

High-throughput phenotyping of 38 maize varieties for the study of rhizosphere traits affecting agronomic resilience under drought stress

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Outline

- ◆ Introduction
- ◆ Experimental design
- ◆ Image analysis
- ◆ Results and discussion

Introduction

Problems



Solutions?

Roots
Rhizosphere



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Research questions

- What are the rhizosphere traits affected by drought?
- Do drought-induced rhizosphere traits enhance agronomic resilience? If so, how?

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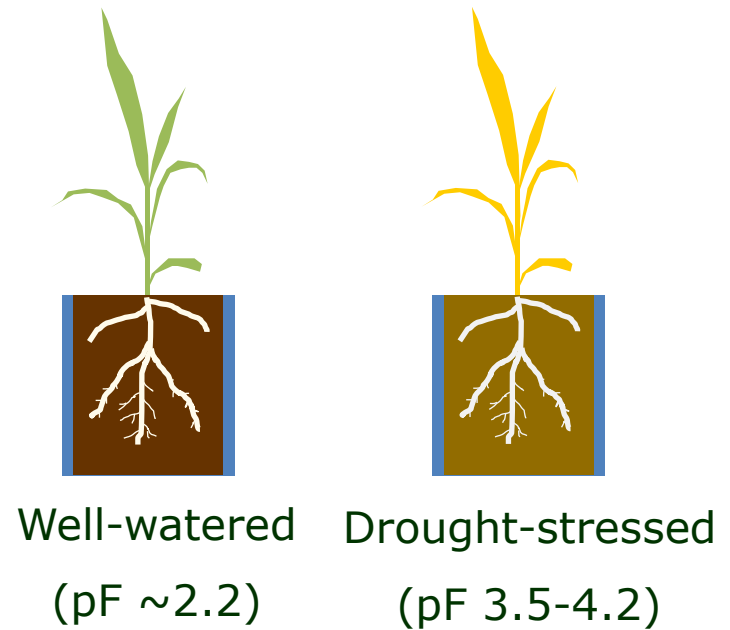
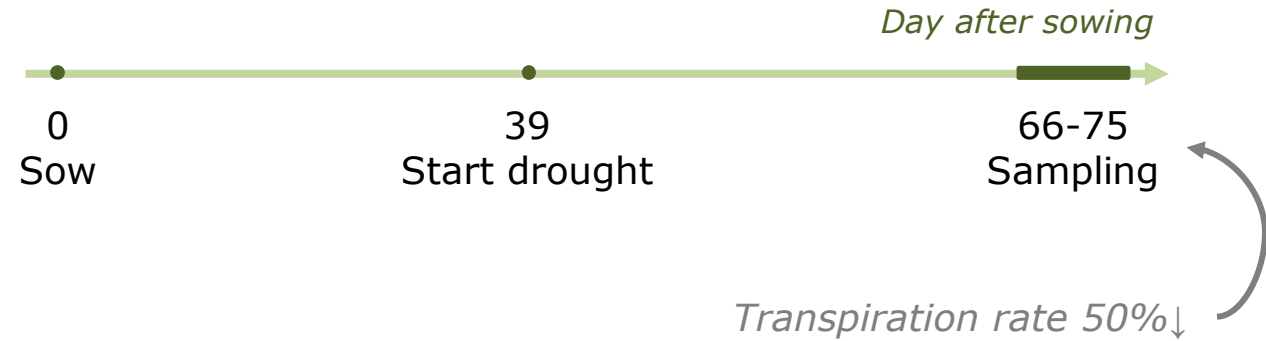
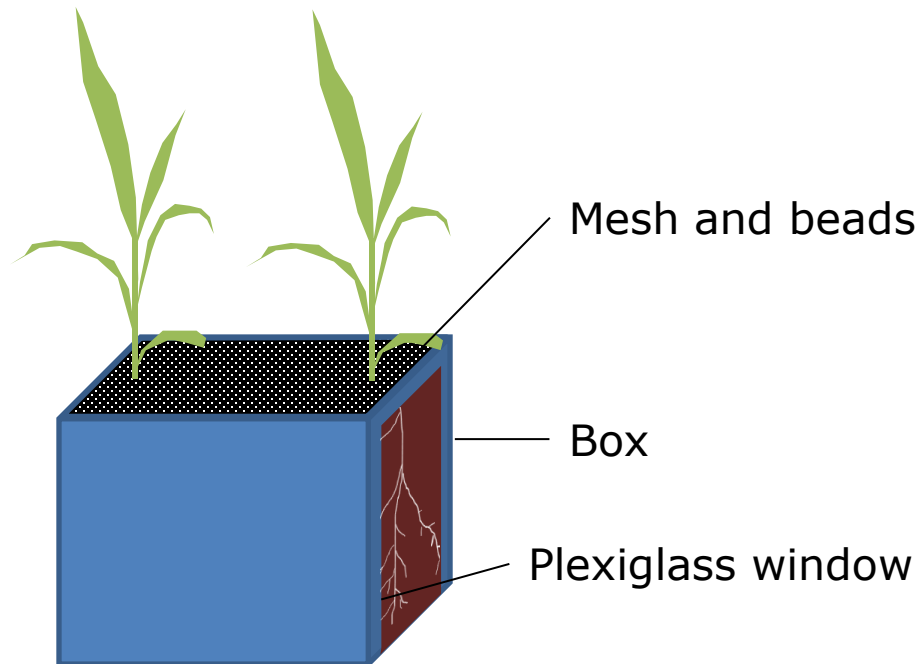


