the Innovator

The Newsletter from the EH Graham Centre for Agricultural Innovation

AUTUMN 2008 EDITION

CHARLES STURT UNIVERSITY

NSW DEPARTMENT OF PRIMARY INDUSTRIES

Message from the Director

It is with pleasure that I welcome Lucinda Corrigan as a member of the Graham Centre Industry Advisory Committee (IAC). Lucinda's background is in farming and beef genetics. She is a Board Director with Meat and Livestock Australia and is also Deputy Chair of the Future Farm Industries CRC. Lucinda sees her involvement with the IAC as fitting in well with the work she does in the grazing industries across southern Australia. She also has a personal interest in strengthening research and education centres of excellence within rural and regional Australia, which she believes is critical for the challenges that face agriculture. Lucinda and I have both been invited to attend the 2020 Summit, which is a great opportunity to promote the needs of rural Australian to government.

Lucinda Corrigan, new member of the Graham Centre's Industry Advisory Committee: [Photo courtesy FFI CRC]

The Centre has made a very strong start to 2008 with at least 12 new PhD students. A significant number of those are funded by the Future Farm Industries CRC as well as GRDC. In mid February we held the final planning meeting of our Strategic Research Initiative "Conservation Farming and Stubble Management" led by Prof Len Wade. A research proposal will be presented to potential funding sources in July/August. We have sponsored two very successful workshops this year, "Rural Australia Without Petroleum?" on 13 March and "Managing Beyond the Panic of Climate Change" on 31 March. For more information, see our website under News & Events.

Both the Board of Management and the IAC have met recently and supported the strategic direction of the Centre. The importance of our research to develop profitable and sustainable farming systems continues to increase with the prolonged drought and implications of climate change. Our innovative research will underpin the need to adapt new farming systems for the future. Our strategic research initiatives on "Conservation Farming and Stubble and Management", "Weed Management" and "Utilisation of Sustainable Pasture Systems and Forage Conservation" will play a critical role of achieving this.

I hope you enjoy this edition of the Innovator.

Professor Deirdre Lemerle

Our Vision

By 2015 the E H Graham Centre for Agricultural Innovation (the Graham Centre) will develop an international reputation as the Australian ***centre of excellence*** for profitable and sustainable agricultural systems. Students graduating from the Centre will be regarded as amongst the best graduates in Australia and overseas. The activities of the Centre will result in agricultural landscapes with a patchwork of diverse enterprises, vibrant and resilient rural communities and unique opportunities for future generations.

Our Mission

- Create new knowledge that delivers solutions through collaborative and integrated systems research supported by key partners
- Improve delivery of new technologies and information through partnerships with stakeholders and ensuring relevant research activities
- Increase scientific research excellence and capacity through staff and student training

Southern NSW Events Calendar 2008

Date	Event	Details
13 June	High Schools Ag Enrichment Day	Location: Joyes Hall, Charles Sturt University, Wagga Wagga NSW Contact: Gordon Murray Ph: 02 6921 1803; Email: gordonmur@gmail.com
23 July	Graham Centre Field Day "Optimising Production from Canola"	Location: Culcairn, NSW Contact: Helen Burns Ph: 02 6938 1947; Email: helen.burns@dpi.nsw.gov.au
14 August	Graham Centre Riverina Outlook Conference "Climate for Fodder - Using best practice forage conservation to meet future environmental and economic challenges"	Location: Charles Sturt University Convention Centre, Wagga Wagga NSW Contact: Helen Burns Ph: 02 6938 1947; Email: helen.burns@dpi.nsw.gov.au
23, 24 & 25 September	Henty Machinery Field Days	Location: Henty NSW
3 - 5 October	Yanco Experiment Farm Centenary Celebrations	Location: Yanco, NSW DPI Agricultural Institute Contact: George Stevens Ph: 6951 2652; Email: george.stevens@dpi.nsw.gov.au
16 & 17 October	FarmLink Bus Tour	Location: Southwest Slopes, NSW Contact: Katrina Sait Ph: 02 6924 4633; Email: katrina@farmlink.com.au
3 - 6 November	7th International Safflower Conference	Location: Wine and Food Industry Training Centre, Wagga Wagga NSW Contact: Rodney Mailer Ph: 6938 1818; Email: rod.mailer@dpi.nsw.gov.au

THIS ISSUE

QUICK LINKS

- Centre Website
- Centre Diary
- Seminar Series
- CSU Website
- DPI Website

If you have an event you'd like included in this calendar, please email Helen Burns or Sharon Kiss.

New Initiative Grants 2008

The Board of Management has approved the allocation of approximately $40K towards New Initiative Grants for 2008. This funding will be used to facilitate the development of new initiatives in line with the Centre's Strategic Research Initiatives. Eligible projects must demonstrate clear objectives and achievable outcomes and preferably comprise of multi-disciplinary teams. International collaboration is also desirable where appropriate. Priority will be given to those projects which closely align with the vision, mission and objectives of the Centre. To be eligible, applications must address the Strategic Research Initiatives (listed below). Closing date for applications is Friday, 23 May 2008.

The following Strategic Research Initiatives were developed through a consultative process with staff and stakeholders to provide a five-year focus for Centre activities in response to climate change, production and environmental issues, and the need to develop more diverse and resilient farming systems.

- **Conservation Farming and Stubble Management**: to increase soil carbon and optimise nutrient use efficiency, improve water and air quality and human health.
- **Utilising Sustainable Pasture Systems and Forage Conservation**: to develop and deliver improved pasture systems and technologies for forage conservation to meet production targets for livestock production, drought mitigation, water conservation, and environmental protection.

