Plant Cell Biology Research Centre

Research Programs
About the Centre
News & Events
Opportunities
Contact
Search
Links
Home

Australian Centre for Plant Functional Genomics: Abiotic Stress and Productivity in Cereals

Staff

Professor Tony Bacic

Senior Research Fellow

Dr Ute Roessner

Research Fellow

Dr Megan Shelden

Support Staff

Mr Andrew Cassin

Ms Kristina Ford

Postgraduate Students

Mr Jairus Bowne

Mr Tim Erwin

Mr Dawei Liu

Ms Sushma Ramesh

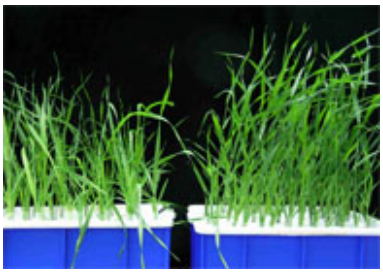
Masters Students

Mr Geraldo Guimaraes

The Australian Centre for Plant Functional Genomics (ACPFG) was established in December 2002. This Centre is a collaboration between our group and researchers working with Professors Peter Langridge, Geoffrey Fincher and Mark Tester from the School of Agriculture and Wine at the University of Adelaide, Professor German Spangenberg from the Plant Biotechnology Centreat La Trobe University and Professor Kaye Basford from the School of Land and Food Sciences at the University of Queensland.

The ACPFG is funded by the Australian Research Council (ARC), the Grains Research and Development Council (GRDC) and the South Australian Government. The ACPFG also has support from the University of Melbourne, the University of Adelaide, Department of Primary Industries (Vic) and the University of Queensland. Regular interactions between all ACPFG researches is a feature of the centre, with joint quarterly research meetings and regular travel ensuring that collaborative potential of each research project is optimized.

The aim of the ACPFG is to develop cereal varieties that have increased tolerances to environmental (abiotic) stresses, with an emphasis on drought, temperature, salinity, and mineral deficiencies and toxicities. Working within an integrated functional genomics program, we are working towards an increased understanding of abiotic stress responses in stress-tolerant and –intolerant varieties. We also aim to identify new genes that confer improved stress tolerance on targeted species.



The University of Melbourne node of the ACPFG uses proteomic and metabolomic technologies to investigate abiotic stress responses and tolerance mechanisms in cereals and a range of adapted and non-adapted barley and wheat lines to examine the responses of these plants at the protein and metabolite level. These studies allow us examine the molecular mechanisms of abiotic stress tolerances and identify candidate genes that control the tolerance traits. These genes are then subjected to a suite of functional analyses to determine their function *in planta*.

Current projects in the lab include investigations into the mechanisms of boron, salinity and drought tolerance in wheat and barley.

Barley plants growing in a hydroponic system

Proteomics

The Victorian Centre for Plant Functional Genomics (www.vcpfg.com) is the provider of a platform of key proteomic technologies for use by our group. The University of Melbourne node of the ACPFG utilises ESI-MS/MS (Q-Star, Q-Trap 4000, Applied Biosystems) and MALDI-TOF-MS (Voyager-DE STR, Applied Biosystems) instruments, together with a full range of protein separation technologies to perform functional proteomic analyses. A major research emphasis is the use of quantitative proteomic methodologies, including iTRAQ (Applied Biosystems) and DIGE (GE Healthcare) technologies to accurately compare the abundances of proteins in different samples.

Metabolomics

Metabolomics is key platform technology within our group. Established under the Science , Technology and Innovation Initiative of the Victorian State Government, the Victorian Centre for Plant Functional Genomics (VCPFG: see 'Facilities and Services') has now become part of the University of Melbourne hub of Metabolomics Australia (together with the Bio21 Molecular Science and Biotechnology Institute).
Metabolomics Australia (MA) is a National Collaborative Research Infrastructure Strategy facility proving metabolomics services and research facilities to Australian researchers in academia and industry.
The University of Melbourne node of the ACPFG uses GC- MS (ThermoFisher and Agilent) and LC-QqTOF-MS and LC-QqQ-MS (Agilent) and 4000QTRAP (Applied Biosystems) instruments to perform both comprehensive and targeted metabolite analyses. The information obtained from these studies is then used to identify stress-related metabolite patterns. This information is then used to identify novel gene targets for the breeding programs to increase stress tolerance in commercial crops.

Bioinformatics

The University of Melbourne node of the ACPFG also includes a bioinformatics program. Research within the bioinformatics program aims to develop methods to improve protein identification from mass spectral analysis of crop plant samples, improve systems for the

storage and interrogation of biological data, and develop applications to integrate complex proteomic and metabolomic data

Created: January 2004 by svgdesign.com.au

Last modified: January 22, 2009

Authorised by: Prof. Antony Bacic & Assoc. Prof. Ed Newbigin

Access: Open

Maintainer: Chris O'Brien, School of Botany