
The Graham Centre alliance is now five years old. The Centre was established in 2005 to improve the agricultural research outputs of CSU and I&I NSW. In the consultation draft *Grains Industry National Research, Development and Extension Strategy* of the Primary Industries Standing Committee – the Graham Centre is recognised as a Major Node for the Regional Network for Mixed Farming Systems of NSW Central Zone and NSW-Victorian Slopes. This is encouraging but there is still a long way to go in improving our links with industry and increasing our capacity to deliver science-based new knowledge. Our new Field Site will be launched on the 8th September (see feature in this edition), and this will play an important role in demonstrating our research and liaising with industry.

Since 2006, our publications in scientific journals and the number of research higher degree students have trebled, and research income has increased slightly. Construction of the National Life Sciences Hub during the next couple of years will significantly improve our scientific capacity.

The Graham Centre is a virtual centre and its strength and future growth rely on the active involvement of staff and students, and support from the parent institutions. While staff and student engagement is encouraged through a limited number of seed grants and support to attend conferences and workshops, the success of the Centre depends on attracting additional research income.

International collaboration is an important component of this and a number of our overseas activities are covered in this issue.

In our strategic planning and implementation for the next five years it is critical that we maintain a strong focus on the important issues facing the industry. The first Graham Centre Monograph Stubble Retention in Cropping Systems in Southern Australia: Benefits and Challenges (see page 10), is an important basis for some of our planned research. The Monograph is available from our website.

In the last 20 – 30 years agricultural industries have made enormous progress towards improved sustainability. It’s time that our farmers are rewarded by the government and consumers for the real cost of food production and environmental protection. Support for increased R&D is critical to underpin sustainable food production.

2010 is shaping up as a bumper year with crop and pasture growth looking very promising. We look forward to seeing you at our Field Site Launch.

Professor Deirdre Lemerle
Director
Ag Enrichment Day

Another successful Ag Enrichment Day was held on Friday, 11 June. Years 10 and 11 agricultural students from Gundagai, Tumut, Cootamundra, Wagga Wagga, Kooringal, Griffith and Murrumburra High Schools, and the Riverina Anglican College, were pleased with the hands-on experience gained from the various activities, including identifying skulls, determining salinity levels in soil and water, identifying different types of insects and weeds and performing ultrasounds on sheep.

Student training is a key role of the Graham Centre and this event has now been running for five years. It offers high school students the opportunity to observe and take part in work done by professional agricultural and animal scientists with the aim of demonstrating that a career in agriculture and related sciences is a worthwhile and viable future.

Ag Enrichment Day coordinator, Dr Gordon Murray, said: “One of the problems for the future is going to be food supply. New students coming in are vital to keeping up our level of preparedness and techniques.”

Feedback has been constructive and positive with plans already underway for next year’s event, which we anticipate will also be well attended.

Review of Internal Grants Scheme

Following a recent review of the Centre’s Internal Grants Scheme by the Research Management Committee, funding is now available for Conference Support Grants. This scheme replaces the Travel Grants scheme which has seen approximately $200K provided to 130 Centre Participants since 2005.

The objective of the new scheme is to provide financial assistance for researchers to attend national and international conferences (including workshops) to enhance their knowledge, activity and performance within the Centre’s research priority areas. The grants are open to active Centre members, including PhD Students.

The first round closed on 9 July and it is expected successful applicants will be announced by the end of July.

Pasture Profile of Australia

In September 2009, Graham Centre member Professor Ted Wolfe accepted an invitation from the Food and Agriculture Organisation (FAO) to write a pasture profile of Australia, one of a series that have been developed for the FAO’s Country Pasture Profiles website: http://www.fao.org/ag/AGP/AGPC/doc/Counprof/regions/index.htm.

The Australian profile took about three months to research, write and edit. A further three months elapsed before it was posted on the website, complete with maps and landscape photos provided by Ted plus pasture photos supplied by several pasture...
researchers, including Dr Brian Dear at Wagga.

“This assignment was one of the most satisfying tasks that I have attempted - ideal for an active retiree”, said Ted.