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Experimental design

38 maize varieties

Landrace	x16
Hybrid	x16
Population	x6



Data collection

High-throughput phenotyping



Fluorescence



Visible light



Image collection

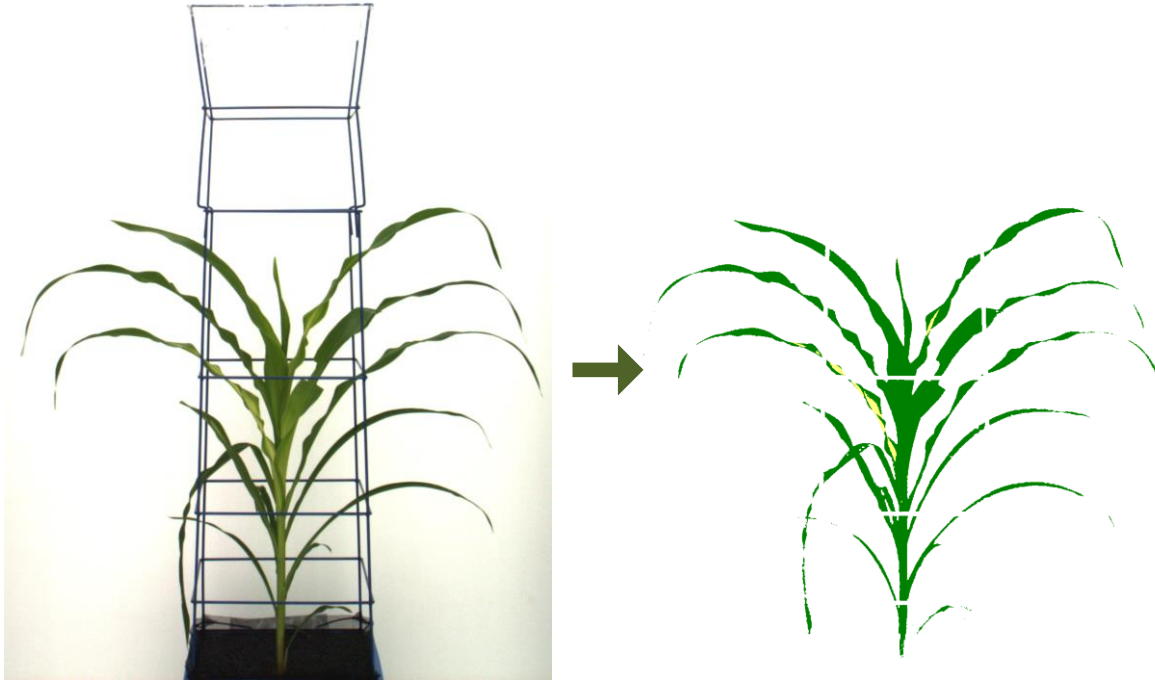
Biomass sample collection



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Image analysis: Shoot segmentation and analysis



