

Sulphur supply improves tomato pathogen resistance

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04.10.2012

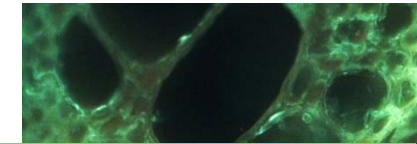
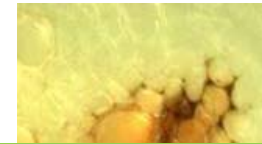


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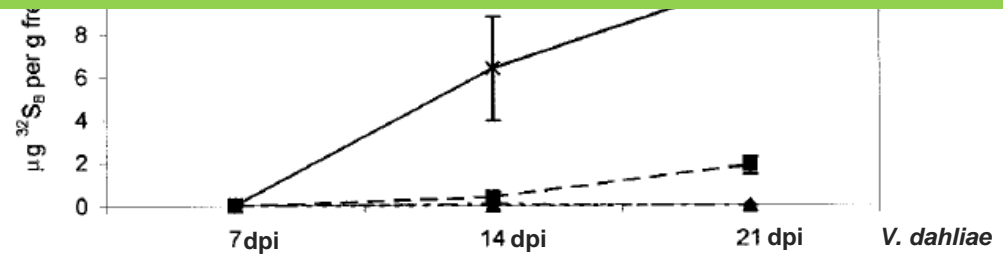
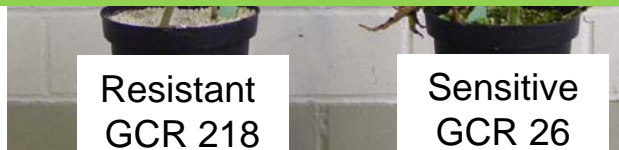
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Verticillium-wilt disease



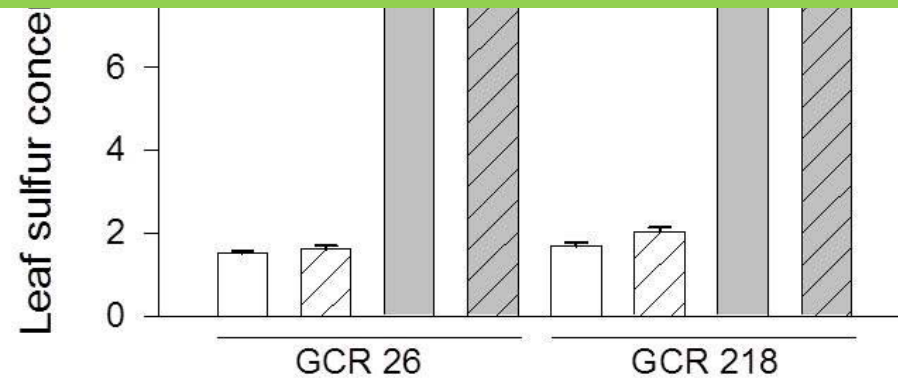
- ▶ Is it possible to activate / enhance SED mechanisms against *V. dahliae* by a modulation of the plant S nutritional status?
- ▶ Is the synthesis of S containing defense compounds (S^0) connected to the primary plant S-metabolism?



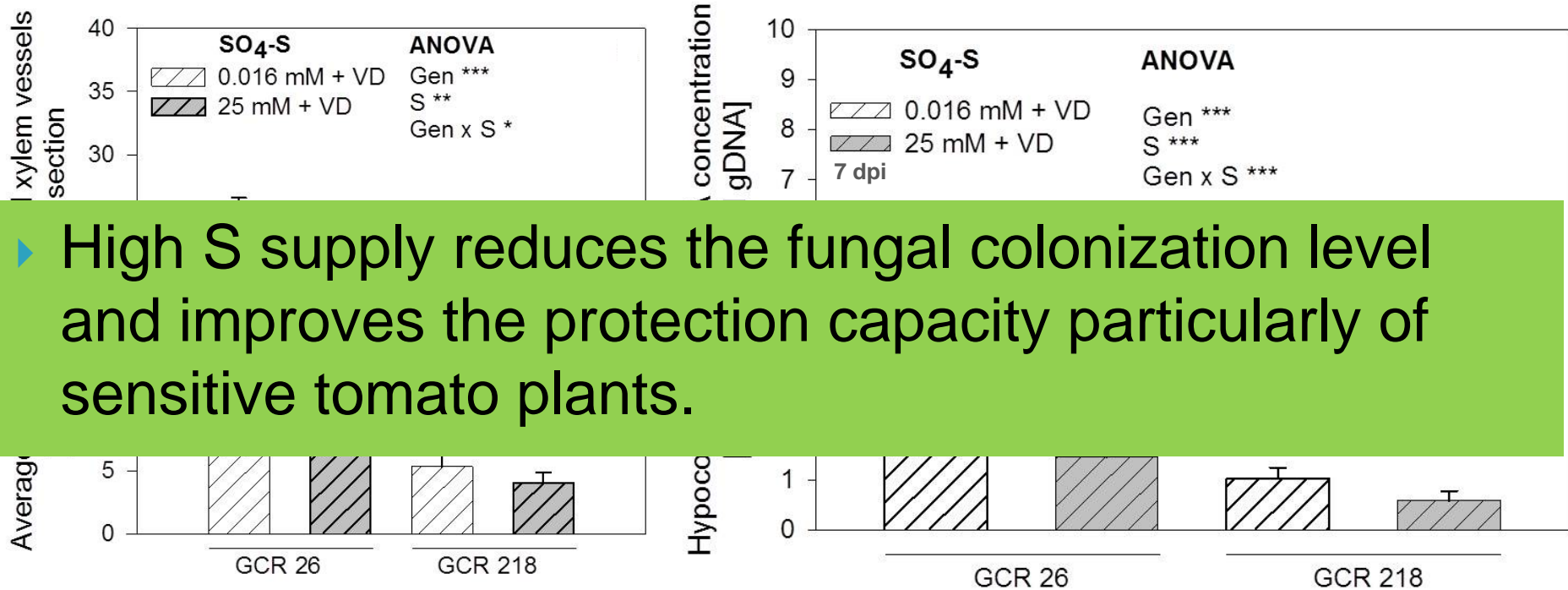
Plant S nutritional status



▶ Successful establishment of a low and high S plant nutritional status.

