

# RD 2.1.7: Plant, soil, water interactions

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## Aim:

To identify the interactions between plants and soils that can be exploited to achieve food security and sustainable production of sufficient, safe and nutritious food.

Crop yield and quality, biodiversity, and soil health are largely determined by the interactions between plant roots and the soil.

This work focuses on understanding, and modelling, the physical, chemical and biological interactions between plant roots, soil and water, which could improve crop and grassland production efficiency and sustainability.

## Research Objectives

- To quantify root traits in laboratory and controlled environments
- To characterise the interactions between root traits and the structure, composition and biology of the rhizosphere
- To determine the consequences of such interactions for the acquisition of water and essential mineral elements
- To develop and validate quantitative models of rhizosphere behaviour



## High throughput systems to study root architecture

For barley and brassicas:

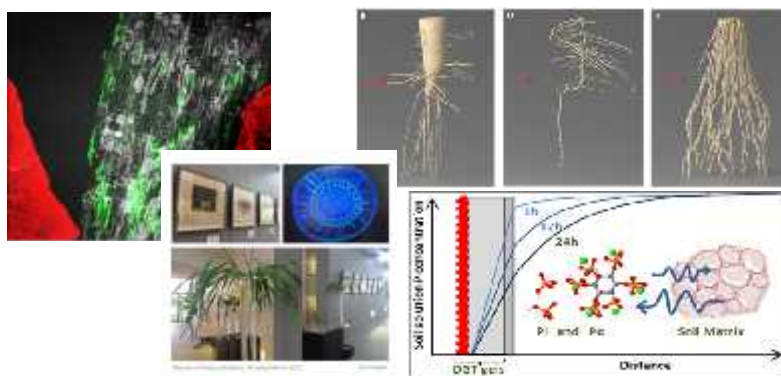
- High throughput systems for quantifying root architectural traits developed
- Germplasm screened for composition of root exudates

We have investigated:

- Effects of root traits on soil structure and water retention
- Effects of root chemistry on nutrient acquisition and biological activities in soil

We are developing:

- Quantitative models of root architecture and nutrient acquisition
- Quantitative models describing interactions between plant roots and soil biota



## Impact

- Policy Documents/Position Papers for Scottish/UK Governments and EU
- Recommendations to Industry for Fertiliser Practice
- SEFARI public exhibitions of “The Beauty of Roots”, Bere Barley Workshop, technical meetings and open days

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