PROJECT: HeatDroughtPheno

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PROJECT TITLE

Wheat phenotyping for a warmer and drier climate

CONSORTIUM

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SUMMARY OF THE REPORT

Around 40% of the global wheat yield fluctuations are explained by climatic variation, and heatwaves and drought are among the principal stressors. In this project ten wheat genotypes, characterised during the SATYN experiment (Stress Adaptive Trait Yield Nursery, CIMMYT), were evaluated under high temperatures (38 /31 ℃, day/night) and different watering regimes. Most of these lines were characterized as the top performers during SATYN in dry or warm environments, and additionally low performers for drought and heat stress were added to the experimental design. The aim of this high-throughput phenotyping experiment was to study how stomatal regulation (gs) and water use efficiency affects carbon allocation in genotypes adapted to different environmental conditions. Thermography was used to estimate gs and transpiration, and multispectral and RGB imaging were applied to track changes in morphophysiological parameters of wheat genotypes exposed to high temperatures and/or drought. At the end of the experiment leaf samples were collected, snap frozen in liquid nitrogen and stored at -80 ℃. In a second step, a semi-high-throughput protocol was performed to quantify the activity signatures of key enzymes of carbohydrate metabolism. Data from plant growth sensing and metabolites flows are being integrated and helping to understand how stomatal regulation and carbon allocation can determine wheat productivity in warmer and drier climates.

Figure 1- 3-week-old wheat plants growing at Phenolab.