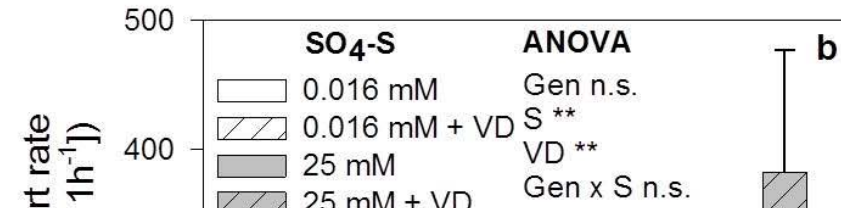
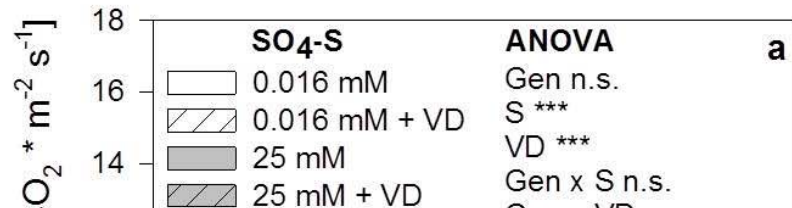


Quantification of *V. dahliae* in tomato

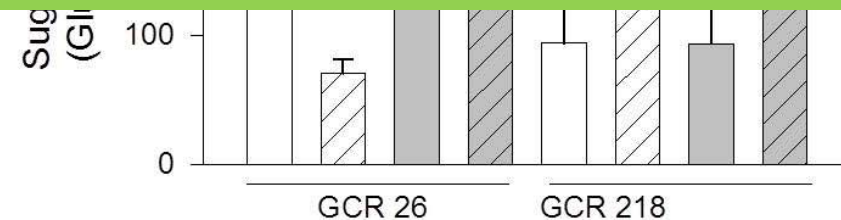
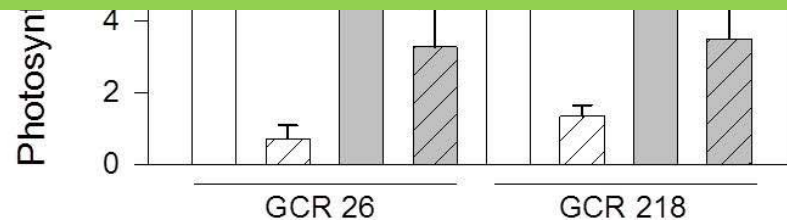


▶ High S supply reduces the fungal colonization level and improves the protection capacity particularly of sensitive tomato plants.

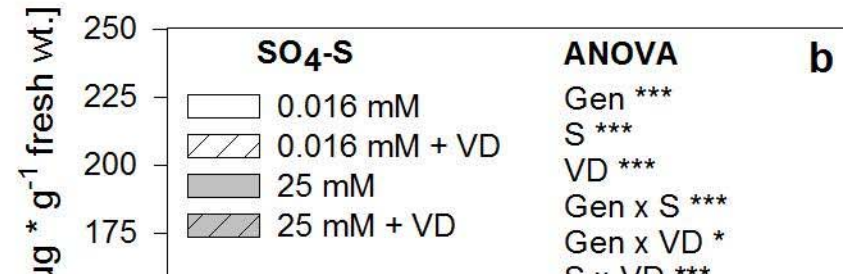
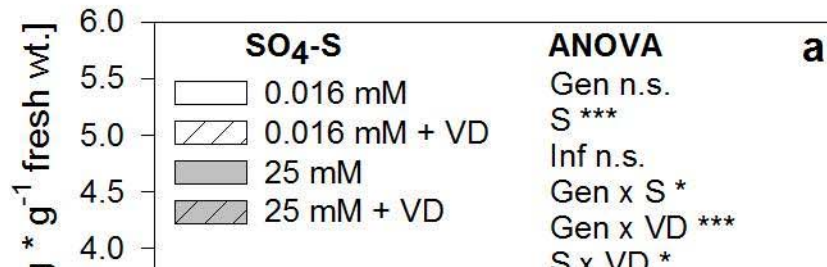
Photosynthesis and Sugar exudation



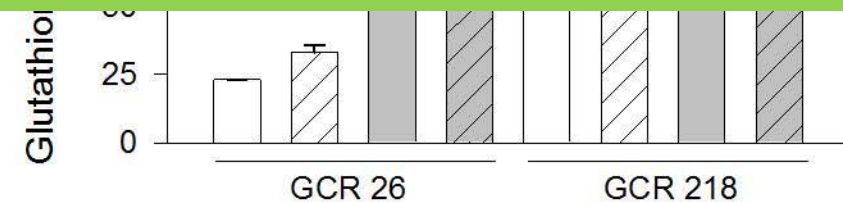
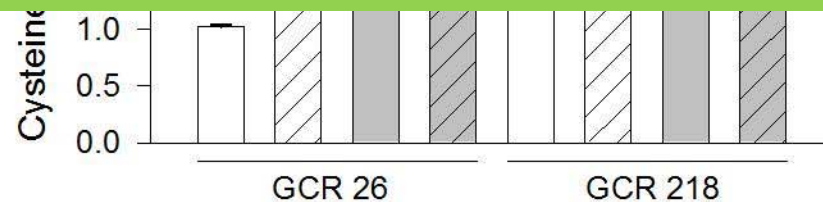
▶ A decreased photosynthesis rate is combined with an increased phloem sugar-channeling for replenishment of metabolic energy and induction of plant-defense.



