From the Director

Welcome to the Autumn edition of the Innovator. Since the last newsletter, we have been busy implementing our new strategy and structure. The new Strategic Plan is on the homepage - I encourage you to look at it, and as always welcome your feedback.

I’m pleased to announce our new Pathway Leaders. Professor Chris Blanchard will lead the Grain and Meat Quality Pathway, Professor Jim Pratley will lead Plant Systems, while Dr Marta Hernandez-Jover will lead the Livestock Systems Pathway. This new leadership team has already been busy discussing appropriate KPI’s for the Centre and assessing Research Centre Fellowship applications, along with other internal grant applications. I am very much looking forward to working with the Pathway Leaders as we implement the strategic plan.

Internally, we have had some staff changes. Emily Malone, previously from CSU media, joins us as our new Communications Officer. We are very fortunate to have secured the services of someone with Emily’s skills and experience, keep your eye out for a greater Graham Centre social media presence in the months to come. The appointment of Emily will see Toni’s role transition to spend more time on managing and developing our partnerships and engagement with others. Sharon Fuller has sadly moved on, and we are indebted to her for all the hard work she has done over the years, especially in relation to the webpage.

Recently, we called for Expressions of Interest (EOIs) for membership of the Industry Advisory Panel. We had very strong interest, with over 20 EOIs being received for the eight positions. This is a good indicator of the level of interest in the work of the Centre, especially given the track record and skills of the applicants. I will now work with the Board to select members of the panel, and look forward to organising the first meeting shortly afterwards.

CSU recently signed a collaborative partnership with seven Farming Systems Groups within the region, see the web for more details. This expands on the existing partnership we had with four Farming Systems Groups, and we look forward to realising increased collaboration in the future. Already we have workshops planned to prioritise RD&E needs and how we can work together to address these.

The last few months have been very busy for our administration team, mainly due to a large number of grant applications being submitted through the Centre. The continued on page 2
outcome from many of these will be known soon. The recent announcement regarding successful 18th round CRCs is good news for the Centre, with our members being involved in both the CRC for High Performance Soils and the Food Agility CRC. Both are long-term (10 year) CRCs and address important cross-cutting issues affecting agriculture and regional development. We look forward to contributing to highly successful programs of work.

Enjoy reading our Autumn edition of the Innovator.

Professor Michael Friend

Capacity building of smallholder farmers to manage weeds in Laos PDR

Weeds significantly reduce yield and quality, and harbor harmful pests and diseases of important cash crops. Traditional hand-weeding mainly by women and children is unsustainable and limits adoption of crop production.

In November 2016, Deirdre Lemerle and Professor Lester Burgess travelled to Laos PDR to extend the biosecurity initiative of the Crawford Fund NSW Committee, to include weed management in crops. This program involves successive Australian Volunteers for International Development (AVID) volunteers in different disciplines being clustered together across three locations, to achieve synergies and continuity of support. The work is designed to help achieve higher yields in a sustainable manner, generate greater income stability, and improve livelihoods at a village level.

The specific aims of Deirdre’s scoping study were to:

- Learn about the agricultural systems
- Meet farmers and extension officers
- Identify the key weed species and their impacts in dry season crops
- Understand the farmers’ constraints to weed management
- Develop recommendations for training and Research and Development (R&D) programs to increase farmers’ capacity to manage weeds in dryland crops in Champasak and Savannakhet Provinces.

The first week was spent at the Provincial Agricultural and Forestry Office (PAFO), in Savannakhet City, where Deirdre took part in the two-day Residential Workshop for women watermelon farmers at the Rice Research and Seed Multiplication Centre at Thasano, near Savannakhet.

The workshop was addressed biosecurity issues (diseases and pests) and empowering women. The residential nature of the workshop enabled Deirdre and Lester to develop close relationships and trust with the smallholder farmers. Deirdre was able to familiarise herself with the local weeds and collected samples at the Research Centre. The weeds were identified and prioritised for importance by the workshop participants.

Deirdre presented the Crawford Fund Certificates of Attendance at the end of the workshop.

The drive from Savannakhet to Pakse in Champasak Province allowed Deirdre to observe the agricultural production systems, including cropping and livestock, and the agricultural landscapes of southern Laos. The group stayed in Pakse for 10 days and undertook field trips and farm visits, mainly to the Bolaven Plateau.

Biosecurity issues and training needs were discussed at length with the local PAFO staff. A local interpreter who understood farming systems and agricultural technical language was integral to these discussions.

