

4D imaging system for root phenotyping (Ramot)

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The Technology

Root phenotypic plasticity is a major factor allowing plants to adapt to their ever changing environment. Although this fundamental issue is of great agricultural importance, studying root plasticity is highly complex due to their hidden nature. We present an automatic system for monitoring root growth and tropic responses (3D spatial coordinates and kinetics). The system is suitable for high throughput applications (mutant screening or physiological responses over various stresses or genotypes) with young seedlings in transparent media. It provides near diffraction resolution, enables dynamic analysis and can be further developed for the detection of fluorescence luminescence signals within the root.

Pottential Applications

The system can be used for:

1. Genetic screens to isolate mutants with altered water sensing and root structures.
2. Developing a high-resolution root scanning system for automatic monitoring of root growth and simultaneous signals from within the root.

Stage of Development

- The CMOS based system provides a four angle view (2 cameras and 2 rotating prisms). Image analysis is performed by our integrated software. Data that can be extracted from the system ranges from root elongation to degree of root curvature, enabling quantification of root system architecture.
- Several novel mutants lacking water sensing and tracking ability, some with altered root structures, have been isolated. The corresponding genes are being investigated.

Publications

The system was presented in a conference in Holland last year: Sherman T, Yakobi P, Zarchin Y, Bolshak G, Svatizky M, Finkler R, Eshel A, Fromm H (2011) 4D Root imaging system for root phenotyping. PhenoDays International Symposium. October 12-14, Wageningen, Holland.

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