The School of Agriculture, Food & Wine at

THE UNIVERSITY of ADELAIDE

The Waite

Issue 2, 2015

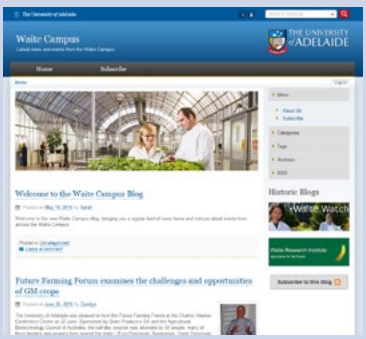
From the Dean's office …

The April to June quarter saw the School of AFW have interactions with two of the Research and Development Corporations that support our research. The University of Adelaide is the Australian university that receives the greatest amount of funding from the RDCs, and the School of Agriculture, Food and Wine receives the greatest share of these funds. A team from GRDC was here at the Waite Campus to review pre-breeding plant research that contributes to the breeding of new crop varieties. Together with colleagues from SARDI, we demonstrated the great range of valuable pre-breeding research that is done at the Waite Campus. I also participated in a strategic planning meeting involving Horticultural Innovation Australia (HIA).

Other recent AFW developments that promise to bear fruit for the Waite and The University of Adelaide include agreements with international partners. At Geisenheim University we are pursuing student exchanges. We will offer a joint PhD degree program with the University of Nottingham. Targeted scholarships will be announced and advertised in the near future, three at each university. The Frontiers in Plant Phenomics workshop in early June also brought together academic staff from Shanghai Jiao Tong, Nottingham, NC State and Adelaide. The productive workshop will lead to a joint publication on plant phenomics and a joint research program in this area.

Want Waite news more regularly than our quarterly newsletters?

The Waite Campus Blog has now been launched and will run in parallel with this newsletter. If you would like to receive more regular Waite news updates via e-mail, subscribe now at http://blogs.adelaide.edu.au/waite/subscribe/.



Wine Innovation Cluster milestone

As the Wine Innovation Cluster (WIC), a collaborative partnership between the Waite-based organisations working in wine and grape research, looks back on the six years since its establishment, it's clear that the multi-billion dollar Australian wine and grape sector is the beneficiary. The four partner organisations – the University's School of AFW, CSIRO, the Australian Wine Research Institute (AWRI) and SARDI, encompassing 62% of the national capability between them – are seeing increasing momentum arising from the collective approach and shared activities generated and facilitated by the WIC. A total of more than $27m in funding for 35 collaborative projects (involving two or more of the agencies) since 2011 is the most obvious measure of success.

However, the other less-tangible benefits of the WIC partnership are also proving significant over the longer term, including reduced duplication in applications for funding, enhanced relationships and communication, shared resources and infrastructure, and a collective, united voice in engaging with industry bodies. The WIC has also run and hosted three highly successful national wine and grape science events since 2011, fostering and developing research connections with groups across Australia. All of these outcomes support the sector by maximising synergies and value for the R&D levy money which funds much of the research in this area.

The WIC partners' research, development and extension work covers the entire value chain, addressing ongoing challenges such as increasing climate and seasonal variability, soil and water limitations, grapevine diseases, bushfire smoke taint, yield prediction, and a range of wine quality, microbiology, alcohol level, consumer and sensory issues. All of the WIC partners are also involved in the newly-launched ARC Industrial Transformation Training Centre in Innovative Wine Production (see page 3). In addition, the WIC winemaking service, a joint venture between AWRI and The University of Adelaide, provides user-pays, small-lot winemaking support to the sector (as well as underpinning the R&D activity at the Waite), and many of the WIC's research projects involve industry partners.

The Wine Innovation Central building (above), a $30m shared investment between The University of Adelaide, AWRI, the former Grape and Wine Research & Development Corporation (now AGWA) and the State Government of SA, opened in late 2008 to coincide with the launch of the Wine Innovation Cluster.

L-R Professors Mike Keller, Aidan Byrne (CEO, Australian Research Council) and Vladimir Jiranek at the Centre opening.

Research finds mechanism of herbicide resistance

Waite researchers have identified the mechanism behind the resistance of the cereal weed brome grass to the widely used herbicide glyphosate.