The weed flora in fields were generally very diverse, but many species were common around the lowland areas of both Savannakhet and Pakse, and on the Bolaven Plateau. Farmers’ and PAFO staff’s knowledge of weed identification and management is very limited. Many plant species are considered both weeds and useful (e.g. wild-harvest food, medicinal, grazing). Symptoms of diseases, viruses and pests were observed on some weed species, an indication of the importance of weeds as vectors of spread. There appears to be considerable opportunity for cattle grazing and forage crops to assist integrated weed management.

Two key areas are needed in Laos for sustainable weed management:

- Accurate weed identification and herbarium facilities, and training material for smallholder farmers
• R&D to develop a range of chemical and non-chemical options integrated for farmers to grow weed-free cash crops.

Contact: Prof Deirdre Lemerle, E: dlemerle@csu.edu.au

New staff member at CSU, Albury

In September 2016, Jen Bond started a position as Lecturer in Human Geography at CSU in Albury, with the School of Environmental Sciences. Jen works at the intersection of development studies, human geography and sociology in relation to natural resource management within agricultural landscapes.

Her PhD (Rural Development, University of Copenhagen) investigated natural resource governance and conflict in the semi-arid lands of northern Kenya, focussing on cattle raiding, agro-pastoral conflict and human-wildlife conflict. Following her PhD, Jen undertook a position on the Australian Volunteers for International Development (AVID) program in 2013, based at the Centre for Climate Change Study in Central Vietnam, Hue University of Agriculture and Forestry. While in Hue, Jen worked on a project investigating the gendered dimensions of farmers’ adoption of a ratoon rice system in response to early flooding and the contestation of this system with existing rice policy. In 2016, Jen returned to Hue to undertake Postdoctoral research through an Endeavour Research Fellowship, focussing on the ratoon case study, and an investigation into farmers’ perceptions of pesticide and food safety using photoelicitation methods.

Jen began her career with a Bachelor of Agricultural Science (Hons) from The University of Melbourne, finishing in 2003, and working for the (then) Victorian Department of Primary Industries as a grains extension officer. Jen started on the DPI Graduate Program, firstly based with the Plant Pathology team in Horsham before moving to Swan Hill and Hamilton.
Jen moved into the social sciences through her Graduate Diploma Rural Systems Management (2007, University of Queensland) and into development through her MSc Agricultural Development (2009, University of Copenhagen). Through her MSc Jen gained fieldwork experience in Malaysian Borneo and India, with her thesis investigating the behavioural dimensions of farmers’ pesticide use. Upon her return to Australia, Jen worked as a Program Manager with Mallee Sustainable Farming in Mildura in 2015, while also being a Sessional Lecturer with Marcus Oldham College.

Jen is happy to now be a member of the CSU community and is looking forward to collaborating with colleagues from the many campuses on rewarding and relevant projects. Please feel free to contact Jen to have a chat or discuss ideas for collaboration.

**Contact:** Dr Jennifer Bond, T: 02 6951 9352, E: jebond@csu.edu.au

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**Summer scholarship realises research career pathway**

Patrick, a first year Agricultural Science student, was successful in gaining a Graham Centre Summer Scholarship during 2016, working with Drs Sergio Moroni and Jason Condon.

Patrick started the summer working with the 2015 Canola harvest, thrashing it and collecting seeds for counting and weighing. He was involved in a major vernalisation experiment with canola, as part of the GRDC funded project ‘Optimised canola profitability - understanding the relationship between physiology and tactical agronomy management’ in collaboration with CSIRO and NSW Department of Primary Industries. Two contrasting varieties are being used to determine flower initiation in place in relation to vernalisation requirements. He helped in determining floral initiation over the first two repetitions over the duration of his scholarship.

Patrick became an expert in sampling plants and dissecting them to view flower initiation stages. He was also tasked with watering and fertilising, monitoring the growth chambers, doing phenology measurements, and data input for the project.

He also spent time helping the soils team measure two and five gram samples for pH and aluminium concentration of soils to characterise the field site as part of the ‘Innovative approaches to managing subsoil acidity in the southern grain region’, a GRDC funded project. Patrick learnt how to collect soil samples and met with local farmers in the Rutherglen region who are participating in field trials.

‘The trip provided some useful insight into the importance of partnerships with farmers and industry when conducting research,’ Patrick said.

‘I had been warned that research was not sexy, and that a lot of time is put into collecting data from the field and the end product, a publication, is the summation of a lot of hard (and sometimes boring) work. I don’t disagree with this assessment, but I enjoyed my time working with the researchers during my scholarship, finding it rewarding and whetting my appetite to do further research.’

**Contact:** Mr Patrick Hawkins, E: patrick.hawkinsjr@gmail.com

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‘When you do 100 canola plant dissections in a day and realise you are actually pretty excited to do some more tomorrow to see how far along the plants have come in flower initiation overnight, that’s when you realise that research is the career path you want’
Graham Centre 2017 scholarships

Congratulations to the following recipients of the 2017 Graham Centre scholarships.

