# IPPS 2022 Conference Book

# 7th International Plant Phenotyping Symposium

# 'Plant Phenotyping for a Sustainable Future'

**Wageningen, the Netherlands**
**September 26-30, 2022**

**www.ipps7.org**

**IPPS 2022 Conference Book**

**7th International Plant Phenotyping Symposium**

**'Plant Phenotyping for a Sustainable Future'**

**Wageningen, the Netherlands**
**September 26-30, 2022**

**www.ipps7.org**

The International Plant Phenotyping Symposium is a conference jointly organized by:

The International Plant Phenotyping Network (IPPN) e. V.
Wageningen University & Research (WUR)
The Netherlands Plant Eco-phenotyping Centre (NPEC)

# TOWARDS PHENOTYPING OF SOURCE-SINK RATIO AS A PROXY FOR PHOTOSYNTHESIS AND YIELD RESPONSE TO ELEVATED ATMOSPHERIC CO2 IN C3 CROPS

**DR. DENIS FABRE PHD**

CIRAD

The increase in atmospheric CO2 concentration (e-CO2) associated with climate change will significantly impact agricultural crop productivity. Varieties of C3-type cereals vary greatly in their photosynthetic response to e-CO2, in large part because of a variable capacity to adjust sink capacity to an increased C source. Optimizing C source-sink relationships might provide gains in photosynthesis response to e-CO2 and thereby increase biomass and yield.

An experiment was carried out on IR64 rice to study the diurnal dynamic of photosynthetic parameters at mid grain-filling stage under modified of C source-sink balance. Control plants were compared to panicle-pruned plants (sink limitation) at two CO2 levels: ambient (400ppm) and e-CO2 (800ppm for 14d from heading) (source boosting). Flag leaf and internode NSC (starch, sucrose and hexose concentrations) were measured, as well as photosynthetic parameters on the flag leaf of the main stem.

TPU (triose phosphate utilization) was identified as the main biochemical driver of photosynthesis down-regulation by sink limitation, occurring predominantly in the afternoon. A negative correlation was found between TPU and markers of sink limitations: leaf [sucrose] and the local C source-sink ratio (LSSR), computed as the ratio between flag leaf area and grain number of the adjacent panicle on the main stem.

A second experiment was carried out in order to confirm these results among 5 indica genotypes having constitutive variation of LSSR: Plants were compared under two continuous CO2 treatments, 400 and 800 ppm. A negative relationship between genotypic LSSR and photosynthetic capacity under e-CO2 was confirmed. Plant biomass and grain yield response to e-CO2 were negatively correlated with LSSR as well, suggesting a key role of C sink capacity in enhancing C3 plant productivity under e-CO2.

Further studies are under way to confirm LSSR and similar proxy traits as phenotyping and selection tools for improved e-CO2 response.