PROJECT: MARISSA

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PROJECT TITLE

Magnetic Resonance Imaging (MRI) -based Image Guided Sampling to study starch storage dynamics in yam tuber development

CONSORTIUM

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SUMMARY OF THE REPORT

Magnetic Resonance Imaging (MRI) is a phenotyping modality for non-invasive quantification of dynamics in plant structure and function under realistic environmental conditions. In the proposed project MRI was used for Image-Guided-Sampling to study storage starchdynamics in underground yam tubers. Yam (*Dioscorea polystacha*) is a tuber crop with high potential as an alternative crop in Europe. Todate, large-scale cultivation is limited by labor-intensive harvest caused by deep growing club-shaped underground tubers. A deeper understanding of tuber growth dynamics and pathways involved in tuber shaping would enable to develop successful breeding strategies and pave the way for full mechanical harvest of the tubers. Our hypothesis was that dynamic starch accumulation along the tuber length is involved in tuber thickening. In the MARISSA project, we tested this hypothesis in planta using MRI-based Image-Guided-Sampling to catch the right moment for underground tuber sampling of different developmental stages of yam tubers. Each individual plant was regularly monitored and the right time point for harvest was determined after visual inspection in the MRI. Two tuber types, one long and thin and one short and thick, were compared in our approach. In follow-up analyses of harvested plants, we found significant differences in starch accumulation within tuber parts and tuber types, as well as significant correlations between leaf (aboveground) mass and underground tuber weight.The designated approach successfully enabled an experimental set-up for precise sampling of underground yam tubers to conduct comparative studies on the correlation of starch accumulation and tuber development.