### 2017 Honours Scholarship Recipients

Total funding of $45,000 has been awarded to Honours Scholarships in 2017.

<table>
<thead>
<tr>
<th>Name</th>
<th>Project</th>
<th>Supervisor(s)</th>
<th>School</th>
<th>Research Pathway</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rebecca BARNEWALL</td>
<td>Drug design against Nipah virus.</td>
<td>Jade Forwood, Shane Raidal</td>
<td>SAWS</td>
<td>LS</td>
</tr>
<tr>
<td>Jennifer CONNOR</td>
<td>Milk sialylated oligosaccharide supplementation and pig behaviour, learning and memory.</td>
<td>Bing Wang</td>
<td>SAVS</td>
<td>LS</td>
</tr>
<tr>
<td>Marnie HODGE</td>
<td>Transcriptome analysis of sialylated milk oligosaccharides intervention in brain development and cognitive in piglet.</td>
<td>Bing Wang, Sameer Pant</td>
<td>SAVS</td>
<td>GMQ</td>
</tr>
<tr>
<td>Thomas KEOGH</td>
<td>Effect of grazing lucerne on ewe reproductive performance.</td>
<td>Shawn McGrath, Bruce Allworth</td>
<td>SAVS</td>
<td>LS</td>
</tr>
<tr>
<td>Emma LYNCH</td>
<td>Investigation into supplementing grassfed cattle with canola meal and the effects on carcass traits.</td>
<td>Michael Campbell, Edward Clayton</td>
<td>SAVS</td>
<td>GMQ</td>
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<tr>
<td>Annabel STODDART</td>
<td>Investigating Parasites in the Murray Darling Basin.</td>
<td>Shokoofeh Shamsi</td>
<td>SAVS</td>
<td>LS</td>
</tr>
<tr>
<td>Veronika VICIC</td>
<td>An investigation into the performance and eating quality of Holstien steers finished on two different diets.</td>
<td>Michael Campbell, Paul Cusack</td>
<td>SAVS</td>
<td>LS</td>
</tr>
<tr>
<td>Grace WHITELEY</td>
<td>Validation of a Fasciola hepatica LAMP diagnostic assay for Australian livestock.</td>
<td>Rob Woodgate, Andrew Peters</td>
<td>SAVS</td>
<td>LS</td>
</tr>
</tbody>
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SAWS = School of Agricultural and Wine Sciences, SAVS = School of Animal and Veterinary Sciences
LS = Livestock Systems, GMQ = Grain and Meat Quality

### 2017 University Research Centre Scholarship (PhD) Recipients

<table>
<thead>
<tr>
<th>Name</th>
<th>Project</th>
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<th>School</th>
<th>Research Pathway</th>
</tr>
</thead>
<tbody>
<tr>
<td>Kayla KOPP</td>
<td>Evaluation of the effects of nutritional supplements on lamb survival.</td>
<td>Michael Friend</td>
<td>SAVS</td>
<td>LS</td>
</tr>
<tr>
<td>Kiara THOMPSON</td>
<td>The potential functional properties of phenolic compounds present in grains and pulses in alleviating the risk factors of thrombosis in cardiovascular and metabolic diseases</td>
<td>Abi Santhakumar, Chris Blanchard</td>
<td>BMS</td>
<td>GMQ</td>
</tr>
</tbody>
</table>

SAWS = School of Agricultural and Wine Sciences, SAVS = School of Animal and Veterinary Sciences
LS = Livestock Systems, GMQ = Grain and Meat Quality
What does a good pasture paddock look like?

In conjunction with FarmLink, a Farming Systems Group based in Temora, NSW, Dr Jeff McCormick conducted a pasture survey in late spring 2016 on mixed farms. Jeff interviewed 17 farmers and surveyed 54 paddocks covering an area from Pleasant Hills in the south to West Wyalong in the north.

The survey aimed to determine how pastures were managed and what pasture species were sown on mixed farms. An assessment of the paddock then compared the sown species to what was growing in the paddock. This included two measurements; the frequency of the sown species (i.e. whether it was present or not) and secondly, an estimate of the pasture composition. Back of the envelope calculations would estimate that walking the transects of the paddocks Jeff covered about 60 km, not including walking back to the ute.

The variety of paddocks was immense. Paddock sizes ranged from 10 - 112 ha with a total of 15 different species sown across the farms. Lucerne and subterranean clover were the dominant species being sown in 80 percent of paddocks. Some paddocks were sown with only one species (Lucerne or Biserrula), while others included six different species in the mix.

