

- ◆ Appointment of Air Policy & Program Officer
- ◆ Mucormycosis of platypus
- ◆ 59th Australian Cereal Chemistry Conference
- ◆ 16^h Australian Research Assembly on Brassicas
- ◆ New research project
- ◆ Canola competition for weed suppression
- ◆ Links with Laos
- ◆ Pastures to improve lamb weaning weights
- ◆ Recent advances in animal nutrition
- ◆ Science updates
- ◆ In The Limelight
- ◆ Short Honours Projects

- ◆ Centre Website
- ◆ Centre Calendar
- ◆ Seminar Series
- ◆ CSU Website
- ◆ I&I NSW Website

One of the Graham Centre's parent organisations has recently undergone a major restructure. Industry & Investment NSW, previously NSW Department of Primary Industries, is one of the NSW Government's thirteen super departments, and has been established to assist in building a diversified state economy that creates jobs. It aims to attract investment to NSW and support innovative, sustainable and globally competitive industries through strong technical knowledge and scientific capabilities. Industry & Investment NSW (I&I NSW) comprises the previous agencies of Primary Industries, State and Regional Development, and Energy. It also incorporates partner agencies: Tourism NSW, NSW Food Authority, NSW Film and Television Office, Forest NSW, Rural Assistance Authority, Game Council NSW and Mine Subsistence Board. Dr Richard Sheldrake is the Director-General of the new department and will remain on the Board of the Graham Centre.

The Graham Centre had a strong presence at Henty this year. The children visiting our stand were very interested in Supermarket Botany. Increasing the profile of agricultural and veterinary sciences as an interesting and rewarding career path is one of our major objectives.

It was pleasing to see that the Graham Centre's Supermarket Botany page was classified as Website of the Month in the September edition of Gardening Australia. The site was developed by Drs Geo Burrows and John Harper.

Research is underway to find out why seasonal high levels of air pollution have been recorded at Wagga Wagga during recent years.

The research will be undertaken by a new collaboration between the Graham Centre and the NSW Department of Environment, Climate Change and Water.

Graham Centre Director Professor Deirdre Lemerle said the sources of the air pollution were unclear.

A number of possible causes have been suggested including bush fires, seasonal domestic wood burning, burning of crop stubble and dust from degraded pastures, she said.

Poor air quality affects everyone's health, especially the young and old, so there is a great need to find out the exact causes of this pollution.

Lauren Bartosh has been recently appointed as the Air Policy & Program Officer based at Wagga Wagga. [Photo: S Kiss]

Professor Lemerle said the recent appointment of Lauren Bartosh, as the new Department of Environment, Climate Change and Water Air Policy and Program Officer based at Wagga Wagga, would underpin the collaboration between key stakeholders.

Ms Bartosh is part of an innovative program that will coordinate new scientific research to determine the sources of pollution.

We need to have the science to understand and manage the problem, she said.

Professor Lemerle said a steering committee of stakeholders was being formed to guide the program to improve air quality for the people of the Wagga Wagga region.

Further information: Prof Deirdre Lemerle (02) 6938 1667, deirdre.lemerle@industry.nsw.gov.au.

Many microorganisms and parasites have been reported from the platypus, but most infections are subclinical. *Mucor amphibiorum* a fungus initially isolated from frogs and toads, is the only disease agent known to cause significant morbidity and mortality in the free-living platypus (*Ornithorhynchus anatinus*) in Tasmania. Mucormycosis in platypuses causes a granulomatous dermatitis that may progress to disseminated disease and death. We discuss the findings of a twelve month investigation into mucormycosis which began in 1994 (Connolly et al.1998).

The distribution of affected animals was determined from questionnaires, databases, literature, a mark-recapture study and a necropsy study. Platypuses with mucormycosis were located in Brumby's Creek, Lihey River, Supply River, South Esk River, Meander River, and Macquarie River.

Seventeen of 60 platypuses (28%) captured during this Tasmanian study had mucormycosis. Eleven adult males, five adult females and one juvenile female were affected. The prevalence at Brumby's Creek was 33% (12/36) and from Lihey River 66% (2/3). During the study two of 25 necropsied platypus had mucormycosis; possibly an underestimation due to difficulty in obtaining dead platypuses. No disease seasonality was observed. Body condition was variable, but affected males were larger than non-affected ones. Hindlimbs and tails were most commonly affected, followed by front feet, trunk, head and bill. Skin lesions included nodules, plaques, abscesses and ulcers. Histologically, granulomatous or pyogranulomatous lesions were seen. T cells were the predominant infiltrating lymphoid cell, commonly present with neutrophils, epithelioid cells and giant cells. Affected platypuses were anaemic, lymphopenic, with lowered cholesterol and calcium and higher globulin and potassium concentrations. Platypuses with mucormycosis had significantly higher concentrations of serum antibody against the fungus, as determined by ELISA.

