Life in the rhizosphere: My root as a research scientist

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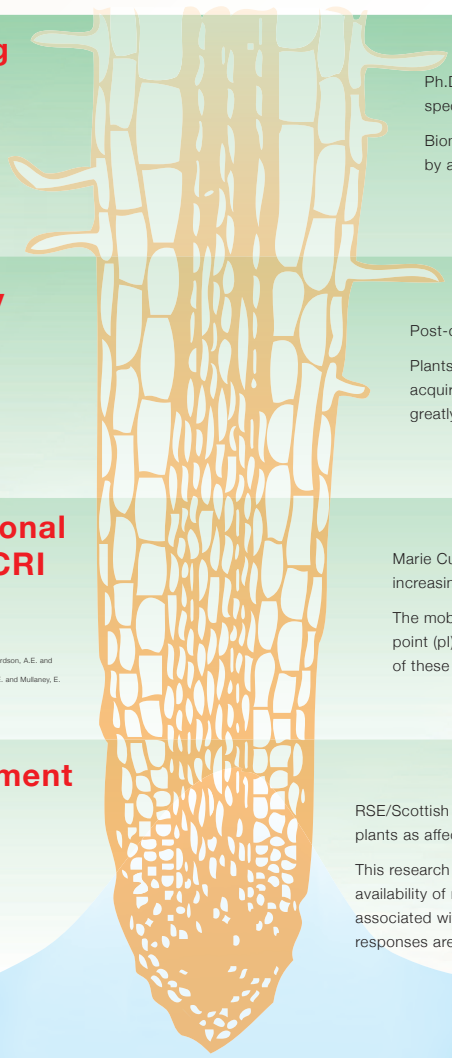
Rhizosphere is point of contact for plant and soil

Chemical, Biochemical and Biological environment very different to bulk soil.

Zone of soil over which plants have control

Understanding how plants react to and alter their external environment is key to optimising their nutrition and therefore the sustainability of agriculture and natural ecosystems. I am specifically interested in understanding the physiology of and genetic controls on plant responses to P-deficiency.

- 5.7 billion ha globally is P deficient
- 95% of acid soils in Africa, South America, Asia and Australia are P deficient
- Efficiency of P fertiliser use is poor (10-30%)



University of Reading /ICRAF Kenya

1997-2000

Ph.D. Soil Science. Mechanisms enhancing acquisition of P by agroforestry species.

Biomass transfer species acquire large P contents on the P-poor soils of Kenya by a combination of landscape position and rhizosphere processes.

George et al. (2002) Soil Biol Biochem 34:1487-1494
George et al. (2002) Plant Soil 246:53-63
George et al. (2002) Plant Soil 246:65-73
George et al. (2000) Agroforestry Systems 52:199-20
George et al. (1999) Agroforestry Forum: Special Edition 9:33-37

CSIRO Plant Industry Australia

2001-2004

Post-doc: Improving the efficiency of phosphorus use by pasture plants

Plants genetically enhanced with a microbial phytase gene had improved ability to acquire P from inositol phosphates in a non-sorbing environment, but growth was greatly compromised when grown in soils.

George et al. (2005) Plant Soil 278:263-274
George et al. (2005) Soil Biol Biochem 37:977-988
George et al. (2005) Plant Biotechnology Journal 3:129-140
George et al. (2004) Plant, Cell and Environment 27:1351-1361

Marie Curie International Fellowship CSIRO/SCRI

2004-2007

Marie Curie Fellowship: Optimising the efficacy of phosphatase in the rhizosphere, increasing the sustainability of agricultural crops.

The mobility of phytase in the rhizosphere of plants is determined by its isoelectric point (pI). The greater mobility of acidic pI proteins was implicated in a greater ability of these phytases to mineralise inositol phosphates in soils.

George et al. (2007) Australian Journal Agricultural Research 58:47-55
George et al. (2007) Soil Biol Biochem 39:793-803
Richardson, et al. (2006) In Inositol phosphates in the soil-plant-animal system. Turner, B.L., Richardson, A.E. and Mullaney, E. (eds) CABI Publishing, Wallingford. pp. 243-261
George (2006) In Inositol phosphates in the soil-plant-animal system. Turner, B.L., Richardson, A.E. and Mullaney, E. (eds) CABI Publishing, Wallingford. pp. 222-242
George et al. (2006) European Journal of Soil Science 57:47-57

RSE/Scottish Government Fellowship SCRI

2007 - present

RSE/Scottish Government Personal Fellowship:Phosphorus-use efficiency mechanisms in plants as affected by water availability

This research will identify barley cultivars which cope with nutritional drought, the reduced availability of nutrients following climate change. With many of the physiological responses associated with both water and nutrient deficit being shared, it is imperative that responses are decoupled to identify the key driver of relevant phenotypes

George et al. (2009) Nature Biotechnology (in preparation)
George (2009) FEMS Microbial Ecology (in press)
Neumann et al. (2009) Plant Soil (in press).
Richardson et al. (2009) Crop and Pasture Science 60, 124–143
George et al. (2008) Experimental and Environmental Botany 64 239–249

Scottish Crucible

2009

The skills and experience offered by attendance of the Scottish Crucible 2009, including creative thinking and understanding of the wider societal and political environment, will allow me and my group better target our research to societies needs and interact with the public in a more meaningful way.