Sown species produced 62 % of dry matter on average across all paddocks but this ranged from 11 - 89 %. While almost 80 % of paddocks received some form of weed control (i.e. winter clean or spray topping), only 46 % of paddocks had any phosphorus fertiliser applied during the pasture phase. Grazing management was predominantly set stocked (70 % of farmers) from winter to harvest, although the definition of rotational grazing was very broad. The lack of rotational grazing is despite decades of research demonstrating that Lucerne persistence decreases dramatically under set stocking. If Lucerne is to be productive and persistent then significant rest periods need to be enforced on farm.

Many conversations indicated a resistance to rotational grazing plus the size of paddocks and spread of pasture paddocks across farms make rotational grazing very difficult. It was determined that unless the frequency of a species in the paddock was at least 50 % (i.e. present at every second sampling position), then the contribution to production of that species would be low (<20 %). For a species to contribute up to 50 % of the dry matter it had to have a frequency greater than 80 %. Using the frequency benchmark of 50 % it could be demonstrated that pasture composition commonly included only 2 - 3 of the sown species.

Currently mixed farmers have the greatest number of useful species available to them but there is still difficulty in determining how best to use the species available, and how to integrate them. Further work needs to be conducted in determining how to optimise the pasture base on mixed farms for increased profitability.

Contact: Dr Jeff McCormick, T: 02 6933 2367, E: jmccormick@csu.edu.au

CSU and Graham Centre researcher Dr Jeff McCormick worked with FarmLink during spring 2016, conducting a grower survey to investigate how pastures are managed and what pasture species are sown on mixed farms. Photo: Jeff McCormick

Graham Centre team seeks crop diversification options in Vietnam

The Mekong Delta of Vietnam is home to 17.6 million people, produces more than 50 percent of the country’s food and has an average elevation of just over one metre above sea level. Coastal areas are utilised for intensive shrimp production, while inland areas are used to grow rice in a three crop per year system. This is made possible by the freshwater from the Mekong that swells during the wet season (June - Nov) when the majority of the 2000 millimetre annual rainfall occurs. An intricate web of canals feeds freshwater from the rivers to the thousands of farmers in the Delta allowing them to grow the final (third) rice crop with irrigation.

However, recent changes in upstream water use and sea level rise (=1 - 2 cm/year) has resulted in saline intrusion from the coast to well into the traditional rice growing areas. The rivers and canals carry salt water further inland and are no longer suitable for irrigation in the dry season. Farmers began utilising groundwater to irrigate dry season crops but this has lowered watertables (=4 - 6 m/year) causing land subsidence (=4 cm/year) that increases the perceived sea water rise and accelerates saline intrusion.
Salinity now affects areas of the middle Delta that had previously never been salt affected. In 2016, provinces of this region reported complete loss of the dry season rice in 30% of agricultural land, with 70% of land experiencing some degree of yield loss. Farmers are seeking profitable crop options that can be grown as salinity worsens.

Graham Centre researchers Drs Jason Condon, Sergio Moroni (CSU) and Susan Orgill (NSW DPI), together with Dr Ed Barrett-Lennard (WA DPI) and Dr Paul Kristiansen (UNE) travelled to Vietnam in February on an ACIAR funded project to learn the experiences of Vietnamese partners and farmers as salinity worsens across the Mekong Delta, and to identify possible crop options that could be used to diversify from rice. A workshop was held at Can Tho University with more than 60 provincial extension and policy staff, researchers, and representatives from private industry attending.

The Australian team also met with farmers who are trying to diversify their crop rotations, visited research institutions involved in crop selection and spoke with staff of companies that are engaging in contracting farmers to achieve significant scale to benefit growers.

A need was identified for research in breeding, agronomy and markets of potential alternative crops to rice in the ever increasing saline environment. Improved screening of species and varieties is required in order to select plants that can handle conditions of waterlogging early in life and salinity as the plant matures. Ideal plant species will have short growth duration and high water use efficiency so the period of greatest salinity can be avoided and groundwater extraction can be decreased.

Best management practices for any new crops need to be developed and extended to growers, and links to the private sector will ensure that crops will be marketable and profitable. Above all, Vietnamese partners highlighted that potential research must include soil, water, plant and markets together; ‘all without one is nothing.’ The Graham Centre team will play a key role in such a multidisciplinary project.

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Lasagne, chopsticks, and communication in international teams

Imagine this. You are visiting another country for the first time, and you visit an Italian restaurant. Lasagne is on the menu, you remember your nona’s amazing food, and you order it.