All 13 isolates of *Mucor amphibiorum* cultured from platypus skin lesions were of the positive mating type. An isolate was found sensitive to amphotericin B, but resistant to itraconazole and fluconazole.

No *M. amphibiorum* was cultured from intact platypus skin (n=8), platypus faeces (n=40) or environmental samples (n=14). *Mucor circinelloides*, *M. saturninus* and *M. hiemalis* were commonly isolated from soil or faecal samples (platypus and frog). The role of other aquatic animals, such as fish, frogs and invertebrates in Tasmanian freshwater ecosystems, as potential carriers of *M. amphibiorum* and sources for platypus infection, is yet to be adequately investigated. An ELISA serological survey of platypuses and a diagnostic PCR test for other carriers are required. To date an environmental niche has not been identified for *M. amphibiorum*.

This article was extracted from the proceedings of the Platypus Forum held in Hobart, Tasmania 3–4 September 2009.

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Graham Centre Honours student, Tom Claridge, has completed platypus field surveys across the Murrumbidgee catchment. After nine months of netting waterways from Yass, Narrandera, Kosciusko National Park and everywhere in between, a total of 28 platypus were captured. Preliminary blood analysis suggests a relationship between the health of platypuses and the condition of the riparian vegetation at the site of capture. The plural of platypus is platypuses due to the Greek, not Latin derivation of the name.

Honours student, Tom Claridge has completed platypus field surveys across the Murrumbidgee catchment.

Thanks to the sponsorship from the EH Graham Centre the 59th Australian Cereal Chemistry Conference was held at the CSU Convention Centre from 28–30 September 2009. More than 120 researchers attended the conference from all around the world including delegates from the USA, Canada, Japan, Saudi Arabia, Jordan, Russia, Germany, Ireland and Australia. The theme of the conference was Quality Science for the Country and sub themes included Grains and Health, GM grains, Grains and the Environment, Processing and Genetics. The conference culminated in a lively forum debate about the future of food grains. CSU undergraduate students were also given the opportunity to attend the conference, which gave them their first taste of world-class research. Graham Centre postgraduate student Ms Siem Siah was rewarded for her excellent poster by receiving the student poster prize.

Professor Les Copeland (USyd), leads a panel discussion on the future of food grains with panellists Dr John Harvey (GRDC), Dr Crispin Howitt (CSIRO), Mr Robert Sewell (Wheat Classification Council), Dr Grant Campbell (University of Manchester, UK), Mr Alan Brown (NSW Farmers) and Andrej Kilian (DART) [Photo: C Blanchard]

Graham Centre PhD student, Siem Siah receiving the Best student poster award from International guest Prof Ravi Chibbar. [Photo: C Blanchard]

Ten members of the Graham Centre recently participated in the 16th Australian Research Assembly on Brassicas (ARAB) held 14 – 16 September at Ballarat, Victoria. The conference gathered about 90 public and private researchers and extension personnel as well as educators and students involved in canola research. The 52 research papers presented at the conference ranged from molecular biology right through to extension. The Graham Centre group presented a total of seven papers as either posters or talks. The international status of the conference was emphasised by a large contingent from China and India many of whom were invited to attend as part of a successful ACIAR project that concluded recently. Prior to the ARAB conference Dr David Luckett attended the national ACIAR meeting where options for continuing the collaborations were discussed. It is very likely that the Graham Centre will be involved in continuing this important collaborative project with support from GRDC once the details are worked out.

The strong presence of the Graham Centre group helped to secure the right to host the next ARAB conference in 2011 in Wagga Wagga.

Pre-conference field tour included this site with dramatic background of the Grampians. [Photo: R Cowley]

Canola research forms an important part of the research conducted at Wagga. The NSW node of the National Brassica Germplasm Improvement Program and the Canola Molecular Marker Project are both based at Wagga. Canola pathology and oil quality research is also in progress.

Graham Centre PhD Student, Je McCormick, receiving the Canola Breeders Western Australia Pty Ltd (CBWA) prize awarded for Best Student Presentation from Dr Wallace Cowling CEO of CBWA. [Photo: S Moroni].

Congratulations are extended to Graham Centre PhD student, Je McCormick, awarded for the best student presentation at the conference.