Plant segmentation

- Pixel area (biomass)
- Plant height
- Plant color classification



Plant parameter analysis

- Stem-leaf segmentation
- Leaf area
- Plant shape
- ...

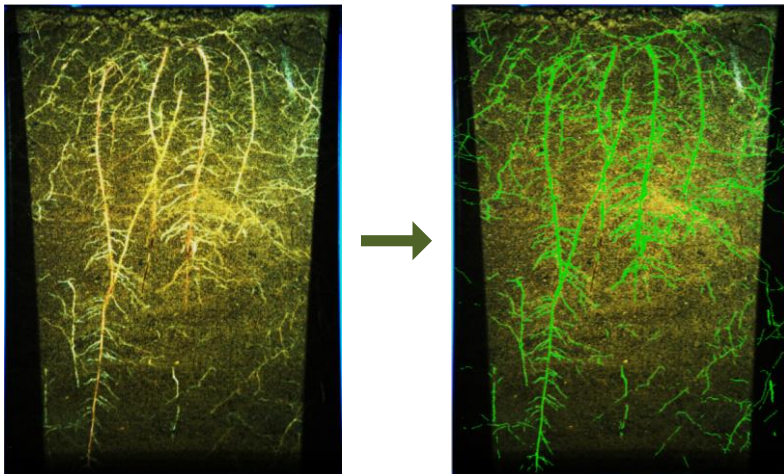


Image analysis: Root segmentation and analysis

Plant segmentation

Supervised classification

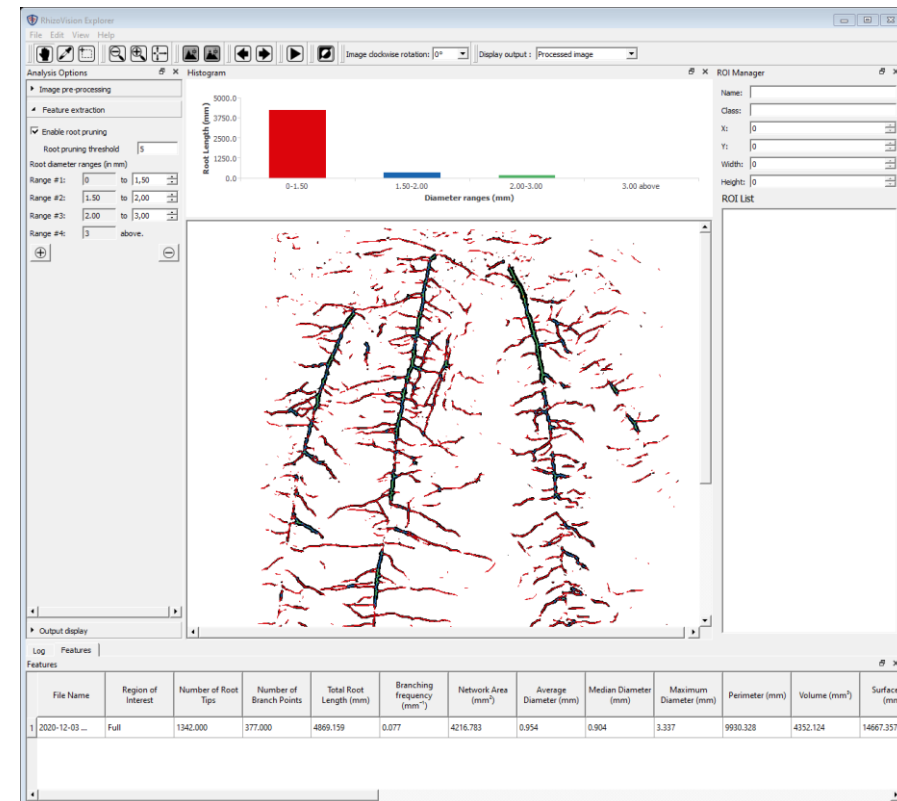
- Pixel area (biomass)