Steaming, hot lasagne arrives at the table, smelling fantastic. To eat it, your waiter presents you with a set of chopsticks. You have never used chopsticks, the lasagne is soft and runny, not made for chopsticks, but you battle on and finish the dish.

The dish is familiar but the eating tools are not, and they are hard to learn and use.

Welcome to the world of inexperienced computer users trying to communicate with their overseas counterparts in international research projects. They see the project problems, they see the need, but the communication tools, the ‘chopsticks’, are not ideal for the job.

International research teams usually include members from developed and developing countries, with variable levels of education and international experience, but
who are endowed with either access to greater economic resources and skills, or access to the land and people with whom the research will be carried out.

Over the years, CSU Media Officer Wes Ward had noted communication barriers within teams that often led to poorly executed projects, and sometimes failures. Wes was intrigued and felt sure it could be done better, and so ensued a PhD involving a case study based in Australia and Laos.

His first major result showed nearly all members of international research team’s preferred face-to-face communication. This may not be surprising, but this may also not be possible where members live in different regions, countries and time zones. In response to funding limitations for travel to enable face-to-face communication, team members have come to rely on information and computer technologies (ICTs) to allow communication between members of teams collaborating for and in developing countries.

Wes also found a number of barriers to effective communication between team members. Language stands out as number one problem for researchers for whom English might be their second or third language, particularly where technical terms are used and spoken in an Australian accent.

On the other hand, researchers from Western countries, including Australia, believed developing mutual trust and respect was most important. Interestingly, while Australians Wes interviewed consider language differences important, especially fluency in English, this issue was not consistently their number one concern, and not all interviewees saw the need to learn their counterpart’s language.

Time and geographic distance between team members also presented difficulties for communication, especially in developing professional relations and trust. Research shows close proximity increases effective communication, but funding may preclude this particularly where travel is expensive. This is the role of ICTs in team communication.

Cultural differences were another major barrier. Team members from Eastern and Western cultures often have differing attitudes to ‘face’, or the perceived ‘public worth’ of a person, and towards professional relations, where Eastern team members often desire personal as well as professional relations with their Western counterparts. For Easterners, personal relationships help develop trust in teams, but such personal relationships can be a barrier for Western team members who do not appreciate the importance of a Beer Lao and game of petanque after work each Friday.

Team members can also assist communication by developing a personal sense of ‘cultural intelligence’. This includes empathy for other cultures, willingness to learn about others, and listening skills. Team members with high cultural intelligence were held in high regard by others.

Other communication barriers included differences in organisational structures, national political systems and access to funds; amount of broadband and infrastructure...
available to run various ICTs; and the importance of non-verbal cues such as a nod or a grunt for effective communication, which can also vary with the culture of the team member.

These barriers were apparent in all communication modes, both face-to-face and via ICTs. This has important implications for ICTs used in multicultural communication as each mode varies in its ability to account for cultural differences while completing a task in a research project.

The second stage of Wes’ research shows no one ICT overcame all these barriers. And no one ICT made an inexperienced researcher a better team member.

However, he did find that email was by far the most preferred ICT, especially by non-native English speakers. Why? Because it gave them time; more than instant messaging, Skype or even face-to-face, to craft their messages and get advice as required, especially where they wanted to preserve their face with native English speakers and maintain good personal and professional relations. They want to understand and be understood. This flies in the face of traditional IT theory that decries email for not transmitting non-verbal cues, particularly for Eastern cultures.

Other ICTs have their pros and cons. Skype has been hailed recently as a replacement for face-to-face meetings. But within international research teams, non-native English speakers in particular were concerned at the lack of understanding, trust and so poor communication engendered when using it, while limited access to sufficient broadband and infrastructure also limited its use in some developing countries and organisations in them.

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Australian aid project to increase the profitability of pulse crops in Pakistan

The Functional Grains Centre (FGC) has teamed up with the Australian Centre for International Agricultural Research (ACIAR) to help farmers in Pakistan with a new project to improve the profitability of pulse crops. The project is funded by the Australian government agency ACIAR, a division of the Department of Foreign Affairs. The FGC has co-ordinated a multi-disciplinary team of agronomists, food technologists, economists and social scientists from Charles Sturt University, Wagga Wagga, local Farming Systems Group FarmLink and Pulse Australia.

Pulse crops such as chickpeas, lentils and groundnuts (peanuts) are an important part of local diet in India, Bangladesh and Pakistan. They are high in protein and dietary fibre, so can be used as staple foods.

This project aims to help local farmers improve the way crops are grown, to add value by basic food processing technology and make the crops more economic. There are benefits for both Pakistan and Australia interacting in this project. Collaborative projects bring researchers and farmers together to understand the problems faced in producing grain in different climates and localities. For Australian farmers and processors there is the opportunity to find out what value added products may be suitable for this market and to connect with local buyers and processors.