Although canola meal has a significant amount of proteins, it is currently under-utilised, especially as a food ingredient. This is due to the current commercial fractionation method which produces proteins that are not suitable for incorporation into food for human consumption, principally as a result of poor solubility in aqueous systems. Preliminary studies at the Graham Centre have shown that food-functional protein bodies could be potentially fractionated from canola meal in commercial quantities. Using improved fractionation methods, this project seeks to separate and characterise canola protein fractions for their molecular properties, determine their functional properties, evaluate them against commercially available food protein isolates and provide relevant information to improve meal quality (by breeding if accepted as a key trait by the Canola Breeders Group). The project will provide the opportunity to enhance the value of canola meal by promoting it as a viable source of ingredients for human food use. It will also improve the health of Australian consumers by enhancing the availability of a wider variety of non-allergenic plant sources of edible proteins as ingredients for food manufacturers. The main outcome will be a significant increase in the value of canola meal and potentially higher canola price.

Siong Huat Tan is a Graham Centre PhD student supervised by Drs Samson Agboola, Rod Mailer and Chris Blanchard. [Photo: D Lemerle]

Further information: Siong Huat Tan, PhD Student, siongtan@csu.edu.au.

Competitive crops are an important component of integrated weed management strategies. Most previous research on crop competition for weed suppression has focussed on cereals. Little information is available for canola.

New research this season, funded by GRDC, is examining the impact of variety and seeding rate on competitiveness against weeds. Preliminary data indicates large differences between 12 different canola varieties in suppression of annual ryegrass. Another experiment is examining canola seed rates (4–80 plants/m²) impacts on canola yield and weed suppression. Results will be available for GRDC Updates in 2010 and will be presented at the 17th Australasian Conference in September 2010.

Further information: Prof Deirdre Lemerle, (02) 6938 1667, dlemerle@csu.edu.au.

Strongly competitive canola variety (left picture) compared with poorly competitive type (right picture) showing severe weed infestation at Wagga Wagga. [Photo: D Lemerle].

ACIAR received \$10 million for research to enhance food security in rice-based systems of Laos, Cambodia and Bangladesh in the federal budget, and a further \$2 million for climate change in Vietnam. The first three countries were identified as having a higher risk of hunger by 2020, while the latter was chosen for impact of sea-level rise and inundation in low-lying deltas. Professor Len Wade was invited to lead the project in Laos, and he and Mr John Lacy visited Laos from 22 August to 2 September to define the project. The trip included visits to farms and experiments in Savannakhet and Champassak provinces in southern Laos, where the majority of rainfed lowland rice is grown. The project is quite diverse, with components in socio-economics and marketing, rice productivity and risk with limited labour, system diversification including livestock, and capacity building in extension services, with linkages to major projects by the World Bank, Asian Development Bank and the International Fund for Agricultural

A rice experiment in Savannakhet in southern Laos, showing varieties in the rainfed lowlands. Vorachit (blue shirt) is in charge of the experiment with Pheng to the left, and John Schiller (FAO Consultant) and John Dixon (ACIAR Senior Advisor) to the right. (Photo: L Wade).

Our welcome at a remote village, where the village leader gave thanks for our visit. The table decoration is a huge rice oret showing stamens (male), and style and ovule (female parts). They put on a banquet, with much singing and dancing. (Photo: L Wade).

Development. The preliminary proposal was accepted on 17 September, with an indicative budget of \$4.6 million. Geo Beecher has now been asked to lead the project for Cambodia, and will undertake a similar site visit later this month. While the details are still being mapped out, there will be an Australian component to both projects, with benefits to Australia as well as to Laos and Cambodia.

Further information: Prof Len Wade, (02) 6933 2523, lwade@csu.edu.au.

Dr Susan Robertson (Post-Doctoral Fellow Livestock Production) attended the Grasslands Society of Southern Australia Conference 6-7 August to present a poster describing how weaning weights were affected by breed, pasture type and stocking rate, and used simulation modelling using GrassGro to determine the risk of low weaning weights at different lambing dates.

The EverGraze projects large presence at the conference, including the posters, a project stand, and invited speakers, resulted in a 24% increase in EverGraze website traffic in one week. Anyone visiting the website would have had the opportunity to become aware of the research, especially at Wagga. A second poster authored by Jim Meckin and Michael Friend, again highlighting Wagga trial results, won the best poster award.

Of particular interest at the conference were presentations on the future of current Australian agricultural methods. Andrew Campbell suggested agricultural systems need to be dramatically modified to be viable under changing climate, input availability, cost and social pressures, with a doubling of food production required in the next 40 years. This was highly relevant to the Graham Centre objectives of pastures and animals and constraints to production, and reinforces the need for research to find alternative production methods.

There were several presentations on business management which gave different views on optimum management – from profit only, achieving work/life balance through to achieving economic goals by increasing land value (eg land rehabilitation, tree-planting).

It was clear that while there is still an important role for narrow, fundamental research, there is a clear and increasingly urgent need to develop agricultural systems that are resilient or flexible under both variable seasonal conditions, and will be appropriate in a future much more consumer rather than production driven market. With the current season progressing towards the fourth sequential year of economically disastrous cropping in the local (and wider) region, alternative, less risky systems are required.