“There was a lot of material that I had written or edited previously - it was good to pull it all together. For the challenging section on tropical pastures, I received valuable assistance from Bruce Cook, a tropical forage specialist”, Ted continued.

The pasture profile series is an invaluable guide to the pasture livestock systems of more than 90 countries. The guide is potentially useful for undergraduate and postgraduate students, agricultural and environmental scientists, and farmers.

“The lack of an Australian overview was an embarrassment and its completion fulfilled a need”, said Ted.

A New Zealand profile is another recent addition. The coordinator of the website, Dr Stephen Reynolds (UK), recently indicated that a Canadian profile is proceeding, a contract is open for a USA profile, and France and Germany may soon follow.

“By the end of 2010, Steve expects there to be more than 100 country pasture profiles to be available on the website”, Ted concluded.

Graham Centre members might like to explore the website and read the Australian overview at: http://www.fao.org/ag/AGP/AGPC/doc/Counprof/Australia/australia.htm.

Further information: Emeritus Professor Ted Wolfe: 02 6922 4347, twolfe@csu.edu.au.

Student Activities

Kah Yaw Ee, PhD student, presented the following paper at the Public Health Association Australia Conference in Canberra in April this year. The Conference theme was “Food Futures: An Australian Approach” which is in line with major initiatives of the Graham Centre relating to Healthy Foods and Food Sustainability. His supervisors are Dr Jian Zhao, Dr Samson Agboola (CSU) and Dr Ata-ur Rehman (I&I NSW).

Extraction and Health Functional Properties of Wattle Seed Protease Inhibitors and Polyphenols

Kah Y. Ee, Jian Zhao, Ata-ur Rehman and Samson O. Agboola

Introduction

Wattle seed (Acacia victoriae Bentham) is one of the most economically viable native plants in Australia being considered as ingredients for food manufacture due to its high level of proteins and carbohydrates. At CSU, we have conducted series of studies on the extraction, purification, characterization and functionality of its extracts. We have previously studied the nutritional and food-functional properties of wattle seed extracts (Agboola et al., 2007; Ee et al., 2009; Agboola and Aluko, 2009). Further investigation revealed the presence of a Kunitz-type trypsin inhibitor (Ee et al., 2008; Ee et al., 2009), and major phenolic compounds were recently extracted and characterized using RP-HPLC and GC-MS. The potential beneficial effects of antinutrients and phytochemicals in plant foods, including protease inhibitors (PI) and polyphenols (PP), on human health are
increasingly being recognized. We hereby present in vitro health functional properties of PI and PP of varying degrees of purity, by analysing their antioxidant and antimicrobial activities, angiotensin-converting enzyme (ACE) inhibition (anti-hypertensive activity), cytotoxicity, anti-tumour activity and the possibility of synergy between PI and PP.

Results and Discussion

- Wattle seed PI, including crude extract, (NH$_4$)$_2$SO$_4$ precipitate (AS-2), fractions obtained from column chromatography (3-I, G-90m) and purified extract (AvTI) were obtained as in previous studies (Ee, et al., 2008; Ee, et al., 2009). Extracts were also obtained from hydrolysed or non-hydrolysed wattle seeds by aqueous mixtures of organic solutions to obtain total or free phenolic constituents.

- The on-line reverse phase-high performance liquid chromatography-post column derivatization (HPLC-PCD) was an antioxidant analysis using ABTS free radical solution. Figure 1 shows that the HPLC-PCD profiles of wattle seed PP are similar irrespective of extraction medium. Succinic and gallic acids were identified as the major and active components, respectively, in all extracts.

- Antioxidant activity of wattle seed extracts was approximately 99.7% (TE) contributed by bound phenolic acids. Corresponding results of other studies showed that 58–90% of total phytochemicals in the insoluble-bound form present in cereal grains and legumes were the major contributors to the antioxidant activity (Adom and Liu, 2002; Han and Baik, 2008; Madhujith and Shahidi, 2009).

- Good correlation was found between the antioxidant activities determined by the ORAC, DPPH and ABTS assays (Figure 2A). Total phenolic acids showed high antioxidant activity in all the assays; however, the antioxidant activities of AvTI and free phenolic acids were much lower in comparison. Figure 2B indicates that the antioxidant synergy is biased towards the PP content in comparison to the PI extracts.