Published online ahead of print in the journal *Pest Management Science*, the researchers report that it is the first weed species in Australia that has shown this mechanism of resistance.

"Great brome (*Bromus diandrus*) is a significant weed of both crops and pastures across the southern and western Australian cereal belts, causing contamination, yield reductions and damage to meat and livestock," says postdoctoral researcher Dr Jenna Malone.

"Glyphosate is the most widely used and versatile herbicide in the world and one of the most important herbicides for weed management in Australian agriculture. Loss of glyphosate for brome grass control would cause serious issues for farmers."

Resistance to glyphosate has been found in recent years in two different populations of great brome. Both populations showed the same mechanism of resistance –called gene amplification. In gene amplification, the resistant plant produces numbers of copies of the gene responsible for the enzyme EPSPS which is targeted by glyphosate. More enzyme production overcomes the herbicide action.

"It shows yet another way that plants are developing resistance to herbicides," says Dr Malone. "Until now there have been just three key mechanisms for resistance. Unfortunately it means that there will be even more cases of plants developing resistance to herbicides."

Research group leader Associate Professor Christopher Preston says the research underlines the importance of using diverse practices for management of brome grass to reduce the risk of resistance developing.

"The bad news for farmers is that brome grass is another weed that will become increasingly harder to control," Associate Professor Preston says.

"It reinforces the need to not overuse glyphosate; to employ good practice of diverse weed management including crop rotations, fallow periods, interspersing with grazing cycles and other control mechanisms."

The researchers are continuing with further genetic investigations of brome grass to see how the gene amplification occurs and how it is controlled.

"If we can discover answers for this, we will have much better knowledge of how the genome of weeds and other plant species can rapidly adapt under stress," Dr Malone says.

The research received funding from the Grains Research and Development Corporation and the Yitpi Foundation.

ARC Training Centre for Innovative Wine Production launched

The $2.4m ARC Training Centre launched at the Waite on 20 May will help the Australian wine industry address key challenges such as climate warming, water limitations, changing consumer preferences and increasing production costs, while strengthening links between research, industry and education. The Centre was officially opened by the Hon Christopher Pyne, Minister for Education, at the Roseworthy-Hickinbotham Wine Science Laboratory.

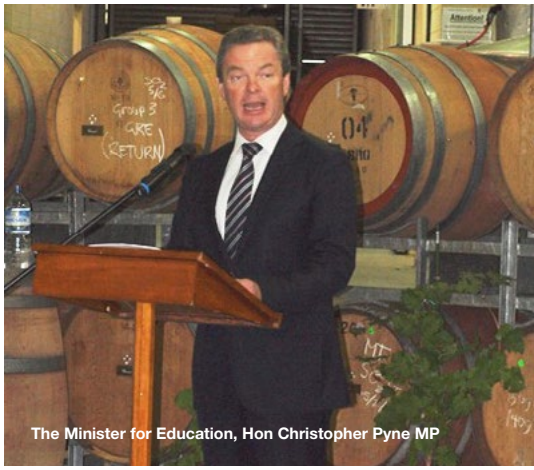
Supported by the Australian Research Council (ARC) and 12 partner organisations, the ARC Training Centre for Innovative Wine Production aims to build the knowledge and technologies that will both address these challenges and produce highly skilled graduates and postdoctoral researchers honed for working at the industry/research interface.

"We have a portfolio of 18 projects which together take a 'grape to glass', multi-faceted approach to tackling these key issues facing the industry," says Professor Vladimir Jiranek, Professor of Oenology in the University's School of Agriculture, Food and Wine and Director of the ARC Training Centre for Innovative Wine Production.

"We aim to underpin and enable more profitable grape-growing and winemaking while achieving the desired flavour and alcohol balance that consumers want."

The Centre is supported by the Federal Government through the ARC's Industrial Transformation Research Program, and the Australian Grape and Wine Authority. The partners are: The Australian Wine Research Institute, BioInnovation SA, Charles Sturt University, CSIRO Agriculture, Laffort Oenologie Australia, Lowe Wines, Memstar, NSW Department of Primary Industries, Sainsbury's Supermarkets, South Australian Research and Development Institute, Tarac Technologies and Treasury Wine Estates Vintners.