Further information: Dr Susan Robertson, (02) 6933 4199, surobertson@csu.edu.au.

Dr Ed Clayton was a delegate at the Recent Advances in Animal Nutrition in Australia conference held at the University of New England, Armidale, in July. This event is a nationally recognised meeting in the field of animal nutrition and was attended by approximately 120 delegates – national and international experts in the field, and many industry representatives.

The conference was extremely stimulating with many ideas for new projects arising. It provided an opportunity to meet with research leaders from a number of national institutions, including the University of New England, University of Queensland, Deakin University and DPI Victoria (Werribee), several leading Australian animal nutrition companies such as Alltech, Kemira and Feedworks, as well as international researchers. There was interest from several groups in developing collaborative projects, including the Kemira company who produce additives used in the ensiling process.

There were many themes covered at the conference, including a mixture of ruminant and monogastric nutrition, with topics such as metabolism, omega-3 fatty acids, enzyme addition to feeds, food security and, of course, several presentations on the

contribution of agriculture to greenhouse gas production and global warming and the Carbon Pollution Reduction Scheme. The meeting allowed discussions to be held with several leading researchers and helped gain a focus on how to integrate relevant findings into our current research programs. This will greatly assist in allowing us to submit world class competitive funding applications.

During the conference Dr Clayton presented a short paper titled Higher omega-36:omega-3 fatty acid ratio in silage compared with fresh forage. The presentation received a lot of interest and he fielded several great questions from the audience. Papers from the conference were published in the proceedings, which is available online and has a wide readership in the field.

Some of the highlights of the conference included presentations on the relationship between animal food products and human health. There were also two very informative sessions on the federal government's proposed Carbon Pollution Reduction Scheme. In addition, there were several social functions where it was possible to chat more informally to people about their research and ways to develop links between organisations.

More information: Dr Edward Clayton, (02) 6938 1971, ed.clayton@industry.nsw.gov.au.

A delegation of plant scientists from the Fujian Association for Science and Technology, China visited the Centre on 18 September. The purpose of the visit was to develop collaborative links with our scientists in the areas of integrated pest management and biosecurity.

Wattle seed (*Acacia victoriae* Benth.) is one of the most viable native plants in Australia being considered as ingredients for food manufacture and has been recognized to have significant economic potential due to its high level of proteins and carbohydrates. At CSU, *A. victoriae* seed functional compounds, including protease inhibitors (PIs) were further investigated as they might have potential beneficial effects on human health and could be applied in the biological control of insects and fungal diseases in crops. Previously we have reported crude wattle seed extracts as possessing significant levels of trypsin and α -chymotrypsin inhibitor activities; the inhibitors being also susceptible to inactivation by moist heat treatment. Recently, an *Acacia victoriae* trypsin inhibitor (AvTI) was purified from the seeds by salt precipitation, chromatography methods and then characterized by electrophoresis and N-terminal amino acid sequencing. AvTI had a specific activity of 138.99 trypsin inhibitor units per milligram (TIU mg⁻¹). SDS-PAGE of AvTI revealed that it is constituted by two polypeptide chains (α -chain, Mr 13,000 and β -chain, Mr 5300), the molecular weight being ~18.3 kDa. Although only a single peak was resolved by ion exchange chromatography and

HPLC, native-PAGE and isoelectric focusing revealed the presence of three isoforms possessing acidic pI values of 5.13, 4.76, and 4.27, respectively. N-Terminal amino acid sequencing analysis of native and reduced AvTI showed two sequences with a high degree of homology with a typical Kunitz-type trypsin inhibitor. All isoforms had considerable trypsin inhibitory activity but showed relatively very low inhibition against α -chymotrypsin. This study makes a very significant contribution to the overall research into PIs and their potential application as a health-functional ingredient in food systems. Research continues on inhibition kinetics, glycoprotein analysis,

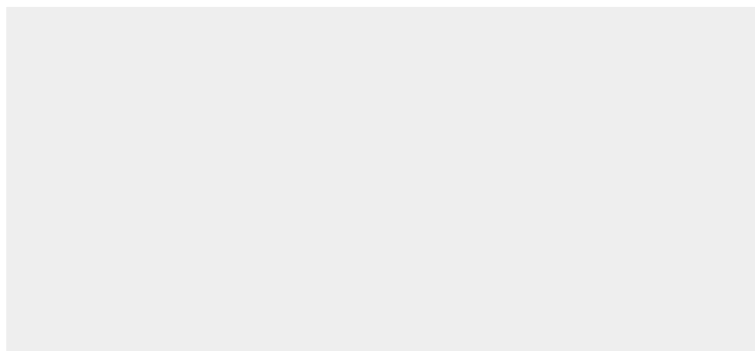


Figure 1. HPLC analysis of AvTI .

antimicrobial and insecticidal properties, also health-functional properties of minor constituents (i.e. PIs and phenolics) and the possibility of synergy between them will be analysed.

