

the Innovator

The Newsletter from the EH Graham Centre for Agricultural Innovation

SPRING 2007 EDITION

CHARLES STURT
UNIVERSITY



NSW DEPARTMENT OF
PRIMARY INDUSTRIES

Message from the Director

Welcome to the second edition of the Innovator. Thank you to those who gave us positive feedback on our Winter Edition.

Since then we have had a very busy three months, including a number of major events (Riverina Outlook Conference, Weed Management Field Day), many visitors, new students, significant progress in the development of our new research initiatives and a number of new research grants. More detail of our progress is provided in this newsletter.

Despite drought again this year, many growers continue to show considerable capacity to respond to the challenges of a variable and changing climate. Many crops have been cut for silage and hay, providing income and fodder for feed gaps. This has highlighted the need for more research into forage conservation to improve its efficiency, and reinforces the importance of our National Forage Conservation Initiative launched at the Outlook Conference in August.

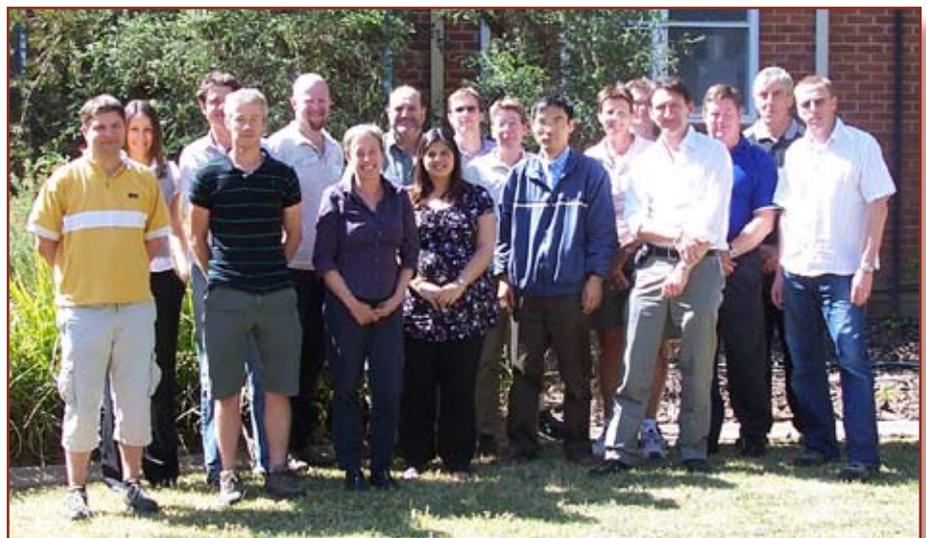
The ongoing drought is having a huge impact on the Australian environment, its people, and our capacity to feed ourselves. Lack of water has drastically reduced local food production and food prices are escalating for consumers. Lack of groundcover is leading to soil erosion, invasion of new weed species, and reduced biodiversity in agricultural landscapes. Australian farmers are highly skilled at drought management but the droughts of the last few years are amongst the worst on record and are severely testing farmers' resilience. Drought is reducing land managers' capacity to protect the environment and make a profit from production. The social and economic effects are huge. Government and industry must support land managers if Australia is to be self-sufficient in food production, earn export dollars, and for agriculture to remain environmentally sustainable. Our research equips farmers with the tools they will need to recover from drought.

Prof Deirdre Lemerle

Major Activities

Formation of Graham Centre Bio-Protection Research Team

Members of the new Australian Centre for Bio-Protection Initiative met in Wagga Wagga mid-October, uniting entomologists, pathologists and weed scientists in the development of a new innovative program aimed at non-chemical and ecologically-based management tactics for agricultural pests.



THIS ISSUE

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Riverina Outlook Conference

Over 100 people attended the Graham Centre Riverina Outlook Conference on Thursday the 23rd August. It was a very successful day and shone the light on some interesting issues as well as allowing for some great networking to take place with others in the industry. Key speakers and topics included:

- Stuart Pearson, Land & Water Australia - 'Greenhouse gas emissions - how is agriculture addressing this'
- Andrew Bouffler, Lockhart Farmer and 2007 Nuffield Scholar - 'The Impact of Globalisation on Australian Agriculture'
- Jason Alexandra, Farmer and Conservationist - 'Environmental stewardship'
- Leo Hyde, Research & Development Manager, Dupont (Australia) Limited - 'Biofuels - the potential impact on crop production'
- Rex Stanton, Weed Scientist, EH Graham Centre - 'New weed issues: managing 'sleeper' weeds'
- David Sackett, Consultant, Holmes Sackett & Assoc - 'Opportunities in livestock production'
- John Wilkins - Livestock Research Officer, NSW Dept. of Primary Industries - 'Breeding and management for targeted beef markets'

The conference was sponsored by Land & Water Australia, Australian Centre for International Agricultural Research, Commonwealth Bank Agribusiness, Management Opportunities for Rural Enterprises (MORE), Westpac Agribusiness, and Grain Growers Association.

