MSc. internship/thesis

How does a dynamic environment impact QTL underlying photosynthesis?

Institute: Jan Ingenhousz Institute

Theme: Photosynthesis breeding

Type of experiment: Climate chamber

Location: NPEC

Background & aim

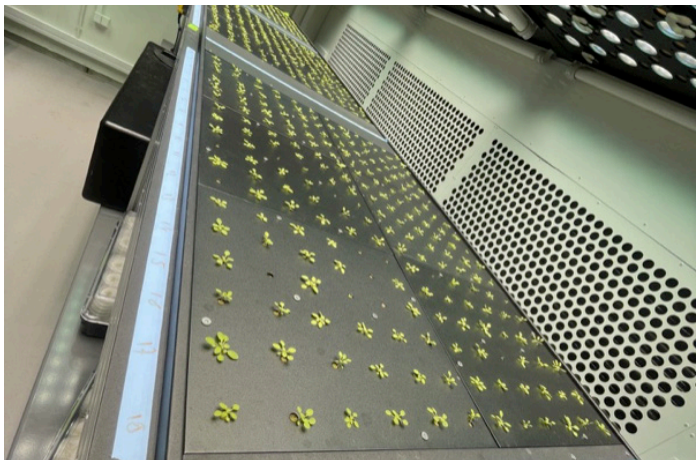
With strong selection on traits contributing to crop yields, breeders and farmers have successfully increased yields in many crop species. Photosynthesis has often been overlooked in these breeding efforts, and little to no direct selection has been applied to increase photosynthetic efficiency. There are however indications that increasing the efficiency for photosynthetic processes could contribute to enhancement of crop yield. In our research, we aim to identify strategies to select for enhanced photosynthetic efficiency and greater yields.

In previous studies, many QTL (quantitative trait loci) have been associated with photosynthesis traits, suggesting there is ample genetic variation present for improvement through breeding. In that study, plants were grown in controlled, but dynamic (fluctuating light) conditions, and it was shown that many photosynthesis QTL are dependent on environmental conditions and the plant's developmental phase. In the field the environment will be a lot more dynamic: Light, temperature and humidity will change on timescales from seconds to days.

The aim of this project is to study how the QTL patterns for photosynthesis traits are affected by a realistic, messy environmental regime.

Your tasks

- Collect and pre-process an environmental dataset of outside conditons.
- Use the advance high-throughput phenotpying NPEC facilities to program a climate chamber with the outdoor environmental conditions.



Jan IngenHousz Institute

The Jan IngenHousz Institute (JII) is an open science research institute dedicated to improving photosynthesis to enhance global crop productivity, sustainability, and climate resilience. JII brings together expertise in engineering, data science, plant biology, biophysics, genetics, and breeding. We develop innovative sensors, research methods, and data analysis platforms that enable collection and interpretation of real-time field measurements of photosynthesis.

Located on the campus of Wageningen University, JII offers a dynamic, interdisciplinary environment where curiosity meets impact. If you're a student eager to apply your knowledge to photosynthetic efficiency challenges, this is your opportunity!

What you will learn

During this project, you will develop a range of skills used in modern **plant breeding**. In the field, you will use our sensors **to collect a realistic environmental dataset**. You will then use this dataset to design a **high-throughput phenotyping** experiment in the advanced NPEC facilities. Finally, in the data analysis phase, you will gain hands-on experience in **quantitative genetics**.



For more information, contact Mats Bours (mats.bours@jii.org)

Jan IngenHousz Institute