- **Weed Management**: to develop chemical and non-chemical technologies (e.g. allelopathy, bio-control, competition) for integrated management strategies in crops and pastures to reduce the impact and spread of weeds, reducing land managers' dependence on herbicides and retarding the development of herbicide resistance.
- **Australian Bio-Protection**: to develop alternative non-chemical control tactics for the important pests of agricultural crops through the development of ecologically-based and innovative new tactics and quantify the impacts of agricultural practice on ecosystem biodiversity and environmental stewardship.
- **Healthy Food Products**: to develop new plant and livestock products that have human health attributes for niche markets and that value-add post farm gate.
- **Animal Parasites**: to reduce the impact of internal parasites and reducing chemical resistance by developing practical and sustainable methods of parasite control incorporated into whole farm enterprises; providing disease surveillance, thus giving parasite diagnosis and control advice; and evaluating potential impacts from climate change and wildlife reservoirs of disease.
- **Resilient Farmers**: to use 'Resilience Theory' to provide a clear understanding of current farming system drivers and sustainability indicators. We will work with farmers to define limitations of current practice and identify systems that are more attuned to existing and potential landscape resources and constraints.

Previously Funded New Initiative Grants

Since the Centre commenced operation in early 2005, approximately $160K has been provided to Centre participants to facilitate the development of new initiatives. The following is a list of those funded. A number of these New Initiative Grants have led to further projects and funding grants from external bodies to facilitate this research.

Year	Principal Applicant	Full Project Title	Amt Approved
2007	Ash, Gavin	Improving plant health: turning enemies into friends	$4,000
2007	Bowmer, Kath	Potential off site benefits of stubble farming (water quality and quantity)	$7,200
2007	Chenoweth, Peter	Factors affecting livestock semen quality and fertility	$3,000
2007	Condon, Jason	Influence of tillage and stubble retention on the nitrogen management of wheat	$5,000
2007	Dehaan, Remy	Improving the airborne mapping of soil moisture	$8,000
2007	Grillo, Victoria	Population genetic analysis of the parasitic nematode Ostertage (Teladorsagia) circumcincta in Australia	$5,000
2007	Harper, John	The role of mastigonemes in oomycete zoospore motility and their contribution to infection	$2,500
2007	Knott, Stephanie	Temperament and sensitivity to adrenocorticotropin hormone in Merino sheep	$10,000
2007	Luckett, David	Genetic diversity of putative spelt genotypes - towards non-allergenic cereals	$9,000
2007	Scott, Chris	Genomic approach to investigate the actions of endocrine disruptors on the brain in male sheep	$8,600
2007	Wilson, Bree	Genetic diversity of mycorrhizal fungi in saline soil	$4,000
2006	Ash, Gavin	Wheat Streak Mosaic Virus project	$15,000
2006	Ash, Gavin	Fingerprinting the soil metagenome	$15,000
2006	Doran, Greg	Investigation of adsorption, degradation and mobility of the rice pesticides, thiobencarb and fipronil	$4,200
2006	Moroni, Sergio	Value adding to the Canola Yield Decline tender: Quantifying the effects of high soil manganese on canola yield and evaluating the concept of canola "plant vigour".	$22,000
2006	Piltz, John	TopFodder Silage business model development for on-going research, development and extension (Stage 1)	$8,800
2006	Reynolds, Michael (M&M Project Management)	Analysing benefits of agricultural innovations	$12,320
2005	Ash, Gavin	Collection, isolation and pathogenicity studies of insect-pathogenic fungi for the development of biological pesticides	$7,500
2005	Harper, John	Science in Agriculture - how it impacts upon Australian society at large	$10,000

Travel Grant Reports

2007 International Annual Meetings of American Society of Agronomy, Crop Science Society of America and Soil Science Society of America at New Orleans, Louisiana, USA

Dr Guangdi Li, Senior Research Scientist, NSW DPI

During 1-11 November 2007, Dr Guangdi Li attended the 2007 International Annual Meetings of American Society of Agronomy, Crop Science Society of America and Soil Science Society of America at New Orleans, Louisiana, USA. More than 4,000 delegates from over 50 countries attended the conference. There were more than 2,500 poster/oral sessions, symposia, lectureships, and other learning opportunities. Dr Li presented an oral paper, titled "Conservation Tillage Practices on the Western Loess Plateau, China" under division "A011.06 Div. A-6—International Agronomy". The paper summarised the key results in 2001-2005 from two experimental sites at Gansu, China, which was funded by ACIAR. There were more than 20 people attended the session. The conference provided an excellent platform for Dr Li to communicate with scientists from other countries and establish links with leading scientists in the world in his research area. During the conference, Dr Li discussed with many scientists on various topics related to his research interests. The commercial displays presented the latest technology in the research areas of agronomy, crop and soil sciences. All these activities increase his understanding of research and development in the field of agronomy, crop and soil research, which is in line with the objective of the Farming Systems Program in NSW Department of Primary Industries for the adoption of sustainable and productive crop rotations, technologies and farming systems, and the aim of EH Graham Centre for Agricultural Innovation to develop technologies to drive sustainable and profitable mixed farming systems through excellent, multi-disciplined research.

Dr Guangdi Li took part in a pre-conference tour of the University of Illinois.