The Riverina Outlook Conference is an annual event and the next is scheduled for Thursday 14th August 2008. Proceedings for 2007 are available upon request.



Speaker Mr Andrew Bouffler (Nuffield Scholar), Mr Geoff Casburn (NSW DPI) and Mr James Crawford (Agri Partners).



Speakers Mr David Sackett (Consultant) and Mr Mick Keogh (Executive Director, Australian Farm Institute) with Prof Jim Pratley (Graham Centre).

Weed Management Field Day

The Graham Centre Annual Field Day was held on Thursday the 18th October; the theme was Weed Management. Due to the drought, the event became a virtual field and was held at the NSW DPI Conference Room. Despite being held indoors, this did not deter a few flies and over 65 farmers, agronomists, consultants, noxious weed officers and others interested in weeds and their management.



Dr Hanwen Wu addresses the Graham Centre field day about ways to reduce risks of herbicide resistant weeds.

Twelve presenters covered a broad range of issues, starting with a focus on weeds in cropping systems, including: the factors that cause herbicide resistance (Dr Hanwen Wu); the current levels of resistance in the region (Mr John Broster); integrated weed management to retard the spread of resistance, including the use of non-chemical control options such as smother crops, and green manures and cutting for silage or hay (Mr Eric Koetz); the economic importance of preventing weed seed-set and seedbank replenishment (Dr Randall Jones); the pros and cons of GM canola for resistance management (Dr Rex Stanton); issues influencing the damage caused to crops from herbicides (Mr Peter Lockley); and a farmer's perspective on integrated weed management (Mr Murray Scholz - Nuffield Scholar).

The second part of the day discussed the invasiveness and spread of garden (and other) species - including Patterson's Curse (Prof Richard Groves); the importance of recognising potentially invasive species (Ms Annette Beer); opportunities for biological control, especially in pastures and conservation areas (Mr Barry Sampson); new research examining

potential control of silver leaf nightshade and prairie ground cherry, both deep-rooted summer weeds, using herbicides, competitive pastures, biocontrol and allelopathy (Dr Rex Stanton); and finally the legislative requirements of landholders to manage the various categories of noxious weeds (Dr Stephen Johnson).

This field day was sponsored by the NSW Weeds Society.

Henty Field Days

The Graham Centre's display at this year's Henty Field Days showcased the Organic Spelt Wheat Project which is funded by the Rural Industries Research and Development Corporation (RIRDC). Over 20,000 people visited the Field Day this year.



Prof Deirdre Lemerle and Mrs Helen Allen at the Graham Centre Stall at Henty.

Travel Grants - Second Round 2007

The Graham Centre awarded Travel Grants to centre members to assist them in attending national and international conferences.

| Recipient | Reason | Destination |
|-------------------|---|--|
| Nicholas Sangster | World Association for the Advancement of Veterinary Parasitology Conference | Belgium (plus visits to Saudi Arabia & Germany) 12-30 Aug 07 |
| Gavin Ash | 9 th International Congress of Plant Pathology | Torino, Italy, 22 Aug 1 Sep 08 |
| Raymond Cowley | 16 th Biennial Australasian Plant Pathology Society Conference | Adelaide, 23-28 Sep 07 |
| Melissa Gan | 16 th Biennial Australasian Plant Pathology Society Conference | Adelaide, 23-28 Sep 07 |
| Guangdi Li | 2007 International Annual Meetings of American Society of Agronomy, Crop Science Society of America and Soil Science Society of America | New Orleans, Louisiana, USA 1-11 Nov 07 |
| Harsh Raman | Plant & Animal Genome Conference | San Diego, California, USA, 12-16 Jan 08 |
| Rex Stanton | 5 th International Weed Science Congress | Vancouver, Canada, 21-30 Jun 08 |
| Hanwen Wu | 5 th International Weed Science Congress, | Vancouver, Canada, 22-27 Jun 08 |
| Mark Stevens | XXII International Congress of Entomology | Durban, South Africa, 3-14 Jul 08 |

EH Graham Centre Postgraduate Research Scholarships 2008

The EH Graham Centre will be offering two full-time Postgraduate Research Scholarships in 2008. Scholarships are open to students intending to take up research reflecting the EH Graham Centre research priorities. Applications must be received at the EH Graham Centre by Friday 23rd November 2007. Should you require further information or wish an application form to be sent to you please contact the Centre Business Manager Karryn Murray (02 6938 1989, kamurray@csu.edu.au).

