



Australian Plant Phenomics Facility

Hyperspectral imaging and analysis

Hand-held through to field-scale hyperspectral platforms enabling early detection of abiotic stresses such as drought, salinity and nutritional status, and biotic stresses such as pathogens, pests and diseases. A valuable technology for plant scientists as well as the agriculture, horticulture and viticulture industries.



plantphenomics.org.au

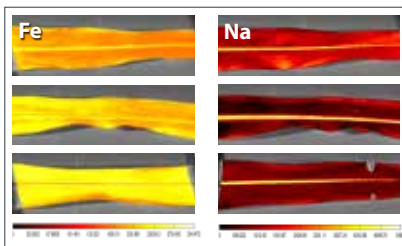
The Australian Plant Phenomics Facility has three nodes strategically located at



We are proudly supported by



Non-destructive assessment of abiotic stresses and early detection of biotic stresses, from individual plants through to field-scale studies



HYPERSPECTRAL IMAGING AND ANALYSIS

Capability highlights

- Non-destructive assessment of abiotic stresses such as heat, frost, UV, drought, salinity and nutritional status.
- Detection of biotic stresses including pathogens, pests and viral diseases well before symptoms are visible.
- From hand-held to field-scale platforms.

Hyperspectral techniques measure the reflectance of light from plant surfaces; generally the first two cell layers. With high spectral resolution over a range of wavelengths, from visible to short wave infra-red (SWIR), the reflectance properties of plants can reveal much about plant chemistry not visible to the human eye. Once calibration models are developed, hyperspectral analysis allows non-destructive measurement of plant pigments, nutrient content, water status and chemical composition based on optical spectroscopy. These range from interactive probing to high-throughput monitoring in the greenhouse and the field.

The APPF's Adelaide node and the Fraunhofer Institute (Germany) have combined their expertise in plant phenotyping, data processing and tailored machine-learning approaches that allow the full value of the datasets to be realised for the benefit of customers.

Capability benefits

Our hyperspectral analysis suits all plant types, with a variety of crops including wheat, barley, maize, grapevines, cotton and chickpeas already studied. Hyperspectral analysis is applicable to plant science, agriculture, horticulture and viticulture.

Expertise at Fraunhofer IFF

The core expertise of Fraunhofer IFF is the development of tailored mathematical calibration models that transform acquired hyperspectral data into meaningful information in the context of a specific application. In order to obtain the most flexible and robust models, dedicated methods of machine learning are utilised.

Technical specifications

Hand-held

- High-end: hyperspectral (based on ASD FieldSpec, 400-2500nm)
- Inexpensive: multispectral (based on HawkSpex Gadget, 350-1000nm)

Controlled environment

- A WIWAM hyperspectral imaging chamber (based on Specim high-resolution cameras 400-2500nm) installed in our Lemnatec high-throughput phenotyping platform. Allows top and side view imaging of plants, complementing the existing phenotyping capacity.

Field - ground

- Ground-based phenotyping platform combining LIDAR and hyperspectral imaging from 350-1750 nm (using a shielded chamber with precision lighting)

Field - airborne

- A range of UAV platforms capable of flying multispectral cameras
- UAV DJI Matrice 600 platform with Resonon PIKA hyperspectral camera (350-1100 nm) and tailored hexacopter with Cubert UHD 185 hyperspectral matrix camera (450-950 nm)
- Manned aircraft with hyperspectral cameras (Specim and NEO, 400-2500nm) in partnership with Airborne Research Australia

Expertise at The Plant Accelerator® (TPA)

TPA, in Adelaide, is a true service facility, with the team focused on delivering high quality customer support in plant phenotyping, from initial consultation through to growth of plants and analysis of results.

Discover more: plantphenomics.org.au

Australian Plant Phenomics Facility The Plant Accelerator®

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