Special Studies Program (SSP) at the University of Manitoba, Canada, July - December 2007

Dr Samson Agboola, Senior Lecturer, School of Agricultural & Wine Sciences

The Special Studies Program (SSP) is an investment by Charles Sturt University (CSU) in the professional development of its staff. Dr Agboola took a five-month SSP leave at the University of Manitoba, Winnipeg, Canada. The objective was to enhance his professional development by conducting research in the developing area of health-functional foods and nutraceuticals. This objective was realised and several manuscripts for publication in research journals are already in preparation. The experience gained during the leave has also resulted in the successful application for an RIGB grant of $50,000 for the purchase of instruments that would enhance studies on functional foods, and lead to future success in ARC and industry-based grant applications. The overall aim would be the expansion and development of the Healthy Foods Initiative of EH Graham Centre for Agricultural Innovation.

The SSP leave has benefited, and will continue to benefit the Graham Centre in several ways including:

- Research quantum through successful publication of journal articles in high impact food science journals;
- Current and potential research collaboration in the highly important area of healthy foods;
- Successful RIBG application for AKTA FPLC system, Pharmacia (GE) Phastsystem and small-volume Avestin homogeniser (application was written in Winnipeg and submitted through other CSU collaborators);
- Re-invigoration of the Healthy Foods Initiative of the Centre and the confidence to approach funding agencies in this oft-described priority area.

Developing Collaborative Initiatives Concerning Olive Oil Research and Education

Dr Rodney Mailer, Principal Research Scientist, NSW DPI

Dr Mailer is leader of the olive and canola research team at DPI in Wagga Wagga and is principal investigator of various industry funded research projects on edible oils. Together with the Charles Sturt University, and bound by the E H Graham Centre for Agricultural Innovation, this facility is a centre of excellence for studies on oil.

Dr Mailer was invited to travel to Buenos Aires, Argentina between 19/04/07 and 25/04/07 to attend the 19th meeting of ISO/TC 34/SC 11 Animal and Vegetable Fats and Oils, as the Australian representative. The meeting discussed 20 separate methods at different levels of development. In all, 17 resolutions were approved at the meeting. ISO will hold the 20th meeting of ISO/TC 34/SC 11 at the Sydney Exhibition and Convention Centre in Sydney in September 2009 in conjunction with the World Congress on Fats and Oils.

Rod Mailer, developing collaborative links with overseas researchers.

Whilst in Argentina, he visited INTA, Instituto Nacional de Tecnologia Agropecuaria in Santiago and La Serena. He also held talks with ASAGA, Asociacion Argentina de Grasas and Aceites, the National Agrifood Health and Quality Service and Nacional de Alimentos to discuss international standards applying to olive oil and restrictions placed on Argentina and Australia due to European based standards.

He travelled to Chile and visited various research organisations including INIA, Ministerio de Agricultura, Universidad de Chile, and the Chile Olive Association to develop MOUs for collaborative research and possible student exchange with the EH Graham Centre at Wagga Wagga.

Dr Mailer attended the AOCS Annual meeting in Quebec and presented an invitation to delegates to attend the 2009 World Congress on Oils and Fats in Sydney, of which he is Chair of the organising committee. He also attended a meeting of the International Society for Fat Research and was elected President of that organisation for two years.

ACIAR John Dillon Fellows Visit Wagga

The importance of international scientific exchange was clearly evident when the Graham Centre recently hosted the visit of two overseas visitors, Dr Gina Nilo and Mr Arnab Chakraborty, each sponsored by the Australian Centre of International Research (ACIAR). In their home countries, both visitors are leading teams focussed on the sustainability of catchments and the well-being of farmers. They were members of a group of overseas agricultural scientists who were visiting Australia to attend management training arranged by ACIAR and to liaise with their Australian collaborators at the University of Western Sydney and other institutions.

Dr Nilo is a soil scientist and agricultural systems specialist with the Bureau of Soils and Water Management, Quezon City, Philippines. She is leading a team that is developing integrated watershed management practices for the Inabanga watershed (61,000 ha) on Bohol Island, Philippines.

Mr Chakraborty, an agricultural economist with a privately-sponsored humanitarian organisation PRADA (Professional Assistance for Development Action, headquartered in New Delhi, INDIA) is currently working with landholders in an impoverished rural area in West Bengal, near Calcutta.

CSU's Associate Professor Phil Eberbach (left) explains the operation of the Graham Centre's rhizolysimeter, an underground laboratory for observing crop root development, to Dr Gina Nilo (Philippines) and Mr Arnab Chakraborty (India) during their visit to Wagga in March. [Photo: Ted Wolfe]

During their Wagga visit, there were two particular highlights. The first was a presentation to the visitors by Dr Tom Nordblom (NSW Department of Primary Industries) of tools that his team has developed for the economic assessment of options for the management of water yield and salinity loads in catchments. Dr Nilo and Mr Chakraborty also discussed with their counterparts from CSU and NSW DPI some common issues in developing improved practices for catchment management and sustainable agriculture.

The second highlight occurred when the visitors presented seminars of their work. Their challenge is not only to improve agricultural practices and arrest soil erosion and nutrient losses in catchments but also to enhance the socio-economic conditions of farmers and the rural communities. The project on Bohol Island is directly relevant to 15% of the area of the island (412,000 ha). PRADAN is currently working with 101,500 farm families in 2,500 rural villages throughout India. Wagga researchers were deeply impressed with the scale of each project and the commitment of the team members.