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Graham Centre member and Professor of Applied Ecology at CSU, Geoff Gurr, is working with an international team to develop new methods for insect control that minimise the use of insecticides.

Various pests that attack rice such as planthoppers are now difficult to control because they have developed a resistance to chemicals due to the overuse of pesticides, Professor Gurr said.

As these resistant insects can migrate hundreds of kilometres between countries, the threat to rice is extremely widespread. It is now so serious that the Asia Development Bank (ADB) has made a multi-million dollar investment in finding solutions to this problem for rice farmers in the region.

In response to the threat, a new research project led by the International Rice Research Institute (IRRI) that includes Professor Gurr is now looking into developing new methods to increase biodiversity and natural biological control in eastern and southern China, Vietnam and Thailand. The research areas cover many hectares involving multiple farm families.

We are developing a new approach for pest control called ecological engineering, Gurr said.

Unlike genetic engineering which many consumers are uneasy about, ecological engineering involves introducing carefully-chosen plant diversity onto farms.

For example, we have introduced sesame to be planted around rice fields and sesame flowers provide nectar that is fed upon by beneficial insects. This has multiple benefits: farmers have an additional crop in sesame seeds, and during the growing season the sesame acts as a nursery for predators and parasites of the pests. Rice farms can then harbour large numbers of good insects so when pests arrive they are more likely to be eaten before they breed and damage crops.

Professor Gurr has been researching clean and green pest control methods for over 15 years, working with crops as diverse as rice, grapevines, potatoes and lucerne.

An important part of IRRI-ADB project is the emphasis on high farmer participation in the research.

Dozens of farm families are involved and we aim to make a real impact on their economic viability and health by providing better pest control with fewer sprays, Gurr concluded.

Article courtesy of Charles Sturt University.

Further information: Prof Geoff Gurr, (02) 6365 7551, ggurr@csu.edu.au.

Exotic Plant hopper. [Photo IRRI].

Figure 2. Isoelectric focusing gel of re-chromatographed AvTI. Lanes 1 and 3: pI markers; lane 2: AvTI isoinhibitors with pI at 5.13, 4.76 and 4.27 respectively. Arrow indicates direction of protein migration.

Graham Centre researchers, Masters student Darren Herpich, Drs Remy Dehaan and Iain Hume who are funded by the Graham Centre New I Grants Scheme, CSU Competitive Grant Scheme, IC Water and Australian Geographic sponsorship, are investigating groundwater discharges agricultural landscapes using thermal imagery. Airborne thermal Infrared and visible spectrum imagery were captured in September over terres and marine environments in the karst landscape of south-east South Australia and along the Glenelg River in south-west Victoria.

Why Thermal Imagery? Given differences in groundwater and surface waters, temperature can be used as a tracer or indicator of discharging groundwater. Quantifying the volume and location of groundwater loss is critical if accurate water balance models are to be developed. Preliminary results using raw imagery illustrates that a number of discharges to riparian, terrestrial and marine ecosystems can be identified within the project area. Figure 1 illustrates a section of the Glenelg River where groundwater (usually around 15°C) discharge is noticeable. For example, the brighter colour indicates warmer water (11 - 12°C) intruding into the river (10°C). Due to volume and flow the discharging water temperature is quickly assimilated to the receiving environment.

Figure 1. Thermal imagery showing groundwater discharge zones in the Glenelg River.

Figure 2. The karst landscape of parts of the Glenelg River. [Photo: Darren Herpich].

Using image analysis techniques this project will develop methods and suitable algorithms to define the spatial extent of groundwater discharges over the total project area. Other parameters such as colour (indicative of turbidity or biological activity) and surface roughness will be explored to determine if additional indicators of groundwater discharge from a remote sensing perspective are feasible.

Ocean imagery will be calibrated with temperature data collected from in situ loggers (Figure 3) attached to moored boats in addition to temperature and salinity data that was collected at the time of image capture using a SONDE. Fresh groundwater discharging at beach spring sites (Figure 4) were also monitored during image capture to assist with the calibration process.

Figure 3. Tid Bit temperature logger monitoring groundwater discharge zones [Photo: Darren Herpich].

Figure 4. Beach springs discharging fresh groundwater. [Photo: Darren Herpich].

This project will be the first to define the spatial extent of groundwater discharge in this region and thus provide a baseline dataset over the project area. Future imagery collection and assessment of spatial extents may be used to assess the sustainability of groundwater allocation plans.