- Cytotoxicity screening models provided preliminary data on potential antineoplastic properties of wattle seed extracts. High level of LD$_{50}$ values indicated low toxic effect on brine shrimps. Of all extracts, the lowest LD$_{50}$ value (239.88 ± 4.57 ppm) was obtained from AvTI. This toxic potency was however lower than the protein extract of Phaseolus acutifolius (LD$_{50}$ 3.0 ppm) which claimed to have trypsin inhibitory effect and cytotoxicity on human colon cancer cells (Lopez-Martinez et al., 2008).

- All samples were revealed to have captopril equivalent (CapE) values lower than standard captopril concentration that inhibits ACE by 50% (IC$_{50}$ = 0.028 µg/mL), except the free phenolic acids (0.0390 ± 0.0037 µg CapE/mL) of wattle seeds.

- In vitro studies of all extracts showed no significant antibacterial, antifungal, antiparasitic, antitumor or insecticidal activities.

![Figure 1. High performance liquid chromatography-post column derivatization (HPLC-PCD) profiles of (A) aqueous methanol (80%)-extractable phenolics; (B) aqueous acetone (70 %)-extractable phenolics; (C) total phenolic acids; (D) free phenolic acids. Peak 1: succinic acid; Peak 2: gallic acid.](image-url)
Conclusion

This study indicated that compared to the protease inhibitor, phenolic compounds of wattle seed possessed better potential health-functional properties. As most wattle seed in Australia is consumed in the roasted form, research is continuing on the beneficial effects of roasted wattle seed extracts.

New ACIAR-funded Project

Congratulations to Prof Len Wade, whose project, Developing Improved Farming and Marketing Systems in Rainfed Regions of Southern Lao PDR has been funded by ACIAR. The project is a collaboration between Charles Sturt University, the University of Queensland, I&I NSW, the International Rice Research Institute and the International Center for Tropical Agriculture. The Lao collaborating institutions include the National Agriculture & Forestry Research Institute, the National University of Laos and Provincial Agriculture and Forestry offices. The overall aim of the project is to improve food security and rural livelihoods in the rainfed uplands and lowlands of southern provinces of Lao PDR.

Canola Yield Decline

The final publication summarising results from the GRDC funded ‘Canola in Depth’ project has been produced by FarmLink on behalf of the project research team from the EH Graham Centre, CSIRO, FarmLink and Vic DPI.

The conclusions were:

- **Subsurface compaction:** Canola is not expected to respond to deep ripping where compaction (penetrometer resistance) is less than 3MPa. Above 3MPa, a response to deep ripping is possible but the economic viability depends on its residual value. The use of tap-rooted species (including canola) over a number of years may be preferable.

- **Subsurface acidity:** Canola appears to be relatively tolerant of subsurface acidity, except where exchangeable aluminium exceeds 20%, manganese is toxic, or where the acid ‘throttle’ is greater than 20 cm deep. Typical subsurface acidity can be managed by liming the surface to pHca 5.5 and by using acid tolerant varieties.

- **Subsoil sodicity:** Canola is not expected to respond to deep placement of gypsum unless subsoil exchangeable sodium levels are above 15% and growing season rainfall exceeds 400 mm.

- **Subsoil salinity:** Canola appears relatively sensitive to subsoil salinity, although effects can be masked in a favourable season. EM surveys combined with strategic soil sampling can identify saline paddocks that may be better suited to a more tolerant species, e.g. barley.

Overall, canola appears to be generally tolerant of subsoil constraints. Other than late-season water stress, disease remains the major factor limiting canola yields in south-eastern Australia.
Dr Rolando T Cruz

Dr Rolando T Cruz (Rolly) is on a one-year sabbatical with Prof Len Wade, working on the Generation Challenge Project on ‘Drought Avoidance Root Traits for Enhancing Productivity of Rice under Water-Limiting Environments’ at the EH Graham Centre for Agricultural Innovation.

