

The Australian Plant Phenomics Facility (APPF) invites expressions of interest from Australian plant scientists wishing to undertake pilot projects in its new facilities in Adelaide and Canberra. The projects will be aimed at validating data obtained through *high throughput* and ‘*deep*’ phenotyping against data obtained by conventional methods in the field or in the laboratory.

Background

Established under the National Collaborative Research Infrastructure Strategy, the APPF is a cross-institutional facility, which involves two quite different but highly complementary research centres; *The Plant Accelerator* in Adelaide and the *High Resolution Plant Phenomics Centre* in Canberra.

The Plant Accelerator™- Adelaide

The Plant Accelerator™ is a state-of-the-art plant growth and analysis facility with automated high throughput imaging and computing equipment for the continuous non-destructive measurement of plant phenotypes.

The building, located at the Waite Campus of the University of Adelaide, contains two areas referred to as *Smarthouses™* (PC2 and non-PC2), which are purpose built for the automated, non-destructive phenotyping of plants. Each *Smarthouse™* consists of two greenhouses and an imaging hall, which together can accommodate 2,400 plants at one time. The *Smarthouses™* include conveyor systems for transporting plants through five imaging chambers (LemnaTec Scanalyzer), which will provide images in the following wavelength bands:

• far infrared	- leaf temperature
• near infrared	- leaf water content
• near infrared (roots)	- soil water content
• visible light (RGB)	- shoot mass, leaf number, shape, angle, other morphometric data, leaf colour and senescence
• fluorescence imaging	- plant health (state of chlorophyll)

The *Smarthouses™* also contain automated watering stations to enable plants to be watered to weight, and the volume of water required to achieve that weight logged. There is also a facility for the automated spraying of plants as required for pest control or even the application of specific growth altering chemicals.

High Resolution Plant Phenomics Centre (HRPPC) – Canberra

The High Resolution Plant Phenomics Centre involves CSIRO Plant Industry and the Australian National University in Canberra.

The facility has developed technologies focussing on ‘*deep*’ phenotyping (delving into metabolism and physiological processes within the plant) and reverse phenomics to determine the mechanisms underlying agricultural traits, spanning controlled environment analysis to non-destructive field measurements. The centre’s analytical tools include:

• Small model plant module	Simultaneous growth imaging and monitoring to compare individuals and genotypes variability in growth, water use and photosynthetic performance.
• Crop plant shoot module	3-D imaging for plant architecture and growth analysis, allowing multiple images to be overlaid.
• Root module	Optical, infra-red and electromagnetic detection of root morphology, structure and function in soil in controlled environments and in the field.
• Gateway to field module	Plant growth and composition in field plots remote sensed by stereophotography, laser radar and hyperspectral reflectance, combined with thermography and distributed sensor networks.

Pilot Project Examples

Opportunities to use the facilities for pilot projects could include:

- a) Replicating previously completed experiments using the new imaging technology, and comparing previously obtained data with the new data acquired by using APPF technology. Examples of this would be:
 - to use The Plant Accelerator™ to phenotype a trait in a mapping population and to compare the map positions of the trait of interest with map positions obtained previously in the field or in the glasshouse, or
 - to use the HRPPC pulse modulated chlorophyll fluorescence and IR thermography for abiotic or biotic stress screening and compare results to traditional destructive analysis or field validation.
- b) Undertaking new phenotyping experiments or developing new screening protocols then subsequently checking/validating the results using conventional field- or laboratory-based methods.

Eligibility

Applications from all Australian plant scientists will be considered.

Conditions of Funding

1. Applicants for projects in 2010 must submit their expression of interest using the attached form by 30 April 2010.
2. Pilot projects must commence by 1 July 2010.
3. Whilst the Intellectual Property will be owned by the client, the APPF will be entitled to release information about the pilot project output / data on its website and/or other public domains within three months of the final measurement or imaging.
4. Successful applicants must sign a Facility Access Agreement.

Guidelines

- a) Access to the APPF will be based on the scientific quality of the project and the principal investigators. While it is expected that scientists with publicly funded research projects will have access to the Facility,

the Executive Management Committee will evaluate all pilot project proposals and may provide feedback on the project design.

b) Pricing: There are two levels of access fees for Australian researchers, namely public good research and commercial / for-profit research.

The Plant Accelerator™ - The cost per plant per day on the Scanalyzer is priced at

AUD 1.25 plus GST – public good research

AUD 6.25 plus GST - commercial / for-profit research

A project cost example can be viewed at <http://www.plantaccelerator.org.au/bookings/>

HRPPC – For information on pricing please refer to

<http://www.plantphenomics.org.au/HRPPC/pricingandaccess>

c) Initial priority may be given to projects using

- the NIR, FIR and fluorescence imaging capabilities of the Scanalyzer in Adelaide
- hyperspectral, FIR and pulse modulated fluorescence imaging in Canberra

d) Successful applicants will receive a 30% rebate on the daily *Smarthouse™* access fee in Adelaide and the equipment access and staff consultation fee in Canberra.

Applications / Expressions of Interest

Deadline: 30 April 2010

Expressions of interest must be submitted as follows:

	The Plant Accelerator™	HRPPC
Form:	The Expression of Interest form for pilot projects at The Plant Accelerator™ can be downloaded at http://www.plantaccelerator.org.au/bookings/	For HRPPC proposals, applicants should fill out a general project proposal form and indicate that the proposal is for a Pilot Project in the category section. http://www.plantphenomics.org.au/HRPPC/pricingandaccess
Email:	Please email your application as a PDF file to: helli.meinecke@adelaide.edu.au	Please email your application as a PDF file to: alyssa.weirman@csiro.au
Post:	Helli Meinecke Business Manager University of Adelaide The Plant Accelerator PMB 1 Glen Osmond SA 5064	Alyssa Weirman Business Manager CSIRO Plant Industry High Resolution Plant Phenomics Centre GPO Box 1600 Canberra ACT 2601