Plant phenotyping at La Trobe University

APPN is a coordinated national network of nine research infrastructure nodes hosted by renowned plant research organisations across Australia. We provide open access to state-of-the-art plant phenotyping technologies, underpinned by multidisciplinary expertise and FAIR data principles, to enable research excellence and innovation, and to accelerate research output.

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plantphenomics.org.au

LA TROBE
UNIVERSITY

aPPN
Australian Plant Phenomics Network

High resolution, high throughput plant monitoring at scale

The APPN node at La Trobe University operates as part of the La Trobe Institute for Sustainable Agriculture and Food (LISAF). Our extensive facilities provide plant scientists and researchers at LISAF with the capacity to rapidly, accurately and objectively assess plant performance using non-destructive digital technologies.

This means research crops can be assessed repeatedly through their entire growth phase, to provide a valuable temporal dimension to the plant performance data.

Controlled growth environments

By precisely controlling temperature, light, nutrient and irrigation for individual experiments, researchers are able to isolate specific growth responses and correlate them to genetic traits.

Fluorescence imaging

High resolution cameras and handheld scanners enable measurement of photosynthetic performance at plant scale, to non-destructively monitor physiological and metabolic processes.

Hyperspectral imaging

High throughput hyperspectral imaging provides insights into plant responses to their growth conditions – highlighting physical health as well as early indication of biotic or abiotic stress.

RGB 3D and thermal imaging

Advanced 3D imaging systems provide fine-scale assessment of plant architecture, growth and key physical parameters such as leaf area – all contained in data point clouds for subsequent analysis.

Photo: Dr Muluneh Tamiru Oli

Technical Details

Glasshouses
- 3 x controlled (18 – 28°C) glasshouse compartments with sunlight / programmable multispectral LEDs.
- 3 benches x 60m^2 each plus 2 x blackout curtains, 2 x shade curtains.
- 1 x climate controlled (18 – 28°C) enclosed phenotyping compartment with RGB, hyperspectral (VNIR), fluorescence, thermal and 3D sensors and programmable multispectral LEDs.
- ~~3 benches x 60m^2 each~~
- ~~1 x climate controlled (18 – 28°C) enclosed phenotyping compartment with RGB, hyperspectral (VNIR), fluorescence, sensors and programmable dualspectral LEDs.~~
- ~~3 benches x 60m^2 each~~
- All glasshouses are serviced by automated fertigation systems allowing up to three nutrient mixes per compartment.

Controlled environment room
- 1 x controlled (18 – 28°C) phenotyping with RGB camera and programmable dualspectral LEDs.
- 10m^2 growth space

Fluorescence sensors
- PSI Fluorocam with XY gantry
- PSI Fluorocam with conveyor system
- Closed FluorCam FC 800-C
- Fluoropen FP 110 PAM fluorometers
- Leaf clips

Hyperspectral sensors
- VNIR 400-900 nm line scanning (45 frames/sec, 1900x1000 pixel resolution)
- Multiple PSI PolyPen RP 410
- 2 x UVIS (380 – 790 nm)
- 2 x NIR (640 – 1050 nm)

RGB, 3D, Thermal sensors
- RGB: 2 x Top view CMOS (2560 x 1920 pixel)
- Thermal: Top view long wavelength infrared sensor
- 3D: Top scan, distance up to 60cm, point cloud to 1mm resolution

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Discover more:
plantphenomics.org.au