

# the Innovator

The Newsletter from the EH Graham Centre for Agricultural Innovation

Charles Sturt  
University

NSW  
GOVERNMENT | Primary  
Industries

## AUTUMN 2011 EDITION

Welcome to the Autumn Edition of the Innovator.

Charles Sturt University (CSU) has injected over \$1 million of research funds into the Graham Centre following the Centre's outstanding performance in the recent Excellence in Research Australia (ERA) rankings. In the Crop and Pasture Production Field of Research we scored four out of five, which is above world average, reflecting the excellent research standards of staff and students at the Centre. The research funding provided by CSU will allow the Centre to further build our world rankings.

Over the next five years we will continue to expand this reputation, with a focus on improving agricultural productivity, while keeping a keen eye on natural resource management.

CSU provides two PhD scholarships each year to support postgraduate research at the Centre in the areas of crop and pasture science and animal and veterinary science.

Our recent strategic planning has determined that the Centre should embrace the broad base of disciplines across soil, plant and animal sciences, appropriate to mixed farming systems, thus making us more inclusive and less exclusive. This builds on our strengths associated with our location and focus and gives us a competitive advantage. Additional effort will strategically target research funds in

three focus areas during the next three years, ie. Ruminant feedbase, nutrition and health; Canola-based cropping systems; and Rice-based irrigated systems. Our success will depend on aligning with industry priorities and availability of research funds. We will strengthen our industry links using our Research Liaison Officers - Helen Burns (Industry Links) and Toni Nugent (Communication) and develop strong partnerships with our local farmer groups and NSW DPI extension staff.

This issue contains some detail of the recent graduations and I would like to congratulate all our successful students. Our role in training the next generation of researchers and advisers is critical to address the skills shortage in agriculture.

Our growers are facing considerable difficulties sowing into heavy stubbles and summer weed growth this year. This has required widespread burning of residues to enable sowing of winter crops. Most growers would prefer not to burn but there is no choice this season. Our research in stubble retention will hopefully reduce the need for burning in the future.

Professor Deirdre Lemerle

## News

### Visit by Vietnamese Officials

A group of 31 Vietnamese officials from the Institute for Policy and Strategy for Agriculture and Rural Development, a part of the Ministry of Agriculture and Rural Development, visited the Graham Centre at Wagga on Wednesday 6 April.

The officials are currently training for a six week period in policy and strategic planning, at the Crawford School at the Australian National University.

Centre Director, Deirdre Lemerle, described the Graham Centre alliance to the group, who were interested in discussing in more detail ways to establish a similar model in Vietnam. There was particular interest from the Director of the National Agriculture and Forestry Research Institute Dr Douangsavanh.

The group also visited the Charles Sturt University and NSW Department of Primary Industries facilities and a local dairy milking 350 cows.

"They are very keen to develop research collaboration in mixed farming systems," reported Professor Lemerle.



*Vietnamese officials visited a local dairy farm, as part of a visit to CSU and NSW DPI facilities on 6 April. Photo: Deirdre Lemerle.*

### US Consul General visits the Graham Centre

US Consul General Mr Niels Marquardt visited the CSU Wagga campus on 16 March. Graham Centre Director, Professor Deirdre Lemerle, gave a presentation on the Centre, highlighting the outstanding research and achievements, including the importance of our international links.

"The Consul General was very interested and impressed with our collaboration between CSU and NSW DPI, the research being undertaken

by staff and students, our links with industry and future focus," Professor Lemerle said.

While at Wagga the Consul General also spoke to CSU students and staff about his experience as a Peace Corps volunteer and the impact this international community engagement had on his life.



*Professor Deirdre Lemerle with the US Consul General Mr Niels Marquardt, Professor Peter Wynn and Wagga Mayor, Councillor Kerry Geale.*

#### THIS ISSUE

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- ◆ Research Activities
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#### QUICK LINKS

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- ◆ [Seminar series](#)
- ◆ [CSU website](#)
- ◆ [NSW DPI website](#)

### Large attendances at silverleaf nightshade workshops

More than 400 farmers, advisors and weed control officers recently attended 14 workshops in NSW, Victoria and South Australia to hear the latest research on the management of the perennial weed silverleaf nightshade.

The workshops are the culmination of a five-year Graham Centre research project, funded by Meat and Livestock Australia.

Project leader, Dr Hanwen Wu, said continuing demand for these workshops and farmer feedback highlighted the growing economic, social and environmental cost of silverleaf nightshade to grain and livestock producers.

“Estimates show that this highly adaptable weed has the potential to infest up to 400 million hectares of the most productive farming land of southern Australia,” he said.

Dr Wu said silverleaf nightshade grows from seed and root fragments.

“Research looking at the ecology and biology of this summer growing weed identifies the need for a dual action approach, with a combination of chemical and non-chemical control strategies, that target the seedbank and root system,” he said.

Dr Wu said the workshops combined local experience and farmer success stories to reinforce research findings.

“The clear message from the workshops is that silverleaf nightshade management is a long-term commitment that focuses on key stages of the plants’ life cycle.

“Many of the current strategies have been successful in stopping seed set, which may control spread but we now know that silverleaf nightshade reshoots very effectively from significant root reserves,” he said.

Dr Wu said that feedback from the workshops highlighted the financial and social cost of managing large infestations.

“Farmers grappling with silverleaf nightshade infestations strongly supported our message to quickly contain and eradicate small infestations before they establish and spread.

“Effective management should begin with a map and rating density of infestations, which then enables farmers to consider long-term options to either contain or control the weed.