Before coming to Wagga Wagga, Rolly was Leader of the Favorable Rice Ecosystem Program at the Philippine Rice Research Institute (PhilRice). The Program had component projects from plant breeding and biotechnology to pest management. A major accomplishment of the Program was the development of the PalayCheck System (Palay means rice) of Integrated Rice Crop Management for irrigated systems that increased on-farm rice yields by an average of one tonne per hectare. The PalayCheck System is now included in the National Rice Program of the Philippine Department of Agriculture.

An earlier major interest of Rolly’s was plant stress physiology, having worked on drought resistance at the International Rice Research Institute (IRRI), PhD thesis on sorghum root hydraulic conductivity and structure at Texas A&M University, and post-doctoral work on enzyme activity in fruits in response to low oxygen at Michigan State University.

With the sabbatical research on drought avoidance root traits at the Graham Centre and at I&I NSW’s Yanco Agricultural Institute, Rolly has rekindled his interest in plant stress physiology. He has started work on rice genotypic variation in root growth in response to water deficit and mechanical impedance. Soon he will initiate basic studies on non-hydraulic root to shoot signalling, an ‘early warning response’ to water deficit and osmotic adjustment in leaves and roots in relation to turgor maintenance and growth. Rolly has authored/co-authored papers in international journals, book chapters, technical bulletins and handbooks, received recognitions from Philippine national scientific societies, and the Rank of Scientist I from the Department of Science and Technology.

Dr D (Viji) Vijayalakshmi

Endeavour Postdoctoral Research Fellow, Dr D (Viji) Vijayalakshmi, is keen to develop long term research collaborations focused on abiotic stress tolerance in cereals between India and Australia.

Viji is one of 117 recipients world wide of the Australian Government’s internationally competitive, merit-based 2010 Endeavour Research Fellowship award, and is in Australia for six months (until 30 November), based at Wagga Wagga, working with Prof Len Wade and his team of researchers at the Graham Centre.

Viji is an Assistant Professor of Crop Physiology with the Centre for Plant Molecular Biology of Tamil Nadu Agricultural University, Coimbatore City, India, where she is involved in research on developing rice varieties tolerant to abiotic stresses like high temperature, drought, salinity and submergence.

Currently she is the Principal Investigator for two externally funded projects namely, “Marker Assisted Introgression of sub1 locus conferring tolerance to flooding in rice” funded by the Government of India and “Engineering rice for drought tolerance using dreb 1 transcription factors” funded by University Grants
The Commission of Indian Government. She is involved as co-researcher in the project “Genetic and molecular dissection of high temperature tolerance in rice”.

The proposal for her post doctoral research at CSU, which, in association with Prof Len Wade, is on elevated temperatures and heat tolerance in wheat/rice. The overall objective of this research will be to quantify the effects of high temperature on the physiology of wheat and to develop a protocol for screening lines for tolerance to elevated temperatures, which will be used internationally to phenotype and map this important trait in wheat and rice.

She wants to utilise her time in Australia to identify the research issues of mutual interest for proposing collaborative research projects with Prof Len Wade and his team on the subject of abiotic stresses in cereals in future which could be applicable for both countries.

Both Viji and Rolly presented seminars on their current research on 24 June.

China

Protecting rice against pests - ecologically

Professor Geoff Gurr is currently working with the International Rice Research Institute (IRRI) on a project that aims to put rice production on a more sustainable footing. Rice production in the tropics of Asia has a long history and billions of humans now depend upon this production system for their food staple. Rice eaters and growers form the bulk of the world’s poor. Since the green revolution’ of the 1970s, traditional production approaches have changed radically by the introduction of higher yielding varieties and higher inputs. But recent years have witnessed a resurgence of insect pests, especially planthoppers which cause devastating damage termed ‘hopperburn’ and transmit a range of plant viral diseases. Dramatic yield losses have resulted as pest populations develop resistance to widely used insecticides and rice variety resistance breaks down. It is currently estimated that China, the world’s largest rice producer, loses about a million tons of rice from planthopper outbreaks annually, in some years as much as 2.8 million tons.