New Australian Research Council (ARC) Discovery Grant

Centre members A/Prof Gavin Ash, Dr Jason Condon and Dr Mark Conyers have been successful in receiving an Australian Research Council Discovery Grant for their project 'Fingerprinting the soil microbial metagenome'.

Project Summary: Soil-based problems costs Australia over \$2700 million annually. Many of these problems are man made. Soil biodiversity is an indicator of soil quality and sustainability. This innovative project will quantify and benchmark soil diversity in Australian agriculture using sophisticated, novel genotyping methods (Diversity Arrays Technology). The results are expected to provide a low-cost method of benchmarking soil biodiversity which will lead to enhanced sustainability and profit in Australian agriculture, and will place Australia at the forefront of this highly competitive research field.

AgFund Application Success for Forage Conservation

The Graham Centre has been awarded \$55,000 by the Department of Agriculture, Fisheries and Forestry as part of its Advancing Agricultural Industries AgFund Program. The project is titled 'Building linkages, improving information flow and risk management

strategies for profitability and sustainability in a variable climate'. The aim of this project is to access relevant economic data in combination with best management practice for livestock, crop and pasture enterprises that ensure long term productivity, viability and sustainability. This is part of the Graham Centre Forage Conservation Research Initiative.

The Graham Centre will be working in conjunction with the Alma Park and Pleasant Hills Landcare group who will be providing an in-kind contribution of \$46,146 to the project. Graham Centre members Helen Burns, Tom Nordblom, Richard Culas, John Piltz and Belinda Hackney will be working closely with the Landcare group on this project.

The Changing Face of CSU

A/Prof John Kent - Head, School of Agricultural and Veterinary Sciences, CSU, Deputy Director, EH Graham Centre.

CSU has undergone many changes in recent years in response to demands imposed by the Federal Government and to position itself for the future.

CSU has determined that it will build on current strengths and regional focus, with agriculture and rural health at the forefront, and establish itself as the national university for inland Australia. In order to achieve this, many sections of the University have undergone reviews and restructures. At the beginning of 2007 the creation of the Faculty of Science brought together all the sciences in one group with the result that the health, agricultural, environmental and applied sciences are more easily able to work together and collaborate in teaching and research. These synergies for the Graham Centre initiatives like stubble management and paddock-to-plate food production, bring together diverse research groupings for a common goal.

The current School of Agricultural and Veterinary Sciences is experiencing a period of very rapid growth as staff and student numbers increase through the roll out of the Veterinary Science and Animal Science programs. This has brought with it a major investment in both teaching and research facilities with this investment to continue for some years with further essential building construction and refurbishment.

Following a review of "agriculture" at CSU earlier this year, it has been decided that to facilitate efficient administration and further enhance collaboration and effort, the current School of Agricultural and Veterinary Sciences, the School of Wine and Food Sciences, and the School of Rural Management at Orange will be disestablished, and from January 1 2008 two new schools will be created: the School of Agricultural and Wine Sciences (SAWS), and the School of Animal and Veterinary Sciences (SAVS). SAWS will encompass all the "plant" related disciplines of agriculture, viticulture, wine science, agribusiness/farm management, production horticulture, environmental horticulture, organics and applied sciences including chemistry and have staff at both Wagga Wagga and Orange. SAVS will encompass veterinary science, animal science and equine science. Obviously the two schools will be working together in teaching, research and use of facilities and resources and will have a strong involvement in the Graham Centre.

I look forward to the future with great anticipation because of the great opportunities and synergies that the new collaborations will bring.