Cysteine and Glutathione

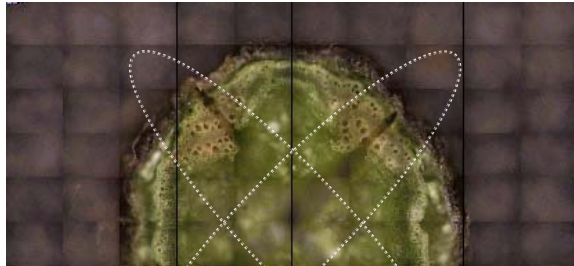


- ▶ Sensitive tomato plants have to build-up thiol pools after fungal infection whereas resistant tomato plants seem to consume them for SED mechanisms.

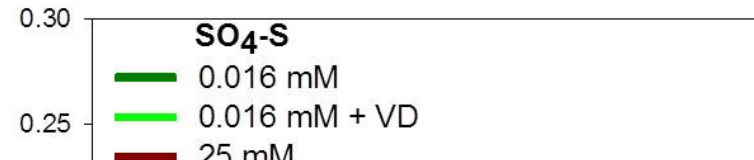


S distribution in tomato tissue

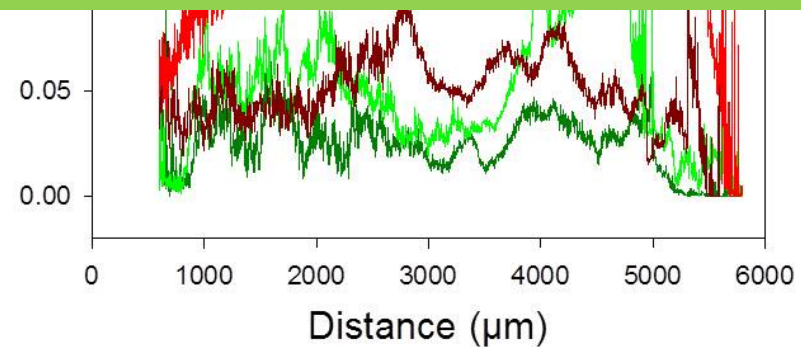
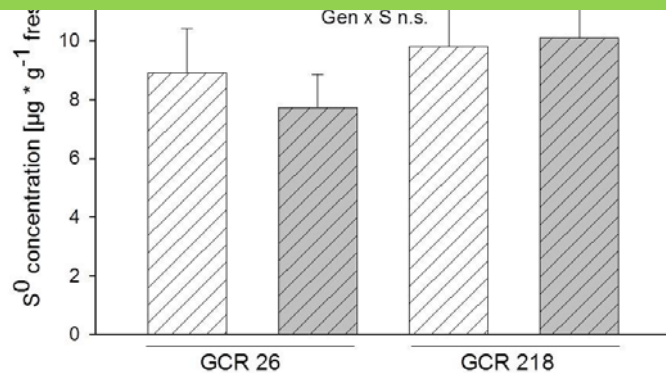
LA-ICP-MS



Resistant Tomato Plants, 7dpi

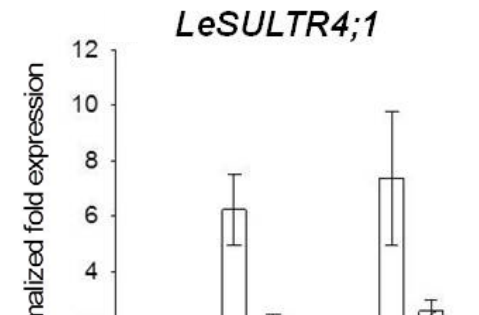
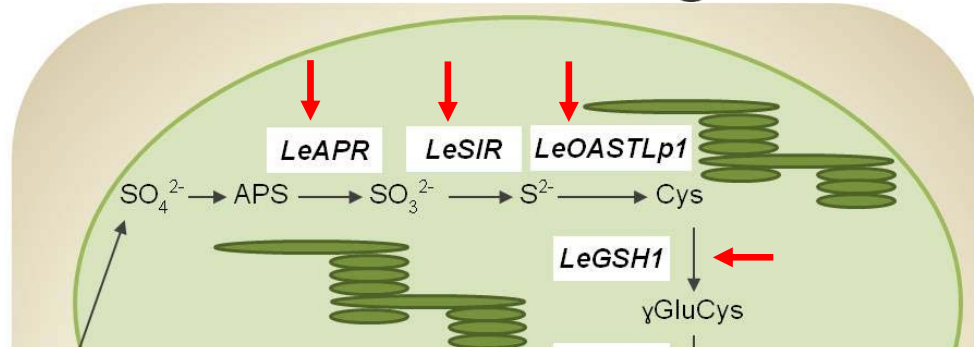


- ▶ A high frequency of vascular S peaks indicates an accumulation of putative antifungal S-metabolites (S^0) in resistant tomato plants.

