From the Director

Increasing research capacity is a major goal of the Graham Centre and this includes improving research training. Since the Centre formed in 2005 we have seen enormous growth in our post-graduate numbers rising from 20 to over 100 in 2014. Students play a critical role in generating new knowledge to increase the productivity, efficiency and resilience of mixed farming systems, as well as improving food quality and the value of the supply chain. This will raise farm profitability and income, enabling diversification and investment in sustainable practices with reduced environmental impact.

The successful funding for the Australian Research Council Industrial Transformation Training Centre (ARC-ITTC) on functional grains, led by Associate Professor Chris Blanchard, will fund nine new PhDs and three post-doctoral fellows. This will give a major boost to our food quality research capacity. Furthermore, undergraduate enrolments at Charles Sturt University (CSU) in 2014 are strong with current enrolments in Agriculture and Veterinary and Animal Sciences comparable or better than last year.

Professor Jim Pratley’s ‘Review into agricultural education and training in New South Wales’ report released in December 2013 identified a number of factors that have led to the current skills shortage in the agricultural industries including: the lack of awareness by students about food and fibre; the perceptions about agriculture and the opportunities therein; the importance of early engagement with students about key issues; concerns about the teaching of science and therefore agriculture in the primary schools; and the need for provision of quality teaching and learning materials to schools. The NSW government has accepted 26.5 of Professor Pratley’s 27 recommendations to encourage secondary school students to engage in a science-based agricultural career.

The success of research depends on the impact it has on farms and agriculture in both Australia and internationally. Digital platforms for information dissemination are becoming more important, and in 2014 we will be continuing to improve our website, use of social media, and forums. We will continue to strengthen our partnerships with our network of grower groups, Local Land Services and other industry organisations, and we will build on the value-chain approach to ensure we connect with our consumers.

This Edition outlines our research activities, international links, staff profiles and upcoming events. Enjoy reading this edition of the Innovator.

Professor Deirdre Lemerle

Congratulations to all Graham Centre students who graduated in December 2013.

**THIS ISSUE**

- News 2
- Research Activities 14
- In the Limelight 22
- Events Calendar 24

**quick links**

- Graham Centre website
- CSU website
- DPI website
Functional grains industrial training centre a reality

The Graham Centre has been successful in its Australian Research Council (ARC) $2.1 million bid for a Functional Grains Industrial Transformation Training Centre (FGC).

The FGC will bring together a network of Australian and international grain science professionals that will facilitate world-class industry focused research in rice, canola and pulses.

The FGC also provides the opportunity to bridge the gap between researchers working on different grains, as well as researchers from different research organisations and state departments.

Associate Professor Chris Blanchard said, “The FGC will stimulate change from commodity-based production systems to higher-value products, tailor-made to increasingly wealthy consumers, particularly in the Asian nations. Such a transformation can be achieved by focusing on food functionality, particularly the growing demand for foods with specific health benefits or novel food applications.”

To achieve the transformation from commodities to functional foods, a ‘whole-of-product’ approach is required including: market intelligence to identify what consumers want; generating fundamental scientific knowledge to understand food systems, as well as monitoring of health-enhancing properties and other functionalities through the production chain so that storage, processing, and consumer acceptance of the end product can all be optimised.

Contact: Associate Professor Chris Blanchard  
E: cblanchard@csu.edu.au; T: 02 6933 2364

Review into agricultural education and training in NSW

Emeritus Professor Jim Pratley gives an overview of the key issues in his recently released Review into Agricultural Education and Training in NSW.

Professor Pratley said the key issues were:

1. The need to address the teaching of science (including agriculture and food) in primary schools particularly through:
   - The provision of high quality, focused teaching and learning materials.
   - The provision of a well articulated statement on what is required in the teaching of agriculture and food in primary education.

2. The need for all secondary schools to expose all students to agriculture and food in the Technology program of Years 7 and 8. Two thirds of high schools have no agriculture instruction.

3. The desirability of the education system to provide for an ‘agriculture and food week’ which:
   - Celebrates our richness in the variety of foods (from bush tucker to ethnic foods).
   - Canvases the issues of diet, food safety, food labelling and related issues.
   - Sponsors a child from the developing world so that there can be engagement by children to appreciate that others struggle for their dietary needs.
   - Teaches the importance of agriculture in the national economy and in the building of the nation.
   - Celebrates the richness of agriculture and food in our literature, poetry, music and art.

4. The encouragement of the Agricultural High Schools to be more involved in agricultural education leadership for other schools and the opportunity for some schools with strong agriculture programs to operate as Lighthouse schools to create a network of strong support to the less endowed schools teaching agriculture.

5. The need for proper careers advice to students regarding the employment prospects related to agriculture at all levels.

6. The re-establishment of the Murrumbidgee College of Agriculture under a not-for-profit Trust with freedom to operate as the business dictates.

7. The importance of revamping the conditions for postgraduate research students and post-doctoral fellows to make them more contemporary, more competitive, and with a better career structure.
8. The need for all players in industry to establish a vision for the sector, to work together to address the community’s image of industry, to ensure the education system is rich with agricultural teaching materials and to focus on the need for a workforce strategy.

9. Key organisations such as the Primary Industries Education Foundation and Career Harvest need to be supported as the portals for educational materials and professional career advice respectively. The Royal Agricultural Society of NSW is well placed to make a significant impact in agricultural education also.

10. There are concerns about the future of education for the horticulture, forestry and aquaculture industries. There is no magic bullet but there are many issues which if addressed can have transformational change. This can only be achieved if all players work together for the common good. Competing and setting up new structures is unlikely to be successful and will dilute the effort. Making existing structures work is the way forward.

Contact: Professor Jim Pratley
E: jpratley@csu.edu.au; T: 02 6933 2862

2013 Graduations

Congratulations to all Graham Centre students who graduated in 2013.

Doctor of Philosophy
- Dante Adorada - Pathogenicity, diversity, Biology and Sources of Resistance to Pseudomonas Fuscovaginae in Rice
- Meredith Mitchell - Ecology of Microlaena stipoides in Grazing systems
- Edward Patterson - Expression and use of Recombinany Beak and Feather Disease Virus (BFDV) Capsid-Associated Protein
- Andrew Peters - People, Pigeons and a Parasite: Studies on Columbiformes and Trichomonas
- Anna Rathe - Incursion Preparedness: Anticipating the Arrival of the Plant Pathogen Xylella Fastidiosa and its Insect Vector Homalodisca Vitripennis in Australia
- Siong Tan - Extraction, characterisation and Functional Studies of Australian Canola Proteins
- Xiaocheng Zhu - Diversity of Silverleaf Nightshade in Australia and Implications for Management
- Tim Hutchings - Financial Risk on Dryland Farms in South-Eastern Australia

Master of Philosophy
- Brett McVittie - Mapping of the Locus Associated with Tolerance to High Manganese in Rapeseed (Brassica napus L)
- Matthew Newell - Summer Dormancy in Elymus Scaber and its Potential as a Parent in the Production of Perennial Cereals

Bachelor of Agricultural Science (Honours)
With Honours Class 2 Division 1
- Michael Hopwood

Bachelor of Applied Science (Honours)
With Honours Class 1
- Erin Lennox
- Emily Martin

Bachelor of Science (Honours)
With Honours Class 1
- Clare Flakelar

Bachelor of Animal Science (Honours)
With Honours Class 2 Division 1
- Maria Boesiger
- Emily Sims
- Ashleigh Wildridge

Bachelor of Veterinary Biology/Bachelor of Veterinary Science (Honours)
With Honours Class 1
- Callum Donnelly
Please don’t rush: This is the land of a million elephants

A record of experiences of an early career researcher operating in a least developed country.

Working on large projects is not new to me; previous research activities have required me to coordinate national and international working groups comprised of cross-disciplinary experts from industry, government, academia and other key stakeholder groups. This is not a great feat in a world where garden variety technology (e.g. reliable internet access) is a human right and a lack of USB ports is a severe violation of civil liberties. But trying to engage in research activities across five different research components in the final year of a four year project in a least developed country like Lao Peoples Democratic Republic. Well, that's a different story.