The visitors also shared some interesting ideas on evaluating the performance of their teams. The success of the team, measured in terms of both outputs and outcomes, is linked directly to the remuneration of the scientists engaged in the work. Success = more pay; poor performance = no promotion.

Student News

2008 Internship: Melanie Bower, 3rd Year Agricultural Student

Melanie is currently undertaking a one-year EH Graham Centre Internship, working initially one day a week during semester time with Mr Ray Cowley and Dr Rex Stanton giving her the opportunity to mix field, glasshouse and laboratory work throughout the year.

Melanie Bower, EH Graham Centre's 2008 Intern. [Photo: Sharon Kiss]

Her work with Ray has involved assisting with the set up of his experiment into the effect of Phomopsis on lupins as well as working on plants and seeds already containing the fungus. The work with Rex, in the area of weed management, involves collecting samples in the field and taking measurements of these samples in the laboratory.

Melanie is interested in research and feels it will play an increasing role in agriculture and allow the industry to readily adapt to changes in markets and climate. She is interested in pursuing an honours project , and the Graham Centre internship will enable her to define areas of agricultural research that will interest and challenge her the most, as well as providing her with a greater network of knowledge.

The EH Graham Centre Internship has illustrated to her the importance of good design in the running of experiments, as well as the need for careful planning and organisation for the project to produce sound results. Without a high level of organisation skills the project will struggle to run activities smoothly throughout the project and produce viable results. It has also made her realise the significance of funding, in that it can provide researchers with the means of producing valuable results for the agricultural sector, however it can also be a restriction if not used in the most suitable way. The EH Graham Centre Internship has provided highly valuable insight into research in the agricultural industry.

Nine EH Graham Centre Students Attend the 2nd International Salinity Forum

The CRC for Future Farm Industries provided funding for all its students including nine EH Graham Centre post graduate students to attend the 2nd International Salinity Forum in Adelaide this month. The theme of the conference was: *Salinity, water and society-global issues, local action*. Six plenary sessions provided much information for debate as well as a packed schedule of concurrent sessions, which included climate change and salinity, mapping and monitoring, designing and engineering solutions, plant responses, salinity process and understanding, social dimensions: farming saline landscapes, salinity and biodiversity,

Some of the Wagga crew at the conference dinner, L-R: Catherine Gulliver, Bree Wilson, Nicole Hyde, Matthew Gardner, Lauren Forrest and Felicity Gummer. [Photo: Bree Wilson].

perennial plants for recharge control, regional policy and dimensions and salinity and revegetation management, among others.

Bree Wilson presented a poster, "Salinity affects the infectivity of mycorrhizal fungi in south-eastern Australia", which won best student poster prize and Alison Southwell presented a seminar on "The effect of pasture composition on the soil water deficits beneath native pastures in the high rainfall zone of south-eastern Australia".

In addition to the salt forum, the Future Farm Industries' CRC annual postgraduate meeting brought together about 40 students from all across Australia, including students enrolled through CSU in Wagga: Karl Andersson, Lauren Forrest, Matthew Gardner, Catherine Gulliver, Felicity Gummer, Tim Hutchings, Nicole Hyde, Alison Southwell and Bree Wilson, CSU's biggest contingent yet!

For more information see the website http://www.internationalsalinityforum.org/

Award

Congratulations to **Dr Rodney Mailer** for winning the prestigious Timothy L Mounts Award.

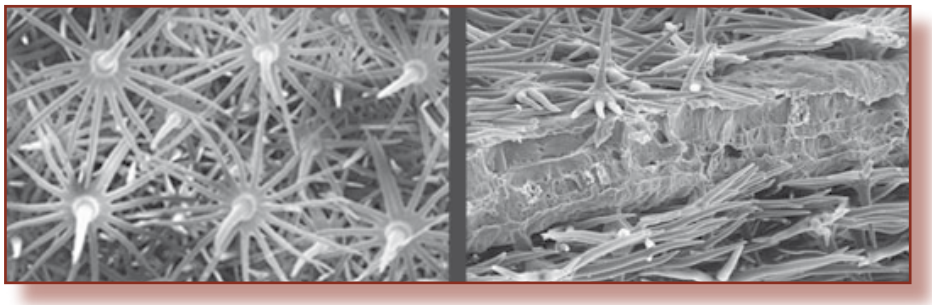
This award recognises research relating to the science and technology of edible oils which may be basic or applied in nature. The award will be presented during the Annual meeting of the American Oil Chemists Society (AOCS) and consists of a plaque commemorating the award and a $500 honorarium.

The award is open to scientists engaged in edible oil research and they need not be a member of the society or division. No geographical limits are placed on the award however the awardee must agree to present a lecture at the annual AOCS meeting. Rod will travel to US later this year to accept his award.

Interesting Articles!

Up close and personal with silverleaf nightshade

Ever wondered why the leaves of some plants look a bit silvery? In the case of Silverleaf nightshade (*solanum elaeagnifolium*), it is caused by a coating of trichomes or hairs-like growths composed of 8-16 lateral rays surrounding a central perpendicular ray. These trichomes are more dense on the lower leaf surface, hence the whiter appearance when you turn the leaf over.