International Visitors & Visits

Pakistan and China Visitors

Dr Paul Prenzler - Senior Lecturer in Chemistry, School of Wine and Food Science, Charles Sturt University

Three overseas visitors joined my group at the end of August. Ms Samia Inayatullah is a PhD student from Quaid-i-Azam University in Pakistan and she will be working with myself and Dr Ata Rehman from DPI on characterising antioxidant and bioactive compounds from traditional medicinal plants. She is supported by a Pakistani government HEC scholarship and will be with our group for 6 months.

Ms Long Qizhi and Ms Cao (April) Qingming are PhD students from Central South Forestry University in China. They will be working on quality improvement in Camellia tea-seed oil and isolation of antioxidant compounds, with myself and Prof. Kevin Robards. The project is funded by an Australia/China Special Fund grant and will involve a return visit by our group members to

China next year. Long and April will be in Australia about six months and will be joined by their supervisor Prof Zhong Haiyan at the end of October.

Weed Science Links with Pakistan

Prof Deirdre Lemerle, Director EH Graham Centre for Agricultural Innovation

Muhammad Ishfaq Khan joined the Graham Centre as a visiting scholar in August 2007. He is supported under the International Research Support Initiative Programme of Higher Education Commission of Pakistan.

Ishfaq completed his Bachelor's degree in Entomology and Master's Programme MSc (Honours) in the field of weed science. Ishfaq put a lot of effort into the field of weed science in his PhD programme, the title of his PhD thesis is "Biology, Ecology and Management of *Asphodelus tenuifolius* CAV in Chickpea".



Muhammad Ishfaq Khan

Currently Ishfaq is working on diversity at DNA level in various ecotypes of *Asphodelus fistulosus* with microsatellite markers (SSR) and random amplified polymorphic DNA (RAPD) and effect of various herbicides on *Asphodelus fistulosus* ecotypes and growth stages in glass house. The herbicides included in the studies are Broadstrike, Select, Motsa, Glyphosate, Balance and Sencor. He will also be working on allelopathic effects of *Asphodelus fistulosus* extract on the germination of various Chickpea varieties.

Australian Society for Parasitology Conference - Canberra

Dr Victoria Grillo - Lecturer, School of Agriculture and Veterinary Science, Charles Sturt University

A Travel Grant from the EH Graham Centre allowed me to attend the combined conference of the Australian Society for Parasitology (ASP) and the ARC NH&MRC Research Network for Parasitology in Canberra, from 8th to 11th July 2007. The ASP and the Network bring together scientists from Australia and overseas to exchange ideas regarding parasitological diseases of humans and animals, including livestock. ASP promotes all aspects of parasitology from fundamental research initiatives through to teaching.

During the conference, I presented my previous research undertaken in the UK investigating population genetic structure of the parasitic nematode, *Teladorsagia (Ostertagia) circumcincta*. I also had the opportunity to establish contacts with a number of parasitologists from both national and international institutions and promote new research programs starting through the EH Graham Centre. In addition, I attended an Early Career Researchers Workshop, a Veterinary Parasitology Textbook workshop and participated as a panel judge for the student presentations. The conference was thoroughly enjoyable and worthwhile in terms of forming collaborative links.

International Symposium on Root Biology and MAS Strategies for Drought Resistance Improvement Visit - India

Prof Len Wade - Strategic Professor of Agronomy, EH Graham Centre

The centre's new Strategic Professor of Agronomy, Len Wade visited India from the 24th of September to the 4th of October. Len was an Invited Speaker for the International Symposium on Root Biology and MAS Strategies for Drought Resistance Improvement, held at the University of Agricultural Sciences, Bangalore.

Len presented a paper entitled, "The nature of drought avoidance in wheat and rice", and visited Indira Gandhi Agricultural University in Raipur to discuss rice breeding nurseries for water-limited environments. This activity was supported by the Drought Frontier Project of the International Rice Research Institute in the Philippines.

New Initiatives Progress

National Forage Conservation Research Initiative

The National Forage Conservation Research Initiative was launched at the Riverina Outlook Conference on the 23rd of August.

This initiative is built upon the forage conservation expertise and history of research excellence within NSW DPI's Wagga Wagga Agricultural Institute, and capitalises on the success of NSW DPI/Dairy Australia's national TopFodder Silage program and provides opportunities for excellent research, development, education and extension not available elsewhere in Australia. The initiative recognises the importance of forage conservation to sustainable livestock industries as Australia faces the threats posed by global warming - changing climatic conditions, reduced water availability and increasing occurrence of drought.