It all began in November 2012, when I was employed by CSU as a Post-Doc to work specifically within the water component of what is known to some as ‘The South Laos Project’. A brief trip to Lao was scheduled where I was to meet the key players and fellow researchers with whom I would interact over the next twelve months.

On arrival in the ‘Land of a Million Elephants’, I was quickly informed by my counterparts that if I wanted to get ahead in this world, it would be best to invest in a few ‘sinhs’, the traditional style of skirt worn by the Lao women. Duly noted; I would purchase some woven material of cotton or silk and have it tailored by one of the many seamstresses when I had the chance.

Next was learning to speak the language; a little bit of Lao goes a very long way. The Lao love it when you speak their language, even if your pronunciation of a particular word may mean that you have called someone a ‘pig’ when, actually, you were referring to them as ‘friend’.

After a whirlwind tour of the capital, Vientiane, and the project sites in the south of the country, I returned home to gather my thoughts and prepare myself for the coming year, where I would be based mainly in Pakse, the former capital of the southern Kingdom of Champasak, now a provincial capital and gateway to the south.

Pakse is a beautiful place on the confluence of the mighty Mekong and the little less mighty Xe Don rivers. Bounded by mountains to the west and the Bolaven Plateau to the east, sunset beers at one of the many local establishments on the banks of the river makes for a very pleasant evening. What does this have to do with work? Everything, and nothing, all at the same time. Here, you quickly learn that Beer Laos, along with sticky rice, is a matter of national pride and to refuse a drink when it is offered can be deeply offensive. So, on one of the many Lao national holidays, or in fact, any day, my work colleagues and associates can be found on the petanque pitch, playing for a minimal amount of kip (the local currency) and sampling the local produce. One thing that is important to understand is that life in Lao moves at a much slower pace than in the western world to which I am accustomed.

I have been told many a time by my Lao colleagues that there is more to life than work, and that work is secondary to family commitments, something that we, as ‘falangs’, often forget in our rush to produce that report or publish that paper.

Another element of the Lao way of life that I have found to be in stark contrast to many developed countries is the openness of its people.

One particular focus of the water component over the last twelve months has been to determine the availability of both surface and groundwater resources within some of the poorest districts in Southern Laos. Part of this research has required physical surveys of many individually-owned ponds located across selected districts as well as many household socio-economic surveys to determine attitude and behaviour with respect to current water use.

Pond measurement and gathering data Laos style (left), fun loving and welcoming villagers (centre) and national pride (right). Photos: Camilla Vote.
Sometimes, a phone call is made to the village headman to give notice of our forthcoming visits; other times, our troupe may descend on the villagers unannounced with a barrage of questions, often resulting in strange men swimming in their ponds in an attempt to gather data about surface water storage volumes. All the time, these villagers are unfazed by the presence of strangers and, if anything, they seem mostly amused. Maybe it is the presence of a large female ‘falang’ with green eyes that provides much entertainment; or maybe it is a welcome distraction from the back-breaking work of hand-transplanting rice seedlings or hand-harvesting rice. Either way, these people are very welcoming, hospitable and willing to assist. I imagine if a stranger entered my house (or yard, for that matter) unannounced, a smile would be the last thing you would expect to see.

And here is where my story will end, at least for now. Reading back, I realise that I have not touched on the administrative and logistical joys of conducting research activities in a least developed country, as was promised at the beginning of this brief. But who wants to read that anyway?

Contact: Dr Camilla Vote  
E: cvote@csu.edu.au; T: 02 6933 8472

Asian scholarship support for CSU student

It is a well worn path from CSU in Wagga Wagga to Vietnam’s Mekong Delta for Graham Centre PhD student David Gale but in 2014 it will be made a little easier with the assistance of a prestigious scholarship.

The PhD student has been named a recipient of a 2014 Prime Minister’s Australia Asia Outgoing Postgraduate Scholarship from the Australian Government.

Mr Gale will use the scholarship to support his 12-month field research from the middle of 2014 into the interactions between compost, synthetic fertilisers and crops in Vietnam.

“The scholarship will help support me during glasshouse and field trials in Vietnam,” said Mr Gale, who is based in the School of Agricultural and Wine Sciences at CSU in Wagga Wagga.

Mr Gale will work out of Can Tho University as its location in the Mekong Delta enables direct access to local farmland impacted by acid sulphate soils.

Baby corn and rice will be grown to explore the interactions between compost, synthetic fertiliser and the different crops.

“My research aims to reduce the dependence of subsistence farmers on large quantities of synthetic phosphorus fertilisers by increasing the efficiency of the fertiliser through the addition of compost to the soil,” Mr Gale said.

“The dependence of the local farmers on large rates of synthetic fertiliser is a particular problem because of its rising global price.”

Ultimately Mr Gale wants a career improving global food security by undertaking agricultural research projects at a community level in developing countries.

Mr Gale is due to leave for Vietnam in the middle of 2014. The 2014 Prime Minister’s Australia Asia Outgoing Postgraduate Scholarship is part of the government’s Australia Awards Endeavour Scholarship and Fellowship scheme.

Under the Endeavour program, CSU will host a PhD student from Cambodia and three academics from universities in Iraq and the USA as well as the Chinese Academy of Agricultural Sciences in 2014.

Contact: Mr David Gale  
E: dgale@csu.edu.au; T: 0423 501 972

This article was reproduced with permission from CSU Media.

Science Extravaganza

The Graham Centre, CSU School of Agricultural & Wine Sciences (SAWS) and CSU School of Nursing Midwifery & Indigenous Health (SNMIH) visited St Joseph’s Primary School in Lockhart on the 6 December, 2013, treating the 70 students to two hours of fun-filled science activities.

The event started with Dr John Harper, assisted by Mr Kerry Schirmer (Technical Officer, SAWS) performing some fun experiments such as using a camp stove to turn a large bin bag into a hot air balloon. This didn’t quite work out, with the camp stove falling over and setting a jet of flame across the school Astro turf. The student’s cheered thinking this was part of the show! At this point John demonstrated some
Health and Safety and produced a fire extinguisher, which alas was not needed.

The ‘balloon’ lifted off the ground a stunning two metres. Ms Kirsty White (Technical Officer, SAWS) clapped excitedly and the students followed suit not realising that our first experiment had been a dismal failure.

Other experiments went well, and included giant bubbles from dry ice, popping Berocca tubes with Alka Seltzer and water, and fast rust with wire wool, vinegar and bleach.

The students then split into groups and went to explore: Supermarket Botany; Microscopes and Minibeasts; Health matters – taking blood pressure and pulses before and after exercise: Working out seed viability and writing letters to farmers letting them know if they could plant their seeds. The students later made Fruit and Vegie people working out what plant parts each body part was.

The School Principal, Ms Debbie Sheather, is keen for CSU to work with them to provide authentic Science activities, aligned with the school curriculum, in 2014.

Thanks to: Dr John Harper (Graham Centre/SAWS), Ms Sally Drummond (SNMIH), Ms Celia Connor (CSU Science student), Mr Kerry Schirmer (SAWS), Ms Kirsty White (SAWS) and Ms Kylie Crampton (Postgraduate Student Graham Centre/SAWS).

Contact: Dr John Harper  
E: jharper@csu.edu.au; T: 02 6933 2837

**Internship provides solid background for future research**

During 2013 Laura Kemmis completed her Graham Centre internship work on several research projects, with Emma Hand, Shawn McGrath, and Louise Sundermann. Laura honed her sheep husbandry skills throughout the year, feeding, weighing and caring for sheep. She also learned more technical skills (e.g. taking blood samples and data recording and analysis), which she says will be very handy for her honours project in 2014. Learning to work as part of a larger team, particularly when people might have different ideas and experiences, is a skill Laura will also take with her from her internship.

“Working on several projects throughout the year gave me a much better understanding of how trials are set up, the statistical relevance of the trial structure, and why the particular treatments were chosen,” Laura said.