A new ACIAR funded project is helping local Pakistani farmers improve the way they grow crops, to add value by basic food processing technology and make the crops more economic.
With a population of 180 million, Pakistan is an exciting proposition for introducing new technologies in food production and processing.

The first steps are to engage with local farmers, in particular the women, who are a major part of the agricultural workforce, to identify the problems they have in growing these crops. From there a series of research demonstrations will be set up to see how Australian technology can be adapted for these farms. Agronomy including improved seed varieties, integrated pest and weed management, use of zero tillage techniques and improved harvesting will need some adaptations for small scale agriculture in Pakistan. Food technologists will investigate how the grains can be used in value added products suitable for the local market, with the best ways to introduce new technology into small scale agriculture that fits with local cultural practices being investigated by the social scientists in the team.

The team will be interacting with a number of local researchers and farmers throughout the regions of Punjab, Sindh, Baloshistan and PKK to get widespread co-operation during the five year project. This will allow local farmers to introduce techniques to improve the cultivation of these pulse crops. The initial meetings were well received by the locals who were very willing to co-operate and were impressed with the prospects of collaborating with Australian advisors and the delivery of the project outcomes. The Australian High Commission in Islamabad who will oversee the project, were also very co-operative, albeit under strict security regulations, and will help with the logistics of access to regional areas of Pakistan.

The team includes Chris Blanchard, Asgar Farahnaky, At-ur Rehman, Gavin Ramsay (Graham Centre and FGC), Deirdre Lemerle (Graham Centre and CSU), Phil Bowden (Pulse Australia), Penny Heuston (GRDC), and Cindy Cassidy (FarmLink).

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Prof Chris Blanchard, T: 02 6933 2364, E: cblanchard@csu.edu.au

Editors note: Funded by the Australian Research Council, the Functional Grains Centre is an initiative of the Graham Centre.

**Tracing the elusive pathways of phytoplasma bacteria in lucerne**

Plant diseases described as ‘yellows’ and ‘witches broom’ greatly affect the quality of valuable forage crops such as lucerne. These diseases are caused by strains of phytoplasma bacteria that are spread among plant hosts by sap-sucking insects. The ecological relationships between the various types of phytoplasma, their plant hosts and the sap-sucking insects which transmit them between plants, is complex. But understanding these systems is essential for managing future outbreaks of phytoplasma diseases. Molecular DNA analyses can illuminate these relationships by detecting phytoplasma presence in infected hosts and vector insects, and for identifying the various phytoplasma strains and vector insect species associated with particular plant diseases.
A recent scientific paper released by Graham Centre Entomology Bioprotection group researchers Gopurenko, Fletcher, Liu & Gurr (2016) identified two genetically and symptomatically distinct strains of phytoplasma co-occurring in Lucerne fields at Forbes, NSW. One strain had not previously been identified in Lucerne and this now extends the number of phytoplasma strains known from this valuable forage crop to eight.

The study genetically identified several known vector insect species feeding near the infected Lucerne plants but despite extensive sampling of these and other insects, none tested positive for presence of phytoplasmas. Seasonal differences between the timing of peak infectious insect abundance and the emergence of disease symptoms in affected plants, may explain this result. Future surveillance efforts for detection of phytoplasma infectious insects in field crops such as Lucerne will likely require more comprehensive sampling to avoid this issue.

Researchers in the Graham Centre Entomology Bioprotection group continue to explore this and other issues relating to pathways of phytoplasma infection. Funding for this current published research was partially provided for by a Graham Centre New Initiative Grant awarded to the research team.

Contact: Dr David Gopurenko, T: 02 6938 1946, E: david.gopurenko@dpi.nsw.gov.au

Further information: Gopurenko D, Fletcher MJ, Liu J & Gurr GM (2016) Expanding and exploring the diversity of phytoplasmas from Lucerne (Medicago sativa). Scientific Reports 6, 37746; doi: 10.1038/srep37746

ACIAR John Dillon Fellows from the Philippines and Myanmar visit the Graham Centre

The Australian Centre of International Agricultural Research (ACIAR) funds the prestigious John Dillon Memorial Fellowship to provide career development opportunities for outstanding agricultural scientists from ACIAR partner countries. Each year up to 10 John Dillon Fellows (JDF) undertake research management and leadership training over a four week period in Australia. In the week following their training, the JDFs visits research institutions relevant to their discipline areas or important for strategic purposes to see theory put into practice and learn first-hand from research managers in Australian.