The initiative will centre on five main projects:

Project 1. Forage Conservation - Impact on the Environment and Human Health

Project 2. Forage Conservation in Farming Systems - Case studies

Project 3. Forage Conservation - New Technologies and Research

Project 4. Forage Conservation - Economic Analysis and Risk Management

Project 5. Forage Conservation - Integration into Farming Systems

The following people are involved in this initiative: Belinda Hackney, Brian Dear, Deb Slinger, Ed Clayton, Geoff Casburn, Helen Burns, Iain Hume, Jian Zhou, John Piltz, Kristy Bailes, Lloyd Davies, Michael Friend, Mike Reynolds, Samson Agboola, Scott Glyde and Steve Exton.

Organisations involved include Inland Elite Dairy Network, NSW DPI Yanco and interstate collaboration through TopFodder Silage state coordinators.

Project Updates

Innovative management of silver-leaf nightshade and prairie ground cherry

Funding Body: Meat & Livestock Australia (MLA)

Project Team: Dr Rex Stanton, Prof Deirdre Lemerle, Dr Hanwen Wu, A/Prof John Kent, A/Prof Gavin Ash, Dr Brian Dear and Dr Min An

Silver-leaf nightshade (*Solanum elaeagnifolium*) or SLN and prairie ground cherry (*Physalis viscosa*) or PGC are deep-rooted, summer active perennial weeds. They are considered amongst the worst weeds of cropping and pasture systems in southern Australia. Environmental costs associated with these weeds include soil degradation (erosion, nutrient and water depletion) and pesticides in the environment.

SLN is more widely distributed than PGC, but both weeds have the potential to spread and become intractable problems unless cost effective integrated weed management strategies are developed and implemented.



Mature silver-leaf nightshade in a failed wheat crop.

SLN and PGC spread by seeds and root fragments through machinery, fodder, grain, animals, wind and water. Once established they are very difficult to control and eradicate. The extensive root systems compete directly with pastures and crops for resources and, through soil moisture depletion during summer, reduce production of subsequent winter crops.

Infestations of these weeds are managed using herbicides, however efficacy is often affected by unfavourable summer spraying conditions. Some herbicides provide effective control of aerial growth but have limited effect against the root system. Residual herbicides can provide control of root stock, but may damage desirable species or affect crop rotations options.

Landholders are very keen to reduce dependence on chemicals to reduce costs and environmental contamination. This MLA funded project (\$480,000 over three years) aims to develop a wider range of potential control options. These include competitive perennial pastures, bioherbicides and allelochemicals. Improvements in herbicide efficacy, through better application timing and new application technology, will also be investigated based on a better understanding of herbicide uptake and translocation.

We aim to develop integrated management packages for these weeds that contain a range of chemical and non-chemical control options. This will provide robust and reliable strategies for landholders.

Lupin breeding and the scourge of fungal pathogens

Funding Body: Grains Research and Development Corporation (GRDC)

Project Leader: Dr David Lockett

The lupin breeding program at NSW DPI in the EH Graham Centre Wagga has recently received a new, 3-year funded grant from GRDC valued at \$830,000. One of the major limitations for growing profitable lupin crops is the damage caused by fungal pathogens. In NSW, and in the absence of anthracnose, *Pleiochaeta* Root Rot (PRR) and Phomopsis Stem and Pod Blight (PSPB) are the two most serious diseases in albus lupins (broad-leaf or white lupins, *Lupinus albus*). Two new, Graham Centre PhD students are tackling these diseases head-on.

Ms Cina Zachariah is working on *Pleiochaeta setosa*, and continues the honours projects of two previous Graham Centre-funded students, Nicola Wunderlich and Melissa Gan. There is good resistance for PRR in the breeding program but screening is time-consuming and costly. Cina's work is focussing on finding molecular markers for the resistance genes so that we can use DNA barcodes to select the resistant plants and discard the susceptible ones. This will enable the breeding program to produce "better varieties, faster". DNA barcodes will make it easier for us to pyramid PRR-resistance plus anthracnose-resistance in our next variety release.

Phomopsis is a somewhat neglected fungus in albus lupins because this species is generally regarded as resistant (compared to many genotypes of narrow-leaf lupin). However, the incidence of infection in recent years, particularly in pods and seeds, has rung alarm bells. Infection in albus is significant because the fungus produces a dangerous toxin which makes the seed inedible for animals and humans. Mr Ray Cowley is working on several aspects of this disease. The first requirement is to develop a reliable screening method. The germplasm and current varieties will then be tested to see whether there is resistance available, and to understand its genetic control. As before, DNA markers are the target of the research so that breeding for resistance can be faster, more reliable, and independent of the growing season. Reduced or eliminated damage from pathogens will mean that growers will benefit from having high-yielding varieties that have more stable yield from season to season.