“I’ve seen plenty of examples of treatment structures in my statistics classes, but it helped to see it in practice. It was useful to apply my knowledge from class to a practical situation, and I found I was making more links between subjects and understanding concepts better once I had applied them.”

The experience Laura has gained from her internship has given her a good background in research that will set her up well for her honours project this year.

“My brain has been trained to think in new ways and consider different aspects of research that I would have missed before,” she said.

Laura thanked the Graham Centre and everyone she worked with throughout the year for their patience and willingness
to answer her questions and explain some of the intricacies of their research.

Contact: Laura Kemmis
E: laura.kemmis@hotmail.com; T: 0487 181 896

Row spacing of winter crops in broad scale agriculture in southern Australia

The Graham Centre’s Monograph series reviews current knowledge for mixed farming systems in southeast Australia. Monograph Number 3 ‘Row spacing of winter crops in broad scale agriculture in southern Australia’ was released at the 2013 Cropping and Pasture Systems Field Forum.

This Monograph reviews the claimed advantages and disadvantages of wide rows and, in Australia, quantifies the effects of widening rows on yields in wheat, barley, canola and lupins. Generally, at yields below 700 kg/ha, widening row spacing beyond 18 cm increased estimated grain yield. But at yields of 2000 kg/ha, widening rows to 36 cm reduced yield, and at 4000 kg/ha yield was further reduced. For barley, the rate of change of yield with changes in row spacing was similar to wheat. Canola yield declined as row spacing increased.

Conservation agriculture claims to improve soil condition and water conservation but unintended other consequences, such as herbicide resistance and disease, can reduce crop yield. The first Graham Centre Monograph, ‘Stubble retention in cropping systems in Southern Australia: Benefits and challenges’, discussed these.

Stubble retention has been widely adopted in the lower rainfall zones of the southern wheat belt. However, uptake has been less in the medium to high rainfall zones and under irrigated crops due to heavier stubble loads and resulting blockages in sowing equipment. The common practice in these environments is for stubble retained over summer to be burnt during late autumn, before sowing, to minimise problems at sowing. To avoid burning, some crops are grown at a wide row spacing (35+ cm compared with the standard 18 cm spacing) to allow crop residues to pass through the sowing machinery.

The financial support from the Grains Research and Development Corporation to cover printing of this monograph is gratefully acknowledged.

The Monograph series can be downloaded from the Centre’s website http://www.csu.edu.au/research/grahamcentre/research/monographs.htm

Contact: Ms Toni Nugent
E: tnugent@csu.edu.au; T: 02 6933 4402

A way forward

The Brand

Our agriculture is world class
At home it’s taken for granted,
We have so much to celebrate
But we constantly complain
Our esteem, it should be very high
Yet clods get kicked around,
We could achieve so much together,
Yet our own thing seems much better.

The tapestry of bush culture
Is very rich and rare,
With the home among the gum trees,
And the swaggy by the billabong,
The dog’s upon the tuckerbox
While Blue plays the didgeridoo,
The shears go click, click, click,
And emu runs the pants off kangaroo,
Let us rejoice.

Of course we can work harder, much harder
But let’s work smarter, much smarter,
We need to move forward but is it too late?
It’s never too late but we need to start now.
We need to build Vision, but what is the Vision?
Common purpose is a good place to start.
We need to build Brand, but what is the brand?
Agriculture Australia, Agriculture Australia.
Let’s advance Australia’s fare.

Jim Pratley 2013
Award winners for 2013 announced

Graham Centre members were recognised for their outstanding achievements in 2013 at the Centre’s End of Year Function held on 3 December, at the CSU Convention Centre.

Guest speaker Professor Lisa Given, Professor of Information Studies in the School of Information Studies (Faculty of Education) and in the Research Institute for Professional Practice, Learning and Education at CSU spoke about ‘Enhancing impact: How scientists can elevate their public and scientific profiles’.

Research Pathway leaders also gave a brief update on achievements during the past six months, while Centre Director Professor Deirdre Lemerle presented highlights from 2013.

2013 Graham Centre Award Recipients

- **Award for the Highest Research Income** - Professor Gavin Ash
- **Award for Publications Excellence** - Dr Guangdi Li (NSW DPI), Dr Hanwen Wu (NSW DPI) and Dr Anantanarayanan Raman (CSU)
- **Certificate of Appreciation for Postgraduate Student Support** - Mr Randy Adjonu, Mr Joe Moore, Mr Emmanuel Quansah, Mr Aaron Preston and Ms Soumi Paul Mukhopadhyay
- **Research Pathway Development Award** - Ruminant Feedbase Group
- **Certificate of Appreciation for Outstanding Media Coverage and Research Promotion** - Dr Ed Clayton (NSW DPI) and Dr David Jenkins (CSU)
- **Private Sector Engagement and Project Development Award** - Functional Food Team
- **International Reputation and Leadership Award** - Emeritus Professor Ted Wolfe

The following researchers’ and students’ attendance at conferences was supported by the Graham Centre.

**Food security, productivity tradeoffs and benefits beyond yield with perennial grains**

The Annual Meetings of the American Societies in Agronomy, Crop Science and Soil Science attract a worldwide cross-disciplinary audience of about 4000 people, and regularly provide a venue for side meetings of major international projects and initiatives, and editorial boards of international journals, along with many exhibitors in scientific measurement and data collection and analysis systems.

Professor Len Wade presented a keynote address ‘Food Security, Productivity Tradeoffs and Benefits beyond Yield with Perennial Grains’, oral presentation ‘Proof of Concept for Phenotyping of Root Growth and Water Extraction by Wheat’ and acted as discussion leader for the perennial grains community at these meetings in November 2013, putting the Graham Centre and CSU on the international stage, and engagement with global agronomy, crop and soil science communities.

Congratulations to all Graham Centre members who were recognised for their outstanding achievements in 2013. Photo: Toni Nugent.
In August 2013 Graham Centre PhD student Jessica Rose attended a conference of the Endocrine Society of Australia and the Society for Reproductive Biology. This conference had a vast array of fields under the two main topics: Hormone Regulation and Reproduction.

Jessica presented data from her first PhD experiment, which showed that the presence of testosterone from the testis in the ram increased the amount of the gonadotrophin inhibitory hormone (GnIH) gene in the most caudal region of the hypothalamus.

GnIH is a newly discovered hormone (first found in birds in 2000), and has been studied in avian, aquarian and mammalian species since. This hormone has been seen to have an inhibitory role in the reproductive axis which allows successful regulation of reproductive hormones.

The conference provided Jessica with the opportunity to showcase her research results and understanding of her PhD topic, and gain feedback on how she has interpreted the results and where this will take her PhD research.

Jessica’s supervisory team also discussed current and future projects involving GnIH and the reproductive hormone axis in the ram, giving her feedback on which hormone sources work and which ones to avoid, as well as the techniques to use to get the most accurate outcome for the studies.

“The conference has enlightened me on how broad this field of study is, and there are so many possible areas to study in regards to how and what affects hormone regulation and reproduction. It has provided me with new opportunities for my future in the science community,” Jessica said.

Contact: Ms Jessica Rose
E: jrose@csu.edu.au; T: 02 6933 2154

Len also attended a reception held by Elsevier for editors of journals including Field Crops Research, where he met with a number of leading scientists and editors from around the world, and also attended the launch of the new journal, Global Food Security.

The American Agronomy, Crop Science and Soil Science Meetings are diverse and cover all Graham Centre Research Pathways. Across the conference as a whole, systems perspectives were evident, and there was some first class science in relation to water deficit and phenotyping.

The majority of attendees were graduate students and postdoctoral fellows, supported by a smaller number of senior people.

“A highlight was the interest and attendance of a diverse young audience at the Perennial Grains Symposium, where this new topic is clearly generating ideas and opportunities. Several expressed interest in including us in their programs,” Professor Wade said.

Contact: Professor Len Wade
E: lwade@csu.edu.au; T: 02 6933 2523

Gonadotrophins inhibitory hormones (GnIH) and the hypothalamus in rams

In August 2013 Graham Centre PhD student Jessica Rose attended a conference of the Endocrine Society of Australia and the Society for Reproductive Biology. This conference had a vast array of fields under the two main topics: Hormone Regulation and Reproduction.