Plant parameter analysis

- Root length
- Root diameter
- Branching frequency
- Surface area
- ...

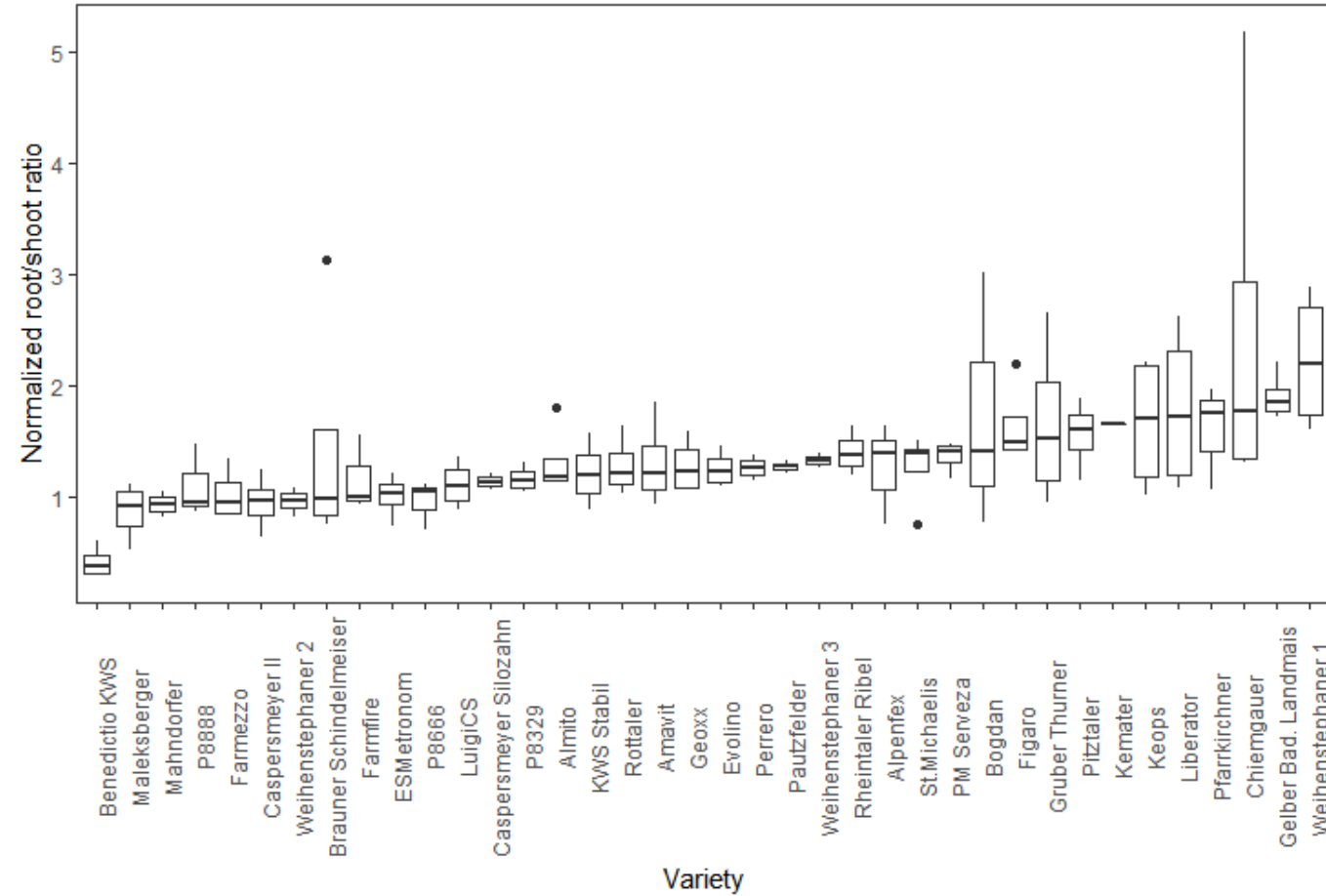
