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Universität für Bodenkultur Wien
Department für Angewandte Genetik
und Zellbiologie

Invitation to the VIBT seminar

Control of root hair development in *Arabidopsis thaliana*

Kris Vissenberg

IMPRES (Integrated Molecular Plant physiology Research)

Biology Department, University of Antwerp

Belgium

Friday 09.11.2018

13:00

DAGZ seminar room (MUG2-04/54)

Host: Marie-Theres Hauser



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Abstract

Root Hair (RH) growth is an auxin-regulated process dependent on modification of the apical cell wall (CW). Based on micro-array data and a reverse genetics approach, we identified the kinase ERULUS, a member of the Arabidopsis CrRLK1L family of putative CW sensor proteins, containing 2 putative AUXIN RESPONSE FACTOR (ARF) binding sites in its promoter. *eru* RHs were short, bulged, grew irregular and slower than WT RHs. Micro-array and ChIP experiments showed that ERU is a direct target of at least ARF7 and ARF19.

Throughout RH development ERU-GFP localized to the apical plasma membrane. CW analysis revealed a 2-fold thicker CW, a lower non-esterified/methylesterified pectin ratio and a 2-fold higher pectin methylesterase (PME) activity in *eru* RHs. Pectin Ca²⁺ binding site oscillations, caused by PME activity and determining CW flexibility, were visualized. Simultaneous analysis of growth and pectin Ca²⁺-binding site oscillations, and growth and intracellular calcium-oscillations indicates that there is an uncoupling of these processes in *eru*, suggesting ERULUS acts to fine-tune growth at the tip. Loss of ERU alters the phosphorylation status of FERONIA (FER) and H⁺-ATPase 1/2 (AHA1/2), both known regulators of apoplastic pH during cell growth.

We conclude that ERU is the first identified RH-specific target of the ARF7/ARF19 auxin-dependent transcription factors and a crucial regulator of CW pectin dynamics during RH tip growth.