Further information: Darren Herpich (08) 8735 1081, darren.herpich@sa.gov.au; Dr Iain Hume (02) 6938 1984, iain.hume@industry.nsw.gov.au; Dr Remy Dehaan (02) 6933 2499, rdehaan@csu.edu.au.

Soil acidity remains a serious obstacle for sustainable food production worldwide. The major limitation to plant productivity on most acid soils is aluminum (Al) toxicity. Genetic variation for Al resistance exists within and between subspecies of *Triticum aestivum* (wheat). The first confirmed mechanism for aluminum (Al) resistance in plants is encoded by the wheat gene, *TaALMT1*, on chromosome 4DL. *TaALMT1* controls the Al-activated excretion of malate from roots, and this mechanism is widespread among Al-resistant genotypes of diverse genetic origins.

Recently, a collaborative research by scientists Drs Peter R Ryan, Harsh Raman, Sanjay Gupta, Walter J Horst, and Emmanuel Delhaize from CSIRO Plant Industry, Canberra, EH Graham Centre for Agricultural Innovation, Wagga Wagga, and Institute for Plant Nutrition, University of Hannover, Germany described a second mechanism for Al resistance in wheat that relies on citrate excretion. This research has been published recently in an international journal *Plant Physiology* 149:340-351(2009) published by the American Society of Plant Biologists.

This study showed that citrate excretion occurred constitutively from the roots of Brazilian cultivars Carazinho, Maringa, Toropi, and Trintecinco. Examination of two populations segregating for this trait showed that citrate excretion was controlled by a single locus. Whole-genome linkage mapping using an F2 population derived from a cross between Carazinho (citrate excretion) and the cultivar EGA-Burke (no citrate excretion) identified a major locus on chromosome 4BL, *Xced*, which accounts for more than 50% of the phenotypic variation in citrate excretion. Mendelizing the quantitative variation in citrate excretion into qualitative data, the *Xced* locus was mapped within 6.3 cM of the microsatellite marker locus. This linkage was validated in a second population of F2:3 families derived from a cross between Carazinho and the cultivar Egret (no citrate excretion). We show that expression of an expressed sequence tag, belonging to the multidrug and toxin excretion gene family, correlates with the citrate excretion phenotype. This study provides genetic and physiological evidence that citrate excretion is a second mechanism for Al resistance in wheat.

Harsh Raman and his collaborators Rummana Rahman, David Lockett, Rosy Raman, Ferenc Bekes, Laszlo Leng, and Zoltan Bedo of EH Graham Centre for Agricultural Innovation, George Westons Pty Ltd, Sydney and Agricultural Research Institute of HAS, Martonvásár, H-2462, Hungary, characterised spelt germplasm for aluminium resistance and for polyphenol oxidase (PPO) activity. This research has been accepted for publication in the *Breeding Science* Journal of Japanese Society of Breeding

Spelt wheat (*Triticum aestivum* ssp *spelta* Thell.) is becoming a valuable crop due to its reputation as a healthy food. In Australia, this crop has not been targeted for systematic breeding. Identification of spelt genotypes having low PPO activity and resistance to acid soils (Al³⁺) are desirable attributes for future cultivar development. We evaluated 51 genebank accessions of spelts from the Australian Winter Cereals Collection, were for polyphenol oxidase (PPO) activity and for resistance to aluminium (Al). PPO activity was measured both visually and spectrophotometrically, using L-DOPA substrate. PPO activity for genotypes ranged from 0.15 to 1.3 and could be grouped into low, medium and high categories. At least eight accessions exhibited low PPO activity (not different to the durum check cultivar Arrivato). After measuring PPO activity, the same kernels were further evaluated for Al resistance using a nutrient solution culture method with haematoxylin staining test of root tips. Thirty-three

Dr Harsh Raman performing DNA analysis.
[Photo: S Kiss].

accessions were resistant to AI. Functional gene markers associated with loci conditioning AI resistance gene (TaALMT) and PPO activity (XPPO-2A) in common wheat confirmed their association with target phenotypes within spelt accessions. Genetic variation within spelt wheat for important agronomic and quality traits such as AI resistance and PPO suggested that progress in spelt improvement can be made by molecular plant breeding. Diversity Array Technology (DART) based allelic data revealed that these spelt accessions are genetically diverse. Identification of low PPO lines of spelt may be suitable for preparation of raw noodles.

Further information: Dr Harsh Raman, (02) 6938 1925, harsh.raman@industry.nsw.gov.au.

GRDC visitors viewing the CSU lysimeter (underground lab for studying plant roots). This facility will be quadrupled in size during the next two years under the National Life Sciences Hub research grant. [Photo: D Lemerle].

