availability of ammonia on biochar surfaces (Taghizadeh-Toosi et al., 2011) opened a new view on how biochar may affect soil nitrogen dynamics (Spokas, 2011). Results of earlier experiments have been substantiated and expanded by showing that heavy metal availability decreased with biochar (Park et al., 2011), nitrogen mineralization decreased (Santalla et al., 2011), and maize growth may be
increased even on alkaline soils while greenhouse gas emissions were decrease (Zhang et al., 2011). In contrast to this field experiment and earlier laboratory incubations, a short-term field assessment did not find any changes in nitrous oxide emissions from soil (Scheer et al., 2011). But also new questions appear such as in what way biochar may influence the observed improvements of water use efficiency as observed for Chenopodium quinoa (Kammann et al., 2011). The compiled articles demonstrate the breadth of questions pertinent to biochar. They also begin to establish research on biochar alongside other soil management such as through compost or manure additions, through tillage or fertilization as an essential tool in our tool box to manage soil health and plant productivity.

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References


Spokas KA, Novak JM, Venterea RT (2011) Biochar’s role as an alternative N-fertilizer: ammonia capture, Plant Soil DOI: 10.1007/s11104-011-0930-8