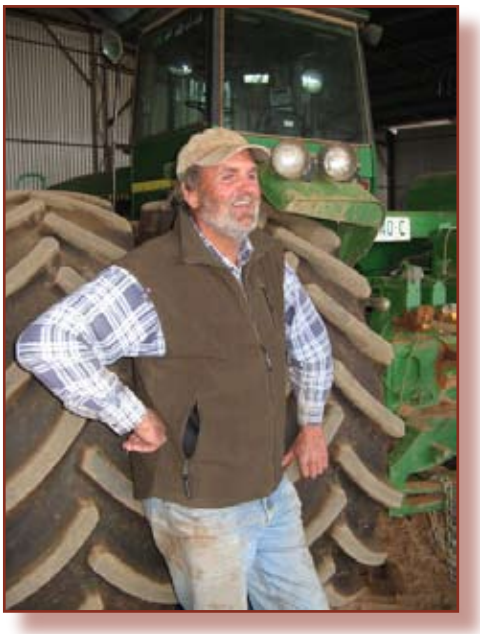


Scanning Electron Microscope images showing (left) the density and structure of trichomes on the lower leaf surface of silverleaf nightshade and (right) leaf cross section. [Photo: Roger Heady]

Herbicides are the major weapon used to manage this weed, but few land managers are able to successfully eradicate the weed once a population has become established.

Trichomes composed of dead cells would create a barrier lowering herbicide uptake, however if these cells are alive and connected well into the leaf structure they may assist with herbicide uptake. The nature of these trichomes is being investigated to help develop herbicide application techniques to maximise herbicide uptake.

Further information: Rex Stanton (02) 6938 1618; rstanton@csu.edu.au



Derek Ingold, Chair of the Industry Advisory Committee and farmer from the Temora District. [Photo: Ted Wolfe]

Mixed farming in the Riverina

With some help from Emeritus Professor Ted Wolfe, farmer Derek Ingold (Chairman of the Graham Centre's Industry Advisory Committee), recently described how his mixed farm in southern NSW evolved from a simple wheat-sheep operation in the mid-1970s to one that is now more efficient in terms of labour inputs, as well as producing higher crop yields, carrying more sheep and meeting sustainability benchmarks. Below, is a timely excerpt from Derek's account, the full version of which will appear as a chapter in a forthcoming book on Rainfed Agricultural Systems (edited by Philip Tow and Ian Cooper from South Australia with Ian Partridge and Colin Birch from Queensland). The book, which contains contributions from Australian and international agriculturalists, will be published by Springer International later in 2008. The excerpt illustrates Derek's philosophy of integrated flexibility.

"During the early 2000s, we responded to a new set of problems. It was clear that we had to redouble our efforts to develop an integrated system of weed management. Also, our reliance on the canola-wheat system was too heavy and canola was proving to be a weak link. … Our current approach to the requirements of the cropping enterprise is to base this enterprise on cereal crops – wheat and barley are cheaper to grow and more reliable than canola and lupins. My philosophy is that the management of each crop, including lupins and canola, must create an environment that is beneficial for, or at least not antagonistic to, the next crop. This approach ensures that I have maximum flexibility in my crop rotation, creating options and strategies for the future. For example, I need a flexible, integrated approach to the problem of take-all. I do not apply lime before a wheat crop, since the take-all fungus is favoured by higher soil pH levels. Again, if I grow a canola crop that is free of grassy weeds, I might consider growing two wheat crops in this paddock. Then, so long as my control of grassy weeds is again excellent, I might even grow wheat or barley after two wheat crops, sowing the third cereal crop late and using an in-crop fungicide to help protect this particular crop from fungus infection. This wheat-on-wheat option is tailored for unreliable seasons and tight finances – costs can be kept down and receipts up. It also helps me create options for herbicide use, since the post-emergent grass herbicides available for use on cereals are rather limited and expensive. I am willing to explore all available options to minimize the risk of herbicide resistance developing in weeds. I am particularly concerned about the possibility of future restrictions on the use of triazine group of chemicals, which are useful for the control of weeds in broadleaf crops. I aim for total control of broadleaf weeds in cereal crops and grassy weeds in broadleaf crops, but I do not rely too heavily on particular herbicides or herbicide groups. I would like to see Roundup-Ready canola released, in order to extend my range of options for weed control."

Further information: Ted Wolfe: (02) 6922 4347; twolfe@csu.edu.au

Searching for the Holy Grail in lucerne development

Lucerne is a key pasture species for local grain and livestock enterprises with about half of all lucerne sold in Australia ending up in NSW. However, a major constraint to its broader adoption both within NSW and elsewhere is the prevalence of acidic soils which commonly reduces the yield of lucerne to only a fraction of its potential.

A collaborative research initiative between the Future Farm Industries CRC, GRDC and the state Departments of Primary Industries in NSW and Vic and SARDI in SA, has spent the last 5 years pursuing the goal of improving lucerne performance on acid soils. This is challenging research and in fact has been pursued previously in North America but thus far with little tangible outcome for lucerne growers.

A recent breakthrough of the Australian research was the development of a solution screening system which enabled the screening of a large number of lucerne seedlings for their ability to regrow after the stress of high aluminium conditions. For the first

Rhizobiologist Nigel Charman (pictured) sampling for lucerne rhizobia from established lucerne plants on a roadside in the Goulburn district. The sampling was part of a more extensive field collection across southern NSW undertaken by researchers from NSW DPI and SARDI. [Photo: Richard Hayes]

Mark Your Diaries

Riverina Outlook Conference ...

"Climate for Fodder - Using best practice forage conservation to meet future environmental and economic challenges"

Thursday, 14 August 2008

time lucerne breeders now have the capacity to apply high selection pressure for performance under aluminium toxicity, an important aspect of acid soil conditions. Preliminary results suggest that lucerne seedling root growth has been increased by at least 15% due to the new selection technique.

