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The University of Western Australia

Institute of Agriculture Newsletter

photo: Brendon Cant

Challenges for productivity improvement and the role of research and development

Dr Michael Chaney AO
Chancellor, The University of Western Australia

Future economic growth in Australia will depend on the ability of Australia's major industries to continue to lift their productivity.

Mr Chris Richardson from Access Economics recently reinforced this by pointing out that the economic success or failure of nations throughout history has been determined by their ability to find ways to increase, in a sustained way, the productivity of their industries. **continued page 2**

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Director's column

Prof Kadambot Siddique

ksiddique@fnas.uwa.edu.au

The Institute of Agriculture (IOA), since its re-establishment earlier this year, is making good progress towards the mandate to integrate agricultural and natural resource management research, education, training and communication across UWA and externally. The IOA has put emphasis on communicating its activities through regular press releases, public lectures, newsletters, industry forums and its website.

The IOA's External Advisory Board (EAB) had its second meeting on September 28, 2007. The leaders of three programs (Integrated Land and Water Management, Animal Production Systems and Plant Production Systems) made brief presentations at the meeting. The EAB emphasised the importance of the IOA's role in integration of activities between the programs, schools and centres of relevance within UWA. The EAB provided further feed back and suggestions on the Institute's strategic plan.

The IOA participated at the recent Dowerin Field Days where we displayed UWA agricultural educational and research portfolios. The feedback received from farmers and parents of potential students was positive.

The IOA's first Industry Forum 'Innovations in animal production to meet consumer expectations' formally opened by Prof Lyn Beazley, WA Chief Scientist, was a great success attended by some 60 people representing the industry, growers and the research community (see article next page).

The IOA's inaugural Postgraduate Student Showcase symposium 'Frontiers in Agriculture and Resource Management' promoted the excellent research undertaken by selected postgraduates at UWA and provided opportunities for students to interact with the industry and future employers (article page 8).

Recently I chaired an internal review of the BSc in Agriculture at UWA. In the review, the overall structure of the degree was examined with particular attention given to assessing the balance of disciplines and academic content, the context provided, the balance of generic and discipline specific skills, the attractiveness of the course to prospective students, whether the needs of external stakeholders are being met and it was compared to agriculture courses offered by the other Go8 Universities. The panel made twenty recommendations and these are currently being implemented by the Faculty of Natural and Agricultural Sciences (FNAS).

The rapidly emerging and strengthening economies of Brazil, Russia, India, China (BRIC) and of Asia generally is resulting in greater emphasis on higher education and research. Increased agricultural productivity and sustainable natural resource management are high on the agenda in these countries. Recently UWA has signed Memoranda of Understanding (MoU) with several of these countries on agricultural postgraduate education and research. Our international linkage and collaboration has been further strengthened by a number of prominent visitors to the IOA from China, India, Brazil, the Middle East, Europe, North and South America. Several staff members also visited various overseas universities and research institutions during the year.

Greater strategic investment in education and research will lead to improved national economic growth, productivity gains and lifestyle. Let us hope that the newly elected Labor Government will boost much needed resource allocation to higher education sectors in Australia.

I wish you all a peaceful and prosperous festive season and look forward to interacting with you in the New Year.

continued from page 1 Agriculture can claim some of the credit for Australia's economic prosperity given the remarkable productivity improvements that have been achieved in that industry over the last century.

But we need to keep in mind that productivity is not only concerned with doing things more efficiently. It is also concerned with finding ways to provide greater value to customers or consumers. In both these endeavours research and development has the potential to make a vital contribution to the continuing productivity growth of key industries like food and agriculture.

This is because delivering additional value to customers depends on new ideas and the ability of organisations to apply them in a practical way. It is in coming up with and testing new ideas that research organisations play a critical role in supporting innovation by industry.

The effectiveness of research and development as a source of innovation depends on two factors.

First, there needs to be continued support from governments, business and the community for public research and the role of research and educational institutions.

Second, effective outcomes depend on the knowledge and skills of researchers, the quality of their work, and their willingness to consult and to collaborate with industry and with the wider community.

Too often in the past, innovation has been seen by some policymakers as involving a focus on new industries or the high technology sector. Such an approach is far too narrow.

Australia should be looking to build on our success in established industries where we already have considerable expertise, comparative advantage and where innovation offers us a way to continue to build on these strengths.

Agriculture is certainly one sector where Australia should continue to direct its research and development efforts. Agriculture, fisheries and forestry products account for about one-fifth of Australia's merchandise exports, generating $30 billion in income for the nation in 2006-07, despite the effects of a prolonged drought in recent years.

One of the most important elements necessary for building world class agricultural industries has been the high degree of collaboration between research institutions and industry.

