

# ***International Rice Research Institute Links with APPF to Secure Rice Production***

## ***Challenge***

Rice is the number one cereal grain consumed globally and by the year 2050 we will have to almost double production of rice to feed 10 billion people. Annual improvements in rice yields are currently less than 1%, causing serious concern for food security in the very near future. The International Rice Research Institute (IRRI), based in the Philippines, leads a global initiative called GriSP, the global rice research partnership. The High Resolution Plant Phenomics Centre (HRPPC), the Canberra node of the Australian Plant Phenomics Facility, has joined this initiative to help avoid world hunger.



## ***How did the facility help?***

The HRPPC has assisted IRRI in two projects. First, it has developed a rice “Phenotyping Boom” to accelerate field breeding and physiology. This boom can be mounted on a tractor or crane and passes above the rice field plots carrying the technology developed at HRPPC for the Phenomobile ([www.youtube.com/watch?v=NTx8RPnciug](http://www.youtube.com/watch?v=NTx8RPnciug)). This unique boom captures the structure of the crop using state of the art laser scanning, stress response by thermal imaging and crop chemical composition by imaging the spectrum of light reflected by the crop. In Australian wheat research partnering with HRPPC and Grains Research and Development Corporation this technology has proven successful, replacing expensive and impractical manual and destructive measurements which hamper crop physiologists and breeders from measuring important crop traits dynamically in the field. Hopefully it will deliver the same benefits in rice physiology and breeding. In the second project, PlantScan<sup>1</sup> (<http://www.csiro.au/Outcomes/Food-and-Agriculture/HRPPC/PlantScan.aspx>) HRPPC’s unique 3D plant digitisation platform, and Cropatron, our field simulation module, are being used to map the growth and photosynthesis of 60 rice genotypes whose genomes are being sequenced in the IRRI genomics program. By linking the “3-D life history” of the performance of these rice lines to their genomes, researchers and breeders will be able to develop new rice varieties with improved photosynthesis, growth and yield.



## **Outcome**

Linking Phenomics and Genomics is crucial to meeting food security challenges. By bringing state of the art digital technologies to bear on rice breeding, APPF can have major international impact in meeting this global challenge.

*“The HRPPC technology is unparalleled anywhere in the world and by bringing this phenotyping technology to IRRI’s genomics assisted breeding efforts, we are confident we can make some major breakthroughs”*

*Dr Robert Coe, Research Scientist, International Rice Research Institute*

## **Background**

The Australian Plant Phenomics Facility (APPF) was established in 2007 under the NCRIS 2006 program. As a world leading centre for innovative plant phenomics research, the APPF helps accelerate the development of new and improved crops, healthier food and more sustainable agricultural practice.

With nodes in Adelaide and Canberra, the APPF facilitates new research programs in plant and agricultural science by providing access to high quality plant growth facilities and state-of-the-art automated phenotyping capabilities in controlled environments and in the field. The facility offers high level consultation and expertise in plant phenomics including project design, statistics, automated imaging, image analysis and data management.

The APPF employs a multi-disciplinary team of experts (30 FTE) in the fields of plant science and biotechnology, mechatronic engineering, bioinformatics and computational science, horticulture, business management and equipment maintenance.

The facility is available to publicly funded and commercial organisations worldwide and to date has provided access to phenotyping services to 25 universities and public research organisations from Australia, Germany, Mexico, USA, the Philippines, Canada, Saudi Arabia, Scotland, as well as ten agribusinesses from Australia, France, Switzerland, Belgium, Germany and the USA.

Commonwealth funding for the APPF has included \$14.85 million over the period 2007/08 to 2011/12 under the NCRIS 2006 program, \$3.28 million for the period June 2013 to December 2014 under the Collaborative Research Infrastructure Scheme, and \$3.44 million for the 12 months 2014-2015 under the NCRIS 2013 program.