“Farmers need to critically assess the time and finances they need to commit to eradication versus a control objective and then consider what area can be physically managed and the tactics that best suit their system,” he said.



*From left, Local farmer Geo Bammann, Iggy Honan (Program manager with the Eyre Peninsula Natural Resource Management Board) and Dr Hanwen Wu (Research Agronomist, Graham Centre) discuss silverleaf nightshade control tactics at the silverleaf nightshade management workshop at Cleve on the Eyre Peninsula, South Australia. Photo: Helen Burns.*

Dr Wu said a best management factsheet produced as part of the project clearly identifies the key stages of the plant’s life cycle that management strategies need to target and reinforces the need for a ‘dual action’ approach to eradicating the weed.

The factsheet can be sourced from: [http://www.csu.edu.au/research/grahamcentre/research/publications/docs/SLN\\_BMPguide.pdf](http://www.csu.edu.au/research/grahamcentre/research/publications/docs/SLN_BMPguide.pdf)

More information: Dr Hanwen Wu, T: 02 6938 1602, E: hanwen.wu@industry.nsw.gov.au

## New Heads of Schools

Congratulations are extended to Professor Nick Sangster on his appointment to Head, School of Animal and Veterinary Sciences and to Associate Professor Philip Eberbach who is Acting Head of School of Agricultural and Wine Sciences until July 2011.

## Field Site Manager

The Graham Centre has recently appointed Vince Van der Rijt as Site Manager of the Centre’s Field Site located at the corner of Coolamon and Prices Roads. Vince will work part-time sowing trials and maintaining the site.

## Graham Centre appoints Communications Officer

The Graham Centre welcomes new team member **Toni Nugent** to the position of Research Liaison Officer – Communications. Toni has a Bachelor of Agricultural Science from the University of Melbourne and a Graduate Diploma of Education (Secondary) from Charles Sturt University.

After completing her Agricultural Science degree Toni was employed by the Victorian Department of Agriculture researching compensatory growth in lofted lambs. Toni then moved to Wagga working with Charles Sturt University on the Urban Salinity project extending the project outcomes to the urban community, before commencing in the position of Communications Officer with the Weeds Cooperative Research Centre in 1997.

Toni was then employed for 11 years with the Kondinin Group as Research Coordinator, heading up their research team. At the Kondinin Group Toni regularly wrote articles and research reports on a range of agricultural issues and topics for their monthly publications *Farming Ahead* and *Group Talk*. She has also written many articles for newsletters and journals and presented a number of conference papers.



*Toni Nugent was recently appointed as Research Liaison Officer, Communications with the Graham Centre.  
Photo: Sharon Kiss.*

Toni coordinated and edited the books *Spraying Solutions*, *Stalk to Store* and *Grain Marketing Lingo*, and has published other books including *Managing Wild Oats*, *Managing Wild Radish*, *The Weed Navigator: Contact and Resource Directory* and *Stubble Management – Best Management Practices for Cropping*.

Toni has also written a subject for Charles Sturt University, Faculty of Science and Agriculture first year students - *Agriculture and Horticulture in the Australian Environment*.

In 2005, Toni was awarded the Best Media Feature from the Rural Media Association of Western Australia, for her report on farm labour.

As Research Liaison Officer – Communications with the Graham Centre, Toni works closely with the media building strategic links to promote and raise the profile of the Centre. Research outcomes are communicated via media releases, articles and case studies in leading Australian agricultural publications to the agricultural and wider communities.

Toni's role will see the Centre's webpage further developed to ensure information is relevant, easily accessible and timely. She will play an integral part in the organisation

and running of the Graham Centre's annual beef and sheep field days, cementing them as a public showcase of the Centre's ruminant research.

Contact: Toni Nugent T: (02) 6938 1806, E: [tnugent@csu.edu.au](mailto:tnugent@csu.edu.au)

## Leading Professor visits Wagga - Advice on ARC grants

The Graham Centre and the CSU Faculty of Science recently funded a visit by Professor Alan Johnson, Managing Director of Research Management Services International – an Australian based research management company.

While in Wagga, Professor Johnson presented workshops to Graham Centre staff and students, providing insight and guidance on applying and preparing Australian Research Council (ARC) Discovery and Linkage grants.

Emeritus Professor Alan Johnson AM, has 30 years of research, research management and research training experience in a range of organisations, including universities, Australian Government agencies and international research organisations.

The Graham Centre aims to increase the number of ARC Discovery and Linkage grants to support its research and development.



*From left, Professor Alan Johnson AM, Professor Deirdre Lemerle, Centre Director and Professor Nick Sangster, Head of School of Animal and Veterinary Sciences.*



## Student Scholarships & Awards

Congratulations to the following students who have been awarded Graham Centre scholarships or awards for a combined value of approximately \$60,000 for 2011.

PhD	Project Title	Supervisors
Ellen Heycox	Mating of sows and gilts during lactation; understanding the physiology and genetic differences	Dr Jan Lievaart (CSU) Prof Peter Chenoweth (CSU)
PhD Top-Up	Project Title	Supervisors
Christina Chin	Effect of cooking on physicochemical and sensory properties of chickpeas and field peas	Dr Chris Blanchard (CSU) Assoc Prof Samson Agboola (CSU) Dr Jenny Wood (NSW DPI)
Melanie Wagner	Identification of pathogenicity factors in the secretome of the wheat pathogen <i>Mycosphaerella graminicola</i>	Prof Gavin Ash (CSU) Dr Andrew Milagte (NSW DPI)
Honours	Project Title	Supervisors
Brodie Argue	Characterising <i>Ureaplasma diversum</i> : A potential pathogen of Australian cattle	Prof Peter Chenoweth (CSU) Dr Kapil Chousalker (CSU)
Naomi Hobson	<i>Ureaplasma diversum</i> in bull semen: its detection and potential effects	Prof Peter Chenoweth (CSU) Dr Kapil Chousalker (CSU)
Jessica Rose	Sex difference in the actions of oestrogen in the brainstem	Dr Chris Scott (CSU) Prof Peter Chenoweth (CSU) Dr Ed Clayton (NSW DPI)