The lupin breeding program team includes Dr David Lockett, Mark Richards and David Roberts (all NSW DPI). The students, Ray and Cina, are jointly supervised with A/Prof Gavin Ash (CSU), Dr Harsh Raman (NSW DPI), and Dr John Harper (CSU).

Evergraze Site 1: New animal production systems for profit and recharge

Funding Bodies: Future Farm Industries CRC, Meat & Livestock Australia, Australian Wool Innovation

Project team: Dr Michael Friend, Dr Susan Robertson and Mr John Broster

Introduction: The threat of salinity highlights the need for increased plantings of perennial pastures, but farms using perennials need to be more profitable than current systems to optimise land use. As part of a national project called Evergraze, the EH Graham Centre is testing a range of grazing systems to increase sheep production and profit from perennial pastures while improving environmental outcomes such as salinity and groundcover.

Comparing grazing systems: The production and profit of four grazing systems is being compared over several years in a study east of Wagga Wagga NSW. The systems differ in stocking rate, lambing time and sire breed (Table 1), but all systems have a



Mr Ray Cowley and Ms Cina Zachariah inspect flowering albus lupins plants in the field at Wagga Wagga, September 2007. Photo copyright NSW DPI (Michel Dignand).

similar stocking rate (dry sheep equivalent) in mid-winter. The proportion of farm area for pastures is 20% lucerne, 20% tall fescue and 60% phalaris except in the High Lucerne system which has 40% lucerne, 15% fescue and 45% phalaris.

Results in 2006: The gross margins show that the low stocking rate systems had an advantage in an extreme drought year (250 mm compared to the average 600mm annual rainfall). This was due to their lower feed costs and higher weaning weights of lambs. However, the spring-lambing, high stocking rate systems are expected to be more productive and profitable in average and good years, and are expected to be more profit-responsive following drought.

Table 1. Production and gross margin data for four farming systems in 2006 (Feb to Feb).

| | Self-replacing Merino | Later lambing | Later lambing – High Lucerne | Split joining |
|---|-----------------------|---------------|------------------------------|---------------|
| No. breeding ewes/ha | 3.9 | 7.7 | 7.8 | 5.2 |
| Stocking rate (August DSE/ha) | 9.2 | 11.9 | 12.3 | 10.8 |
| Ewes joined to terminal (%) | 0 | 50 | 50 | 55 |
| Lambing time ¹ | August | September | September | Aug and Sep |
| Weaning (% of ewes joined) | 118 | 98 | 103 | 111 |
| No. lambs weaned/ha | 4.6 | 7.5 | 8.0 | 5.8 |
| Merino lamb weaning weight (kg) | 30.6 | 19.1 | 19.4 | 20.5 |
| Crossbred lamb weaning weight (kg) | n/a | 25.7 | 23.8 | 36.2 |
| Supplementary feed costs (\$/ha) | 90 | 350 | 330 | 192 |
| Gross Margin (\$/ha) | 45 | -137 | -125 | 26 |
| Potential Gross Margin (\$/ha) ² | 348 | 480 | 480 | 445 |

¹In subsequent years lambing occurs in July and September and winter stocking rate will increase to 13-14 DSE.

²Potential gross margin assumes a mid-winter stocking rate of 14 DSE, 120% weaning, early lambs sold at 50 kg, late lambs sold at 35 kg (crossbred) or 30 kg (merino), and no supplementary feeding.

Also under investigation is the use of summer-active perennials to increase the reproductive rate in ewes. This research will be presented in future editions of Innovator.

Improving Understanding & Management of Rice Pathogens in Cambodia

Funding Body: Australian Centre for International Agricultural Research (ACIAR)

Project Team: Dr Eric Cother, Dr Ben Stodart, A/Prof Gavin Ash, Dr Vincent Lanoiselet, Ny Vuthy (CARDI) and Preap Visarto (CARDI)

In Cambodia, rice occupies approximately 90% of agricultural land and is by far the most important staple food source. The per-hectare yield for rice is amongst the lowest in southeast Asia, with a 10 year average of 2.012 t/ha. While the introduction of high yielding varieties and adoption of improved management strategies has contributed to an increase of 135% in yield over the ten-year period, the role of disease in both reduction of yield and quality has largely been ignored. Very little is known about the distribution, prevalence and severity of rice diseases in Cambodia and the knowledge base for plant pathology is limited. Therefore, a project funded by Australian Centre for International Agricultural Research was established to carry out capacity building in plant pathology and to survey and characterise the diseases commonly associated with rice crops.

