

Non-destructive Monitoring of Subsoil Root Vigour

Motivation

- One of the most important, and yet the least studied parts of a plant system, is the subsoil root structure.
- Roots provide support for the above-ground portion of the plant, supplying it with both water and nutrients; roots also provide a solid foundation for growth.
- The health of the root system can have a significant affect upon above-ground growth, especially during periods of drought, and the root system ultimately affects crop yield.



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Challenges

- The opaqueness of soil, which is composed of mineral and biological materials, hinders visualisation of root health using current monitoring techniques.
- A technique for measuring root size and function—one that overcomes the problems and limitations of existing methods—could create an opportunity to use root selection as a means to increase crop yield and drought tolerance.
- Provision of support for precision farming functions through enhanced in-field geographic information and modeling.
- Collecting information useful for regulatory control of crop protection products, by recording the movement of pesticides in soils.
- Offering seeds and crop protection providers a tool for root worm control and evaluating root rot.

The Proposed Solution

Will utilise:

- Electrical Impedance Tomography (EIT).
- Global Positioning Systems (GPS).
- Data logging and monitoring algorithms.
- Temperature, humidity and nutrient monitoring systems.
- Embedded processing and handheld computing.



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To develop:

- A portable, non-destructive root imaging system based on water uptake.
- Data logging and geographical plotting capabilities to profile crop growth without the need to disturb the growing plant.
- Thereby, providing crop breeding and biotechnology groups with a means of using root mass and function as a key indicator for selecting drought tolerant and high yielding crops.



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