Research Student Internship	Mentors
Nicole Camlin	Dr Chris Blanchard (CSU) Prof Peter Wynn (CSU)
Ally Dingjan	Prof Gaye Krebs (CSU) Dr Livinus Emebiri (NSW DPI)
Andrew Dombrowski	Dr Chris Scott (CSU) Dr Harsh Raman (NSW DPI)



Student interns, Andrew Dombrowski and Nicole Camlin with Dr Chris Blanchard. Photo: Toni Nugent.

## Graduation Autumn 2011

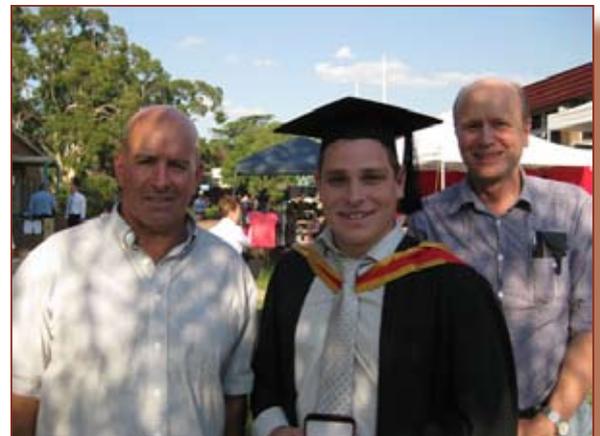
The Graham Centre congratulates the following students who graduated on 1 April:

- Tom Claridge, Bachelor of Environmental Science with Honours Class 2 Division 1
- Lauren Bartosh, Bachelor of Environmental Science (Land and Water)
- Richard Kopf, Doctor of Philosophy
- Margaret Raeside, Doctor of Philosophy
- Bree Wilson, Doctor of Philosophy
- Philip Bowden, Master of Philosophy
- Patrick McCann, Master of Applied Science (Agriculture)
- Jaron Bennett, Bachelor of Science with Honours Class 1, Jaron was also the Prize Winner of the Faculty of Science 'Outstanding Graduating Student in Bachelor of Agriculture/Bachelor of Agricultural Science' Award
- Hayley Rutherford, Bachelor of Science with Honours Class 2 Division 1
- Angela Muller, Bachelor of Animal Science with Honours Class 2 Division 1



*Pictured from left Dr Michael Friend (Dr Raeside's supervisor), Mrs Lucinda Corrigan, Chair of the Graham Centre's Industry Advisory Committee, Dr Margaret Raeside, Dr Bree Wilson, and her supervisors Dr John Harper and Professor Gavin Ash. Mrs Corrigan delivered the Occasional Address at the ceremony.*

- Thomas Steele, Bachelor of Animal Science with Honours Class 2 Division 1
- Katerina Vallance, Bachelor of Animal Science with Honours Class 2 Division 1
- Rebecca Wilson, Bachelor of Animal Science with Honours Class 2 Division 1
- Marianne Joyce, Bachelor of Animal Science with Honours Class 2 Division 2
- Gregory Dale, Bachelor of Veterinary Biology/Bachelor of Veterinary Science with Honours Class 1
- Andrew Hancock, Bachelor of Veterinary Biology/Bachelor of Veterinary Science with Honours Class 1
- Tara Mills, Bachelor of Veterinary Biology/Bachelor of Veterinary Science with Honours Class 1
- Matthew Muir, Bachelor of Veterinary Biology/Bachelor of Veterinary Science with Honours Class 1
- Emma Packer, Bachelor of Veterinary Biology/Bachelor of Veterinary Science with Honours Class 1
- Kelly Plozza, Bachelor of Veterinary Biology/Bachelor of Veterinary Science with Honours Class 1
- Bruno Ros, Bachelor of Veterinary Biology/Bachelor of Veterinary Science with Honours Class 1
- Ashleigh Smith, Bachelor of Veterinary Biology/Bachelor of Veterinary Science with Honours Class 1
- Jessica Cooke, Bachelor of Veterinary Biology/Bachelor of Veterinary Science with Honours Class 2, Division 1
- Rosalie Harvey, Bachelor of Veterinary Biology/Bachelor of Veterinary Science with Honours Class 2, Division 1
- Rebecca Robson, Bachelor of Veterinary Biology/Bachelor of Veterinary Science with Honours Class 2, Division 1
- Coco Willsallen, Bachelor of Veterinary Biology/Bachelor of Veterinary Science with Honours Class 2, Division 1



*Dr Jim Virgona (left) and Dr Peter Martin (right) with Jaron Bennett who graduated with First Class Honours. Jaron was also the recipient of the "Outstanding Graduating Student in the Bachelor of Agriculture/Bachelor of Science" award. Photo: Deirdre Lemerle.*

## Research Activities

### Biological control of pest snails using native nematodes and bacteria

*Professor Gavin Ash, School of Agricultural and Wine Sciences, CSU*

#### Overview

Concerns with the health and environmental risks of chemical pesticides are channelling efforts towards seeking alternative biological pest management strategies. Specifically, biopesticides are seen as fast acting, economical and an environmentally friendly method of pest management. Land snails species are considered a major pest of the Australian grains industry. There are four species which are of a concern in southern Australia.