Jessica presented data from her first PhD experiment, which showed that the presence of testosterone from the testis in the ram increased the amount of the gonadotrophin inhibitory hormone (GnIH) gene in the most caudal region of the hypothalamus.
Solving protein structures

Graham Centre PhD candidate Crystall Swarbrick attended the 2013 CCP4 OIST crystallography school from 4-8 November, 2013 at the Okinawa Institute of Science and Technology, Okinawa, Japan.

The mornings were devoted to presentations from various experts in the field of protein crystallography, followed by workshops where participants worked through sample datasets.

The evenings were spent covering tutorials involving sample data sets and problem solving participants’ own data with the program developers.

“The school covered many programs used for the determination and refinement of protein structures to enable a better understanding of their function within cells,” Crystall said.

To solve a protein structure, the protein must be crystallized and X-ray diffraction patterns integrated. The workshop focused on processing the raw diffraction data then placing a similar protein structure into the resulting density also known as phasing, followed by refinement of the structure to achieve a good quality model. The workshop concluded with validation of the protein structure and deposition to the worldwide protein databank.

The school assisted Crystall to complete part of her research into the molecular basis of diseases in sheep and cattle as well as analyse her data for publication.

“The program developers were very concerned with ensuring that everyone understood the calculations and the theory behind the programs so that what I took from the week was an understanding of the ‘black box’,” Crystall said.

“Prior to the crystallography school I was unable to solve the Listeria monocytogenes thioesterase. I now have both a working model and the knowledge to overcome any similar problems should they arise within my research or that of my colleagues.”

Contact: Ms Crystall Swarbrick
E: cswarbrick@csu.edu.au; T: 02 6933 4751

Beak and feather disease virus in the orange-bellied parrot

Beak and Feather Disease Virus (BFDV) has a relatively simple but compact circular single-stranded DNA (ssDNA) genome of approximately 2000 nucleotides encoding a replicase protein (Rep) and a single capsid protein (Cap), which facilitates whole genome viral epidemiological analysis.

Compared with other DNA viruses, of which the 5 kb circular genome of avian polyomavirus is most analogous, BFDV is highly genetically diverse and prone to genetic mutation.

The recent re-emergence of BFDV infection in the critically endangered orange-bellied parrot (Neophema chrysogaster), with a population size of less than 300 individual birds, provided an opportunity to longitudinally track viral replication and mutation events in ssDNA virus over a period of four years.

Combinations of PCR primers, primer walking, direct amplicon sequencing and sequencing of cloned amplicons revealed the emergence of multiple genotypes both within the population and within individually infected hosts. Preferential PCR amplification events were also detected in an individual sample containing up to eight genotypes, which was likely due to less efficient priming of DNA synthesis because of immediate downstream mismatches close to the primer binding site.

Graham Centre PhD student Subir Sarker attended the 3rd World Congress on Virology in the United States in November 2013, presenting a paper on his research titled ‘Tracking of viral evolution during an outbreak of remerging beak and feather disease virus infection in the critically endangered orange-bellied parrot (Neophema chrysogaster)’.

The congress provided a platform for Subir to hear about research occurring in molecular virology, as well as the
global impact of life threatening viral diseases in relation to human health and wildlife.

Contact: Mr Subir Sarker  
E: ssarker@csu.edu.au; T: 02 6933 2991

Growing knowledge and networks

Attendance at the 19th Australasian Plant Pathology Society conference in Auckland, New Zealand, provided PhD student Nirodha Weeraratne opportunities to mingle with other research groups with similar research interests, making contacts and expanding networks.

“It was a great opportunity to learn about the latest technologies and new approaches,” Nirodha said.

In addition to Graham Centre conference support funding, Nirodha was awarded an APPS/HAL conference travel bursary.

“Associate Professor Virginia Stockwell’s speech at the APPS/HAL student-mentor lunch for the awardees was inspirational. It encouraged me to converse further with her on various subjects ranging from trials and triumphs of a researchers’ life, to the methods which could be successfully used in my research work.

“Meeting the regional councillors of APPS encouraged me to get more involved with the activities of APPS and their tips regarding maintaining a good PhD studentship were useful,” Nirodha said.

Nirodha also participated in the pre-conference workshop ‘Illuminating genomics of plant pathogens - what to do with your genome sequence’ and the post-conference workshop ‘Applying meta analysis in plant pathology’.

The pre-conference workshop was a compilation of knowledge on the use of ‘omics’ approaches for various aspects of plant pathology, in particular diagnostics, origin and evolution of plant pathogens, plant-pathogen interactions, and pathogen-biocontrol agent interactions.

The post-conference workshop was conducted as a practical class on the use of meta-analysis software MetaAgri for plant pathology data. Participants were encouraged to use the software for their own studies and contribute to a scientific publication.

Contact: Ms Nirodha Weeraratne  
E: nweeraratne@csu.edu.au; T: 02 6933 2749

Genetic variation between jojoba isolates

PhD student Mr Amir Sohail gave an oral presentation at the 19th Australasian, Plant Pathology Conference (APPS) in Auckland, New Zealand during November 2013. The conference brought together scientists working in both basic and applied pathology research from New Zealand, Australia, Papua New Guinea and Asia.

Amir investigated a genetic variation between jojoba isolates Elsinoë australis, an ascomycetes fungus that is a regulated
Integration and implementation within diverse research teams

The 1st Global Conference on Research Integration and Implementation brought together a range of researchers to combine knowledge from various disciplines and practice areas. The conference provided an opportunity for people working in diverse teams to create a shared understanding and way of speaking about what is meant by integration and implementation within diverse research teams.

Graham Centre Research Fellow Dr Tamara Jackson said the experience gave her an improved understanding of different approaches to integrated problem solving and interdisciplinary teams, with a particular emphasis on ‘higher level’ inputs to policy and practice across many different disciplines (health, social services, research, community development).

“Integration was explored as an ongoing process that can take various forms, and must in a sense be adjusted to suit the context of each individual project,” Tamara said.

A number of case studies were presented, and through these case studies Tamara improved her understanding of system based problems, and ways in which to implement improved policy and practice.

Tamara presented a brief case study from her multi-disciplinary agricultural systems project in Laos, with the follow up with interested participants proving extremely valuable.

“It gave me a sense of validity to approaches taken and experiences in the field,” Tamara said.

Several of the presentations explored Implementation Science, highlighting the importance of the ‘purposeful and proactive implementation of practice and science’, of actively ‘making it happen’ in terms of creating impact. Having people within a team who are dedicated to integration and implementation has been demonstrated to be highly effective in achieving results in a relatively short time period. The framework and support mechanisms needed for this were discussed.

One of the most valuable outcomes for Tamara was networking with other participants from a range of disciplines, who had a shared enthusiasm for continuing discussion on different interpretations of integration and the approaches for achieving this in a systems context.

Contact: Dr Tamara Jackson
E: tjackson@csu.edu.au
Epidemiology of Australian *E. granulosus* with changing behaviour of wildlife definitive hosts

The 25th International Congress of *Echinococcosis* was held in Sudan, 23-27 November 2013. This meeting is held biannually, rotating around venues in developed and developing countries around the world.

At the welcome reception short talks were given by the Vice President of Sudan (Dr Ali Osman Mohammed Taha), Minister for Higher Education and Scientific Research, Vice Chancellor of Al Neelain University, Professor Peter Kern (University of Ulm, Germany) on behalf of the Scientific Committee, Professor ME Ahmed the Congress Chair and Professor A Mendez da Silva President of the International Association for Hydatidology. The scientific proceedings were launched with an opening keynote address by Professor RAC Thompson (Murdoch University, Australia).

Day one concentrated on the epidemiology of *Echinoccus* with talks from Sudanese presenters and invited and contributing delegates from a range of other countries. The Turkish delegates also ran a round-table discussion on hydatid disease transmission, treatment and control in Turkey.