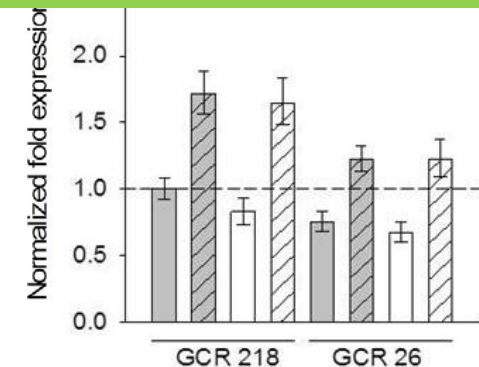
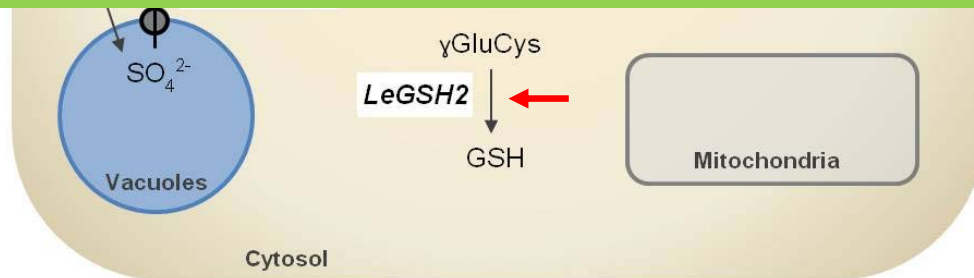


Bollig et al., 2012 (to be submitted)

Global expression analysis of S-metabolism related candidate genes: Hypocotyl



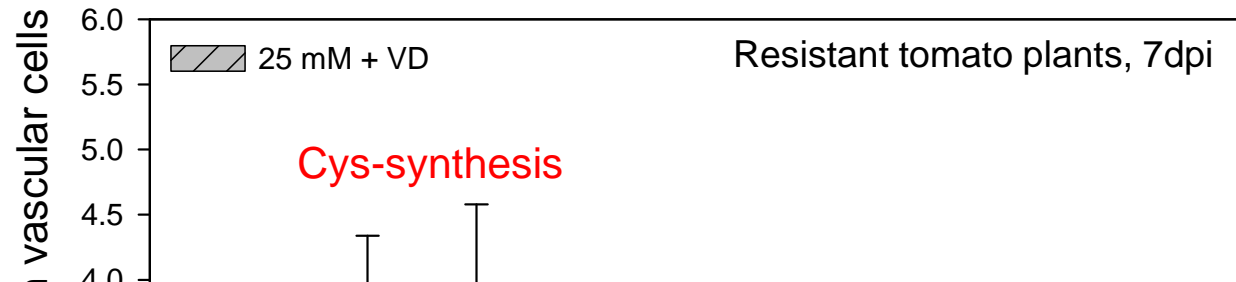
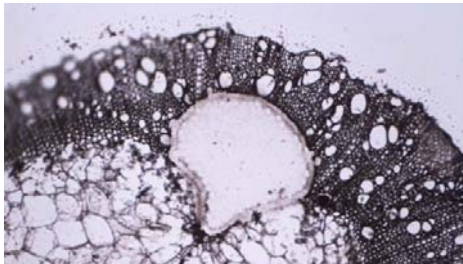
- In bulk hypocotyl tissue the early steps of primary S-metabolism are not involved in SDC (S^0) synthesis but GSH acts as antioxidant.



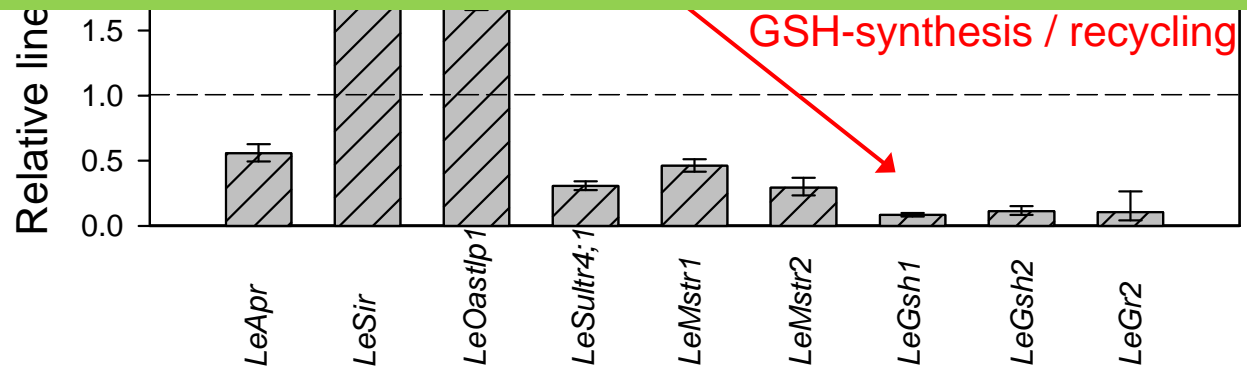
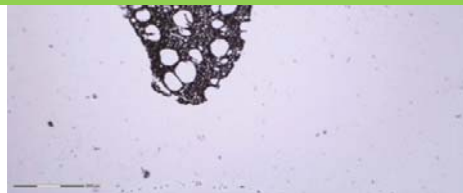
→ reaction
 ●→ transport

Spatial expression analysis of S-metabolism related candidate genes: Vascular Bundle

