

MSc thesis topic announcement

“Non-destructive in-situ xylem sap sampling for field-grown crops”

Supervisors: Maren Dubbert, Maire Holz

Background and problem:

Are you interested in sustainable agriculture, plant water–carbon dynamics, and field-ready method development? Our team at the Leibniz Centre for Agricultural Landscape Research (ZALF) offers a Master’s thesis on non-destructive, in-situ xylem sap sampling in crops. While xylem sap analysis is a powerful tool to study water and carbon allocation, existing methods are often destructive and unsuitable for repeated measurements in crops. This project will adapt and validate minimally invasive approaches, previously used mainly in trees, for herbaceous crops such as maize and sunflower. We investigate how plants acquire and partition water and carbon under real field conditions using in-situ measurements and ecophysiological methods. You will work in an interdisciplinary environment at ZALF with access to advanced research infrastructure.

In this context, this Master’s thesis project is focused on developing and testing innovative methods for in-situ xylem sap sampling in field-grown crops. The goal is to establish a non-destructive technique that enables repeated sampling of xylem water and solutes under realistic growth conditions.

Your tasks:

- reviewing existing xylem sap sampling methods.
- setting up and adapting non-destructive sampling techniques for crops in greenhouse and/or field conditions.
- testing sampling success rates, sample purity, and physiological integrity of plants.
- evaluation & processing of the analysis results

Your qualifications:

- background in plant science, agronomy, environmental science, or related fields.
- interest in experimental work with plants.
- motivation to develop and test new methods.
- basic lab skills; experience with plant physiology or stable isotopes is a plus but not required.

We offer:

- close supervision and training in plant ecophysiology and biogeochemistry methods.
- an interdisciplinary working environment that encourages independence and self-reliance
- a collegial and open-minded working atmosphere in a dynamic research institution

Funding is available for 30 hours/month for 4 months to support the data collection for the MSc thesis. For more information and/or submitting your application in either German or English, as one PDF file, send an email to both Maren Dubbert (maren.dubbert@zalf.de) or Maire Holz (maire.holz@zalf.de) by October 15th, 2025.