The escalating problems of pest losses in rice have prompted the Asian Development Bank to fund a major project focusing on new strategies to combat the damaging ricehopper pests. The ‘Ricehoppers’ project (http://ricehoppers.net/) includes programs of work aiming to breed better varieties and to monitor insecticide resistance. Prof Gurr is helping to lead a program on ‘ecological engineering’, a strategy that uses knowledge of the ecological characteristics of the pests to suppress them in a natural and sustainable manner. Already, this research has found encouraging results from ecological techniques such as growing sesame on the earth banks that surround rice fields. The flowers of this plant provide nectar to parasitic wasps that attack pests. Year one results in eastern and southern China, as well as Vietnam, suggest that the elevated numbers of beneficial insects lead to fewer planthopper pests.

So encouraging are the initial results that Prof Gurr was one of dozens of participants in an international workshop held in...
Bangkok to develop extension material to communicate to farmers the advantages of ecological engineering. Prof Gurr will be based at Zhejiang University in eastern China throughout the second half of 2010 as this project expands in scope.

Further information: Prof Geoff Gurr, ggurr@csu.edu.au.

The Philippines

PhD collaborative research discussions at IRRI, Philippines, April 2010

PhD student, Dante Adorada and Associate Professor Gavin Ash visited the International Rice Research Institute (IRRI), Laguna, Philippines 12-16 April 2010. The purpose of their visit was to meet with IRRI scientists for PhD collaborative research discussions, and meetings for further research collaboration in rice pathology and breeding.

Mr Adorada and Dr Ash were able to inspect the IRRI facilities and evaluate their capacity to conduct high quality research. The facilities, equipment and staff expertise are outstanding and have the capacity to carry out any type of rice research. Due to import restrictions in both Australia and the Philippines, it was decided that a portion of Mr Adorada’s PhD research will be conducted at IRRI. Aside from this collaborative PhD research, other collaborative projects linked to his project were already being conceptualised with IRRI scientists. Collaboration will be done in:

- rice pathology research with Dr Casiana Vera Cruz
- sequencing projects with Dr Mike Thomson
- exploring African rice resource and abiotic stress effects on rice diseases with Dr Glenn Gregorio,
- disease effects on rice grain quality with Dr Melissa Fitzgerald, and
- exploring available sources of genes for desirable traits with Dr Ed Redoña and the GRC group.

Dr Casiana Vera Cruz has been appointed as a CSU Adjunct Associate Professor, and will also be part of Mr Adorada’s PhD supervisory committee. This opens up the possibility of intellectual exchange, student scholarly travel, joint supervision of students, and the like. Mr Adorada and Dr Ash also visited the nearby University of the Philippines at Los Baños. This university caters to IRRI scholars for their academic needs and is another institution that we can explore for possible student exchange and scholars.

The visit resulted into a collaborative project in rice pathology with Drs Casiana Vera Cruz (Senior Plant Pathologist) and Glenn Gregorio (Senior Rice Breeder) of the Plant Breeding, Genetics and Biotechnology Division of IRRI, looking into evaluating rice germplasm for resistance to *Pseudomonas fuscovaginae*, the causal organism of the rice sheath brown rot disease. Talks are underway for further research collaboration in rice pathology and breeding.

A/Prof Gavin Ash inspects the CO₂ chamber being used in the C₄ project with Ms Jacqueline Dionora, and (at right) the salinity and sodicity screening in concrete beds with Dr Glenn Gregorio. Photos: Dante L. Adorada.
Balancing Farm Business and the Environment

A forum attended by about 40 people at Henty discussed how best to balance agricultural production and sustainable management on the high-value land of the mixed farming zone of the South West Slopes.

It was a culmination of a two-year collaboration between the EH Graham Centre and the Eastern Riverina Landcare Network, funded under the DAFF Caring for our Country Sustainable Practices Program, coordinated by the Centre’s Research Liaison Officer, Helen Burns, and including I&I NSW soil scientist, Iain Hume and Albury district agronomist, Janet Walker.

The forum brought together farmers, technical experts, NRM managers and bankers to consider the progress being made in environmental management in mixed farming systems, the impact on profit and production in setting aside land to improve biodiversity areas and the potential of a National Environmental Stewardship Initiative.