A laboratory has been equipped at the Cambodian Agricultural Research and Development Institute (CARDI), which is now a functional plant pathology facility. In addition to this, workshops conducted during this project have enhanced the knowledge of basic plant pathology in Cambodia.

Bacterial diseases are important in rice crops within the provinces surveyed, causing sterility and discolouration of glumes. Little information is known about bacterial pathogens in Cambodia. Several fungal diseases are widespread and are thought to contribute to loss



Team members accompanied by villagers while conducting surveys in Kampong Cham province.

in yield and quality. The severity of infection and yield effects in rice crops is being investigated, which will lead to the development of inexpensive and effective management strategies.

Some diseases reported to be common in this region have not been confirmed by laboratory examination, highlighting the need for plant pathology expertise to correctly identify causal organisms.

Students News

PhD Project Update - Jamshaid Ali Khan

“Modelling the impacts of management strategies on weed population dynamics and farm economics”

PhD candidate, Mr Jamshaid Ali Khan, recently joined the Graham Centre Weeds Research Team to work on this GRDC-funded research project. Mr Khan graduated from University of Agriculture, Faisalabad, Pakistan, with a BSc (Hons) in 1991 and MS (Plant Protection, Hons) in 1993. He has a plant pathology background, with research experience in chemical control of tomato root rot disease. He also previously worked as a Technical Advisor for a chemical company (CIBA), providing technical assistance on the management of pests, diseases and weeds.



The PhD project is to conduct research on modelling the impacts of chemical and non-chemical control tactics on weed population dynamics, herbicide resistance and farm economics. Existing models will be modified to better suit the local conditions of southern NSW. Mr Khan will focus on simulation modelling of weed germination, dormancy and emergence via hydrothermal time approach.

Supervisors: Prof Deirdre Lemerle, Dr Hanwen Wu and Dr De Li Liu.

PhD Project Update - Karen Kirkby

“The role of the grass endophyte *Neotyphodium occultans* in annual ryegrass (*Lolium rigidum*)”

The importance of grass/endophyte associations is largely based on *Neotyphodium* relationships with perennial ryegrass (*Lolium perenne/Neotyphodium lolii*) and tall fescue (*Festuca arundinacea/Neotyphodium coenophialum*). These relationships have been the focus of study due to the economic and agronomical impacts of these associations, in particular plant persistence and detrimental effects of endophytes on livestock health and performance (Cunningham, P., Blumenthal, M., Anderson, M., Prakash, K. and Leonforte, A. 1994; Faeth, S. H. and Hamilton, C. E. 2006; Fletcher, L. R., Sutherland, B. L., and Fletcher, C. G. 1999; Latch, G. C. M. 1994; Moon, C. D., Scott, B. D., Scherdi, C. L. and Christensen, M. J. 2000 and Reed, K. F. M., Leonforte, A., Cunningham, P. J., Walsh, J. R., Allen, D. I., Johnstone, G. R., *et al.* 2000).

The relationship & biological significance of *N.occultans* in *L.rigidum* in Australia is unexplored. *N.occultans* belongs to the fungal family Clavicipitaceae (Ascomycetes), are asexual descendents of sexual genera *Epichloë*, are transmitted vertically in seed, form no visually recognisable symptoms and are not able to be isolated and sub-cultured on agar. The endophyte is found in the aboveground 1-2 mm meristematic tissue of leaf sheaths and nodal tissue in the intercellular spaces (Latch, G. C. M., Christensen, M. J., and Hickson, R. E. 1988). Endophytes grow in the dividing plant cells (Christensen, per com, 2007).

Initial research will determine the incidence of infection - document how widespread E+ is in *L.rigidum* (dominance of E+ or E-). Further to that, determine the frequency of infection to establish selection pressures for/against infection and also determine any fitness benefit/penalty associated with infection.

Supervisors: Prof Jim Pratley, Dr Hanwen Wu and Dr Min An.



Typical symptoms seen in rice crops, from which bacteria and fungi have been isolated.