The Centre builds on a long tradition of research and multi-agency collaboration in winemaking and viticulture at the Waite Campus. The Waite's Wine Innovation Cluster accounts for 62% of Australia's wine research capability and outputs.



The Minister for Education, Hon Christopher Pyne MP

John Randles retirement celebration

On 15 May, the career of an important and long-serving member of the Waite community was celebrated. Emeritus Professor John W. Randles first joined the Waite Agricultural Research Institute in 1969, and retired last year. We are pleased that he is still around on campus, and that he is still active, currently editing a book. John addressed a gathering of about 60 friends and colleagues (past and present), giving us an inspiring outline of his career and work, called 'Some Adventures in Nanobiology'. This was followed by an afternoon tea and chat.

John was educated at Norwood High School, and paid tribute to his botany teacher there, who inspired in him a love of plants. From Norwood he went to the University of Adelaide, where he did a B Ag Sc. (Hons), supported by a Commonwealth Scholarship and a Cadetship to the Department of Agriculture. As a young graduate, he joined the Department of Agriculture, working on plant disease diagnosis, field trials for disease control, and establishment of biological indexing techniques for detecting viruses of fruit trees. This all provided excellent experience for him for his later career. During this time, John also completed a M Ag Sc on "A comparative study of cucumber mosaic virus and a gladiolus isolate of tobacco ringspot virus", supervised by Richard Francki. In 1966, he was awarded a New Zealand University Research Grants Commission Postgraduate Scholarship to do a PhD at the University of Auckland. This was on "Some effects of turnip yellow mosaic virus infection on nucleic acid metabolism in *Brassica pekinensis* Rupr." supervised by Professor R E F Matthews, FRS. In 1969, John took up a lectureship in Plant Pathology at The University of Adelaide. He was appointed 'Professor' in 2001.

During the course of his career, John published ~140 refereed research publications, wrote and/or edited 4 books, wrote 45 book chapters, and 32 reviews and grower publications. His grants included 17 from ARGS and ARC, 4 from ACIAR, 5 from industry funding bodies and 1 from the National Geographic Society – almost $4 million in total. John worked on epidemiology of plant viruses in South Australia (including lettuce necrotic yellows virus), vector-virus relationships (including velvet tobacco mottle virus, the only virus known to be transmitted by a mirid bug), coconut cadang-cadang disease (John discovered the viroid agent causing the disease), icosahedral plant viruses encapsidating satellite RNA, the novel coconut foliar decay virus (CFDV), geminiviruses as a model for virus-plant interactions at the molecular level, and Mundulla Yellows (MY) disease of Eucalyptus and other native species. He also presented various undergraduate classes on plant pathology and microbiology, and supervised 29 PhD students, 14 of whom are now working and teaching overseas. As Scientific Director, he has provided support for industry via Waite Diagnostics, and his name is on 4 patents (in Germany and the USA).

In between all this, John somehow found time for a long involvement with the Scout movement, and was able to indulge his enjoyment of walking and photography. We wish John a long, happy and productive retirement.

- Kerrie Davies

Naomi Verdonk wins 2015 SARDI Women's Suffrage Centenary Science Bursary

'Bubbly' researcher and AFW postgraduate candidate, Naomi Verdonk, has been awarded the 2015 SARDI Science Bursary for Women.

Naomi will use the $1500 bursary to support her attendance at the 5th European Union Wine Law Summer School to be held in Champagne, France in June, which will in turn, feed into her thesis, entitled *'Understanding Australian Consumers' Preferences for Different Sparkling Wine Styles'*.

"The Wine Law Summer School is a unique opportunity for me to further my knowledge and interests in wine law, the French language and the region of Champagne – arguably the world's benchmark for sparkling wine production," Naomi said.

Naomi has already acquired the rather unique combination of a double degree in Oenology (with first-class honours) and Law, a Graduate Diploma in Legal Practice and a Diploma in Languages (French).