Local farmer, and member of the project steering committee, Steven Scott, said, “There have been significant changes in farmers’ attitudes to land management since the 1980s and the forum provided an opportunity to step back and consider what has been achieved”.

His wife, Cindy, said the forum was helping farmers find the “elusive balance” between production and environmental sustainability.

“People here want to improve the environment and they want to know how they can finance it,” she said.

“One thing that has become very clear is that the government and the private sector must come to the table to help us achieve significant bio-diversity gains because for the average farmer in this climate there has to be a financial incentive,” she said.

Dr Sue McIntyre from CSIRO’s Sustainable Ecosystems said the farmers at the forum were very receptive. “A lot of ecological benefits are not easily measured, but they are still of huge importance to the agricultural landscape,” she said.

According to Dr McIntyre, sustainable land management is about finding a balance between immediate production needs and what is necessary to keep ecosystems functioning and recognising the actions that would provide greatest benefit.

“It is possible to achieve greater biodiversity outcomes by being smarter in the way we manage existing assets,” she said.

A paper arising from discussion prompted by the forum is currently being prepared and will soon be available on the Graham Centre website.

New Website to Monitor Soil Moisture Under Crops

A unique website, The Soil Moisture Bank, is undergoing final checks before its release in late July. It will be hosted by the Graham Centre website.

The Soil Moisture Bank is being piloted in the Henty area and will provide farmers with up-to-date soil moisture readings under indicator crops of canola and wheat across a range of soil types common to the area. Data provided will allow informed crop management decisions based on estimates of plant available soil moisture to depth.
The website is a major product developed during a two-year project run by the EH Graham Centre for the Eastern Riverina Landcare Network, with funding from the Federal Department of Agriculture, Fisheries and Forestry under its Caring for our Country Program.

Key Graham Centre staff involved in the project are Soil Scientist Dr Iain Hume, Research Liaison Officer Helen Burns, and District Agronomist at Albury, Janet Walker.

Congratulations!

CE Bessey Award

Congratulations to Dr Geoff Burrows, the recipient of the CE Bessey Award for Excellence in Botanical Education. The award was announced in the summer issue of the Plant Science Bulletin, 56(2) 2010.

The Botanical Society of America was established in 1893 and has over 6,000 members from over 80 countries.

Review in ‘Science’

Prof Len Wade is a co-author of an important review recently published in Science (June 2010, Vol 328, pp 1638-1639), on the potential of perennial grain crops to meet future food needs.

Increased Food and Ecosystem Security via Perennial Grains


Despite doubling of yields of major grain crops since the 1950s, more than one in seven people suffer from malnutrition (1). Global population is growing; demand for food, especially meat, is increasing; much land most suitable for annual crops is already in use; and production of nonfood goods (e.g., biofuels) increasingly competes with food production for land (2). The best lands have soils at low or moderate risk of degradation under annual grain production but make up only 12.6% of global land area (16.5 million km$^2$) (3). Supporting more than 50% of world population is another 43.7 million km$^2$ of marginal lands (33.5% of global land area), at high risk of degradation under annual grain production but otherwise capable of producing crops (3). Global food security depends on annual grains—cereals, oilseeds, and legumes—planted on almost 70% of croplands, which combined supply a similar portion of human calories (4, 5). Annual grain production though, often compromises essential ecosystem services, pushing some beyond sustainable boundaries (5). To ensure food and ecosystem security, farmers need more options to produce grains under different, generally less favorable circumstances than those under which increases in food security were achieved this past century. Development of perennial versions of important grain crops could expand options.

Monograph Series

The ‘EH Graham Centre Monograph Series’ aims to publish in-depth, peer-reviewed scientific reviews on topics relevant to farming systems in temperate Australia. The Series will provide an avenue for the compilation and publication of scientific and other publicised literature on a particular topic. It will document current scientific understanding in a form that is accessible and relevant to a wide audience, including researchers, students, advisors and leading farmers; it will identify information gaps and help develop future research direction.