Recent Publications

- Agboola, S., Ee, K.Y., Mallon, L. and Zhao, J. 2007. Isolation, characterization and emulsifying properties of wattle seed (*Acacia victoriae* Benth) extracts. *Journal of Agricultural and Food Chemistry*. (In press).
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- Guo, Y., Liu, L., Zhao, J. and Bi, Y. 2007. Use of silicon oxide and sodium silicate for the control of pink mould rot (*Trichothecium roseum*) of Chinese cantaloupe. *International Journal of Food Science and Technology* **42**, 1012-1019.
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In the Limelight

Bree Wilson

Position: PhD Student



Organisation: Charles Sturt University

Career and studies thus far: A career in the making..... I haven't managed to leave uni yet! Bachelor of Applied Science (Hons) 2001, A short stint at the Plant Biotechnology Centre at DPI in Victoria in 2002, 'Scientist' at the Pathology Dept at the Alfred Hospital in Melbourne (bits of 2003 and 2004), doer of all things at my parent's spice factory (lots of years), Post-graduate researcher (2005-current).

Currently studying: Doctor of Philosophy (Agriculture)

Research Interests: All things fungi (the good and the bad), plant pathology, soil and root stuff.

Professional Links: Australian Society of Plant Scientists, International Mycorrhiza Society.

A typical day for me includes ... watering many plants to weight, extracting mycorrhizal fungal spores from soil and getting seasick when counting them, weighing, scanning and staining plant roots, taking photos of spores, thesis writing

and managing my supervisory team!

My main project at the moment is ... my only project, which is looking at how mycorrhizal fungi (AMF) are affected by dryland salinity. One big experiment has just finished, which was looking at the infectivity of AMF from different saline levels. The exciting thing to come out of this was that the AMFs in saline soil did better than the non-saline soil, suggesting that they need salt to germinate and colonise plants. So perhaps they're doing better than we think in saline environments ... now we just need the plants to do better.

My favourite part of my studies is ... right now it's seeing cool stuff under the microscope.

When I am not in the office I like to ... landscape my backyard, play volleyball.

Current CD in my car is ... Mark Ronson's 'Versions'.

Ray Cowley

Position: Technical Officer and PhD student

Organisation: NSW Department of Primary Industries

Career and studies thus far: Started with the department in 1994 as a trainee and have been working for DPI on and off since then. I have worked in numerous sections for various contract periods. In my time with DPI I have had four farewell lunches! I have also spent a considerable time working in landscape construction and design, and teaching at both TAFE and with CSU. I completed a degree in Environment Horticulture through CSU in 1998. For the past five years I have



been working as a plant pathologist with the Lupin Breeding Program, and it is within this capacity that my current research interests lie.

Currently studying: The host/pathogen interaction between *Phomopsis* and albus lupins. Initially I'll be focusing on defining 'resistance' in the system and developing procedures to screen for resistance in a wide range of genotypes. Following this I'll focus firstly on the genetics of the pathogen and then the genetics of the resistance in the host.

Research Interests: It's rather fascinating the interactions that occur between the fungal pathogen and a plant. The more I read into this area the more amazed I am at the sheer level of sophistication and complexity in the strategies of defence that plants adopt. It's easy to ignore what goes on at a microscopic and cellular level, but if you take the time to look and explore a new world opens up before you.

Professional Links: None as yet.

A typical day for me includes ... It's rather difficult to define 'typical' in the context of a higher degree, as each day varies somewhat depending on the research being undertaken. If I had to simplify, a 'typical' day would consist of conducting experiments, analysing and interpreting the results, reading literature or undertaking any of my responsibilities within my current Technical Officer position.

My main project at the moment is ... I have two main functions at the moment. 1) As a Technical Officer in the lupin breeding team. I am involved principally in 'pre-breeding' development of germplasm and mapping populations, and in characterising genotypic response to a number of key lupin diseases. 2) I am investing significant time into pursuing my PhD studies described above.

My favourite part of my studies is ... Intellectual stimulation.

When I am not in the office I like to ... Spend time with my family and tinker in the garden. If it's summer I don't mind watching the cricket. If I had more spare time after hours I'd like to do more drawings and paintings.

Current CD in my car is ... It's kind of embarrassing but it's actually a compilation CD titled 'Power Ballads' (It's my kid's favourite ... honestly!)

Summer Edition

The Summer Edition of The Innovator is to be released in mid January 2008. Submission of articles for this edition closes on **Friday, 21st December 2007.**

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