The first epidemiology session was opened with a keynote address (Robert Rausch Memorial Lecture) by Professor Peter Deplazes (University of Zurich, Switzerland), while Dr David Jenkins, CSU and Graham Centre member, gave the keynote address for the second session. Dr Jenkins also co-chaired and contributed a paper in the afternoon session on wildlife reservoirs for *Echinococcus*. The day finished with a session focusing on the social and economic aspects of *Echinococcus* with a keynote presentation by Dr Christine Budke (University of Texas, USA).

Day two concentrated on medical issues associated with *Echinococcus* infection in humans (hydatid disease), including diagnosis (imaging methods and serology), the pathology of human infection and treatment through chemotherapy using artemesin or albendazole, and options when treating hydatid infection in soft tissue or bones. During the second afternoon session aspects of the biology of human infection were covered, ending the day focusing on the value of prophylactic chemotherapy and surgical treatment.

Day three focused on control. The highlight of which was a talk by Dr Marshall Lightowlers (University of Melbourne), during which he gave one of his spirited and informative talks on the opportunities and challenges associated with the use of the highly efficient EG95 vaccine for sheep against hydatid disease.

The meeting concluded with closing remarks from the Sudanese Minister of Health and congress organisers.

Contact: Dr David Jenkins
E: djjenkins@csu.edu.au; T: 02 6933 4179

Expert in his field, Dr David Jenkins gave a keynote address at the 25th International Congress of *Echinococcosis* in Sudan. Dr Jenkins also co-chaired and contributed a paper on wildlife reservoirs for *Echinococcosis*.

Keep up to date with the Graham Centre on social media ...

Don’t forget to follow the Graham Centre on Twitter: @GrahamCentre

and like us on Facebook: https://www.facebook.com/GrahamCentreForAgriculturalInnovation?ref=hl
Improved management strategies for summer perennial weeds

NSW Department of Primary Industries (NSW DPI) and Murrumbidgee Landcare have a new collaborative project funded by Meat and Livestock Australia (MLA), which targets perennial summer weeds such as silverleaf nightshade (Solanum elaeagnifolium. Cav.) across the five states of Queensland, New South Wales, Victoria, South Australia and Western Australia.

Silverleaf nightshade has recently been listed as a Weed of National Significance in Australia. It is an introduced perennial weed that can dominate pastures and cropping areas, reducing crop yields by as much as 20-40 percent, taking moisture and nutrients over summer and autumn that could otherwise be used by the following crops. In pasture paddocks it can reduce the growth of productive species and render areas useless for livestock grazing. It reproduces from both seed and root fragments so can be difficult to control by conventional means. Many common farm activities such as livestock movement and cultivation will spread this weed.

Recent surveys of grower practices have shown that many farmers are not fully aware of the extent of the problem on their farms and that adoption of effective control methods has been inadequate. Silverleaf nightshade is often not specifically targeted as it occurs in many situations as scattered infestations and if not treated over the long term will re-establish. It has been a frustration for many farmers that efforts to control it have failed and it has spread to other areas of the farm.

Recent research has shown that a systematic ‘Dual Action’ approach over the growing season from spring to autumn is needed. In many cases more expensive residual herbicides may be required to be used in conjunction with normal summer weed programs to give effective control of silverleaf nightshade.

This newly-funded project will utilise the existing Landcare networks and grower groups to build local knowledge and capacity, and foster the adoption of the research by farm communities. Large scale demonstrations carried out by local farmers will compare current research with standard farmer practices. A series of workshops and field days complimented by media articles is planned to raise awareness of the problem and get wider adoption of best practices.

The project is led by NSW DPI researcher Dr Hanwen Wu and follows on from research that has been conducted by Dr Rex Stanton since 2006.

CSU staff Dr Karl Behrendt, Professor Leslie Weston and Associate Professor Vaughan Higgins will be involved at various stages of the project to provide technical support, an economic analysis of best management practices and advice on drivers and barriers to adoption of current research.

Project officer Mr Phil Bowden, Murrumbidgee Landcare Inc at Cootamundra, NSW, will be looking for participating growers for on-farm demonstrations across diverse geographical regions, research data collected from these demonstrations will be shared between growers across the five states. Research updates will be made available through grower groups and Landcare networks.

If your group would like a workshop delivered on silverleaf nightshade management, please contact Phil Bowden on 0427 201 946 or email: silverleafnightshade@murrumbidgeelandcare.asn.au

Contact: Dr Hanwen Wu, E: hanwen.wu@dpi.nsw.gov.au; T: 02 6938 1602

What’s the best match between cooking method and chickpea variety?

Chickpeas, the second most largely cultivated legume, are used in varieties of cuisines all over the world. The same chickpeas can be used for main dishes such as dhal or curries with other vegetables or cottage cheese, and also for snacks and sweet dishes as appetizers or desserts. These wide variations of culinary usages and their nutritional qualities make chickpeas one of the most sought after pulse crops.

Australia is a leading exporter of chickpeas to Asian countries, including India. It has been found that consumer perception and preference is potentially one of the driving factors behind acceptance of these legumes in many parts of the world.
With so many recipes available for one pulse crop, it is important to know if there is any connection between a particular chickpea variety and a specific recipe. Farmers will then be able to selectively grow the varieties that will cater to the particular target population in the export market. Hence, it is pertinent to understand the sensory aspects of Australian chickpeas to further improve the market share of Australian chickpeas in the Indian sub-continent.

Two major types of chickpeas are available worldwide: small-seeded desi (brown-coloured with a wrinkled seed-coat) and bold-seeded kabuli (cream-colored with a smooth seed-coat). Research is being undertaken by PhD student Soumi Paul Mukhopadhyay, under the supervision of CSU Associate Professors Paul Prenzler, Anthony Saliba and Chris Blanchard, and Dr Jenny Wood (NSW DPI), to explore and investigate the sensory qualities of Australian desi chickpeas and their consumer acceptance across three different cooking methods.

After the success of the ‘puffing’ study, Soumi has completed the next two studies for ‘frying’ and ‘cooking dhal’ with the Australian sensory panel. In contrast with puffing, where whole desi chickpeas have been used, for frying and dhal, all the chickpea cultivars have been dehulled and split. Frying is a cooking method where soaked chickpea splits are subjected to a high temperature (around 205 °C) in oil and removed quickly as the frothing stops, leading to a lighter product with porous, crunchy texture and a distinct fried flavour. With the global snack food markets expanding rapidly, it may be found that fried chickpeas possess many desirable sensory attributes to meet the demand for ready-to-eat snacks. Dhal, on the other hand, is prepared by boiling the split chickpeas until they are soft without any remaining white core and then seasoned with selected spices and oil. Dhal is one of the popular main dishes in the Indian sub-continent.

Sensory evaluation of dhal and fried split chickpeas are one of the major components of Soumi’s research. Soumi has worked with an Australian panel from CSU and the local community. The whole panel smelled, touched and tasted the two different cooked chickpeas (fried split and dhal), and through consensus created a list of descriptors that characterised the sensory attributes of the selected Australian desi chickpeas.

Sensory panels are one of the major contributors for any successful sensory study. Soumi said she was happy with the energy and eagerness of her panel members and the way they participated in the study, and is thankful for their time and support.

One of the major achievements of her study was that for the most part, the same panel members were involved in each of her three studies.

“I think this is an important aspect in relation to capacity building of the project, for training the panel and making them expert in chickpea tasting in various cooked forms,” Soumi said.

Soumi started her first study puffing chickpeas in May 2013 and finished her final study with dhal in December 2013. The results are currently being analysed to select 5-6 chickpea cultivars for each cooking method for future consumer tasting.

Contact: Soumi Paul Mukhopadhyay
E: smukhopadhyay@csu.edu.au, T: 02 6933 2085

**Does gonadotrophin-releasing hormone at artificial insemination affect conception rate?**

A controlled trial investigating the effect on conception of administration of 250 μg of gonadotrophin-releasing hormone (GnRH) at artificial insemination (AI) in dairy cows in seasonal or split calving herds was conducted.

