

# Quantifying Sink Limitations in Photosynthesis

## Background & aim

While photosynthesis is the primary driver of plant growth and yield, it is not always the main limiting process. During plant development and under certain environmental conditions, photosynthetic performance can become constrained by the downstream consumption of carbohydrates—so-called **sink limitations**—rather than by carbon assimilation itself. Identifying when sink limitations become the primary bottleneck is key for efficiently improving photosynthetic performance. To address this challenge, the JII aims to develop fast, reliable, and scalable instrumentation capable of measuring relevant photosynthetic traits and diagnosing sink limitations. Such tools could facilitate the integration of photosynthetic traits into breeding programs and accelerate the development of higher-yielding, climate-resilient crops.

The aim of this project is to **test and validate fast protocols to quantify downstream metabolic limitations of photosynthesis (sink limitations) and identify key developmental stages**. The project will investigate how sink limitations change during plant development and how different environmental or weather conditions influence the balance between carbon assimilation and carbohydrate utilization.

**Institute:** Jan Ingenhousz Institute

**Theme:** Crop Photosynthesis

**Type of experiment:** Greenhouse

**Location:** Unifarm, Wageningen



## Tasks

You will gain hands-on experience with several state-of-the-art techniques used to measure photosynthesis, including:

- Gas exchange measurements
- Chlorophyll fluorescence techniques
- Spectroscopy-based approaches

These measurements will be used to evaluate and validate fast protocols for detecting sink limitations in plants.

## 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 gain extensive hands-on experience in **plant physiological measurements** and experimental techniques used to quantify photosynthetic performance. You will also develop skills in **data analysis and visualization using R**, and gain experience in **scientific communication**, including presenting results and contributing to scientific reporting.



For more information, contact **Mauricio Tejera** ([mauricio.tejera@jii.org](mailto:mauricio.tejera@jii.org))

