Phenotyping for architectural traits in oilseed rape hybrids

JUSTUS-LIEBIG-UNIVERSITÄT GIESSEN

Giessen Plant Breeding

Assessment of plant architectural traits with relevance for yield and nitrogen use efficiency by 3D imaging

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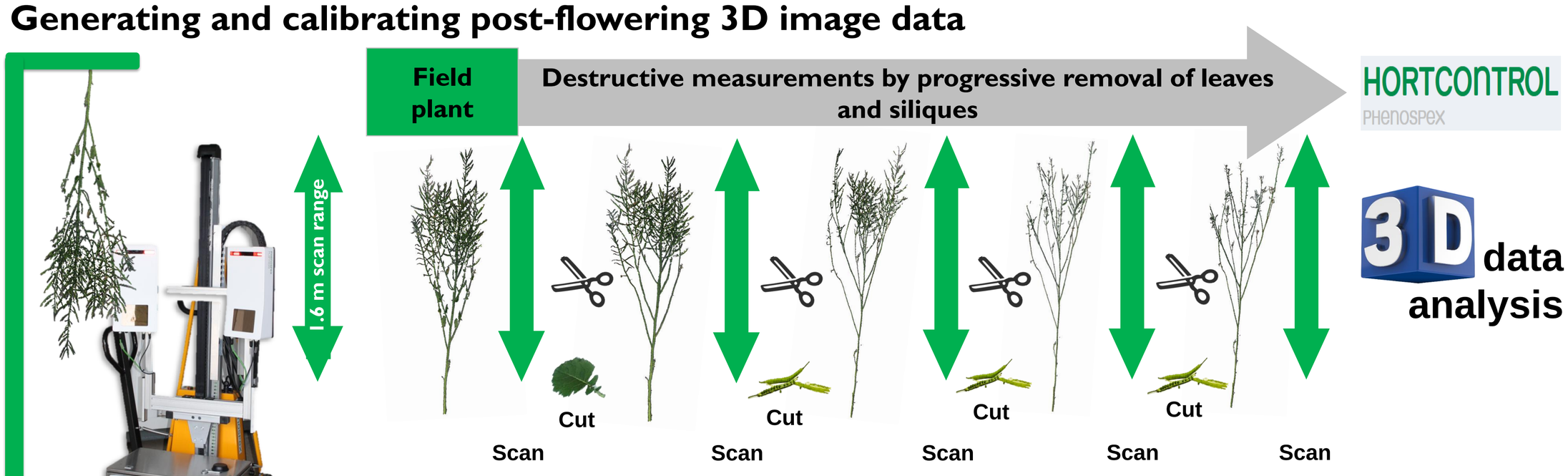
Introduction

Plant architectural traits are highly relevant for optimal use of resources. In rapeseed the inclination of leaves along with the angle and spatial arrangement of side branches and siliques are important morphological characteristics. They affect the efficiency of solar radiation utilization and are consequently relevant for maximizing the yield per unit of water and nitrogen uptake.

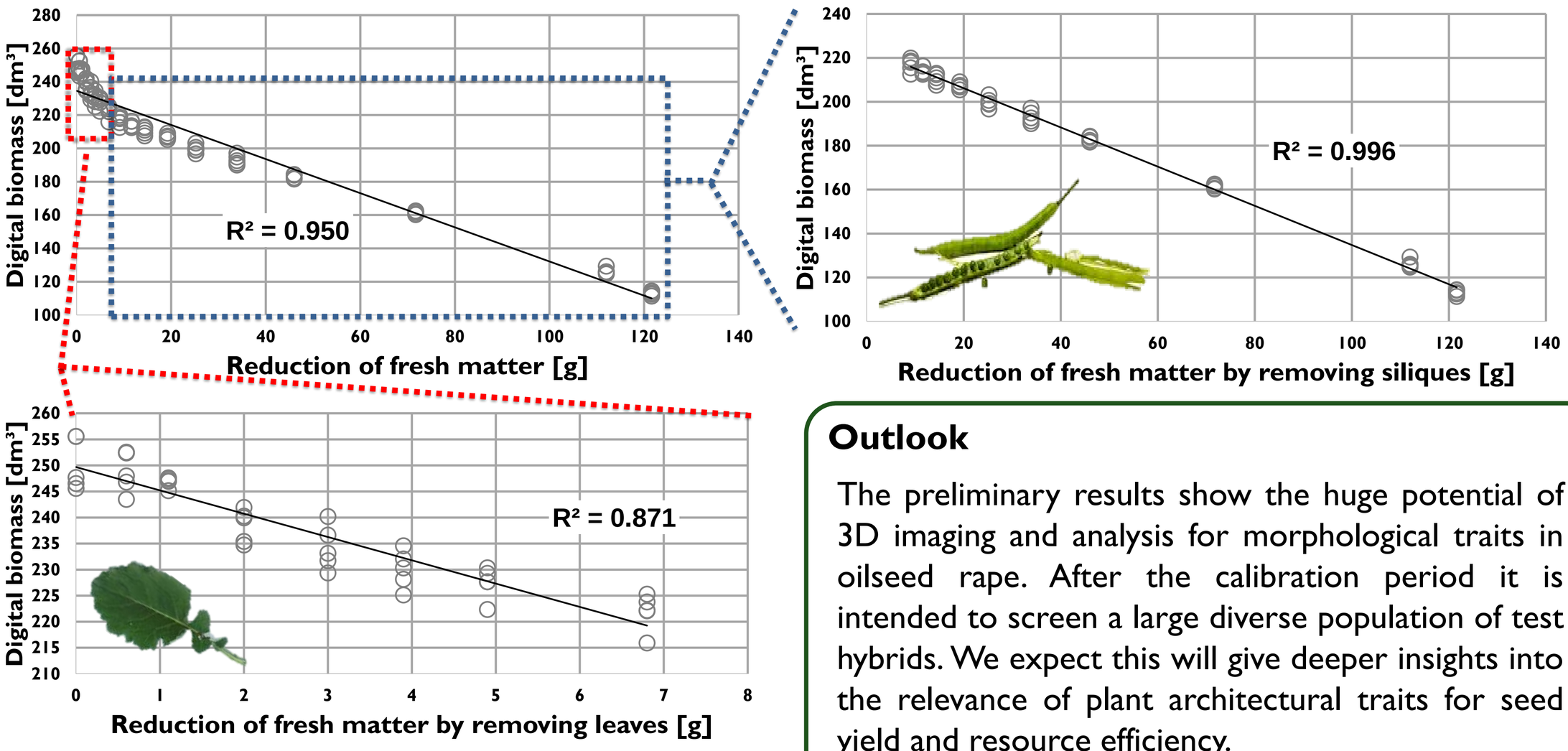
The architecture of oilseed rape is highly flexible and complex, due to the indeterminate growth of side branches and the extremely high compensation potential between yield components. A systematic quantification and dissection requires extremely labor-intensive manual assessment of architectural traits. Thus we are calibrating a 3D scanning device for large-scale screening of populations.

Generating and calibrating post-flowering 3D image data



Workflow for calibration of rapeseed architecture with the 3D PlantEye Dual-Scanner F500 (Phenospex, Heerlen, The Netherlands) as a vertical moving 3D image generating device.

Correlation: Digital biomass vs. fresh matter



Outlook

The preliminary results show the huge potential of 3D imaging and analysis for morphological traits in oilseed rape. After the calibration period it is intended to screen a large diverse population of test hybrids. We expect this will give deeper insights into the relevance of plant architectural traits for seed yield and resource efficiency.

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