Time of detection of oestrus, body condition, extent of oestrous expression, treatment, breed, age and milk production from the most recent herd test of the current lactation was recorded. Cows were tested for pregnancy with fetal aging between 35 and 135 days after AI.

Sixteen herds provided 2344 spring-calved cows and 3007 inseminations. For the first AI, treatment significantly improved conception rate in cows with milk protein concentrations of 3.75 percent or greater, and for cows with milk protein...
Kasbah’s heat switch pumps pasture

Farmers facing hot, dry summers could find a saviour in a drought-resistant perennial grass, Kasbah cocksfoot, according to positive research results from NSW DPI Research Scientist Dr Mark Norton.

Kasbah adapted to its native Mediterranean climate of long, dry summers and winter rainfall by using a special trait, summer dormancy, which allows the plant to switch off and avoid growth during stressful summer periods giving it the edge in hot, dry conditions.

The final harvest in October 2013, of a four-year forage trial at Beckom in the Riverina, saw the perennial grass, Kasbah, yield 1560 kilograms per hectare, streets ahead of phalaris TamPWA which produced 900 kilograms per hectare.

“While perennial pastures provide year-long benefits there are few varieties which survive severe heat and drought, conditions which are predicted to become more common in the future,” Dr Norton said.

With a strong summer dormancy trait Kasbah proved its worth in the Future Farm Industries Cooperative Research Centre-funded Beckom trial where the plant survival rate...
was four times that of Currie cocksfoot, which is only moderately summer dormant.

Kasbah’s ability to survive drought provides soil stabilisation and protection and those surviving plants are in the ground, ready to take advantage of an autumn break.

Following a hot, dry summer the frost-tolerant, winter-active Kasbah can spring back in response to autumn rains to feed stock and fill feed gaps during the cooler months.

Dr Norton said ongoing research to better understand the genetics and exactly how the summer dormancy trait allows plants to adapt would benefit farming systems in areas with low to medium rainfall and long, hot summers.

“While we have had outstanding trial results from Kasbah during some of the worst drought years on record, we need to extend our knowledge so we can consistently produce enough seed to meet a growing demand,” he said.

“We also need to boost our knowledge of summer dormant grasses so they can be successfully managed and integrated with annual and perennial pasture legumes.”

Dr Norton said severe droughts in Australia, New Zealand, the Mediterranean and North America have led to an international focus on research to support grazing and mixed farming systems in a changing climate.

Global interest in the search for drought and heat tolerant pastures was highlighted at this year’s International Grassland Congress in Sydney where 46 scientists met at a specialist workshop to explore pasture plant adaptations. Podcasts of the workshop are available, www.grasslandnsw.com.au/IGC_Satellite

Contact: Dr Mark Norton
E: mark.norton@dpi.nsw.gov.au; T: 02 6938 1934

A Tale of tracers and trichomes

Silverleaf nightshade (Solanum elaegnifolium) is thought to have originated in America and is now a serious summer perennial weed in many countries, including Australia.

It has been the focus of research from the Graham Centre’s Weed Group, supported by Meat & Livestock Australia. The silvery appearance, which gives the plant its common name, comes from intrusive star-shaped hairs (Trichomes), which some have argued are connected to the vasculature and may aid uptake of herbicides.

In collaboration with Dr Rosemary White (CSIRO, Plant Industry Canberra) we have used fluorescent tracer dyes to show that there is no direct connection. Moreover we discovered that the stomatal densities in these plants are much higher than would be expected from a summer weed, indicating that one of the functions of the trichomes is in reducing transpiration by reflecting light from the leaves.

Another is postulated to be in reducing herbivory. It was interesting to see that when the leaves were wet the trichomes went from opaque to clear; a possible adaptation for increasing photosynthesis just after rain.

With the aid of tracers we tested several common adjuvants and found that Sprinta was the most effective in enabling tracer dye access into leaves. Dr Rex Stanton has done some comparisons in the field with the different adjuvants and found Sprinta to be the most effective, although cautions that the results are only based on one field trial.

The results of this research have been published in the following journal:


Contact: Dr John Harper
E: jharper@csu.edu.au; T: 02 6933 2837

Photo: Rosemary White.
A New Approach to Therapies for Alzheimer’s Disease

Most of us have heard about the conditions of Dementia and Alzheimer’s disease (AD), but few of us fully understand them. In short, Dementia is a symptom, and Alzheimer’s is the cause of the symptom. When someone is suffering from Dementia, it means they have significant memory problems as well as other cognitive difficulties, and these problems are severe enough to get in the way of daily living.

Globally, there are more than 36 million people with Dementia today and 115 million are predicted by 2050, while in Australia there are more than 321,000 Australians living with Dementia and this is expected to soar to almost 900,000 by 2050. Dementia is the third leading cause of death in Australia.

There is currently no treatment and cure for Alzheimer’s disease, but there are medicines available on prescription that can help delay the condition’s development. Due to severe inside effect and narrow therapeutic effect, on the basis of suggested research, the herbs or herbal formulations offer certain complementary cognitive benefits to the approved drugs.

Olives have shown powerful antioxidant activities in the in vitro, animal models and some clinical studies. Recently, PhD student Syed Omar performed several enzyme assays that were involved in Alzheimer’s progression and found the enzyme modifying activities by olive biophenols including the presence of enzymes like tyrosinase, acetylcholinesterase, butyrylcholinesterase, hydrogen peroxidase, phenazine methosulphate-NADH, histone decetylase.

These enzymes are up-regulated and cause the progression of Alzheimer’s Disease. Tyrosinase hyperactivity causes neuromelanin deposition in the brain and enhances the toxic production of amyloid beta protein, which is inhibited by olive biophenols.

Acetylcholinesterase and butyrylcholinesterase are involved in the neurotransmitter regulation, and in the disease condition, its hyperactivity causes the depletion of acetylcholine levels in the brain which cause further memory impairment.

Olive biophenols significantly inhibit these enzymes and normalise the neurotransmitter levels in the brain, improving the memory. Oxidative stress is caused by free radical (reactive oxygen and nitrogen species) production in the brain cell, which may enhance the amyloid toxic protein production. These are inhibited by olive biophenols.

Histone deacetylases (HDACs) regulate the homeostasis of histone acetylation, and DNA methylation has been previously shown to play a role in Alzheimer’s Disease.

Several recent studies have suggested that histone acetylation is involved in the etiology of Alzheimer’s Disease. Olive biophenols significantly inhibit the HDAC and may protect the neuron by enhancing synaptic plasticity and learning and memory.

So what does all this mean? On the basis of the results of enzyme modifying activities of olive biophenols, it would become a powerful and safe nutraceutical weapon against Alzheimer’s Disease. PhD student Syed Omar’s ongoing animal studies will further add to these pioneer findings in the field of Neuroscience and therapeutic approach by olive biophenol. Furthermore, it will give a biological and/or therapeutic reason for the Australian olive growers to grow olives on a mass level.

Contact: Mr Syed Omar
E: somar@csu.edu.au; T: 02 6933 4569

Research shows that olive biophenols have the potential to become a powerful and safe nutraceutical weapon against Alzheimer’s Disease.
Sniffing out bacteria: The potential of volatile organic compounds for controlling sclerotinia diseases

Biological control offers environmentally sound and sustainable plant disease management strategies that maintain or enhance production efficiency in the face of climate change.

A number of eco-friendly saprophytic bacteria possess multiple modes of action and serve as potential biocontrol candidates against plant pathogens. Apart from non volatile metabolites, the volatile organic compounds emitted from bacteria are of considerable interest amongst plant pathologists due to their antimicrobial properties.

As part of his PhD studies, Mohd Kamal has screened hundreds of rhizospheric and endophytic bacteria having multiple modes of action against *Sclerotinia sclerotiorum*, a devastating pathogen of more than 400 plant species. He has discovered an isolate of *Bacillus cereus* that is able to control sclerotina stem rot of canola in both glasshouse and field trials. The manuscript of these research findings is currently under review for publication.

Apart from antibiotics, this isolate also produces antimicrobial volatile organic compounds observed during in-vitro studies through divided sealed plate methods. These compounds have been shown to inhibit mycelial growth and sclerotial germination of *Sclerotinia sclerotiorum*.