The first Monograph, Stubble Retention in Cropping systems in Southern Australia: Benefits and Challenges, is now available on our website.
Recent Happenings

Representatives from Papua New Guinea’s University of Technology visited Charles Sturt University in May to sign a Memorandum of Understanding between the two universities. From Left: Prof Abdul Halim, Dr Misty Baloiloi (Vice Chancellor, University of Technology), and Prof Ross Chambers (Deputy Vice-Chancellor & Vice-President (Academic), CSU). Photo: John Kent.

Graham Centre Director, Professor Deirdre Lemerle, has returned from a visit to China as part of an official delegation which represented Australia in Shanghai and Beijing from 7-11 June. The delegation, led by Australia’s Governor-General, Her Excellency Ms Quentin Bryce, included a group of Australian women selected to portray Australia’s achievements to an audience of 70 million people expected to visit the Australian Pavilion at the 2010 Shanghai World Expo.

Professor Deirdre Lemerle (far right) and Her Excellency Ms Quentin Bryce (centre) with some of the Australian and Chinese women who featured in the documentary ‘Sisters’. Photo: Anna Willett Photography.

Research Centre Fellows

Congratulations to the following CSU academic staff who have been selected as 2010 Research Centre fellows to continue working on the Graham Centre’s research priorities areas:

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<th>Dr Gaye Krebs</th>
<th>animal nutrition</th>
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<td>Assoc Professor Gavin Ash</td>
<td>biological control</td>
<td>Mr Jan Lievaart</td>
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<td>Dr Karl Behrendt</td>
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In The Limelight

Professor Leslie Weston

Position: Strategic Research Professor, Plant Biology and Weed Science
Organisation: Charles Sturt University

Career Brief

- BS Cornell University; Plant Breeding
- MS and PhD Michigan State University; Pesticide Research Centre in Weed Science and Plant Physiology
- 1986-1998: University of Kentucky, Assistant and Associate Professor of Horticulture and Weed Science
- 1998-2008: Cornell University, Associate Professor of Floriculture and Ornamental Horticulture and Weed Science
- 2008-current: Charles Sturt University, Research Professor of Plant Biology

Research and Teaching Activities and Interests

Research activities

Studies on the biology of invasion of weed species in Australia; biological activity and rhizosphere interactions of plant roots and their exudates; mode of action of allelochemicals and nutriceuticals.

Teaching activities

In the past, I taught analytical chemistry, plant physiology, weed science and horticulture classes for undergraduates and postgraduates.

Professional Links

- Past and current member of Weed Science Society of America
- American Society for Horticultural Science
- International Society of Chemical Ecology
- Asian Pacific Weed Science Society
- American Chemical Society
- Past editor of Weed Technology and current editorial board member for Weed Biology and Physiology
- Frequent reviewer for Plant Soil and Journal of Chemical Ecology

A typical day for me includes … Meeting with my students, corresponding with past students, advisees and current honours students, working in the laboratory, attending many meetings related to the NaLSH building project or weed steering committee to develop a CRC bid and national research agenda.

My main project at the moment is … studies on the biology and chemistry of novel anthroquinones produced by Echium roots and trichomes; development of efficient extraction and separation protocols for novel plant secondary products.

My favourite part of my job is … working in the laboratory on my own research and seeing my students successfully complete a challenging thesis project.

When I am not in the office I like … to work in my flower gardens, spend time riding or training my horses, or hiking/bird watching with the dogs.

Current CD in my car is … Kanye West and Bruce Hornsby & the Range.
Dr Andrew Milgate

Position: Research Plant Pathologist, Southern NSW

Organisation: Industry & Investment NSW

Career Brief

- Undergraduate University of Newcastle
- PhD University of Tasmania, 2000
- Appointed Wheat Breeder NSW Agriculture, 2007
- Appointed Plant Pathologist I&I NSW.

Research and Teaching Activities and Interests

Research activities

- Resistance breeding for a range of foliar disease in wheat.
- Developing a better understanding of the genetic control of yield in dryland and irrigated systems.
- Providing information to farmers they can act on to make better choices to improve their returns from cropping.