As part of her doctorate topic, Naomi is conducting an online survey of 1000 Australian wine consumers' knowledge of sparkling wine production methods as well as tastings for more than 200 consumers to assess preferences for different sparkling wine styles.

The annual SARDI Women's Science Bursary was established in 1994 to commemorate the SA Women's Suffrage Centenary (1894-1994).

The South Australian Research and Development Institute (SARDI) is a division of Primary Industries and Regions SA (PIRSA) and is the State Government's leading agricultural research institute.

Inaugural Innovative Teaching @ Waite Exhibition 2015

The Innovative Teaching @ Waite Forum has been growing since its inception in 2011. It's an informal platform that academic staff can use to discuss learning and teaching pedagogy, strategies and issues. The overall aim of this forum is to improve teaching practices within the school and provide a supportive network for academic staff. The forum is held regularly over both semesters in the teaching calendar and has developed into a teaching based community of practice unique to Waite Campus.

The 5th anniversary of this forum was celebrated with an Innovative Teaching Exhibition on 23 April, a showcase of effective learning and teaching strategies that have been implemented by staff in courses taught in the School of Agriculture, Food and Wine. The exhibition was opened by Chris Ford (Deputy Head of School -Learning and Teaching), followed by keynote speaker Natalie Williamson who presented on enquiry-based learning and its success in large first year chemistry courses.

The exhibition program focused on two themes; *Preparing students for careers in science* and *Using technology to foster student learning* with seven staff presenting on a variety of learning and teaching strategies. These included:

- Teaching science students to write (Ron Smernik);
- How to manage increased class sizes with limited time (Tina Bianco-Miotto);
- Using online journals for documenting industry placements (Cassandra Collins);
- Development and implementation of a Massive Open Online Course MOOC (Kerry Wilkinson);
- Using MyUni quizzes for testing students (Cameron Grant); and
- Flipping the classroom with Articulate Storyline (Beth Loveys and Karina Riggs).

The exhibition was a unique opportunity for academics to share their teaching experiences, good and bad, within a collegial environment. Enthusiastic discussion and debate followed each presentation and continued into morning tea. Many attendees were able to take away ideas to apply to their own teaching. Feedback from participants was extremely positive indicating that the Innovative Teaching @ Waite forum is here to stay and the exhibition is likely to become a biennial event. The Innovative Teaching @ Waite Exhibition gave everyone who attended a taste of new and exciting developments taking place in the teaching space. The future of learning and teaching at the Waite looks very bright indeed.

Picture: Speakers at the inaugural Innovative Teaching @ Waite Exhibition. (Back row left to right: Ronald Smernik, Cameron Grant, Cassandra Collins, Kerry Wilkinson) (Front row left to right: Natalie Williamson, Beth Loveys, Karina Riggs, Chris Ford, Tina Bianco-Miotto).

Our new Australian Academy of Science Fellow

Professor Mike McLaughlin has been elected a Fellow of the Australian Academy of Science, one of Australia's highest honours for achievement in the sciences.

Professor McLaughlin's outstanding research is widely recognised both nationally and internationally. It combines fundamental science and commercial application. He uses novel methods to study fertiliser and contaminant reactions in soils and plant uptake, including isotopic tracing and spectroscopy. He developed concepts to recognise soil and environmental variability in contaminant risk assessments that have been adopted internationally and recognised by both US and EU regulators.

His research has gained strong commercial success and his laboratory is regarded internationally as a leader in development and evaluation of fertiliser technologies.

Professor McLaughlin, a Professorial Research Fellow with the University's School of Agriculture, Food and Wine is also a Science Fellow with the CSIRO. He will join twenty other new Fellows being recognised for their outstanding contributions to science and scientific research and is the only candidate from South Australia to be honoured in this year's election.

"To become a Fellow of the Australian Academy of Sciences is a great honour for me and I would like to dedicate the award to the many students, postdoctoral fellows, scientific visitors and collaborators who have worked with me over the years and contributed to the research I have been involved in," Professor McLaughlin said.

"For me, science is the excitement of a new idea, testing it and (if it works) seeing it get adopted and go into use. It is also about teaching and mentoring younger scientists to achieve their goals."

Academy President Professor Andrew Holmes said: "Election to the Academy celebrates excellence and recognises contributions to science of the highest order.