#### The Bad

This project aims to develop a biological pesticide for the management of snails for the Australian grains industry by using specific invertebrate-parasitic nematodes. Native

nematodes and their associated bacteria may provide

more effective biological control of conical snails (which are a major crop pest in cropping districts of SA and Victoria) than the imported *ty*. The level of control using the parasitic *ty* imported from France and released as a snail control agent on Yorke Peninsula between 2001 and 2004 has been disappointing. Nematodes have all the characteristics of a perfect biocontrol agent and they have been successfully developed for the biological control of other invertebrate pests in Australia. These nematodes are fast acting organisms; once they enter the host, through natural openings, they release their symbiotic bacteria that lives inside their guts, the bacteria grows in number turning the hosts inner body into food for the nematodes. The host dies soon after. They are naturally occurring, soil dwelling organisms which are harmless to mammals and other beneficial animals, but most suitable to use against pests, such as snails and slugs, which live all or part of their life cycle in soil.

#### The Ugly

These photographs at right, taken with an electron microscope, show a snail's perspective of these nematode predators.



*Cochlicella barbara*



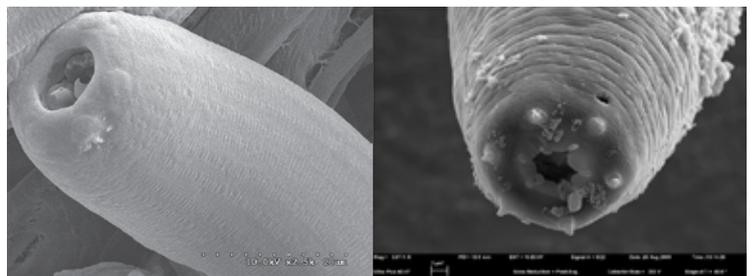
*Theba pisana*



*Cochlicella acuta*



*Cernuella virgata*



#### The Way Forward

Associate Professor Gavin Ash and his team at the Graham Centre have achieved mortality rates of up to 90 percent in adult round and conical snails in about a week using nematodes isolated from Australian cropping soils. The nematodes, and the associated suite of bacteria thought to be integral to the process, are yet to be tested in the field. Field trials will commence in September in South Australia. Dr Ash is optimistic about the biological control potential of the nematodes he and his team are working with and is aiming towards commercialisation of a nematode-based biological control agent for snails by 2012.

Further information: Gavin Ash, T: (02) 6933 2765, E: [gash@csu.edu.au](mailto:gash@csu.edu.au)



*Professor Gavin Ash*

## Effects of cooking on faba bean antioxidant activity

*Siem Siah, PhD Student, CSU, Assoc Professor Samson Agboola, CSU, Dr Jenny Wood, NSW DPI and Dr Chris Blanchard, CSU*

Phenolic compounds have been shown to have in vitro antioxidant activity that has been linked to the prevention of diseases including hypertension, arteriosclerosis and some types of cancers. Faba beans (*Vicia faba* L.) contain high levels of phenolic compounds, with the majority being proanthocyanidins or tannins. In Australia, faba beans are grown as a winter crop and harvested during summer when they are fully mature and dry.

Dry faba beans need to be cooked for human consumption, but heat processing affects phenolic compounds and the antioxidant activity of the food. Research conducted by Charles Sturt University and NSW Department of Primary Industries researchers looked at three Australian grown faba bean cultivars; Nura (blue), Rossa (red) and TF (white, tannin-free), that were cooked and roasted to determine the effect of different cooking methods on antioxidant activities.

Heat processing decreases antioxidant activities of faba beans. Dry heat is shown to be a better way of preserving antioxidant activities in faba beans compared with boiling.

Generally, heat-treated samples showed lower antioxidant activities in all faba bean cultivars except TF, which had slightly increased or similar levels after cooking.

### What the research showed

On-line post column derivatisation assay (PCD) with high performance liquid chromatography (HPLC) profiles suggest that cooking may destroy some phenolic compounds.

Antioxidant activities of boiled beans were lower than roasted beans possibly due to the loss of active phenolic compounds during the soaking, boiling and draining processes, or by the creation of new active compounds. This suggests

that some phenolic compounds, possibly flavonoids and phenolic acids, were rendered water-soluble during the cooking process, which allowed these compounds to leach out. In addition, dry roasting may result in the creation of new active compounds through the Maillard reaction.

HPLC profiles of roasted and boiled Nura appeared similar but had different PCD profiles. This suggests other compounds not detected at 280nm may also be contributing to the antioxidant activity. These may be proteins that are linked with phenolic compounds. The decrease in antioxidant activity after heating processes could be due to de-naturation of these proteinaceous compounds.

Further information: Siem Siah T: 02 6933 4095, E: [ssiah@csu.edu.au](mailto:ssiah@csu.edu.au); Assoc Prof Samson Agboola T: 6933 4041, E: [sagboola@csu.edu.au](mailto:sagboola@csu.edu.au); Dr Jenny Wood T: 02 6763 1157, E: [jenny.wood@industry.nsw.gov.au](mailto:jenny.wood@industry.nsw.gov.au); or Dr Chris Blanchard T: 02 6933 2364 E: [cblanchard@csu.edu.au](mailto:cblanchard@csu.edu.au)

## Use of hyperspectral remote sensing for enhanced detection of weeds in both managed and natural landscapes

*Dr Remy Dehaan and Professor Leslie Weston, CSU*

Dr Remy Dehaan and Professor Leslie Weston have secured RIRDC funding to the value of \$300K for a commissioned project with the National Weed Research Program. Co-participants in the grant include colleagues at the University of New England, University of Adelaide, University of Sydney and Professor Santosh Seelan at University of North Dakota in the USA.