Teaching activities

- Supervisory panel member for PhD student, Ben Ovenden
- Guest lecturer for A/Prof Gavin Ash

Professional Links

- Australasian Plant Pathology Society
- American Phytopathological Society
- Australian Wheat Breeders Association
- Australian Cereal Rust Control Program
- Wagga Wagga Plant Pathology Group

A typical day for me includes … responding to emails; discussing project activities with my technical team. Depending on the season, responding to grower and agronomist requests for information relating to disease management and processing diagnostic samples. Scoring trials for traits of interest, analysing data and then writing the reports/publications.

My main project at the moment is …

- High yielding winter cereal genotypes for irrigated environments of south east Australia (GRDC and ICF)
- Novel approaches to drought tolerance using association genetics (NSW Biofirst)
- Integrated disease management for cereal and broad leaf crops in southern NSW and northern Victoria (GRDC)
- National variety testing for Septoria tritici blotch, stripe rust and leaf rust (GRDC)

My favourite part of my job is … talking to growers and agronomists about our work and getting feedback about what they have taken back to their farms to implement. Also talking to other researchers about problems and coming up with creative projects to solve them.

When I am not in the office I like … spending time with my family. I have two little girls who are great at taking my mind off work. One of these days I’ll get to do more sailing.

Current CD in my car is … I don’t have a CD, on the IPod my favourite at the moment is Nick Cave – Babe I’m on Fire!
Official Launch of the Graham Centre Field Site
9.00 am, Wednesday, 8 September 2010
Cnr. Coolamon and Prices Roads, Wagga Wagga

Demonstrations will include:

- Biochar for carbon capture
- Herbicide resistance management
- Forage crops for feed gaps
- Moving to controlled traffic
- Crop tolerance to herbicide spray grid
- Soil pit
- Historical wheats
A Sneak Preview
of this year’s already sown demonstrations

Mannus oats + Morgan field peas sown 4 May. Cereal/legume crops grown specifically for hay or silage provide a reliable, high yielding forage option for southern NSW.

Controlled traffic wheat crop was sown mid-May. Yield Profit® predictions will be provided.

Forage canola crop – late sown (left), early sown (right).

Albert Oates investigating soil compaction using a cone penetrometer, in stubble retention conservation farming systems.

Field peas in crop tolerance to herbicides spray grid show crop damage risks from commonly used herbicides.

A range of wheat varieties released between 1901 - 2009 demonstrate genetic gains from plant breeding.
Increasing collaboration with the Murrumbidgee CMA

The Centre is going into partnership with the Murrumbidgee CMA with three new initiatives:

**Focus Farm Wetland Study:** This $257,000 joint project, with the Institute for Land, Water and Society is a two-year project which intends to rectify a gap in scientists’ knowledge of rain-filled wetlands in Australia. It will also increase the rural community’s involvement in the conservation of these wetlands by developing their knowledge and skills via Focus Farm Wetlands Study groups.

The project will run in two different geographical areas of the Murrumbidgee Catchment with different farming systems and climate zones - mixed farming (mid Murrumbidgee Catchment - Coolamon district) and semi-arid grazing (lower Murrumbidgee - Hay district).

**Compost Research:** The Graham Centre has recently been successful in obtaining a grant of $20,000 to conduct research into the agronomic impact of organic composts. The Murrumbidgee CMA recently announced the grant which will be used to support local dairy farmers looking at new ways to utilise ‘waste’ from dairies. This follows a similar grant provided by Landcare Australia in 2008 to initiate research in this area.

Research Agronomist Richard Hayes, is working with the Inland Elite Dairy Network to continue this research. In contrast to the large responses observed with high application rates (60 t/ha) of compost in the high rainfall zone, the benefits of applying more commercial rates (< 5 t/ha) of compost to a paddock on a dairy farm at Euberta, west of Wagga, were not obvious. The project team will now look to continue this research in the field and in the glasshouse to help inform farmers of the benefits (or not) of applying composts to broadacre agriculture.

**Field Site Sponsorship:** The Centre has also received sponsorship from the Murrumbidgee CMA towards further development of its newly established Field Site.

Secretariat

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Spring Edition of The Innovator

The Spring Edition of The Innovator will be released October 2010. Submission of articles for this edition closes on **Friday, 17 September 2010**. Please email articles to Sharon Kiss.