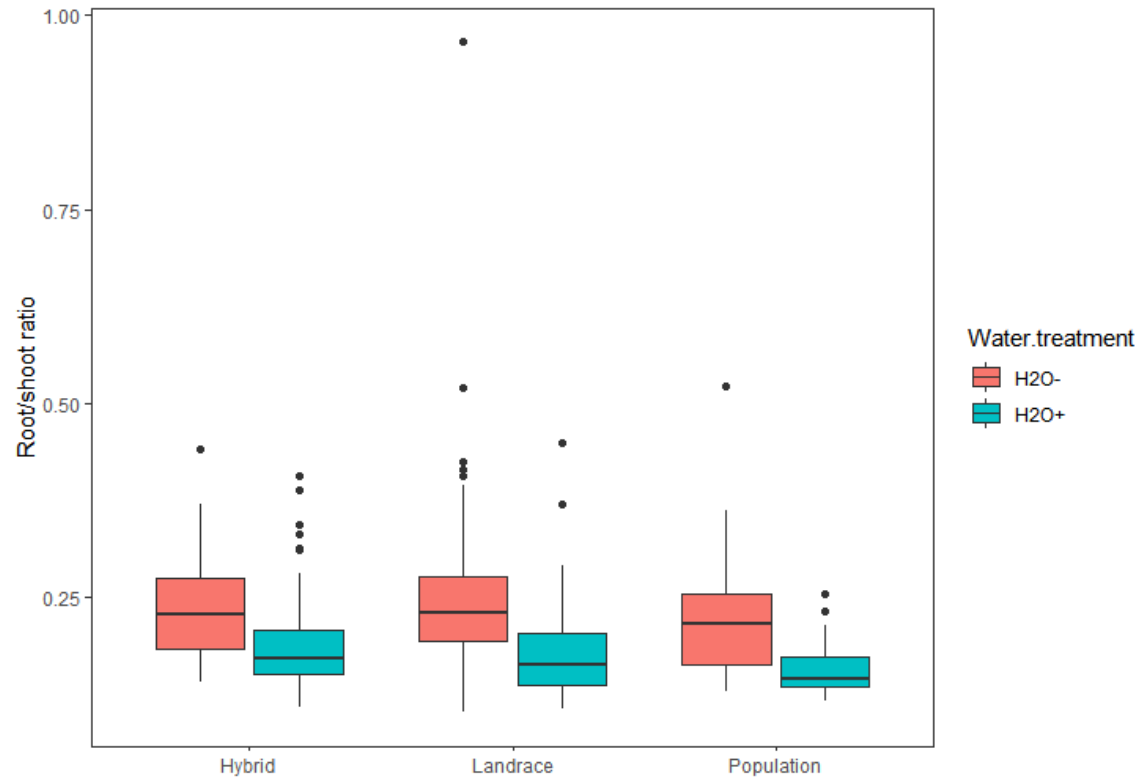
RhizoVision Explorer
Root image analysis for the rest of us