The Graham Centre hosted two 2017 JDFs, Dr Aye Min, the Assistant Director of the Department of Agriculture, Ministry of Agriculture and Irrigation, Myanmar, and Leylani Manadac-Juliano, Supervising Science Research Specialist (Agronomy, Soils and Plant Physiology division), Philippine Rice Research Institute, Department of Agriculture, Philippines from 15 - 17 March.

The JDF visit to Charles Sturt University and the Graham Centre was led by Drs Jason Condon and Ben Stodart and comprised meetings with Professor Gethin Thomas, Director of Research, CSU, Professor Michael Friend, Director of the Graham Centre and Dr Sandra Savocchia, Associate Dean- Graduate Studies, Faculty of Science. These meetings allowed the JDFs to understand the strategies the managers have put in place to advance research within the University and the Graham Centre.

Following the formal research management meetings, the JDFs had meetings with key researchers relevant to their discipline interests, including Associate Professor Phil Eberbach and Dr Jeff McCormick (crop diversification in Lao PDR and Cambodia), Dr John Broster (Herbicide Resistance), Dr Sergio Moroni (crop physiology and agronomy in Vietnam), Dr Ben Stodart (plant protection in Thailand, Lao PDR and Cambodia) and Dr Jason Condon (Crop diversification in Vietnam).

Dr Min is already seeking opportunities to send junior researchers here to capitalise on the close knit research environment he observed at CSU and would like to establish formal postgraduate training programs.

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Dr Ben Stodart, T: 02 6933 2147, E: bstodart@csu.edu.au

The JDFs travelled to Rice Research Australia Pty Ltd at Old Coree, Jerilderie to meet with Manager Russell Ford. Following a tour of the rice trials, Russell described the structure and research activities of RRAPL. From left, Leylani Mandac-Juliano, Dr Aye Min and Russell Ford.
In the Limelight

Mark Greco

Position: Senior Lecturer in Medical Imaging
Organisation: Faculty of Science, CSU

Career Brief: I have a PhD in Biology from the (University of Western Sydney, and a PhD in Engineering from the University of Bath. As the world’s first Diagnostic Radioentomologist, I am also scientific advisor for PESTIVAL: http://www.pestival.org

I am a Medical Radiation Scientist and currently Senior Lecturer at CSU. I have developed innovative methods for studying insects and their behaviour using non-invasive imaging, now termed Diagnostic Radioentomology (DR): http://www.radioentomology.com/index.html

I am a 2016 NHMRC Expert Peer Reviewer, Fellow of the Royal Entomological Society, Patron of the ANU Apiculture Society, a member of the Australian Entomological Society and councillor for the NSW Entomological Society. I have been involved in the management and application of Australian stingless bees and European Honeybees since 1991.

I authored the book ‘Imaging Techniques for Improved Bee Management’, and contributed to the Whitley award winning field guide ‘Native bees of the Sydney region’ by Anne Dollin, Michael Batley, Martyn Robinson and Brian Faulkner. I have also contributed to the book ‘Wildlife of Australia’ by Louise Egerton and Jiri Lochman in 2009.

Research Activities

The effects of pathogens on brain and behaviour in bees - Research has shown that many pathogens affect honeybee health, but there is still a lot not known on how these pathogens are spread from one honeybee to another, one hive to another or one apiary to another. This research will develop a more powerful, accurate and non-invasive method for diagnosing pathogen dispersal within honeybee colonies. A tracking system, using X-ray Computerised Tomography (CT), will be developed to show how and when honeybees pass food from one bee to another within the hive. Human body CT scanners are being used to visualise the inside of honeybee hives. The food is labelled and contains pathogens so the 3-D X-ray imaging produced by the CT scanning can track how and when the pathogen is spread within the hive.

Teaching Activities

• Computed Tomography Practice and Trends
• Radiation Dosimetry Biology & Protection
• Fundamentals of Medical radiation science
• MSc Clinical Judgement and Decision making

Professional Links

• Fellow of the Royal Entomological Society
• AHPRA registered
• Member of the Wagga Amateur Beekeepers Association

A typical day for me includes … Working, walking, eating and sleeping.

My main project at the moment is … Saving the bees of the world.

My favourite part of my job is … Enlightening students, especially first year students.

When I am not in the office I like … Fishing, beekeeping, family picnics and being away from the office.

When I am driving I like to listen to … My daughter sing.