The re-establishment of the Institute of Agriculture at The University of Western Australia earlier this year has involved a renewed focus on collaboration with industry. This has been a very welcome initiative and one that I am sure will see the Institute build on the outstanding contribution made by the University over the last seventy years to agricultural research and development, and to the sustained productivity growth of Australia's agricultural industries.

IOA Industry Forum 2007:

Innovations in animal production to meet consumer expectations

WA to 'meat' clean, green and ethical consumer demands

Animal industries around the world are being challenged by changing societal attitudes, with increasing consumer demand for products that are clean, green and produced to agreed ethical standards.

At the IOA forum 'Innovations in animal production to meet consumer expectations' held at UWA on August 2, 2007, more than 70 farmers, industry representatives and researchers met to explore how Western Australia can turn this consumer sentiment into an opportunity and to ensure its future in this lucrative market.

Australian lamb and sheep meat exports are worth $AU1.6 billion every year and with this expected to increase to $AU2.5 billion per year by 2015, addressing animal welfare issues is vital, according to UWA IOA Director, Prof Kadambot Siddique in his opening address to the forum.

"As availability and choice of product increases, intangibles, such as whether the products have been produced to clean, green and ethical standards, matter more," Prof Siddique said.

"Market differentiation then depends on these intangibles being addressed so the industry can retain its market share and remain globally competitive," he said.

"Such consumers no longer want only nutritious and top quality meat products. They also want to know the products come from animals raised in sustainable, animal friendly environments that have not been fed antibiotics or artificial hormones, where there has been no excess fertiliser use, minimal greenhouse gas emissions from animal production and safe waste disposal from feedlots."

Prof Graeme Martin, Head of School of Animal Biology and IOA Animal Production Systems Program Leader, Dr Peter McInnes, Research Manager, New Animal Products, RIRDC, Prof Lyn Beazley, Chief Scientist WA, Prof Kadambot Siddique, IOA Director and Mr Roger O'Dwyer, Executive Director for Industry and Rural Services, DAFWA.

UWA School of Animal Biology researchers are vigorously exploring ways to address these issues.

Meat and Livestock Australia supported UWA researcher, Dr Dominique Blache and his group have, for example, pioneered techniques to select for temperament in sheep, which improves their welfare, productivity and ease of handling and management on-farm (see article below).

"With an increased focus on these matters in the industry it is likely future sheep producers will need to prove their management is clean, green and ethical if they wish to export meat products to premium markets", IOA Animal Production Systems Program Leader, Prof Graeme Martin commented.

"To achieve this all links in the meat production chain, including abattoirs, processors and livestock transporters, will need to show they are behaving ethically in every aspect of their operation, since ethics applies to more than animal welfare, but to the integrity of the whole business," Prof Martin said.

"The alternative is the distinct possibility that wealthy, educated consumers will boycott their products."

These new challenges and consumer demands create opportunities for WA to lead the way through world class research and instituting clean, green and ethical animal industry practices.

The French and the Allandale flock

Dr Dominique Blache dbla@animals.uwa.edu.au

The Allandale flock of ewes live at UWA Allandale Farm and have been selected for calm or nervous behavioural traits and are part of the IOA's internationally recognized program of research into clean, green and ethical animal production.

Many behavioural and physiological aspects of the flock have been studied by local and international animal scientists, most recently by three visiting French scientists who have been working closely with Dr Dominique Blache from the IOA Animal Production Systems program.

Dr Pascal Poindron, Director of Research at the Centre National de la Recherche Scientifique (CNRS), France, has a long history of collaboration with UWA beginning in the 1970s when he came here to do his PhD with Prof David Lindsay. With the help of a grant from the Distinguished Visitor Fund from the Faculty of Natural and Agricultural Sciences, he has just returned for a 12-month working visit.

For the past 25 years, Dr Poindron has been a world leader in the field of reproductive behaviour in sheep and goats. His major interest has been focused on maternal behaviour and mother-young relationships, with the goal of improving the survival and prosperity of the newborn. **continued p4**

Dr Pascal Poindron, Director of Research Centre National de la Recherche Scientifique, France, at Allandale Farm, where he is working with the Allandale Flock.

continued from p3 While at the IOA, Dr Poindron will work on the coding of information in the vocalisations of ewes and lambs to identify individual 'signatures' that link maternal behaviour to the emotional state of the sheep. These factors interact to influence lamb survival which has been identified as one of the highest priorities for the Australian sheep industry.

Dr Raymond Nowak from the Institut Nationale de la Recherche Agronomique, Nouzilly, France and UWA IOA PhD student Ms Samantha Bickell researching ways to improve the survival of newborn lambs.

Also visiting the IOA from France was Dr Raymond Nowak from the Institut Nationale de la Recherche Agronomique in Nouzilly, who has just spent four weeks working with Dr Blache and School of Animal Biology PhD student Ms Samantha Bickell, on a project also focussing on improving the survival of newborn lambs.