The Industry Advisory Committee inspected Centre facilities as part of the September meeting. Pictured from left: Lee O'Brien, Lucinda Corrigan, Andrew Vizard, Tony Fischer, Mark Harris, David Wolfenden and Steve Thomas (absent Greg Fraser and Mike O'Hare). [Photo: M Crowley].

John Oliver, Director of the Wagga Wagga Agricultural Institute, giving his acceptance speech after receiving the Founders' Award from the Royal Australian Chemical Institute Cereal Chemistry division for significant contribution to the cereal industry. [Photo: C Blanchard]

GRDC visitors examining canola experiments in the I&I NSW rainout shelter. [Photo: D Lemerle]

: Lecturer in Agricultural Systems and Extension

: School of Agricultural and Wine Sciences (SAWS), CSU

After completing my undergraduate in Rural Science, UNE (honours) I undertook various jobs in a range of agricultural enterprises including cotton, agronomy and vegetable research. I graduated with my PhD in 2009, with my thesis being Factors in influencing the soil water dynamics beneath native pastures in the high rainfall zone of south-eastern Australia, sponsored by the CRC for Plant-based Management of Dryland Salinity now Future Farm Industries.

I've made presentations at the International Grasslands Congress in Ireland (2005), the combined Grasslands and Rangelands congress in Hohhot, China (2008), and the International Salinity Forum in Adelaide (2008). For the past 2½ years I've been teaching Bachelor of Agriculture students in the School of Agricultural and Wine Sciences in Agricultural Systems and have also supervised student tours to Pakistan and Vietnam.

I am currently undertaking a teaching fellowship with the Education for Practice Institute to develop Industry practicum programs in the Agricultural Science and Viticulture and Wine Science degrees within SAWS. I am Theme Leader of the Resilient Farmers Initiative within the EH Graham Centre. In my spare time I am Assistant Manager of the family's 2,000 head Merino enterprise at Burrinjuck, near Yass.

Research activities

Currently developing a number of grant applications within the resilient farmers initiative.

Helped out in an ACIAR project aimed at improving Extension processes in small-holder dairy systems in Pakistan.

Writing up articles from my PhD

Teaching activities

Jason Condon and I just got back from taking 21 final year Ag students to Vietnam on a study tour - amazing experience!

Work experience coordinator for the Bachelor of Agricultural Science degree.

Subject coordinator for the new AGS400 Industry Practicum program currently under construction, ready to begin in 2010.

Education for Practice Institute (EFPI) Teaching fellow with project to research and develop practicum programs within the School of Ag and Wine Sciences courses.

With the assistance of a SAVS and SAWS student group, Julie Clements and Peter Wynn, coordinated what is now the Inaugural Agriculture and Animal Industry Careers Fair to be held in August next year. Make sure you come!

The boring stuff now - member of the School Learning and Teaching Committee, Chair of the School Professional Placements committee and School representative of the Faculty Professional Placements Committee.

Manage Industry links for the SAWS

NSW grasslands society

International Grasslands committee

I'm off to the Academy of Science High Flyers Think Tank (High flyers sounds a bit silly!) next month discussing Agricultural Productivity in a Changing climate. Should be fun. Anyone got any ideas?

A jog with the pooch - first up, breaky, off to work to answer a thousand emails, attend meetings (and try and get some constructive stuff done in between) then off to play a game of netball that night or back home to help out on the farm if it's lucky enough to be a Friday.

The EFPI teaching fellowship is what I should say but at the moment I'm trying to get some writing done!

Mixing it with the students, meeting new people and never knowing what is going to happen from one day to the next.

Visiting the boyfriend in the Mallee and heading home to train my new kelpie pup.

Lily Allan.

Research Entomologist

Industry & Investment NSW

I completed my PhD on the thermoenergetics and ecology of sugar gliders in 1998 which basically found out that they tend to sleep and eat a lot over winter to build up a fat layer in order to survive the cold winters in Armidale. Very similar to some humans! From there I worked at UNSW looking at similar things with kangaroos, bettongs and dunnarts. However, life in the city wasn't for me, and as it was hard to get a job working with mammals, I became a Research Entomologist in field crops here in Wagga in 2002 which meant a very steep learning curve to become familiar with both insects and crops. And I'm still learning!

Research activities

Chemical resistance in grain storage insects, Ecology of grain storage insects, IPM in field crops

Teaching activities

Educating growers and bulk handlers in control of grain storage insects

National Working Party on Grain Protection

Australian Entomological Society

National Invertebrate Pest Initiative (NIPi)

Apart from arriving and leaving by bicycle, and checking my emails, my job is so varied there really isn't a typical day. I could be in the field collecting insects, in the lab sorting the insects I've collected, out and about educating growers on grain storage techniques, or sitting at the computer trying to complete the many administrative tasks that go with this job.

