

THEMATIC NETWORK

Research and Innovation Platforms and Infrastructures of CREA

PLATFORM NAME/INFRASTRUCTURE

PhenoHort' 3D Multispectral Phenotyping Platform

FOTO



BRIEF OVERVIEW OF THE INFRASTRUCTURE

The phenotyping platform consists of a PlantEye F500 3D multispectral laser scanner that moves horizontally and vertically (X-Y axes) on a gantry system positioned 1.5 meters above the plants. The system is fully automated and capable of detecting multiple plant morphological and physiological parameters per scan with high throughput.

Based on the 3D model obtained from spectral data in the visible RGB (red, green, blue) and near-infrared wavelengths, it is possible to reconstruct the plant architecture, determine leaf area and biomass, and calculate various vegetation indices, thereby determining the overall development and health status of the plant.

The phenotyping platform has been installed inside a climate-controlled greenhouse. The experimental area consists of 3 independent benches, automatically irrigated via an ebb and flow system. This configuration allows for the execution of drought stress, salinity stress, and nitrogen stress trials, either independently or in combination. Each scan takes 45 minutes (15 minutes per bench) to acquire comprehensive information throughout the trial.

Phenohort acquires spectral reflectance across four different wavelengths, each measured in a specific channel. The peak wavelengths (PW) and spectral half width (SHW) for each channel are reported as follows: red (PW 620–645 nm; SHW 20 nm), green (PW 530–540 nm; SHW 80 nm), blue (PW 460–485 nm; SHW 20 nm), near-infrared (PW 820–850 nm; SHW 20 nm), and 3D laser (PW 940 nm). The platform can analyze up to 420 plants per single scan and acquiring 20 traits, including: morphological parameters (13), color and multispectral reflectance measurements (3), and spectral vegetation indices (4).

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Phenomics, genetic improvement, morphophysiological parameters, UV-VIS, NIR		https://www.plant-phenotyping.org/db_infrastructure#/tool/182/	