"Each of these research scientists has changed the way we think and made a significant and lasting contribution to his or her field."

The fellowship continues an exceptional year for Professor McLaughlin, who was awarded the 2015 IFA Norman Borlaug Award in March, and is now a finalist for SA Scientist of the Year. An almost thirty-year career in science has also seen Professor McLaughlin become a Member (AM) of the Ordinary Division of the Order of Australia.

Frontiers in Plant Phenomics Workshop

Four academic staff from the School of Agriculture, Food and Wine participated in the Frontiers in Plant Phenomics Workshop at North Carolina State University on 1-3 June.

The workshop brought together plant scientists, crop breeders, and technologists from Adelaide, Nottingham, Shanghai and North Carolina.

The workshop was partly sponsored by Academic Consortium for the 21st Century (AC21). It included tours of the NC Biotechnology Center, Monsanto, and Bayer CropScience, in addition to presentations, working sessions and discussions held at N. C. State.

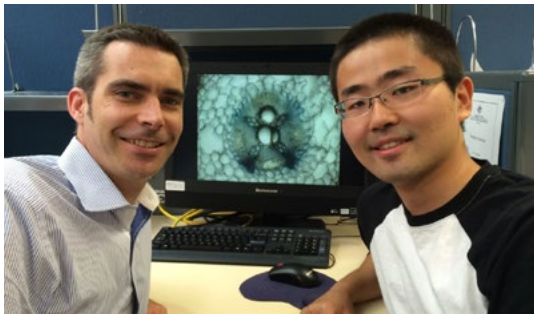
Picture: AFW staff at the Frontiers in Plant Phenomics workshop with colleagues from North Carolina State University and Nottingham University

The workshop aimed to leverage the complementary strengths of each participating institution and to establish a virtual research centre in plant phenomics that links biology and technology.

The ultimate aim is to use advanced technologies and analytical methods to enable better understanding of how genes influence the quality and quantity of crop yields.

Improving the salinity tolerance of soybean

Collaboration between the Australian Research Council Centre of Excellence in Plant Energy Biology (ARCPEB) at the University of Adelaide and the Chinese Academy of Agricultural Sciences has been grabbing people's attention. The research identified a major gene (*GmSALT3*) in soybean that confers tolerance to soil salinity. Soybean, which is ranked as the fourth largest crop in terms of global yield, is a major food, fuel and feed crop, and has been classified as sensitive to salinity. Crop losses due to soil salinity are a growing issue for meeting food security targets. The *GmSALT3* gene was discovered using map-based cloning in a soybean population derived from a salt tolerant and salt sensitive variety. GmSALT3 functions in the root and stem to limit the movement of sodium ions to the shoot. This work led by PhD student Yue Qu (Julian) and Matthew Gilliham from ARCPEB and Rongxia Guan and Lijuan Qiu from the Institute of Crop Science in Beijing was recently published in *The Plant Journal*: "Salinity tolerance in soybean is modulated by natural variation in GmSALT3". The research was highlighted on ABC Radio and numerous online science news sites. Markers are now being provided to breeders to target salt resistance for new soybean cultivars. In Adelaide, Julian is currently determining the precise mechanism by which GmSALT3 provides salt tolerance. The role of related genes in other crop species is also being investigated as a new source for improving their salt tolerance.



Top: A salt-tolerant and salt-sensitive soybean variety exposed to salt

Bottom: Matt Gilliham and Yue Qu with an image showing the localisation of GmSALT3 in cells of soybean roots associated with the vasculature.

Genomics for agriculture and the environment

A new partnership with AGRF

The field of genomics now dominates and underpins the life sciences, encompassing vital and growing sectors of the Australian economy, including medicine, health, agriculture, natural products and the environment.

The future of genomics research in Australia is being promoted by medical, environmental and agricultural research leaders through the proposed implementation of a national genomics concept, Genome Australia. Genome Australia would support infrastructure platforms and strategic research and development programs.

The current focus for genomics support in Australia is predominantly in the medical domain. Thus a key focus is how to increase the presence and evidence of the value that genomics has brought already to the nation's environment and agriculture challenges in order to rebalance the current focus towards these sectors.