Another investigation in the glasshouse has demonstrated that these volatiles are also capable of inhibiting sclerotial germination in field soil. The detection and identification of these volatiles is occurring at the Australian National University as part of a collaborative research project.

However, successful management of sclerotina disease depends on the restriction of overwintering sclerotial germination; the primary source of inoculum. Kamal proposes that volatiles from *Bacillus cereus* may have the potential to diffuse through the soil and kill the sclerotia. Future research will explore the molecular changes underpinning fungistasis. This research is the first of its kind in Australia to investigate the antifungal properties of bacterial volatile organic compounds for biological control of sclerotinia diseases.

Contact: Mohd Mostofa Kamal
E: mkamal@csu.edu.au; T: 02 6933 2749

International Rice-based Farming Systems Research

In the last two editions of *the Innovator*, we introduced ACIAR’s Rice-based Systems Research (RSR) Program: Food Security in Lao PDR, Cambodia and Bangladesh, and subsequently showcased one of its project’s led by NSW DPI on ‘Improved rice establishment and productivity in Cambodia and Australia’. In this article we focus on feedback from a series of meetings in Cambodia with fertiliser wholesalers, pesticide resellers, farmers and rice exporters to inform the program’s final event in Phnom Penh in May 2014 - ‘A Policy Dialogue on Rice Futures: Rice-based Farming Systems Research in the Mekong Region’.

Dr Jason Condon, Lecturer in Soil Science at CSU, together with Mr Som Bunna, a senior researcher with the Cambodian Agricultural Research and Development Institute, organised a field trip to the south of Phnom Penh near the border with Vietnam.

The first stop was at a flourishing medium-scale wholesale fertiliser business, where the owner explained that he must compete with businesses selling fertilisers labelled as reputable brands, but which are actually lower quality products. This practice appears to be common in the rice production system in Cambodia and Vietnam.

“Farmers are being disadvantaged by paying hard earned money to buy low quality inputs,” Dr Condon said.

“By way of example, a farmer applying fertiliser at the recommended dosage may find that they have inadvertently purchased urea with less than the labelled nitrogen content.”

There is an unregulated fertiliser supply chain operating in Cambodia. The government does not have good data on the quantities or types of fertiliser used, and it is extremely difficult to estimate regional fertiliser use efficiencies.

In a nearby town, an agrichemical reseller who has been in business for more than twenty years said that she is aware that low quality copies of reputable brands of agrichemicals

Plate A shows the presence of Bacillus cereus SC-1 restricted mycelial growth, as compared to the control (B).
Farmers often buy products without the active constituent being present at labelled concentrations.

“Many chemicals sold come from Vietnam or Thailand and are labelled in those languages, which many farmers are unable to understand,” Dr Condon explained.

This means that farmers are reliant on resellers to explain dosage, application and safe use procedures. Many farmers are also illiterate, so labelling in the local language, Khmer, does not necessarily solve the problem of access to essential information.

An agrichemical reseller claimed that she was the main source of technical advice to farmers regarding chemical choice, application rates and safety. She has received training by the company providing the products. This means that resellers have a strong vested interest in providing advice that results in the use of agrichemical products.

“The availability of safety advice and equipment is also problematic,” Dr Condon emphasised.

Products banned in Cambodia and other countries may still be available, and it’s not always possible or affordable to purchase safety equipment like masks.

In Cambodia, chemical use is not effectively regulated, with implications for the health of farmers, consumers and the environment. The quantities of chemicals being used for agricultural production are not known.

Rice collection and export is a role often played by women, who buy wet paddy from their local networks and on-sell, in the case of our host collectors, to wholesalers in Vietnam. Much of this trade occurs without the knowledge of the government and therefore official rice production data is likely to be underestimated as a result.

When asked about the secret to their success both women pointed to the importance of ‘trust’, together with having the multi-lingual skills necessary for negotiating the trades. Women are important actors in the trading sector.
and should be key targets in market-focused research and development programs.

Finally, we heard from the perspective rice farmers. It’s clear that labour shortages are starting to influence rice production - labour availability strongly influences the method of land preparation, variety selection, sowing method and the type of harvesting.

“Mechanisation of rice production is rapidly developing,” explained Dr Condon.

“There seems to be many opportunities for different business models to support this expansion.”

Succession planning is not apparent. Farmers aspire for their children to become educated and gain off farm jobs and careers. A big question for policy is who will farm in the years to come?

Contact: Dr Jason Condon
E: jcondon@csu.edu.au; T: 02 6933 2278


Future Farm Live!

A special event showcasing the increased value delivered to Australian agriculture through perennial plant based farming systems research will be held in Canberra on 8 April 2014.

‘Future Farm Live’ will present the culmination of 13 years’ research by Future Farm Industries Cooperative Research Centre (CRC) and its predecessor CRC Salinity.

Between 2007 and 2021, the CRC’s farming systems and salinity management research outcomes will add a projected $800 million in increased productivity to Australian agriculture. Future Farm Live will demonstrate how this increased value is already being implemented and measured across its research areas in southern Australia.

The interactive event will include a range of sessions incorporating videos and panel discussions featuring farmers, researchers and extension teams, with questions from the audience also encouraged.

Sessions will highlight improvements to livestock and cropping systems, and the development of biomass systems based on woody crops suited to marginal land. There will also be a focus on new products and technologies developed and delivered by the CRC, and the biodiversity and water research that underpinned the CRC’s work.

A further highlight of the day will be a recorded ABC Radio National ‘Big Ideas’ panel discussion, hosted by Paul Barclay, examining issues facing the future of Australian agriculture. Panellists will include some of Australia’s leading thinkers on agriculture, climate change, and research and development.

CEO, Peter Zurzolo, said Future Farm Live is an opportunity to highlight the great results that come from a successful collaboration between the University sector, agricultural RD&E organisations, industry and farming communities - all coordinated from within the structure of the federal government’s CRC program.

“Future Farm Live will not only demonstrate our research teams’ achievements in an engaging way, but also how these achievements shared between our 16 partners flow on to benefit the broader agricultural industry and community in general,” said Mr Zurzolo.

Future Farm Live will be held at the Gandel Hall in the National Gallery of Australia. Future Farm Industries CRC winds up on 30 June 2014. For more information and to register online visit http://www.futurefarmonline.com.au/calendar.htm

Contact: Ms Barbara Williamson, E: Barbara.williamson@futurefarmcrc.com.au
Dr Jason Condon

Position: Senior Lecturer Soil Science
Organisation: School of Agricultural and Wines Sciences, CSU

Career Brief

Other than farm work, my first real pay cheque came from working as a technical assistant on the MASTER trial site with Agriculture NSW and Agriculture Victoria in the mid 1990s. On graduating from university I took up a position of Teaching Fellow in Soil Science at CSU where I taught soils part-time whilst completing my PhD part-time. Following the award of my PhD I was appointed Associate Lecturer in Soil Science and have continued on at CSU since whilst also holding roles in course promotion and coordination. I worked as a visiting research fellow at Can Tho University, Vietnam in 2006 and have maintained research collaboration with colleagues there ever since.

Research Activities

My research expertise is in soil chemical fertility. Current research involves ACIAR work in the Southern tip of the Vietnamese Mekong Delta. I am looking into the nutrient (N and P) transfer from rice to shrimp production and vice versa, the fertiliser value of shrimp pond sludge and the N fertiliser efficiency within the rice crop. I am also co-organising a conference that highlights the policy implications of the ACIAR funded rice systems based research that has been going on in the Mekong Delta in recent years. The conference will be held in Cambodia in May.

I work with colleagues within the Graham Centre (Iain Hume, Toni Nugent and Deirdre Lemerle) on DAFF funded stubble projects and the supervision of a number of fantastic postgraduate students - Matt Gardner, Susan Orgill, Felicity Harris and David Gale on projects covering soil carbon, compost use and nitrogen management in crops and pastures.

