

Cyclic programmed cell death stimulates auxin signaling and root development in Arabidopsis

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In dicot root systems, lateral roots are regularly spaced along the longitudinal axis of the primary root to facilitate water and nutrient uptake. Recently, we demonstrated that recurrent programmed cell death in the root cap of the growing root is involved in lateral root positioning. Moreover, an auxin source from the root cap modulates lateral root patterning. The release of auxin by dying root cap cells contributes to the priming of cells for lateral root formation. In addition, the gravitropic response appears to adjust lateral root specification through stimulation of cell death in the root cap.

Positioning of lateral roots along the main root axis will importantly contribute to the final root system architecture (RSA) which is essential to safeguard the main function of roots as organs responsible for uptake of nutrients and water. Because of the limitations of phenotyping in soil, RSA has unfortunately not been investigated exhaustively. We are currently investigating 260 ecotypes of *Arabidopsis thaliana* representing variable root traits due to their local adaptation. Root phenotyping is done with innovative root tracing software, on in-vitro grown plants. Detection of candidate regions of interest is based on Genome Wide Association Studies (GWAS). Another innovative aspect of this project is the investigation of root systems at a relative mature stage of development. This allows to see more complex traits influencing the distribution of roots in space and thus nutrition span. Growing of *Arabidopsis* accessions in a specially created set-up, so-called mini-rhizotrons, will be introduced to expand the phenotyping to soil conditions.