The Murrumbidgee Catchment Management Authority and Wagga Wagga City Council are also supporting the project.

The project aims to develop a research platform using an autonomous unmanned vehicle (likely a small helicopter or hovercraft) equipped with a sensitive imaging system for detection of weeds on a paddock and large field scale. The technology, with sensitivity at this scale, is not currently in use in the private sector in Australia.

Although considerable work has been carried out in Australia on spatial distributions of weeds in crop fields and factors responsible for their patterns of distribution, relatively little work has been reported on quantification of the distribution and spatial analysis of weeds in Australia on a broader landscape level.

This project aims to address the spatial distribution of weeds, building on previous research related to the use of hyperspectral imagery (HI) and unmanned autonomous vehicles (UAVs) for mapping specific weeds and their distributions in the Australian landscape. In particular, the project will investigate the optimal detection parameters and sensor capability for identifying and mapping a number of important weeds with different life cycles in different habitats, using a UAV equipped with state of the art HI equipment for sensorial analysis and imaging.

Weeds to be examined include Paterson's curse and silverleaf nightshade in managed agricultural settings, and serrated tussock and lantana in natural and less managed settings.

It is increasingly important to develop a low-cost remote sensing platform to collect detailed weed inventories at various spatial scales, particularly for a large, sparsely populated area such as Australia. Current site-specific weed management systems such as WeedSeeker can reduce herbicide application by directed or targeted applications, while recent research demonstrates the capacity to deploy these active optical sensors in aerial platforms. These systems rely on the ability of the multispectral sensor to detect greenness and typically work well when the weed emergence occurs before the crop develops or weeds project above the crop canopy.

Where the pre-sowing window is small or weeds are in abundance or mixed with other vegetation in less managed situations, multispectral systems are less reliable for detection and separation of weeds from the desired vegetation.



*The Zealous II radio controlled scale turbine helicopter will be fitted with a sensitive imaging system for detection of weeds.*

Hyperspectral remote sensing is a relatively new technology that allows clear separation of plant materials with unique spectral signatures. It provides a quantum leap in the ability to map a variety of materials that previously could not be mapped by multispectral sensors. The necessary UAVs and sensor technology are now commercially available and capable of spatial resolutions of 2-50 centimetres. They offer significant advantages over satellite and traditional manned airborne systems, allowing flexibility for researchers, federal agencies and producers to collect quantitative data at low cost.

This project also aims to build a "learning community" based around the use of hyperspectral remote sensing and builds on the experiences of their international collaborator on the project, Professor Santhosh Seelan, North Dakota, USA. Professor Seelan has built a "learning community" of over 500 farmers, researchers and extension officers. Together they have adopted multispectral remote sensing technology to elicit financial, environmental and social benefits through the mutual ownership and collaboration associated with the management of remote sensing data for their various enterprises.

The "learning community" to be built with this project will involve land managers, research corporations, CMAs and extension officers in proximity to locations of specific weeds of interest.

In addition to weed detection and mapping, HI and remote sensing research offers land managers another tool to improve agricultural productivity through pest monitoring, detection of insects and pathogens, and variable rate applications of agrichemicals.

The project will target land management agencies, industry and end users who are charged with managing both public and private land and water resources. The outputs from the project will target researchers, providing a foundation for ongoing high-definition mapping of weeds in a variety of landscape settings using a diverse set of weeds as model systems for investigation. The development of smarter, more cost effective methods for capturing much needed spatial information is likely to also capture the interest of consultants, advisors and farmers.

There are a number of potential commercial applications for this research platform including usage for monitoring pest infestation and impacts on crops, monitoring water flow and riverine drainage systems and monitoring invasive pests including mammalian species and their invasion across targeted landscapes.

Further information: Dr Remy Dehaan on T: 6933 2499, E: [rdehaan@csu.edu.au](mailto:rdehaan@csu.edu.au) or Professor Leslie Weston T: 02 6933 2429, E: [leweston@csu.edu.au](mailto:leweston@csu.edu.au)

## Honours project takes David to Vietnam

### David Gale, Honours Student

In the last edition of *the Innovator* we read about the work David Gale was doing in Vietnam as part of his honours project. In this edition we talk to David about some of the outcomes of that project.

#### How was your trip to Vietnam?

The trip to Vietnam was great - I learnt heaps, saw tonnes, and in the process developed my skills in research, added to the body of industry knowledge around the use of compost in agriculture and horticulture.

#### Remind us why you chose compost as your honours topic.

The reality is, and this is increasingly undisputed, the world's population is probably going to be nine billion by 2050. So as a global community in 40 years time we will need to grow around 30 percent more food than we do now. The mechanisms which have been used to keep pace with increases in demand for food in the past, such as chemicals and breeding, will play a part in providing this food, but they are slow processes. Expansion in land area has been important in the past but with climate variability appearing to be an inevitable reality, land area which is usable for agriculture is likely to decline, compounding the food issue. Fertilisers hold the strongest hope for the future but with some of the raw materials for fertiliser originating from mined resources which are finite, alternatives need to be sought. This is the basis for the project which I did using a glasshouse experiment growing barley (*Hordeum vulgare*), and a field trial using baby corn (*Zea mays* L.).

