



## Modification of soils by plants: sustainability by design

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In recent years, food and environmental security threats have increased the prominence and funding of soil science. A growing area is the study of root-soil interactions in soil, driven by the need to increase crop productivity, whilst also decreasing inputs. The untapped potential in manipulating soil properties with plants to increase food security is increasingly recognised. We argue that this area of soil science has been successful for a number of reasons: (1) it offers something positive, in terms of more food for a growing population; (2) the research is collaborative, with plant and soil scientists working together and bringing the research from the lab to the field by working across a broad range of disciplines; (3) there have been technical advances in both plant genetics and soil science that allow for very novel and exciting research questions to be answered; and (4) there are commercial demands from both plant breeding companies and farmers for more sustainable crop varieties, which provides lobbying power to funders. However, soil science is still viewed by many as 'bucket science' where the answers are known but just poorly applied in farming practice. We know this is nonsense, but how do we convince others?

Using examples from our EGU 2014 session, we will demonstrate how recent scientific advances in soil science have greatly increased the understanding of the root-soil interface. The research includes new technologies such as high resolution non-invasive imaging of roots in soil, the use of model plants that have controlled traits that modify soils, molecular biology approaches to investigate nutrient cycling and other microbial functions affected by plants, and the development of new models of root growth, nutrient capture and plant-soil water relations.

Despite a surge of soil researchers studying roots, the research still fails to attract the attention or funding of other disciplines, including our collaborators in plant science. This is typical of many areas of soil science. We will discuss opportunities to increase demand for our science and its impact in addressing food security challenges.