It is in this context that the University of Adelaide and AGRF agreed to pursue a closer relationship, with emphasis on taking a national leadership role in the areas of agricultural and environmental genomics. It was proposed this be achieved through jointly seeking to establish an Adelaide / Waite based genomics hub that focusses on agriculture and environment as its major focus.

As a first step, the Australian Genome Research Facility (AGRF) at the Waite recently announced a call for proposals in conjunction with The University of Adelaide. This pilot program sought to identify high-visibility demonstration projects that can be used to attract the interest of government ministers, officials and other investors, by illustrating the power and potential of genomics research to address agricultural and environmental questions.

Fourteen proposals were received, including several from the School of AFW, and these were reviewed and ranked by an external panel of specialists in plant, animal and soil genomics.

Dr Cassandra Collins and a team composed of AFW, Biological Sciences and Mathematics researchers were successful in winning a $50,000 AGRF/UA grant to explore the eco-genomics of wine terroir, linking epigenetics to soil genomics, climate and land management in an approach which will be applicable to a host of other agricultural and environmental systems.

Professor Alan Cooper from the Australian Centre for Ancient DNA and a team composed of SA Museum and Mathematics researchers were successful in winning a grant of similar funding value. The team will use genomic information to reconstruct the evolutionary history leading to current lack of diversity in some of Australia's endemic species. Understanding how and why species come to lack diversity will help prevent future declines.

Future Farming Forum

The University of Adelaide was pleased to host the Future Farming Forum at the Charles Hawker Conference Centre on 22 June. Sponsored by Grain Producers SA and the Agricultural Biotechnology Council of Australia, the half-day session was attended by 50 people, many of them farmers and growers from around the state - Eyre Peninsula, Bordertown, Yorke Peninsula and the Mallee were all represented.

The audience heard from four speakers: A/Prof Chris Preston and Dr Heather Bray from UA, Victorian agronomist Greg Sefton and Executive Director of the Australian Oilseeds Federation, Nick Goddard, about the challenges, opportunities, performance to date and market potential of GM crops, with a focus on canola. Chris Preston's presentation focussed on the co-existence of GM and non-GM crops, and the management of GM canola in the landscape. Heather Bray's talk on consumer and community attitudes to GM products arising from her recent social science research was of great interest to the diverse audience and there was plenty of discussion and question time.

The Agricultural Biotechnology Council of Australia has released an official reference guide to Ag Biotech and GM crops and will be running future sessions around the country aiming to increase growers' understanding of and engagement with agricultural biotechnology.

Main picture: Forum speakers (L-R) Heather Bray, Chris Preston, Greg Sefton and Nick Goddard (also pictured above)

The Who's Who of AFW …

Each issue, we'll profile a different AFW School Office staff member so you can put a face to the name and know who to go to for what! This issue, it's …

Aileen Yeo

I joined the School of Agriculture, Food & Wine in 2011, and am currently the School Budgeting & Finance Officer. My responsibilities include preparing the school budget and coordinating financial forecasts, providing financial reports and advice to the School, reviewing grant application budgets including salary costings, and overseeing financial & administrative services to the School.

Originally from Malaysia, I have a long association with the University. I completed both my bachelor degree in Commerce and my postgraduate degree in Masters of Business Administration, here at The University of Adelaide. And now I am back working for the University! I enjoy very much the University environment, and especially in my current role -- as I have a great passion for numbers!

MOOC Update

The first iteration of the MOOC (massive online open course) 'World of Wine: From Grape to Glass' on the edX Platform, developed and taught by Kerry Wilkinson, Cas Collins, David Jeffery and Paul Grbin, took place between 2 April and 18 June.

Almost 18,000 students representing 163 countries (30% from the USA, 10% from Australia) enrolled in the World of Wine MOOC, and the peak of activity in the course involved around 7000 learners watching videos, participating in discussion boards and completing the assessment tasks.

Feedback on the course quality was incredibly positive, prompting edX to open the course again to run under 'self paced' mode for the remainder of 2015. Use the search term 'Wine101x' and follow the simple enrolment process to join another 8000 new students currently taking this free course!