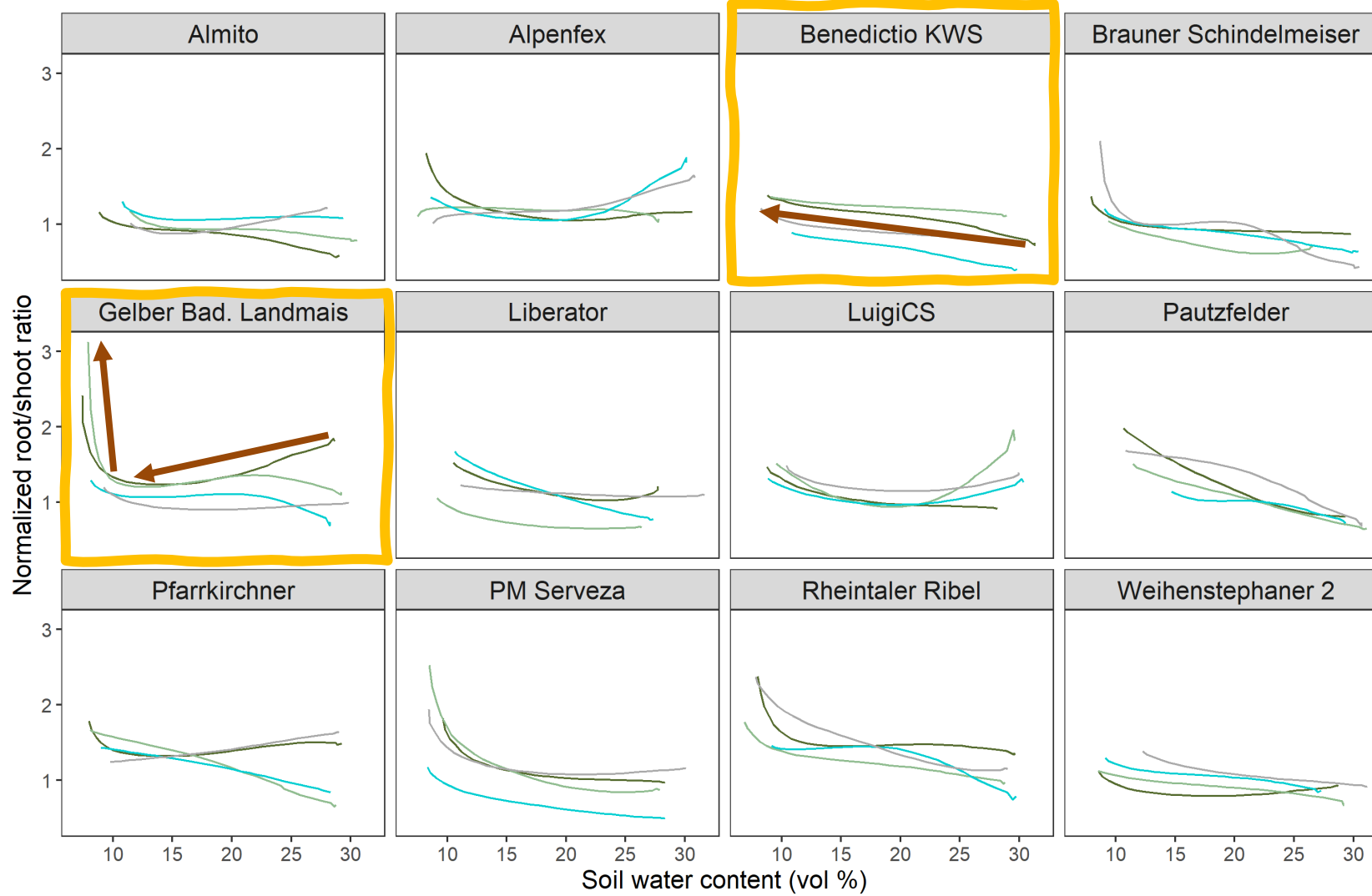
- ◆ Introduction
- ◆ Experimental design
- ◆ Image analysis
- ◆ **Results and discussion**