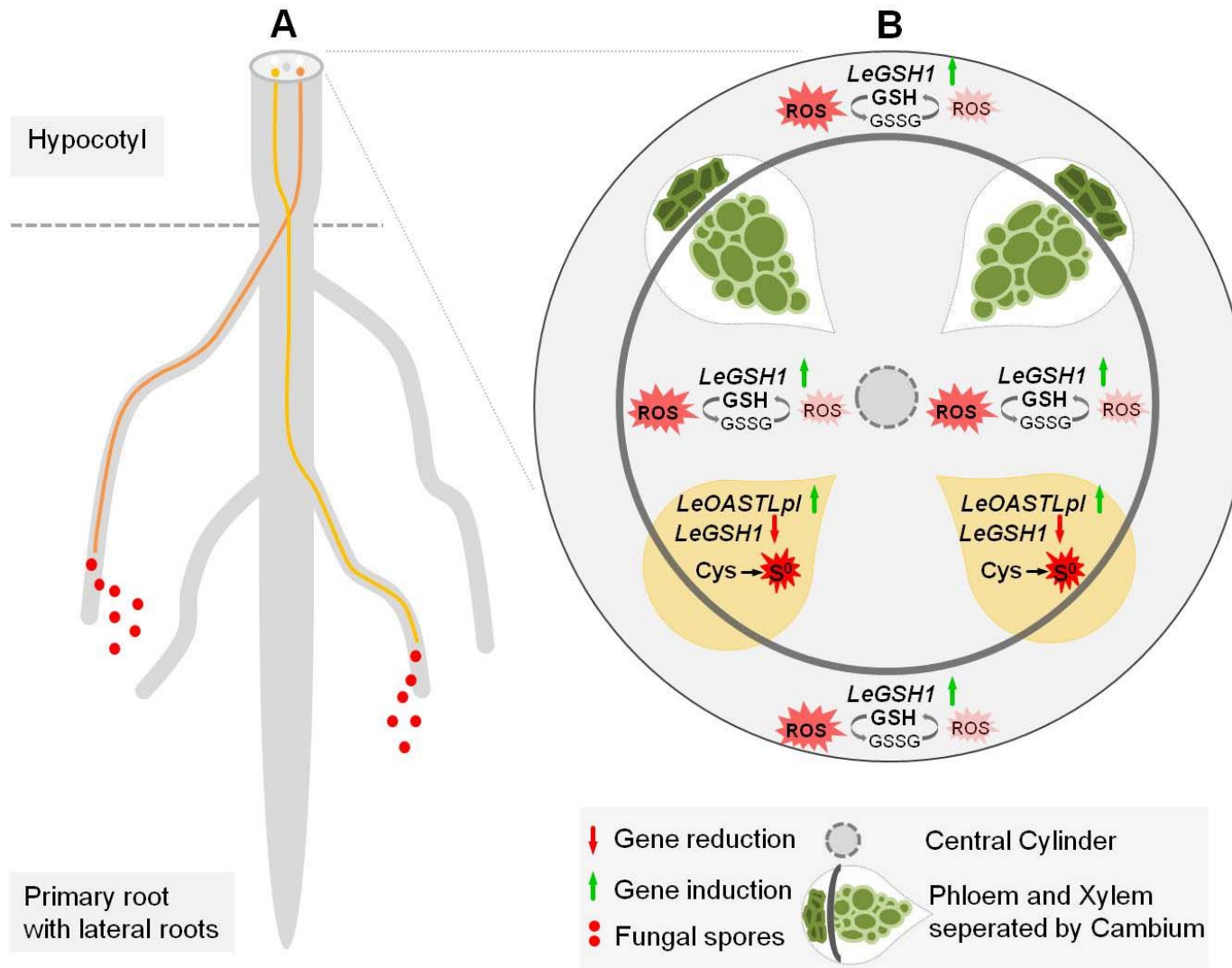
LMPC



- ▶ Vascular gene expression switches towards cell-specific induction of Cys-synthesis possibly promoting SED reactions.



Summary: Transcriptomic characterization



Bollig et al., 2012 (to be submitted)