Equally divided between Phosphine resistance in grain storage insects in the southern region of Australia, and Assessment of IPM strategies that encourage beneficial invertebrates.

Going home - Only kidding! Being able to vary what I do - especially the ability to escape the office.

Pub trivia, indoor soccer, bushwalking, photography and sleeping.

My iPod on shuffle - a wide range of musical styles. Anything but tearjerker country and western, or rap/hip hop. If I had to choose, my current favourites are The Waifs and Ash Grunwald.

The Graham Centre sponsors Honours projects through the School of Animal & Veterinary Sciences at CSU. The following projects, conducted by Veterinary Science students, are currently underway or will commence in 2010. The Veterinary Science projects comprise an experimental period of nine weeks. It is expected that the number of Honours students in the School will more than double in 2010 with Animal Science students and a small number of students from other courses undertaking Honours. Honours is a useful stepping stone to further research as a Higher Degree student and the program attracts high quality students who have the potential to make significant contributions to scientific research and knowledge in Australia. The Subject Coordinator for the School's Honours Program is [Dr Raf Freire](#).

Commencement date Project title/outline
August 2009

Greg Dale	The effect of transport medium, temperature and time on the isolation of bacterial pathogens in equine peripheral blood. The diagnosis of bacterial diseases requires collection of appropriate samples from the host animal and transportation to a diagnostic laboratory in a correct and timely manner to ensure survival of the bacteria for culture and subsequent identification. This project aims to quantify the effects that transport medium, time and temperature have on bacterial survivability and therefore culture results.
Rosie Harvey	Survey of seroprevalence of <i>Toxoplasma gondii</i> . Tg is a protozoan that causes toxoplasmosis, a serious reproductive disease in sheep. The aim of this project is to determine the seroprevalence of Tg in adult sheep in a number of flocks within the Tumbarumba Shire of NSW.
Tara Mills	Management of wounds in horses. Horses can suffer from severe and slow-healing wounds. This study will review and compare traditional management of wounds along with more novel approaches, in particular the utilisation of platelet rich plasma, on wound healing in horses.
Matt Muir	Subacute ruminal acidosis and liveweight gain in feedlot lambs. The objective of this research is to collect a data set that will provide valuable insight into trends associated with the SARA disease in commercial situations.
Kelly Plozza	Sub-clinical mastitis in NSW dairy farms. Sub-clinical mastitis is of great concern for dairy farmers due to the associated health issues as well as the potential for great economic losses. As there has been no published data representing the prevalence of sub-clinical mastitis within NSW, it seems pertinent that this be addressed as well as analysing associated risk factors that may contribute to the development or longevity of sub-clinical mastitis within herds. A collaboration with Dairy Express will allow for the current prevalence to be assessed, and a questionnaire will be distributed to farmers to analyse associated risk factors. This questionnaire will be sent to around 400 farmers, with the expectation that around 50-100 participants will reply and thus will be included in the study.
Bec Robson	Selenium deficiency and mineral block intake in sheep. This project aims to assess the efficacy of mineral lick blocks as a means of correcting selenium deficiencies in sheep.
Bruno Ros	Use of oxytetracycline intra-uterine infusions in mares. There has been little study into the effects or effectiveness of intrauterine administration of oxytetracycline use in mares for treating intrauterine infections. This project will determine the efficacy of oxytetracycline infusions in mares by comparing the effect of different doses on uterine health.
Coco Willsallen	Response of mare's endometrium following intra-uterine infusion of oxytetracycline. The aim of this project is to determine the severity if any of inflammation of the lining of the mare's uterus in response to infusion of oxytetracycline.

Commencement date Project title/outline
March 2010

Jess Cooke	Polyarthritis in sheep. The bacterium <i>Chlamydophila pecorum</i> has been implicated in the causation of polyarthritis in lambs. The purpose of this project is to investigate the stage at which the organism is transmitted from the ewe to the lamb. It is likely that the time of transmission coincides with a change from a latent infection to an active infection, which would correspond to a rise in serum antibodies.
Andrew Hancock	Meta-analysis of risk factors for bovine mastitis. Using meta-analysis this research will combine the results from studies into the management practices used to control bovine mastitis in an effort to determine the true effect size of each practice.
Ash Smith	Presence and potential effects of <i>Ureaplasma diversium</i> in Australian cattle. The aims of this study are to establish the presence of <i>U. diversum</i> in Australian cattle and compare methods of detecting this organism.

The Summer Edition of The Innovator will be released January 2010. Submission of articles for this edition closes on . Please email articles to Sharon Kiss.

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Historic wagon located on the perimeter of the
Graham Centre Field Site. [Photo: G Murray].