#### What were the key findings of the project?

In the glasshouse trial leaf dry matter yield (DMY) increased significantly at a rate of 0.05g DMY ( $\pm$  0.012g) per kilogram P application as compost (with MAP making up the difference so that a total of 20kg P/ha was added in each treatment). A significant increase in leaf P of 15.2mg P/kg leaf ( $\pm$  6.7) with an increase in compost equivalent to one additional 1 kg P/ha, with the remainder of the 20kg P/ha application as MAP, was also found. But in the field trial yield was smaller in the treatments which had a partial substitution of synthetic fertiliser with compost, each based on current local rates. It is hypothesised that this is because application of compost was not sufficient to meet nutritional requirements of the plant. A residual effect was seen in the glasshouse experiment and suggests that benefits for future crops could exist following the application of compost to a paddock.

It has been shown that the use of composts, together with synthetic fertilisers, make it possible to reduce the quantities of synthetic fertilisers required and prolong the global availability of minable resources, such as P, without compromising yield. The potential for increasing yield is also present.

#### Would you recommend honours to other people?

YES! My honours experience was terrific and I would recommend it to anyone interested in developing research skills, as well as an understanding of the world in which they live. Honours is about the research - although people were right when they said that I couldn't expect to change the world through this project, but it is also about thinking critically about one aspect of the world in which we live, which ultimately results in a deeper thinking and understanding of the world as a whole.



David Gale presented his key results in a seminar to the Graham Centre on 1st April. David (right) with one of his Graham Centre supervisors, Dr Jason Condon, after the seminar. Photo: Toni Nugent.

I now work for NSW Department of Primary Industries and there have been a number of occasions when my honours project has enabled me to make informed decisions directly, and other times when the critical thinking aspect of honours has enabled me to work through problems and provide solutions.

**Note from the Editor:** Keep an eye out for the Winter edition of *the Innovator* where we'll have the rest of this informal interview with David about the key findings from the final third of his honours project.

## Travel & Conference Reports

### Wildlife Disease Association Australasian Section Annual Conference

*Dr Joanne Connolly, School of Animal and Veterinary Sciences, CSU*

In December 2010, Joanne Connolly travelled to Dover, Tasmania to attend and present at the Wildlife Disease Association Australasian Section Annual Conference. Joanne also took the opportunity to meet with platypus researchers from Tasmania.

Researchers and veterinarians from across Australia, New Zealand and Asia attended the conference with a diverse range of research topics presented covering wildlife health and disease.

In her presentation Joanne discussed the procedures of platypus field work and the difficulties in estimating population abundance. Joanne also presented the findings of platypus at a variety of habitat types ranging from pristine headwaters in Kosciuszko National Park to the end of their range at Narrandera. Platypus health issues were also discussed.



*An ulcer formed from *Mucor amphibiorum*.  
Photo: Joanne Connolly.*

Joanne visited a number of platypus field sites in northern Tasmania, including some in the Inglis, Emu and Black-Detention catchments. While in Tasmania, Joanne worked on a draft fieldwork protocol for submission to Murdoch's Animal Ethics committee application.

Following the conference Joanne met with Dr David Obendorf a wildlife pathologist and previous collaborator on her investigations into mucormycosis in the Tasmanian platypus, to discuss the current situation of mucormycosis in the Tasmanian platypus population. As a result of the meeting and the culture of other agents from lesions similar in appearance to *Mucor amphibiorum*, Joanne will update her situation report on the Australian Wildlife Health Network website to include these agents in the differential diagnosis of mucormycosis in the platypus.

Through participation in this meeting, collaborative links have been forged with other researchers from across Australia.

Further information: Dr Joanne Connolly T: (02) 6933 2218, E: [jconnolly@csu.edu.au](mailto:jconnolly@csu.edu.au)

### Integrated Water Resource Management, Karlsruhe, Germany 2010

*Dr Ketema Zeleke, School of Agricultural and Wine Sciences, CSU*

Dr Ketema Zeleke presented a poster entitled "Regulated Deficit Irrigation of Nine Olive Varieties in a Semiarid Region of Australia" at the IWRM conference in Karlsruhe, Germany. Conference topics covered the areas of rainwater retention and storage via waste water management, water resource management and modelling, and water management under extreme conditions.

Delegates from 33 countries were represented at the IWRM, Karlsruhe, Germany

Conference participants included Professor Stephen Foster, Director of World Bank Groundwater Management Advisory Team and Dr Reza Ardakanian, Director of the UN Water Decade Program on Capacity Development. Dr Zeleke used the conference as an opportunity to see the recent developments in IWRM. Most of the reports were projects supported by the German Development Cooperation and conducted by German research institutions and universities, mostly in developing countries.

Captures physical characteristics and health of the platypus (*Ornithorhynchus anatinus*) in agricultural and natural landscapes within the Murrumbidgee Catchment

Dr Ardakanian reported on the AquaCrop training given by FAO Irrigation and Drainage Division in China, Indonesia, Iran, South Africa, Egypt and Burkina Faso (for French speaking African countries). Dr Zeleke was able to inform him that he is calibrating and validating this program for canola under Australian conditions. Once Dr Zeleke completes the current AquaCrop canola modelling he will be communicating further with Dr Ardakanian to explore the possibility of conducting such training in Australia, in cooperation with CSIRO Land and Water.