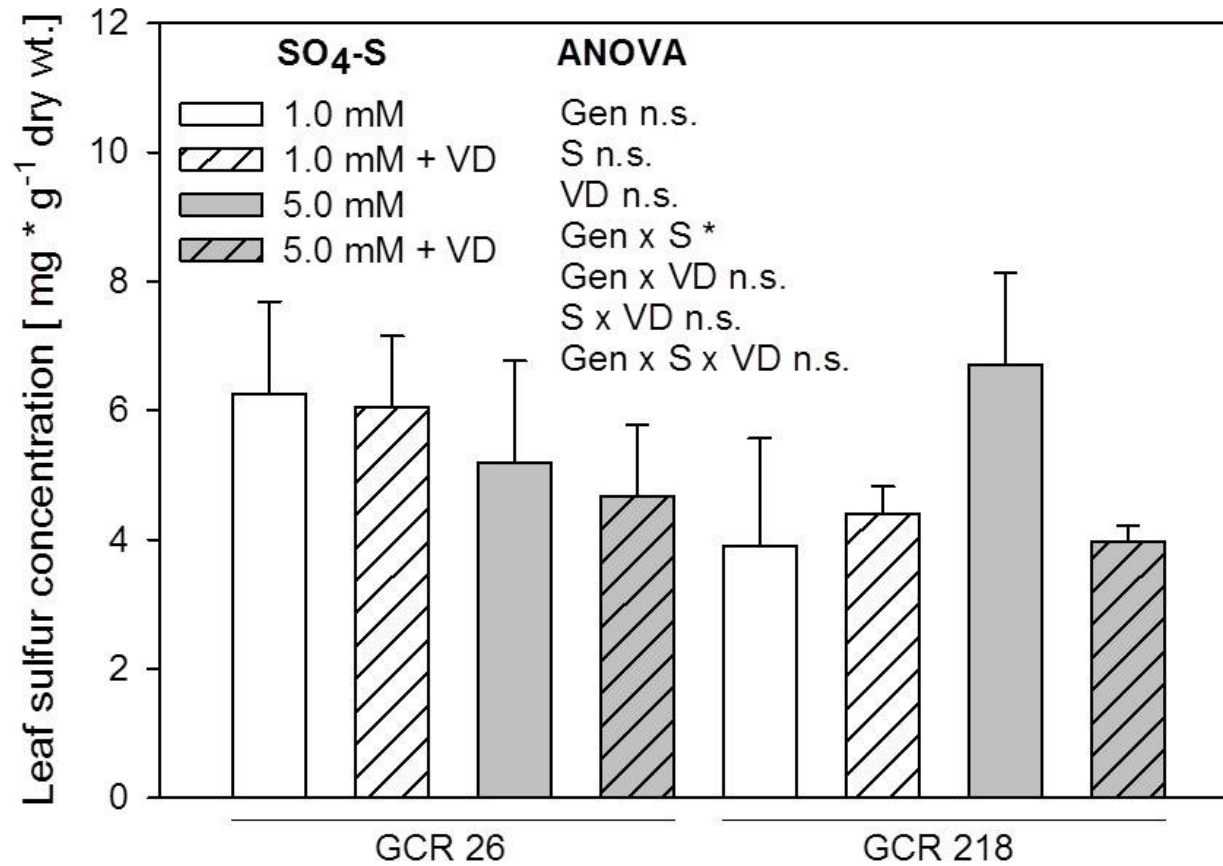




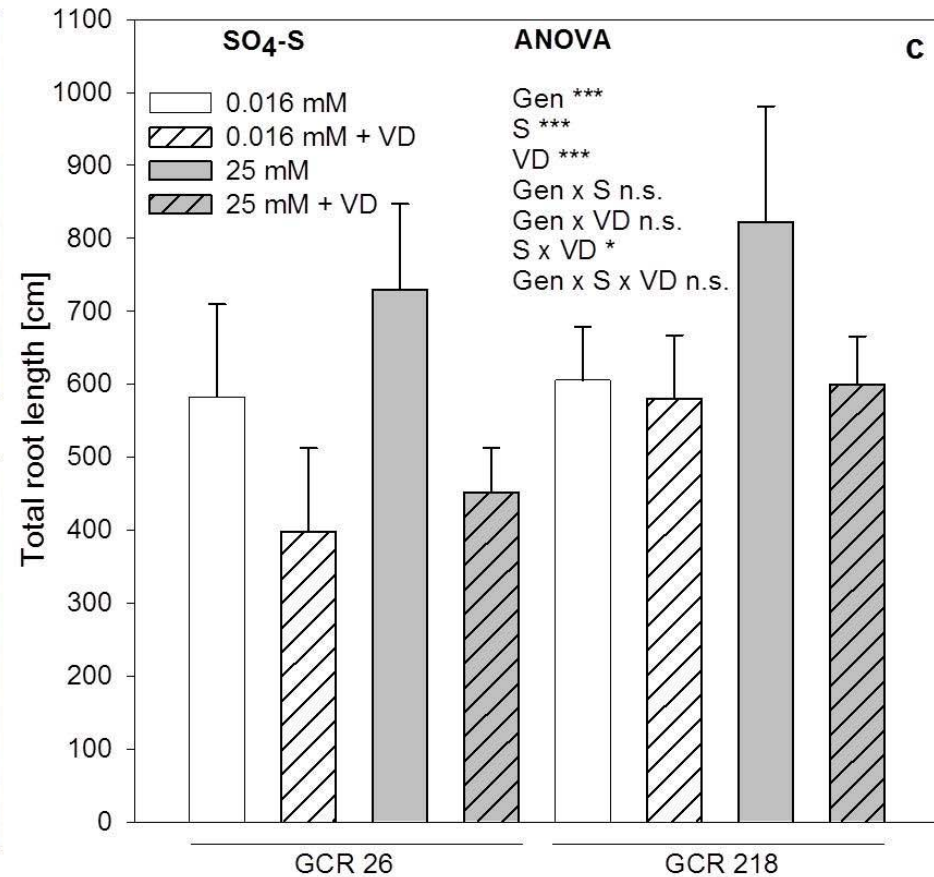
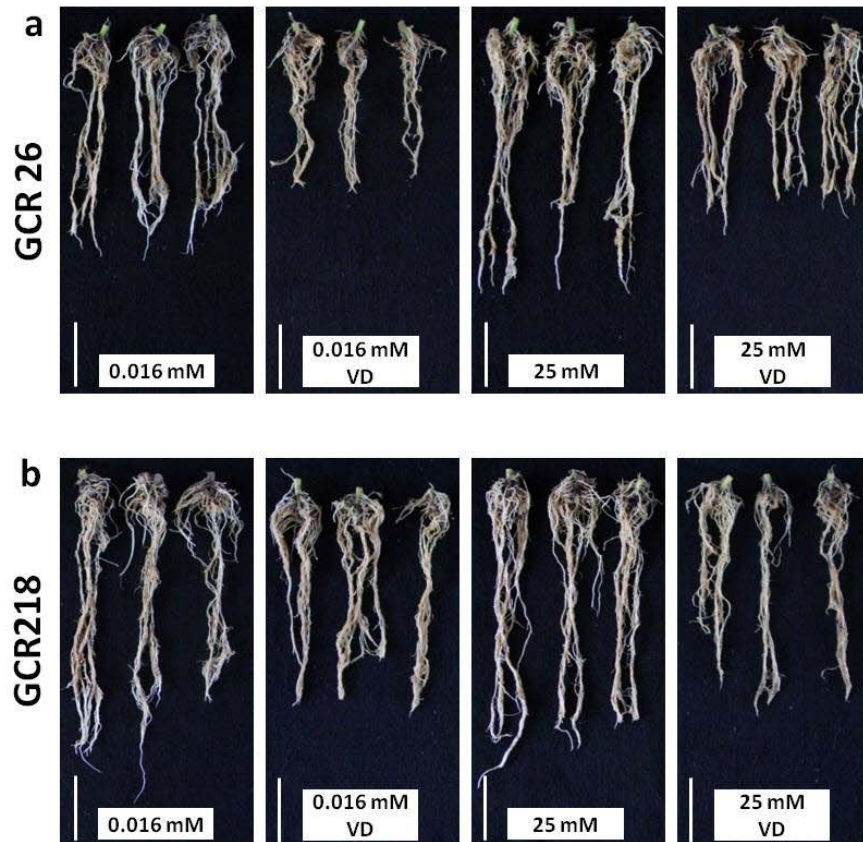
▶ Thank you for the attention !