The research team has now focussed its attention on the nodulation of lucerne. Nodulation is critical in maximising the Nitrogen fixation capacity of lucerne, an issue only likely to become more important with the increased cost of nitrogen fertiliser. Nodulation has also been shown to be an important aspect of lucerne survival as unnodulated plants appear to be less persistent than nodulated plants. Nodulation of conventional lucerne using the current commercial rhizobia has been shown to be very poor in acidic soils, with only about 20% of plants forming nodules.

Researchers are addressing the poor nodulation of lucerne in two ways.

- Selecting lucerne plants on their capacity to form effective nodules.
- Screening of lucerne rhizobia that are more tolerant and effective in acidic conditions

A promising development in the current research has stemmed from a collection of naturalised lucerne rhizobia undertaken by Richard Hayes (NSW DPI) and Nigel Charman (SARDI) from across southern NSW in November 2007. The objective of the collection was to isolate lucerne rhizobia naturally adapted to acidic soil environments. Samples were taken from roadsides and paddocks containing established lucerne growing on acidic soils down to pH 4.2. In some cases the stands of lucerne were up to 15 years old and were from the Bookham, Bowning, Yass, Bredalbane, Goulburn, Crookwell, Ladysmith, Book Book and Tarcutta districts, on a range of soil types.

In total, 229 new strains of lucerne were collected and isolated. Screening of the new rhizobial strains is just about to begin but the diverse morphology of the material has already surprised researchers giving great hope that significant gains can be made in lucerne nodulation, particularly if elite rhizobia strains can be used in combination with 'acid-tolerant' lucerne plants. In view of the poor nodulation of the conventional lucerne rhizobia in acidic conditions, researchers are confident that there is much room for improvement in the performance of lucerne on acid soils which is an exciting prospect, particularly for growers in NSW.

Further information: (02) 6938 1615; richard.hayes@dpi.nsw.gov.au

Herbicide Resistance – Awareness doesn't necessarily mean adoption

A preliminary survey was circulated by Helen Burns to southern NSW consultants and agronomists (public and private) in 2007 to gauge the level of adoption of integrated weed management (IWM) strategies by grain producers in the southern NSW cropping zone, as part of the Graham Centre's GRDC-funded Integrated Weed Management project.

The responses are a timely wake-up call as we enter an era of GM herbicide-tolerant crops.

It is about 20 years since herbicide resistance (HR) was highlighted as one of the major management challenges facing farming systems. However, progress in overcoming HR appears to have faltered somewhere between increased awareness of HR and widespread implementation of effective IWM strategies.

Advisors were asked to comment on their clients' understanding and management of HR. Responses indicated that awareness of HR is generally good with most growers aware that HR is a likely consequence of traditional heavy reliance on herbicides. This is not surprising considering the well reinforced HR publicity coming from advisors and chemical companies.

Advisors considered that, in general, producers do not have a good understanding of how and why HR develops, which really highlights the extension dilemma – a concerted effort that results in awareness of HR has not necessarily translated into an understanding of how HR develops, and to the next stage of adoption of IWM strategies that effectively manage HR.

In reality there is a long way to go when some advisors consider "we are in trouble", there is "lot of misunderstanding", "total confusion" and Hoegrass® is still being used because it is a cheap option, and poor control is often incorrectly blamed on poor application technique and/or moisture stress.

There are, of course, a proportion of producers who have a very good understanding of IWM and are effectively managing HR. However, advisors considered that often producers only accept HR as a significant issue when they are hit with a resistance "blow out" that clearly impacts on their farming business. Hard evidence of impact on their profit is the motivation producers need to seek information and to adopt IWM strategies.

Drawing on her discussion with producers at focus meetings regarding major issues affecting their cropping decisions, comments from the survey and follow-up discussion, she suggests that there are a number of issues that have clouded the HR message for southern NSW grain producers. These include:

- Weed management strategies have traditionally focussed on chemical solutions – there is limited information on the cost/ benefit of non-chemical strategies versus the financial penalties of inaction on HR in southern cropping systems.
- Producers are continually looking for (and up to now have often received) a 'silver bullet' solution and this has not been helped by the regular release of new formulations of old chemical groups with new names and associated advertising claiming improved (but inadequate) levels of control.
- In recent seasons many grain producers have had more than enough to worry about without facing complex management issues associated with managing HR.
- HR and IWM have dropped off the radar since the Wagga-based weeds extension specialist position was discontinued. Curtailing this position may have implied that HR was no longer an issue for southern NSW.
- The HR/IWM message needs revitalising - it is 20 years old and is often preached by out-of-state experts relaying experiences from farming systems considered irrelevant by local producers with their heads in the sand. Advisors suggest that the IWM message needs to include up-to-date local data, delivered by experts working in local farming systems, supported by local case studies and producer champions.
- Insidious, chronic problems that evolve over time, such as HR, which need on-going vigilance and elevated management skills require different education/ extension strategies to those that promote simple solutions and provide an immediate, easily measured benefit.

The results of the survey and focus group meetings have provided a valuable update for the IWM project. It helps clarify the research targets of the IWM project and reinforces the significant role of producers, consultants and agronomists in developing effective IWM strategies and promoting their adoption.

