# on the mark

Newsletter of the Molecular Plant Breeding CRC JANUARY 2009

## From the CEO

Welcome to the first edition of On the Mark and Happy New Year! I hope that you had a relaxing break over the festive season and are now well rested and ready for a productive 2009.

The quiet time over the holiday period was a great opportunity for reflection. One of the conclusions that I came to over the break is that MPBCRC has evolved dramatically since the days of the CRC for Molecular Plant Breeding and that this is a good development not only for the CRC, but also for Australian cereals and pastures prebreeding.

In the last decade of evolution, we have developed from a research consortium focused on early stage research to an organisation with a powerful patent estate and technologies that are being evaluated in the field and approaching market entry. In fact, 2009 should turn out to be quite an auspicious year since, at the time of writing, we are conducting our second field trial on candidate drought tolerance genes in GM wheat (we conducted Australia's first field trial of GM drought tolerant wheat in 2007/2008). We are also conducting the first field trial in Australia of GM pastures with improved nutritive quality.

In the R&D pipeline, we have made a satisfying step forward into bringing our technologies closer to the market where they will hopefully deliver significant benefits to the enduser. This should not be interpreted as a criticism of our earlier work. Far from it. Early stage research such as development of innovative enabling technology platforms like TSP and ddSNP (see articles below), and discovery of new markers and genes has always been and will always be absolutely crucial to plant improvement and must be strongly supported. However, regardless of how innovative the technology is, all the hard work and dollars that are invested into its development are wasted if effective commercialisation does not take place.

I for one will be waiting with bated breath to see what our field trial results look like in early 2009. If all goes well, our commercial partner may start selling our first GM pasture product around 2014. GM wheat is a bit further away but it is satisfying to know that good progress is being made.

Glenn Tong

## MPBCRC Chairman made Order of Australia member

MPBCRC Chairman, Tony Gregson, was recognised as part of the Australia Day awards for his work in agricultural science.

Tony was appointed an Order of the Australia Member for his work in the areas of agri-biotechnology and grain growing.

Tony has played a key role on MPBCRC's board since inception, playing an integral role in the foundation and management of MPBCRC. Tony has continued in this role facilitating national and international collaboration between leading research groups and building productive relationships between diverse stakeholders.

With a PhD and DSc from the University of Melbourne, Tony has an extensive science and corporate research management background. As well as acting as Chairman for MPBCRC's Board, Tony is also:

- Chairman of Plant Health Australia
- Chairman of the Australian Academy of Technological Science
- Chairman of the Victorian Committee of the ATSE Initiative's Crawford Fund
- Chairman of the University of Ballarat's Water in Drylands collaborative research program, and
- On the board of trustees for Bioversity International in Italy.

Tony was an inaugural Board member of CSIRO and the GRDC, and a Board member of the Rural Finance Corporation of Victoria, the Australian Nuclear Science and Technology Organisation and of CIMMYT in Mexico.

Through these roles, Tony has shown exceptional vision in his leadership supporting cutting edge research. It is clear from his contributions that Tony has used his exceptional intellect and leadership to ensure that agriculture continues to benefit from research, and can sustain the increasing world population.

Congratulations to Tony for this well deserved honour.

## GM crops coexistence conference launched

MPBCRC will host an international conference exploring ways to facilitate coexistence between GM and non-GM crops in Melbourne in November 2009.

The Genetically Modified Crops Coexistence (GMCC) conference is the only international forum that focuses on coexistence between GM and non GM crops throughout the entire supply chain. The Melbourne event will cover key issues from production level to the market place or 'paddock to plate'.

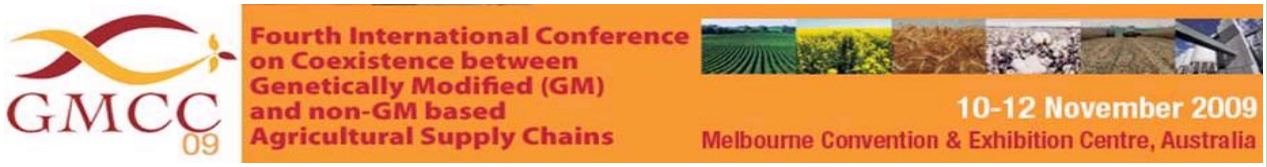
GMCC'09 will highlight the progress of the Australian approach to coexistence of GM and non-GM canola. The conference will also address the measures that are being planned for new GM crops.