Listen now: https://soundcloud.com/nellgreco

Senior Lecturer in medical imaging Mark Greco is passionate about honeybees and their health. He is undertaking research investigating the effects of pathogens on the brain and behaviour of bees.
Adjunct Professor Hanwen Wu

Position: Principal Research Scientist - Weeds and Adjunct Professor

Organisation: NSW Department of Primary Industries

Career Brief: I graduated with a Bachelor Degree in Agronomy in 1984 and a Master’s degree in Plant Breeding in 1987. I lectured Weed Science and Farming System Research at Fujian Agricultural and Forestry University from September 1987 through until October 1994. With the support of a China-Dutch scholarship, I completed my second Master’s degree in Ecological Agriculture at Wageningen University (The Netherlands) in 1996. I then spent six months at Texas Tech University as a visiting scholar studying crop allelopathy. In 1999, I received my PhD degree in Agriculture (Allelopathy) from CSU.

I worked as a Postdoctoral Fellow on genetic markers of wheat allelopathy at CSU between 2000 and 2002, and as a Weed Research Agronomist on integrated weed management of summer weeds at Leslie Research Centre based in Toowoomba, Queensland Department of Primary Industries & Fisheries, between 2003 and 2005. During the three-year period, I travelled extensively across the Darling Downs and Central Queensland and acquired much needed practical experience on integrated weed management in broadacre farming systems.

Since January 2006, I have been with NSW DPI and am a team leader in weed research at the Wagga Wagga Agricultural Institute.

Research Activities

Presently I am studying the ecology and biology, and management of key weeds in southern NSW, including fleabane, silverleaf nightshade, sowthistle, marshmallow, prickly lettuce, Indian hedge mustard, wild radish and barley grass. My research also covers the identification of bioactive compounds with herbicidal activities to combat herbicide resistance. Part of my research is to improve the adoption of integrated weed management through large scale on-farm demonstrations by participating growers across states.

Teaching Activities

I co-supervise a number of PhD students through CSU. I am also heavily involved in organising workshops and field days on weed-related issues across the country, raising the awareness of weeds, herbicide resistance, and promoting the adoption of integrated weed management practices.

Professional Links

- NSW Weeds Society
- International Allelopathy Society

A typical day for me includes ... Emailing, telephone calls, teleconferences, and project meetings, now an integral part of my day. However, most of my time is spent in front of the computer, writing research proposals, project annual reports, manuscripts and reviewing scientific manuscripts from various journals. I spend the rest of my time in the field selecting trial sites, sowing, harvesting and data recording.

My main projects at the moment are ... Emerging weeds (seedbank biology of emerging weeds); Exploring Australian native Eucalyptus for its novel bioactive compounds against herbicide resistance; Improved DNA barcode identification of invasive grasses using Next Generation Sequencing; and Facilitated RD&E in weed management - Improving strategies for summer perennial weeds.

My favourite part of my job is ... knowing my grant proposals have been approved or manuscripts accepted. My current job also gives me the great satisfaction of being able to meet a wide range of people, such as researchers, advisors and growers. There is nothing more rewarding than answering phone calls from growers/advisors asking about weed issues.

When I am not in the office I like ... I was a mad volleyball player in the past. Nowadays, I find myself keen on playing cards with a group of friends over the weekend; the competitive tension between players can be quite entertaining. I have a passion for growing some unique Asian vegetables in the backyard, where I can practice organic farming principles for integrated weed management predominantly through hand weeding!

When I am driving I like to listen to ... I often turn to the ABC Radio National, while also paying too much attention to weeds on the roadside. I am fully aware that it is a bad habit but I simply can’t get rid of it!
## 2017 EVENTS CALENDAR

<table>
<thead>
<tr>
<th>Date</th>
<th>What</th>
<th>Where</th>
<th>More information</th>
</tr>
</thead>
<tbody>
<tr>
<td>2 &amp; 23 June</td>
<td>Science and Agriculture Enrichment Day</td>
<td>Graham Centre, Wagga Wagga</td>
<td>Toni Nugent</td>
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<tr>
<td>7 July</td>
<td>Graham Centre Sheep Forum</td>
<td>Convention Centre, CSU   Wagga Wagga</td>
<td>Toni Nugent</td>
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<tr>
<td>4 August</td>
<td>Graham Centre Beef Forum</td>
<td>Convention Centre, CSU   Wagga Wagga</td>
<td>Toni Nugent</td>
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<tr>
<td>10 &amp; 11 August</td>
<td>Agribusiness Today Forum</td>
<td>Location and Venue TBC</td>
<td>Dr Karl Behrendt</td>
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### New Look Innovator coming soon

The Winter 2017 edition of *the Innovator* will be in the form of an e-Newsletter incorporating a new layout and design. Keep an eye out for it in June.

Submission of articles for the Winter edition close on **26 May 2017**

Please email articles to: Emily Malone, Communications Officer
E: emalone@csu.edu.au

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

Don’t forget to follow the Graham Centre on Twitter @GrahamCentre
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and on Instagram grahamcentre05

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