Further information: Helen Burns (02) 6938 1947; helen.burns@dpi.nsw.gov.au or Hanwen Wu (02) 6938 1602; hanwen.wu@dpi.nsw.gov.au or Eric Koetz (02) 6938 1954; eric.koetz@dpi.nsw.gov.au

Managing Beyond the Panic of Climate Change

The Graham Centre, together with the Australian Institute of Agricultural Science and Technology, co-sponsored a seminar on climate change in Orange on 31 March.
Climate change is a reality, accepted by the majority. The most probable cause is the production of green-house gases by man. While many Governments and private operators are developing and employing solutions to reduce these gases, it is likely that global warming will continue to increase well through this century.

Society and agriculture in particular, are confronted with two main issues. How to reduce greenhouse gases over the medium to long-term and how to adjust to climate change and still produce the food, fibre, fuel and other agricultural products that society wants. What does this mean for how farming systems will change?

The aims of the seminar were to review the current state of knowledge on climate change, assess what this means for Australia and then what are the impacts and changes that need to be implemented at a regional level.

The seminar program dealt with the two issues that have been emerging over the years that recent events have highlighted as the main challenges facing agriculture:

- **Variability**: A gradual change in climate may not be a huge problem, but more rapid change and the increased variability in temperatures and rainfall does make it very difficult to still manage a viable business, producing what society wants. The recent extensive drought confronted Australia with more difficulties than were expected, based on previous climate cycles.
- **Food Security**: It has really only been over the last 100-150 years that the majority of the world has been well fed, even over-fed. With concerns about global warming, rising energy costs and limited supplies of fresh water – highlighted by the recent drought, the issue of food security is again being discussed. World food prices have been rising, which is good for farmers, but increases the number of people who now cannot get enough food.

Further information: David Kemp (02) 6365 7526, dkemp@csu.edu.au or visit our website.

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, Dr Brian Dear and Dr Min An

A range of registered and experimental herbicide treatments have been assessed on SLN and PGC, with Group I pyridine herbicides (eg, Tordon 75-D™, Grazon Extra™) providing consistent in-season control; it is yet to be determined if the faster acting herbicides also provide long term control of the root systems. Time of application also appears important, as late season application of glyphosate or 2,4-D amine can help reduce stem emergence the following season. Adjuvant choice can influence the amount of regeneration observed when herbicides are applied during flowering.

"Picloram can provide rapid burndown of silverleaf nightshade stems, helping prevent seed set". [Photo: Rex Stanton]

Scanning electron microscopy (SEM) of SLN leaves indicate multiple layers of dense trichomes, with higher densities observed on the lower leaf surface. Anatomical studies indicate these trichomes penetrate deep into the leaf structure to the vascular bundle. The nature of these trichomes is being investigated to help develop herbicide application techniques to maximise herbicide uptake.

SLN seedling emergence was observed in the field following a significant summer rainfall event, demonstrating that the soil seedbank can play an episodic role in population dynamics. Seed burial studies indicate little seedbank decline after six months burial, although this was during a season with below average rainfall. Intact seed pods appear to provide some protection against loss of dormancy and viability, with pods decaying faster at increasing burial depth.

Canola in Depth

Funding Body: GRDC
Project Team: Dr Mark Conyers, Dr Sergio Moroni, Prof Yin Chan, Mr Albert Oates, Mr Graeme Poile, Dr Neil Coombes, Dr Roger Armstrong (Vic DPI), Prof Rob Norton (Uni Melbourne), Dr James Nuttall (Vic DPI), Ms Kirrily Condon (FarmLink), Dr Mark Peoples (CSIRO PI), Dr John Kirkegaard (CSIRO PI), Mr Tony Swan (CSIRO PI), Prof John Angus (CSIRO PI)

The issue addressed by this project is the impact of subsurface constraints (sodicity, salinity, acidity and hardpans, generally in combination) on the yield of canola.

Trials in 2007 were established near Birchip and Brimpaen in Victoria, and at Rand, Lockhart, Milvale, Greenethorpe (2 trials) and Morven in NSW. Farmer demonstration sites were established at Corowa and Yuluma in NSW. A CSIRO summer student conducted a pot trial on the NSW soils.

Common treatments across the sites included: control, rip, rip + lime or rip + gypsum. Additional treatments were more site specific. Similarly, canola varieties were selected according to local conditions but we used a range of varieties in common across several locations. Common measurements such as EM surveys, penetrometer profiles (compaction), soil chemical properties (EC, pH, %Na) and plant data (dry matter at anthesis, grain yield) were also undertaken across sites.

Grain yields were only obtained at Brimpaen, Lockhart, Morven and the two Greenethorpe sites. There were no responses to injection of limestone or gypsum in the drought, and with one exception, ripping generally resulted in decreased grain yields. Clearly in a dry year, ripping let more water out of the soil profile than it let in.

Three "Canola in Depth" publications were distributed to members of Farmlink and the Riverine Plains group in 2007.

All sites have now been ripped and either have lime or gypsum applied for the 2008 season. The ripper and injector performed well, though further improvements are being discussed.