The event will be highly relevant for industry, policy, agricultural biotechnology and agribusiness communities.

GMCC'09 will be held 10-12 November 2009. Abstracts are now being accepted on session topics including:

- The socioeconomics of coexistence
- Management of coexistence in farming systems
- Management of coexistence in the marketplace
- Coexistence case studies
- Identity preservation systems and testing methodologies
- Legal frameworks for coexistence
- Communication on GMOs

Further information on the GMCC'09 conference is available at http://www.gmcc-09.com/




## ddSNP: A simple and rapid method for SNP discovery

Marker development in polyploids can be time consuming and expensive. Detection and characterisation of SNPs in polyploids is complicated by the presence of homeologous and paralogous variation. When a SNP is found, it can also be difficult to determine which genome it resides on.

However Matt Hayden and Tania Tabone from MPBCRC have developed a SNP detection method which allows direct detection and characterization of SNPs in polyploids.

The method offers substantial benefits through reductions in time and cost according to Ian Christensen, MPBCRC's Chief Operating Officer.

"Previously, the most effective method for finding SNPs in polyploids was to clone a gene of interest and sequence numerous clones to detect all possible genomic and varietal SNPs", said Ian.

"By contrast, the ddSNP assay detects SNPs directly from inspection of Sanger sequences, and comparison with corresponding aneuploid stocks or progenitor diploids. This enables the host genome and genome specific primers sequences to be identified."

"These features make the ddSNP assay a straight-forward method that lends itself to low cost and automation", said Ian.

The ddSNP assay has applications in many situations that require identification of polymorphism in complex genomic environments. These include resequencing candidate genes, validating in-silico SNPs, developing gene-based markers in polyploids and detecting mutations in TILLING populations.

When combined with comparative genomics, ddSNP can also be used to rapidly fine-map a QTL region, and to accelerate the development of diagnostic assays to directly select for favorable alleles in marker assisted breeding.

More information on the technology is available by contacting Ian at ian.christensen@molecularplantbreeding.com

## TSP assay for SNP genotyping

MPBCRC has developed a way to perform a complete genotyping assay in a single tube.

PCR assays usually involve two steps: amplification of the locus of interest followed by amplification and interrogation of the polymorphism. By separating the two amplification steps to different temperature regimes MPBCRC has developed a simple, robust, co-dominant single-tube assay for genotyping polymorphisms.

Termed temperature-switch PCR (TSP), the assay can improve the efficiency of trait-linked marker development in complex plant genomes and improve the robustness of any diploid assay.

The TSP method can be applied for the genotyping of microsatellites (SSRs), single nucleotide polymorphisms (SNPs) and insertion-deletion changes (INDELs). TSP also has application for marker assisted selection where large numbers of samples must be assayed for only a small number of markers.

The TSP assay has many advantages over current methods, said Ian Christensen, MPBCRC's Chief Operating Officer.

"It can also be combined with a very wide range of detection technologies leading to low cost and making it easy and cheap to adopt by any lab,"

"By operating in a single tube under standardised conditions the TSP assay supports high throughput genotyping," said Ian

"This means there are opportunities for automation, as well as substantial labour and cost savings for techniques like highly-paralleled SSR genotyping and SNP analysis."

For more information, please contact Ian at ian.christensen@molecularplantbreeding.com

### Profile: Wayne Crismani

Wayne Crismani, PhD student at the University of Adelaide and MPBCRC, has recently submitted his PhD on meiosis in cereals.

Working with Dr Jason Able's group on meiosis in cereal plants, Wayne's research focused on the underlying processes in meiosis. Successful reproduction depends on the intricate co-ordination and precise timing of a series of events within the cell during meiosis.

"The group aims to understand these processes and use this knowledge to speed up breeding programs," Wayne said.

"We want to be able to produce fertile hybrids by breaking breeding barriers. This means we want to be able to have two different plant species cross and give offspring which are fertile."

Focussing on bread wheat (allohexaploid), Wayne's project compared studies on meiosis between wheat, rice and a model plant Arabidopsis thaliana.

"I ran a microarray study of meiosis in wheat, which was able to simultaneously look at the behaviour of tens of thousands of genes", Wayne said.

"Knowing how the genes behave is an important step to being able to manipulate chromosomes pairing in plant breeding programs in native three-dimensional and disrupted states respectively".