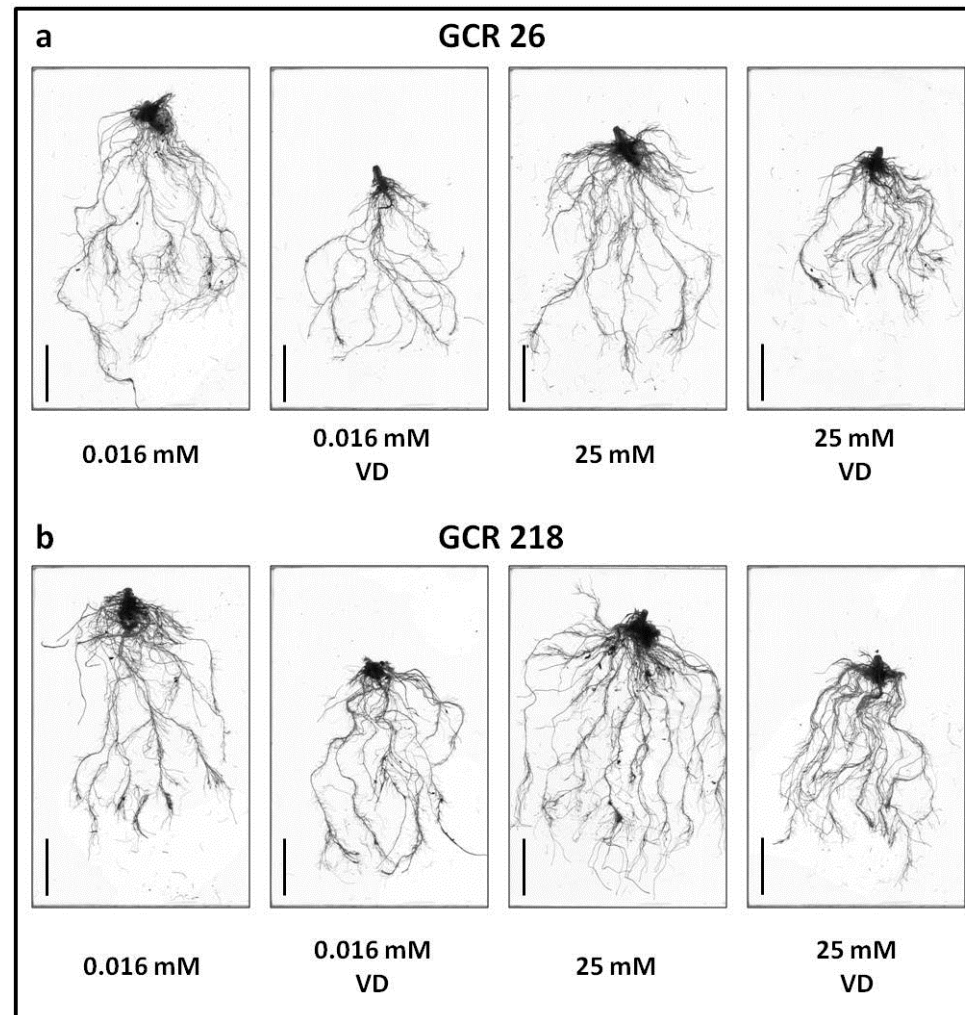
Plant S nutritional status



Root length analysis

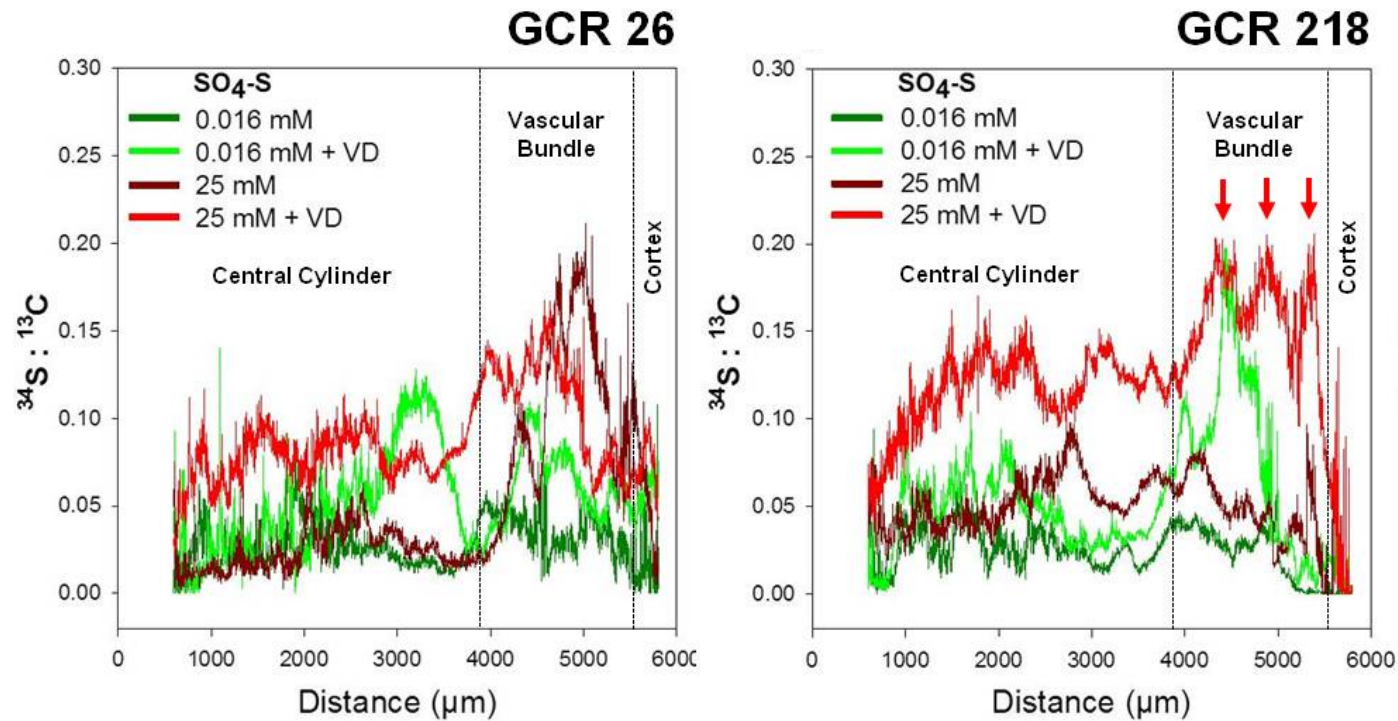


Root length analysis

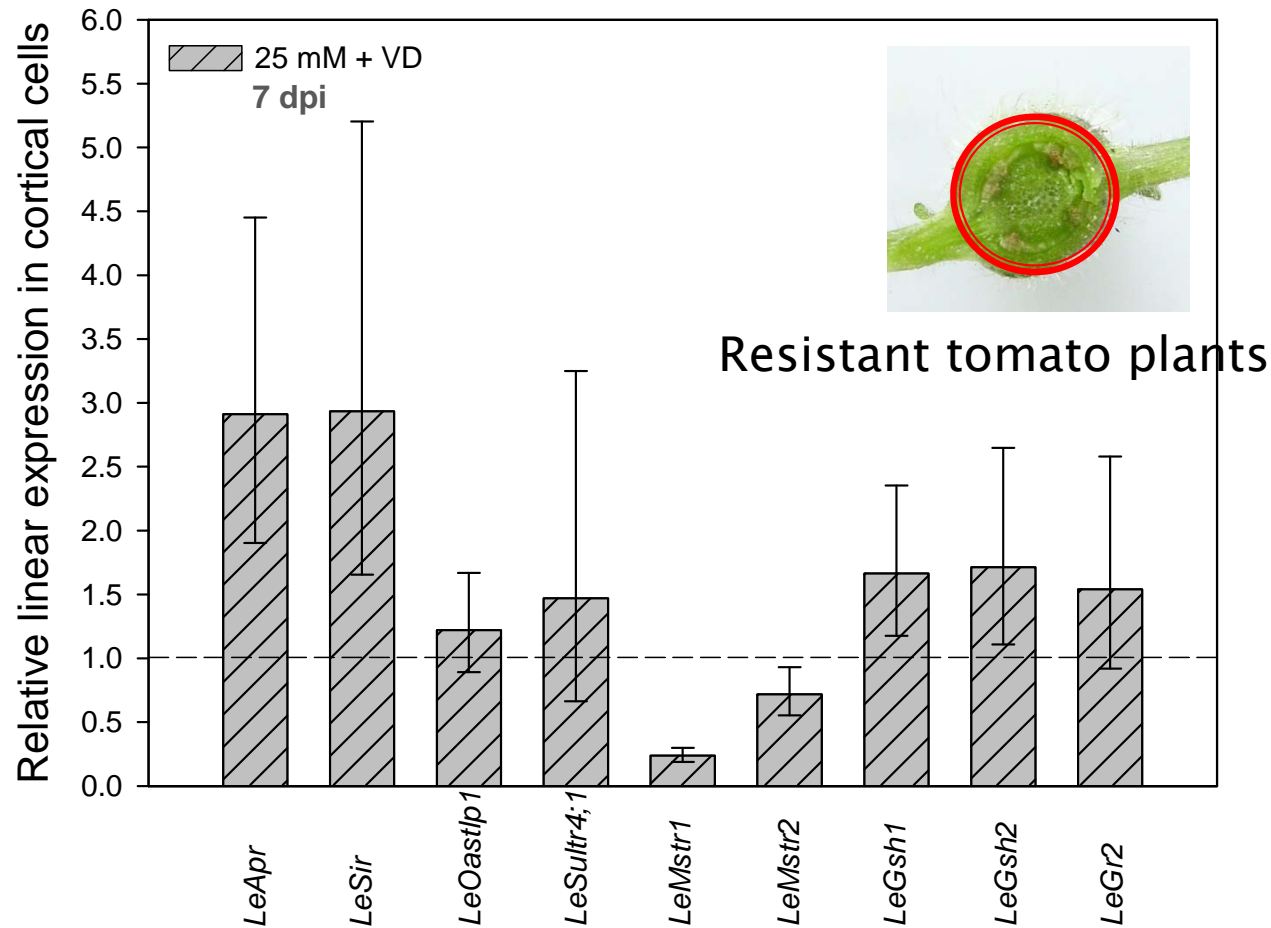


Bollig et al., 2012 (Eur J Plant Pathol)

S distribution in tomato tissue



Spatial expression analysis of S-metabolism related candidate genes: Cortex



Bollig et al., 2012 (to be submitted)

Dear lecturer, please use this format for your presentation:

- ▶ - **keynote** 25 min. and 5 min. discussion max.
- ▶ - **standard presentation** 15 min. and 5 min. discussion max.! (- in most cases: 1 slide/minute)
- ▶ - *in respect to the subject of IPM: please give attention to the question what your research contributes to the (8) IPM principles of the EU-directive* (see http://ec.europa.eu/environment/ppps/pdf/final_report_ipm.pdf)