Further information: Dr Ketema Zeleke: T: 02 6933 4998, E: [kzeleke@csu.edu.au](mailto:kzeleke@csu.edu.au)

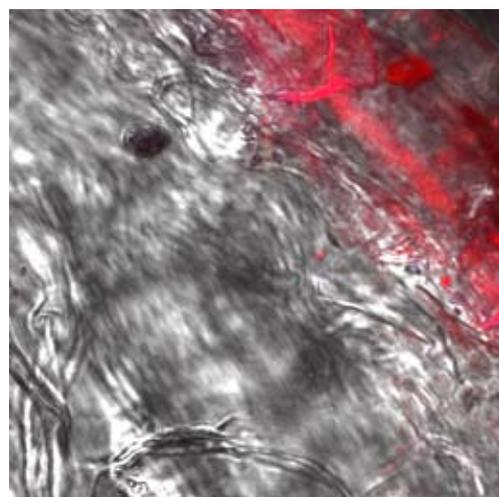
## International Union of Applied Pesticide Chemist's meeting (IUPAC), Melbourne

*Professor Leslie Weston, School of Agricultural and Wine Sciences, CSU*

Professor Leslie Weston was an invited speaker at the largest symposium on natural plant products at the IUPAC meeting in July 2010, along with other respected scientists from around the world. She presented results from her research "Bioactive root exudates: a novel source of allelochemicals and bioherbicides". During the course of the meeting she networked with other world class scientists, including Professor Ian Baldwin from Max Planck Institute in East Germany and Professor Francisco Macias from University of Cadiz, Spain.

### Presentation Summary

Plant root exudates are known to play an important role in community structure and are involved in complex rhizospheric interactions. Leslie's past work with *Sorghum* spp. has elucidated the role of the allelochemical sorgoleone, a potent inhibitor of plant growth that is released in sorghum root exudates. Graminaeous species including the fescue (*Festuca rubra*) also produce large amounts of novel secondary products and can selectively inhibit weeds in both field and laboratory conditions. These constituents are known to play important roles in plant defence against herbivores, insects, pathogens and microbes as well as competing plants. In Australia, Paterson's curse (*Echium plantagineum*) also produces unique root exudates from two types of root hairs, which are involved in active exudation processes in the plant. Research has discovered that the epidermis of both its younger lateral roots and older taproots produce unusual, red-coloured chemical constituents which are localised in the outer peridermal layers of its roots. Their identification and mode of action is currently under evaluation, as is their role in plant defence and invasion success.



*Close up of bioactive naphthoquinones present in peridermal root tissue of Paterson's curse. These bioactive compounds are known anti-microbials and plant growth inhibitors and were first identified in Paterson's curse root exudates and extracts by L and P Weston in 2009-2010).*

Further information: Professor Leslie Weston T: 02 6933 2429, E: [leweston@csu.edu.au](mailto:leweston@csu.edu.au)



*In the next couple of years, the Graham Centre will increase research capacity on the ruminant feedbase, nutrition and health, including greater sharing of animal facilities at NSW DPI and CSU. Photo: Toni Nugent.*

## In The Limelight

### Siem Doo Siah, PhD Student

**Thesis Title:** Phenolic compounds and health properties of Australian grown faba bean (*Vicia faba*)

**Supervisors:** Dr Chris Blanchard (CSU), Associate Professor Samson Agboola (CSU), Dr Jenny Wood (NSW DPI), Dr Izabela Konczak (CSIRO)

**Funding Bodies:**

- EH Graham Centre (2008-2009)
- Grains Research & Development Corporation (2009-2011)
- CSIRO PhD Top Up (2010-2011)

**Relevant Current Employment:**

Final stage of PhD

**Career and studies till now:**

- 2005 – B. Ap. Sci. (Food Science) (Hons), Charles Sturt University
- 2006 – 2008: QC and R&D Executive, Puratos Malaysia Sdn Bhd
- 2008 – present: PhD Student, Charles Sturt University
- 2009 – 2010: Certificate in Research Management (Commercialisation Training Scheme), Southern Cross University

**Research Interests:**

Cereal grain sciences

**Professional Links:**

Royal Australian Chemical Institute (RACI)

**A typical day for me includes:** Juggling between lab works and writing, not much of those on the weekends though.

**My main project at the moment is ...** Evaluation of phenolic compounds and their health properties in faba beans, as well as the effect of different cooking methods.

**My favourite part of my studies is ...** Being able to (although it can be minimal) contribute to science.

**When I am not studying ...** I like cooking, housekeeping, doing yoga and watching drama movies.

**When I am driving I like to listen to ...** Mix 106.5 FM.



*Siem Doo Siah is looking at phenolic compounds and health properties of faba beans.*



### Lauren Howard, PhD Student

**Thesis Title:** Relationships between agricultural extension service providers and sustainable farming practices.

**Supervisors:** Adjunct Associate Professor Ian Gray and Dr Scott Glyde (CSU)

**Funding Body:** Future Farm Industries CRC

**Career and studies till now:**

- Completed undergraduate studies in agricultural science at CSU in 2007.
- Began a PhD in agricultural extension at CSU in 2008.
- Casual lecturing in agricultural extension and systems.
- Recently I have been involved in various research projects relating to the resilience of rural communities, evaluation of government services and the value and importance of community events in the local calendar.
- Trying to complete data collection and analysis for my PhD before the arrival of my second baby in September.

### Currently Studying:

The influence of the increasing role of the private sector and various extension related industry groups on sustainable agricultural practices.

### Research Interests:

- Increased participation of the private sector and industry bodies in the provision of extension services to farmers and land managers.
- Sustaining rural communities. Empowering people in rural communities to address everyday challenges to ensure the survival of their community.

### Professional Links:

- Australasian-Pacific Extension Network (APEN)
- NSW Weeds Society

**A typical day for me includes:** Depending on what day of the week it is, I'm either working on my PhD or running my own business, all the while looking after my 11 month old son.

**My main project at the moment is ...** Analysing survey data (and I have no idea what I am doing so don't ask me about it!)

