Contribution ID : **49** Type : **Oral**

DWARPH: An Open Source, scalable platform for High-Throughput Environmental response mapping in Duckweed

martedì 29 settembre 2026 09:45 (15)

Duckweed is a uniquely fast and tractable plant model, making it ideal for studying dynamic plant–environment interactions on time scales impossible with conventional crop or model species. However, fully harnessing this in duckweed requires sample-level environmental control paired with dense temporal phenotyping. Standard room-scale or chamber-scale growth systems lack the targeted precision, parallel experimentation and imaging frequency required to impose the environment and monitor the plant's response.

We present **DWARPH** (DuckWeed Automatic Robot for PHenotyping), an open-source hardware and software platform engineered to bridge this gap exact gap. DWARPH integrates programmable, localized control of light intensity and temperature with continuous, high-frequency imaging. The system supports complex environmental perturbations, including rapid step changes, continuous ramps, and cyclic regimes. By automatically synchronizing microenvironmental perturbations with image capture, DWARPH allows researchers to measure phenotypic metrics, quantitative growth dynamics, and short-interval acclimation responses in real time.

Because DWARPH relies on accessible 3D-printed components and a modular architecture, researchers can deploy multiple units in parallel to explore broad parameter spaces simultaneously rather than relying on sequential experiments in expensive climate chambers.

This presentation will focus on the design and engineering of the DWARPH system. We will present initial data validating system performance and temporal precision for detecting plant responses to microenvironmental perturbations, followed by a brief overview of future experimental applications.

Corresponding author email

Scientific Session

Cell Biology, Physiology, Metabolisms

Keywords

High-throughput, phenotyping, environmental response

References

N/A

Primary author(s) : Mr. MARKUS DAHL, Lauritsen (Center for Quantitative Genetics and Genomics (QGG), Aarhus University, Aarhus, Denmark); Dr. GEISSMANN, Quentin (Center for Quantitative Genetics and Genomics (QGG), Aarhus University, Aarhus, Denmark)

Presenter(s) : Mr. MARKUS DAHL, Lauritsen (Center for Quantitative Genetics and Genomics (QGG), Aarhus University, Aarhus, Denmark)

Session Classification : Cell Biology, Physiology & Metabolisms I