Wayne has also travelled to both Cornell University in Ithaca, New York and the French National Institute for Agricultural Research (INRA) in Versailles, France to learn techniques for analysing chromosome and proteins in their native three-dimensional state.

These techniques were then applied to characterise bread wheat mutants created by other teams within MPBCRC.

Sponsored by a Marie Curie early stage training scholarship, Wayne also stayed in France for an additional four months, working on another project characterising a protein essential for meiosis in Arabidopsis.

"The work was interesting and has led to me being offered a post-doctoral position at INRA".

Wayne submitted his thesis in November 2008 and is currently making arrangements to move to France for his new role.

## Get into Genes gets a new home

*Belinda Griffiths*

During August 2008, Get into Genes Victoria moved into its brand new lab space in the Reid Building, on campus at La Trobe University Bundoora.

We celebrated the move and our achievements of 2008 with a 'lab-warming party' on August 8th. This was a great opportunity to say 'thank you' to the many supporters of Get into Genes.

Invited guests included Professors Roger Parish and Nick Hoogengraad, of the Faculty of Science Technology and Engineering, as well as members of the Faculty's Schools Outreach team and MPBCRC head office staff. One of the most important aspects of Get into Genes is its PhD student presenters, and they too were present to join in the celebrations.

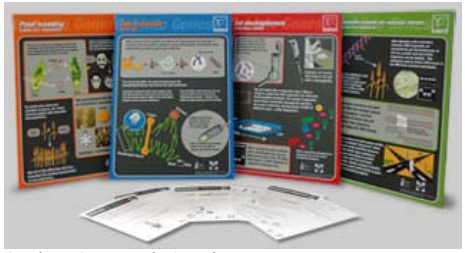
Room 232 was re-furbished with generous funding from the Faculty of Science, Technology and Engineering, to the specific requirements of Get into Genes. The lab is modelled on the Adelaide Get into Genes workshop space, and staff from the Faculty worked tirelessly to get everything just right. The lab is bright and spacious, with room for students to work in small groups on a range of hands-on workstations.

The Get into Genes sessions give students the change to learn about and use the latest cutting-edge techniques in molecular biology, as well as learning how these apply to agriculture. School students also get immersed in the University environment, often taking a guided tour of LaTrobe's facilities.

Students love learning about the opportunities open to them through tertiary study, and they always enjoy having lunch in the 'Ag' alongside real university students!

Get into Genes Lab Opening

Get into Genes in action



Teaching material

## New IP & Contracts Manager

MPBCRC head office has welcomed William Lancaster (Will) as our new IP & Contracts Manager.

Will has joined on secondment from long-term MPB supporter, FAL Lawyers and has experience commercialising technology and licensing intellectual property. Will has also worked for IP Australia as a patents examiner.

"Working with FAL I've been able to represent a number of CRCs. The secondment to MPB is a great way for me to gain commercial experience in the day-to-day running of a CRC," said Will.

"The best part is that I get direct contact with a long-term client."

In his spare time, Will enjoys cycling and swimming and has combined these to establish an MPB head office triathlon team, along with Ian Christensen and Belinda Griffiths.

"The event is in March, so we're really getting into the training now. We're been hitting the pool at lunchtime, and I'm riding to work to get my cycling hours in."

A little about Will...

Alternate career path: When I was a kid I wanted to be an archeologist like Indiana Jones

Best way to spend a weekend: At the beach

Favorite book: Neuromancer by William Gibson

I'd really like to: Learn how to DJ.

## The final word

Best science images of 2008 ... http://news.nationalgeographic.com/news/2008/09/photogalleries/2008-best-science-photos/

## Diary dates

**Outlook 2009 - A Changing Climate for Agriculture**
3 - 4 March 2009
National Convention Centre, Canberra
More information: www.abare.gov.au/outlook/

**14th Australiasian Plant Breeding and 11th SABRAO Conference**
Combined conference for the Australasian Plant Breeding congress and the 11th Society for the Advancement of Breeding Research in Asia and Oceania congress
10 – 14 August 2009
Cairns Convention Centre
More information: www.plantbreeding09.com.au

**4th International Conference on Coexistence between Genetically Modified (GM) and non-GM based agricultural supply chains**
10 – 12 November 2009
Melbourne Convention and Exhibition Centre.
More information: www.gmcc-09.com

On the mark is produced quarterly. All contributions are welcome. If you have news about MPBCRC activities, events, research or international travel please contact us for inclusion in the next newsletter.

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