Fakultät Umweltwissenschaften, Fachrichtung Forstwissenschaften

Institut für Bodenkunde und Standortslehre, Professur für Waldstandorte und Wasserhaushalt

Technische Universität Dresden, 01069 Dresden

M.Sc. Thesis topic

How does leaf temperature regulate transpiration? A comparative study of winter wheat and maize

Leaf temperature is an often-overlooked but crucial factor controlling plant transpiration. Transpiration is driven by the vapor pressure difference between the leaf interior and the surrounding air. Any change in leaf temperature alters the leaf vapor pressure and therefore the transpiration rate. This M.Sc. project aims to identify the drivers of leaf temperature variation in two contrasting crop species. Infrared images (Fig. 1), meteorological and plant physiological data are available for this thesis. This study forms part of a larger research unit the “Land-Atmosphere-Feedback Initiative” (LAFI; https://lafi-dfg.de/) dedicated to improving the understanding and quantification of land–atmosphere feedbacks (e.g. evapotranspiration fluxes) through unique synergistic observations and model simulations.

You will:

- Learn about plant physiological responses to environmental changes
- Learn how to analyse infrared images from wheat and maize canopies to derive leaf temperature dynamics
- Interpret diurnal patterns of leaf temperatures in relation to environmental and plant physiological drivers (stomatal conductance, air temperature, soil moisture, etc.)
- Work at the interface of plant physiology and micrometeorology
- Apply general statistical methods to determine factors that drive leaf temperature dynamics (in R or Phyton)

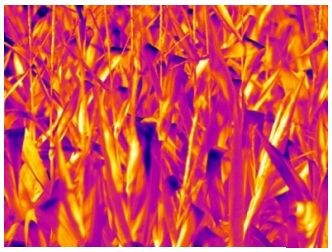

Fig. 1: Example of thermal image of wheat leaves

Requirements

- Interest in plant–atmosphere–water interactions and environmental processes
- Motivation to develop and apply new analytical tools and statstical methods
- Interest in image analysis and quantitative data interpretation

Supervision & Contact

- Prof. Dr. Natalie Orlowski
- Dr. Claudia Voigt (claudia.voigt@tu-dresden.de)

Literature

Rippa, M., Di Mola, I.D., Ottaiano, L., Cozzolino, E., Mormile, P., & Mori, M. (2024). Infrared Thermography Monitoring of Durum and Common Wheat for Adaptability Assessing and Yield Performance Prediction. Plants, 13.