**My favourite part of my studies is ...** I love writing and meeting the people my research will ultimately impact on. I also love the freedom which comes with working on a PhD. Never again in my career will I be able to work on a research topic purely of my choice; and follow the leads and answer the questions which I think are important, and work the hours I like, when I like, from where I like.

**When I am not studying ...** Shop for shoes and handbags.

**When I am driving I like to listen to ...** I am an impatient channel surfer and flick between various radio stations, CD's and my iPod. However since I became a Mum, if Zac isn't in the car with me, I often just cherish the silence!



*Lauren Howard, with son Zac, capably balances her PhD studies and motherhood.*

## Winter Edition of The Innovator

The Winter Edition of The Innovator will be available mid July 2011. Submission of articles for this edition closes on **Friday, 17 June 2010**. Please email articles to Toni Nugent or Sharon Kiss.

## Secretariat

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**Our Location:** Wagga Wagga Agricultural Institute, NSW Department of Primary Industries, Pine Gully Road, Wagga Wagga NSW 2650

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

## Events Calendar 2011

Date	What	Where	More information
5 May	Dr Thida Hing, visiting agronomist from Cambodia will present a brief overview on crop production and weed management systems in Cambodian cropping systems	NSW DPI Conference Room, Wagga Wagga Agricultural Institute	Leslie Weston T: (02) 6933 2429 E: <a href="mailto:leweston@csu.edu.au">leweston@csu.edu.au</a>
5-7 May	Ag Fest Field Days		<a href="http://www.agfest.com.au">www.agfest.com.au</a>
12 May	Seminar: Professor Peter Chenoweth, CSU School of Veterinary Science. "Key issues associated with livestock reproduction research in Australia"	NSW DPI Conference Room, Wagga Wagga Agricultural Institute	Leslie Weston T: (02) 6933 2429 E: <a href="mailto:leweston@csu.edu.au">leweston@csu.edu.au</a>
13-14 May	Riverina Field Days		<a href="http://www.riverina_elddays.com">www.riverina_elddays.com</a>
19 May	Seminar: Dr. Simon Speirs, NSW DPI, "Plant nutritional status research in Wagga"	NSW DPI Conference Room, Wagga Wagga Agricultural Institute	Leslie Weston T: (02) 6933 2429 E: <a href="mailto:leweston@csu.edu.au">leweston@csu.edu.au</a>
10 June	Ag Enrichment Day	Wagga Wagga	Raylene Heath, T: (02) 6938 1978 E: <a href="mailto:rheath@csu.edu.au">rheath@csu.edu.au</a>
16 June	Seminar: Dr Ian Links , NSW DPI "Monitoring for disease in sheep abattoirs – improving productivity on-farm and in the supply chain"	NSW DPI Conference Room Wagga Agricultural Institute	<a href="http://www.dpi.nsw.gov.au/agriculture/livestock/sheep/health/shmp">http://www.dpi.nsw.gov.au/agriculture/livestock/sheep/health/shmp</a>
7 July	Seminar: Professor Je Weidenhamer, Ashland University, Ohio, USA. "Analytical systems for assessment of root exudates and bioactive constituents in the plant rhizosphere"	NSW DPI Conference Room, Wagga Wagga Agricultural Institute	Leslie Weston T: (02) 6933 2429 E: <a href="mailto:leweston@csu.edu.au">leweston@csu.edu.au</a>
26 July	Hart Field Site Winter Walk	South Australia	<a href="http://www.hart_eldsite.org.au">www.hart_eldsite.org.au</a>
27 July	Mixed Farming Forum	Temora	<a href="http://www.farmlink.com.au">www.farmlink.com.au</a>
26-28 July	NSW Grasslands Society Conference	Bathurst	<a href="http://www.grasslandnsw.com.au">www.grasslandnsw.com.au</a> Janelle Witschi, T: (02) 6369 0011 E: <a href="mailto:secretary@grasslandnsw.com.au">secretary@grasslandnsw.com.au</a>
4 August	Graham Centre Annual Beef Field Day	Joyes Hall, CSU, Wagga Wagga	Toni Nugent T: (02) 6938 1806 E: <a href="mailto:tnugent@csu.edu.au">tnugent@csu.edu.au</a>
5 August	Graham Centre Annual Sheep Field Day	Joyes Hall, CSU, Wagga Wagga	Toni Nugent T: (02) 6938 1806 E: <a href="mailto:tnugent@csu.edu.au">tnugent@csu.edu.au</a>
15-17 August	17th Australian Research Assembly on Brassicas (ARAB)	Wagga Wagga	Don McCaery T: (02) 6391 3648 E: <a href="mailto:don.mccaery@industry.nsw.gov.au">don.mccaery@industry.nsw.gov.au</a>
7 September	Graham Centre General Field Day	Graham Centre Field Site, Corner Coolamon & Prices Roads, Wagga Wagga	Deirdre Lemerle, T: (02) 6938 1667 E: <a href="mailto:dlemerle@csu.edu.au">dlemerle@csu.edu.au</a>
20-22 September	Henty Machinery Field Days		<a href="http://www.hmfd.com">www.hmfd.com</a>
4 October	Graham Centre Agribusiness Field Day	Graham Centre Field Site, Corner Coolamon & Prices Roads, Wagga Wagga	Deirdre Lemerle, T: (02) 6938 1667 E: <a href="mailto:dlemerle@csu.edu.au">dlemerle@csu.edu.au</a>

We are pleased to advertise your events for 2011. Please email details to Sharon Kiss ([sharon.kiss@industry.nsw.gov.au](mailto:sharon.kiss@industry.nsw.gov.au)) or Toni Nugent ([tnugent@csu.edu.au](mailto:tnugent@csu.edu.au)).