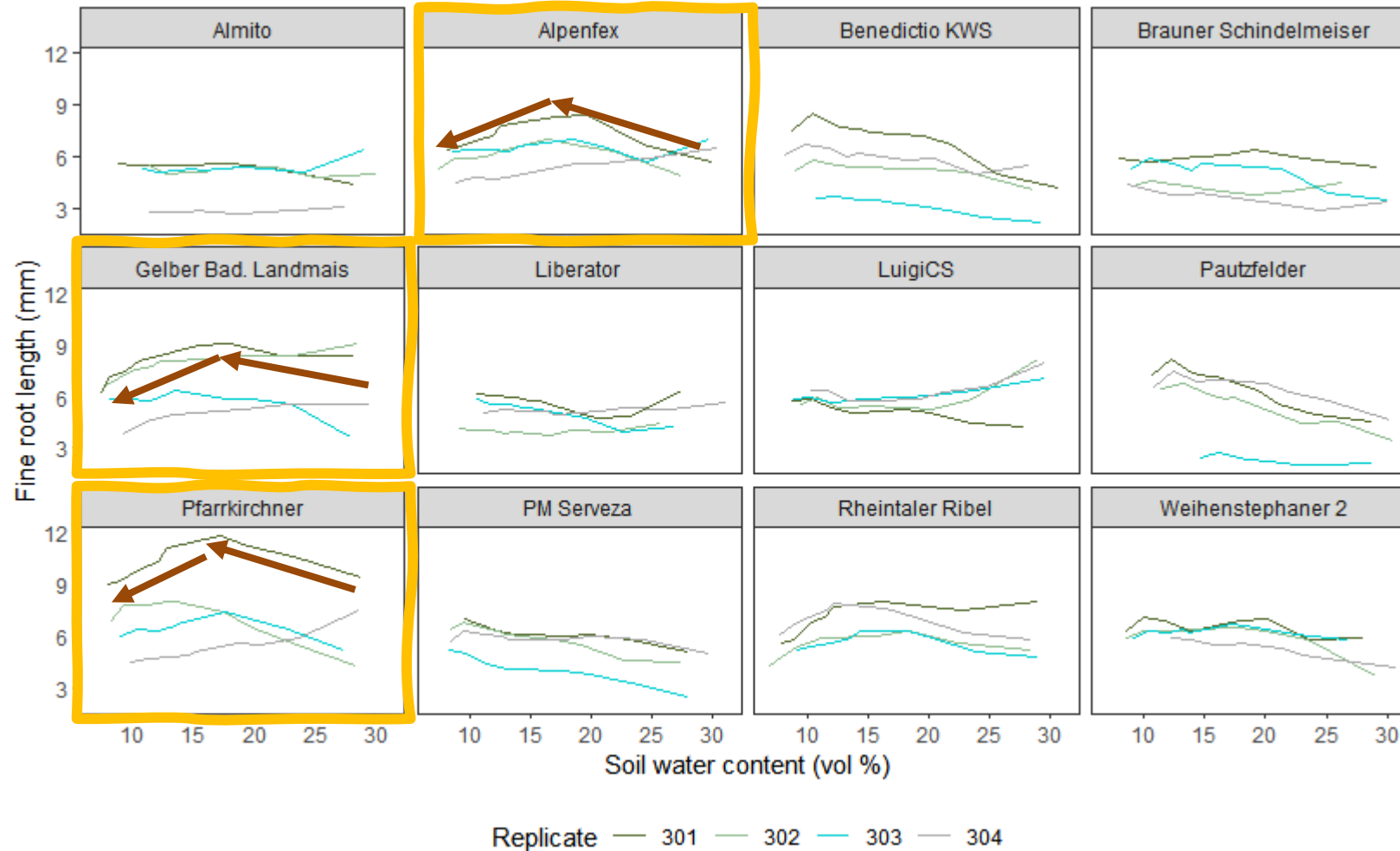
Biomass data - Root/shoot ratio



Imaging data - Root/shoot ratio



Imaging data – Fine root length



rhizosphere traits enhancing yield resilience
to drought in modern cropping systems



Thank you



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