In the Limelight

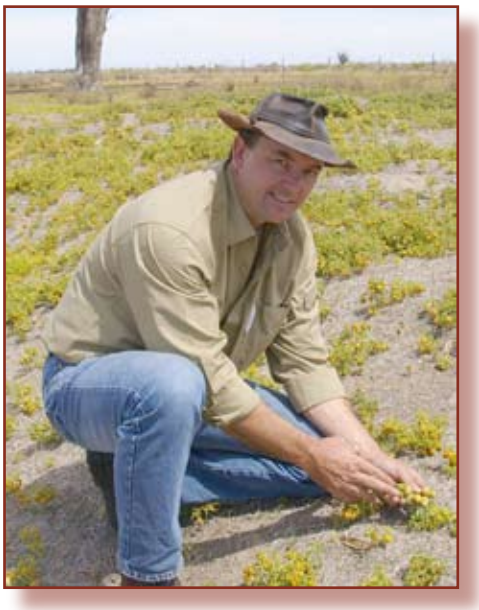
Dr Rex Stanton

Position: Post Doctoral Fellow

Organisation: E H Graham Centre

Career Brief

I started my career based in Cobar as a technical officer with NSW Agriculture working on a project using feral goats as an innovative control method for woody weeds. Moved to Wagga Wagga 11 years ago to take up a position with Charles Sturt University as a technical officer investigating glyphosate resistance in annual ryegrass, which led to post graduate studies in the same field. Commenced my current position within the Graham Centre as Post Doctoral Fellow mid 2006 to work on innovative management of silverleaf nightshade and prairie ground cherry.



Research and teaching Activities and Interests

Herbicide resistance, particularly glyphosate resistance; genetically modified crops; integrated weed management

Professional Links

- Weed Society of New South Wales (President, 2007 – present)
- National Glyphosate Sustainability Working Group (Chair, 2006 – present)
- Council of Australasian Weed Societies
- International Weed Science Society

A typical day for me … No two days are the same, although cursing the limited rainfall at crucial times of the year has been a recurring trend. Time can be spent managing field sites, working in the glasshouse or the laboratory, writing reports and papers or attending meetings.

My main project at the moment is … Innovative management of silverleaf nightshade and prairie ground cherry, which consists of a great blend of field, glasshouse and laboratory based research to develop new strategies to help manage these perennial summer weeds.

My favourite part of my job is … Freshly ground coffee for morning smoko and the camaraderie of being part of a good team. On a more serious note, though, the opportunities to work with researchers from a range of disciplines and backgrounds allows me to always be learning new skills and viewing situations from new points of view.

When I am not in the office like … Participating in a diverse range of sports, mucking around in a kayak, or cruising through an art gallery.

Current CD in my car is … Icehouse, Cold Chisel, compilation of various 80's artists

Dr Edward Clayton

Position: Livestock Research Officer

Organisation: NSW DPI

Career Brief

I completed a Bachelor of Rural Science and a PhD in ruminant nutrition at University of New England (UNE) before commencing work with the NSW Department of Primary Industries in 1999. I conducted industry-based commercial research between 2000-2002 in parasitology and nutrition at The Oaks, near Camden. During this time I became involved with monogastric nutrition and the effects of nutrition on behaviour. In line with the nutrition and behaviour theme, I was employed as a research fellow in a child and adolescent intensive care psychiatric unit at the John Hunter Hospital in Newcastle.

I was then employed as a Research Fellow in the Nutraceuticals Research Group at the University of Newcastle, researching the effects of omega-3 fatty acids on a range of disease models in humans including risk factors for cardiovascular disease, before taking up the position of Livestock Research Officer with NSW DPI in 2007.

Research and teaching Activities and Interests

Current research projects focus on the relationship between feeding systems and health aspects of meat including omega-3 fatty acids and examining possible beneficial effects of omega-3's in human disease models including bipolar disorder in children and adolescents. These projects are funded by Hunter New England Area Health Service and Charles Sturt University.

I have taught nutrition and physiology at UNE and pharmacology at the University of Newcastle.

Professional Links:

- Member of the technical committee for the World Congress on Oils and Fats to be held in Sydney September 2009 (Current)
- Member of the Australian Society of Animal Production and Nutrition Society of Australia

A typical day for me includes … Conducting literature reviews and developing lab methods. Some time is always spent playing with silage. At the moment I have lots of time at the computer with more time coming up in the lab.

My main project at the moment is … Examining omega-3 concentrations in fresh forage versus silage. This will hopefully lead on to bigger projects examining the effects of these forages and silages on meat quality.

My favourite part of my job is … Apart from working in a great team, 10.00 am weekdays… morning tea.

When I am not in the office I like to … To play touch footy and rugby. I also do a lot of driving.

Current CD in my car is … Bat Out of Hell

Winter Edition of The Innovator

The Winter Edition of The Innovator will be released in mid July 2008. Submission of articles for this edition closes on **Thursday, 19th June 2008**.

New Role for Maree Crowley

Maree Crowley has taken up the position of Administrative Officer with the Graham Centre. In this role she will continue her commitment to supporting research to develop profitable and sustainable future agricultural industries.

Maree has extensive experience in administration and has worked in a range of industries and positions since completing an Advanced Secretarial Diploma at the Metropolitan Business College in Sydney in 1983.

Maree returned to Wagga in 2000 – back to the region where she had grown up – on a mixed farming property at Beckom. After a three year break from the workforce, Maree commenced at CSU in 2003 as Centre Administrator at the Farrer Centre. When the Farrer Centre ceased operating at the end of 2004, Maree was involved in setting up the office of the E H Graham Centre for Agricultural Innovation, or the Wagga Wagga Agricultural Innovation Park as it was then known. As Centre Coordinator, Maree has worked closely with the researchers and staff of the Graham Centre since early 2005. She embraces the opportunity to nurture the relationship between the Centre's alliance partners, CSU and NSW DPI.

Secretariat

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