Teaching Activities

I teach first year introductory soil science. We have about 100 internal students and about 130 distance education students doing that subject so it keeps me busy. It is nice to provide learning about something that we all have a connection with. I also teach a 3rd year subject called Soil Management. In this subject I am responsible for soil testing, soil fertility and fertiliser recommendation theory and practice.

Professional Links

• Member of Soil Science Australia
• Member of International Union of Soil Sciences

A typical day for me includes: Start off by checking emails, doing administration for the university and postgraduate/honours students, touching base with postgraduates and colleagues on the various research projects in operation, providing feedback on manuscripts of papers or thesis chapters and answering student questions on subject forums.

My main project at the moment is: The next big task is to create video clips reporting the issues facing farmers, researchers and people from the supply chain of rice based farming systems in Laos, Cambodia and Vietnam. These videos will be part of the presentations for the Cambodian conference in May.

My favourite part of my job is: The variety or people, tasks, projects and places. Working with staff from CSU and DPI on research projects is great, I have learnt so much from these people over the years. I find teaching very rewarding. There is nothing like being the person to provide help which allows someone to achieve their goals and set them away on their career path.

When I am not in the office I like: Road cycling with mates, enjoying coffee with friends and quality family time.

When I am driving I like to listen to: Eddie Vedder and Jack Johnson.
Kylie Crampton, PhD Student

Supervisors: Professor Gavin Ash (CSU), Dr Mike Hodda (CSIRO) and the late Dr John Marshall (NZ)

Thesis title: Biological Control of Root Lesion Nematodes

Funding body: Graham Centre and GRDC

Relevant current employment
Casual demonstrating for undergraduate laboratory classes (Biology and Microbiology)

Career and studies till now
• 2001 - BSc, Sydney University
• 2001—2006 - Andrology & Embryology in human IVF
• 2006—2012 - NSW DPI, Biological control of greenhouse pests and pathogens in post harvest crops.

Currently studying
• PhD in Agricultural Science

Research Interests
• Molecular biology
• Food biosecurity

Professional Links
• Australasian Plant Pathology Society
• Australasian Association of Nematologists
• International Organisation for Biological and Integrated Control

A typical day for me includes: Wake at 6:00 am and kick off the children’s morning, breakfast and getting ready for school and university. Check on the chickens and sheep and make sure the kids get on the school bus by 8:00 am, and then head off to university.

Check/water my experiments (wheat with different microbial inoculants to protect against the nematode parasites). Count a few thousand nematodes from experiment samples. Meet peers and supervisors in the tea room for morning tea and/or lunch and discuss latest challenges and achievements. Either head back to the laboratory for more microscope work, or spend time at the computer trying to get some statistical analyses done, follow up references, or draft reports/thesis documentation.

Go home by 6:00 pm, check children’s homework and feed family. Drive children to extracurricular activities. Check sheep, collect eggs and put chickens away for the night. More documentation until lights out, ready to do it again the next day!!

PhD student Kylie Crampton is researching biological control of root lesion nematodes.

My main project at the moment is: Making sure the experiments, family and farm are all running smoothly.

My favourite part of my studies is: The challenge of new research, learning new techniques and methods to create new knowledge.

When I am not studying I like to: Read, cook and sleep.

When I am driving I like to listen to: An eclectic mix of music, from the latest hits to classical, rock, metal, instrumental and international artists. Never jazz or blues - played too much in high school bands!

Autumn Edition of the Innovator

The Autumn Edition of the Innovator will be available April 2014. Submission of articles for this edition close on Friday, 7 March 2014.

Please email articles to Toni Nugent or Sharon Fuller.
## EVENTS CALENDAR

<table>
<thead>
<tr>
<th>Date</th>
<th>What</th>
<th>Where</th>
<th>More information</th>
</tr>
</thead>
<tbody>
<tr>
<td>11-12 Feb</td>
<td>GRDC Advisor Updates</td>
<td>Temora</td>
<td></td>
</tr>
<tr>
<td>20 Feb</td>
<td>ConAg Day</td>
<td>Condobolin</td>
<td><a href="#">FarmLink</a></td>
</tr>
<tr>
<td>5 March</td>
<td>Graham Centre Stubble Research Forum</td>
<td>Corowa</td>
<td>Toni Nugent</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>E: <a href="mailto:tnugent@csu.edu.au">tnugent@csu.edu.au</a></td>
</tr>
<tr>
<td>5-6 March</td>
<td>FarmLink Sheep Handling Days</td>
<td>Temora</td>
<td></td>
</tr>
<tr>
<td>12 March</td>
<td>FarmLink GRDC Grower Update</td>
<td>Wallendbeen</td>
<td></td>
</tr>
<tr>
<td>8 April</td>
<td>Future Farm Live</td>
<td>Canberra</td>
<td></td>
</tr>
<tr>
<td>13 June</td>
<td>Science &amp; Agriculture enrichment Day</td>
<td>Wagga Wagga</td>
<td>Toni Nugent</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>E: <a href="mailto:tnugent@csu.edu.au">tnugent@csu.edu.au</a></td>
</tr>
<tr>
<td>4 July</td>
<td>Graham Centre Sheep Forum</td>
<td>Convention Centre</td>
<td>Toni Nugent</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Charles Sturt University</td>
<td>E: <a href="mailto:tnugent@csu.edu.au">tnugent@csu.edu.au</a></td>
</tr>
<tr>
<td>15 Jul</td>
<td>Graham Centre Mid-Year Members Meeting</td>
<td>Convention Centre</td>
<td>Toni Nugent</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Charles Sturt University</td>
<td>E: <a href="mailto:tnugent@csu.edu.au">tnugent@csu.edu.au</a></td>
</tr>
<tr>
<td>7 Aug</td>
<td>Agribusiness Today Forum</td>
<td>Blayney</td>
<td>Karl Behrendt</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>E: <a href="mailto:kbehrendt@csu.edu.au">kbehrendt@csu.edu.au</a></td>
</tr>
<tr>
<td>15 Aug</td>
<td>Graham Centre Beef Forum</td>
<td>Convention Centre</td>
<td>Toni Nugent</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Charles Sturt University</td>
<td>E: <a href="mailto:tnugent@csu.edu.au">tnugent@csu.edu.au</a></td>
</tr>
<tr>
<td>21-22 Aug</td>
<td>National Food &amp; Farming Forum</td>
<td>Convention Centre</td>
<td>Toni Nugent</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Charles Sturt University</td>
<td>E: <a href="mailto:tnugent@csu.edu.au">tnugent@csu.edu.au</a></td>
</tr>
<tr>
<td>3 Sept</td>
<td>Graham Centre Cropping &amp; Pasture Systems Field</td>
<td>Graham Centre Field</td>
<td>Toni Nugent</td>
</tr>
<tr>
<td></td>
<td>Forum</td>
<td>Site</td>
<td>E: <a href="mailto:tnugent@csu.edu.au">tnugent@csu.edu.au</a></td>
</tr>
<tr>
<td>10 Sept</td>
<td>FarmLink Expo</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2 Dec</td>
<td>Graham Centre End of Year Function</td>
<td>Convention Centre</td>
<td>Toni Nugent</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Charles Sturt University</td>
<td>E: <a href="mailto:tnugent@csu.edu.au">tnugent@csu.edu.au</a></td>
</tr>
</tbody>
</table>

## CONTACTS

**Professor Deirdre Lemerle**  
Director  
T +61 2 6933 4398  
M 0419 816 267  
E dlemerle@csu.edu.au

**Ms Toni Nugent**  
Industry Partnerships and Communications Manager and Editor  
T +61 2 6933 4402  
M 0418 974 775  
E tnugent@csu.edu.au

**Ms Maree Crowley**  
Centre Manager  
T +61 2 6933 4399  
E mcrowley@csu.edu.au

---

**Our Location:**  
Pugsley Place (off Pine Gully Road)  
Wagga Wagga NSW 2650 Australia

**Mailing Address:**  
Graham Centre for Agricultural Innovation  
Charles Sturt University  
Locked Bag 588  
Wagga Wagga NSW 2678 Australia

---

*Layout & Design: Sharon Kiss*