This is the third consecutive year that Dr Nowak has visited UWA specifically to work with the Allandale Flock and his presence brings important expertise in the field of lamb behaviour and lamb nutrition in the establishment of the mother-young bond to this Meat & Livestock Australia funded project.

In a reciprocal gesture, Ms Bickell has spent several weeks in France working in Dr Nowak's group to learn new techniques for analysing the behaviour of lambs and ewes around the time of birth.

Ms Bickell's research has shown the temperament of the newborn lamb is influenced mainly by genetics rather than by the temperament of its mother, contributing to the important understanding that temperament is heritable in sheep.

Ms Céline Lenoury, a second year French student at the Institut National Agronomique Paris-Grignon (INA-PG) has just finished a six-month internship working in the IOA Animal Production Systems program. INA-PG insist their students to do training internship in a research institution or company located outside of France. Ms Lenoury was the most recent of a long list of French students who have spent time with researchers at UWA working on the biology of farm animals.

Ms Céline Lenoury, a postgraduate student from France, testing the efficiency of an olfactory repellent for sheep.

Ms Lenoury's work focussed on testing the effectiveness of an olfactory repellent that might be useful for controlling sheep, for example, for deterring them from eating specific plants. Repellents have proven effective for preventing deer from grazing valuable trees and plants but they have not been tested in domestic ruminants such as sheep and goats.

These important international collaborations with the IOA help to strengthen understanding, research and development into clean, green and ethical animal production worldwide.

Three days full for sheep producers

Dr Dominique Blache dbla@animals.uwa.edu.au

Dr Dominique Blache, Senior Lecturer and Ms Aprille Chadwick, postgraduate student, of the IOA Animal Production Systems Program, helped almost 400 participants discover the UWA method for testing sheep temperament and encouraged them to reflect on the benefits of calmer temperament for sheep production at the 'Sheep Innovators Forums'.

The three-day roadshow series, which stoped at Lake Grace, Brookton and Wyalkatchem on August 15, 16 and 17, was an initiative of the 'Grain & Graze Avon' program managed by the DAFWA and saw a crew of about 25 people, showcasing 18 displays, to demonstrate that innovation in sheep production is alive and well.

Dr Blache and Ms Chadwick were almost overwhelmed by the warm response of the farming community and the general interest in the technology.

Dr Blache said road-shows like this help the IOA to gauge the potential for our research and development to be embraced by the farming community.

"The program also offered unique opportunities to exchange knowledge and ideas among the exhibitors, during the exhibitions as well as during the travel between towns," he said.

Dr Blache and Ms Chadwick commented that they had come back with long lists of new contacts and new ideas for research and development, as well as new friendships that will lead to new collaborations with the sheep industry and other innovators.

The roadshow also gave the IOA an opportunity to showcase and promote its research into clean, green and ethical animal production to producers and industry.

Ms Aprille Chadwick and Dr Dominique Blache presenting the 'isolation box' to producers.

Animal science to Africa

Prof Graeme Martin gmartin@fnas.uwa.edu.au

Prof Graeme Martin, head of the IOA School of Animal Biology, was one of three instructors selected for a training program in Cairo, Egypt from November 11-14, 2007 under the auspices of the International Atomic Energy Agency (IAEA).

The program's theme was 'Nutrition-reproduction Interactions' with the approximately 25 participants, representing almost every African country, attending lectures and practical sessions as well as general discussions regarding the problems in animal industries in Africa. The other instructors were Dr Anthony Ologhobo, a nutritionist from Nigeria and Dr Tony Schlink, formerly of CSIRO and now working with the IAEA.

Prof Martin lectured on male and female reproductive endocrinology, the effects of nutrition on the reproductive system and the principles of radioimmunoassay. He also covered clean, green and ethical production systems and the role of 'high tech' in production systems in Africa.

Prof Graeme Martin with instructors and participants of the training program 'Nutrition-reproduction Interactions'.

The practical sessions included condition scoring for goats and cattle and a visit to Dina Farms, a large corporate farm in the desert, with 5000 irrigated hectares of food crops, orchards and forages and about 1000 head of dairy cattle.

Collaboration with India: Focus on chickpeas

Front L-R Assoc Prof Tim Colmer, Mr Alan Harris, Dr Pooran Gaur, Mr Geoffrey Smith, Mr Bruce Piper Back L-R Mr Mike Tagliaferri, Adj Prof Neil Turner, Mr Geoff Ludemann, Prof Kadambot Siddique, Dr Heather Clarke, Mr Srini Vasan, Mrs Sue Ludemann, Mr Michael Perry, Mr Tom Sweeney, Adj Prof Tanveer Khan, Dr Vincent Vadez and Mr Ian Pritchard.

Adj Prof Tanveer Khan tkhan@agric.wa.gov.au

Existing CLIMA UWA collaboration with the International Crops Research Institute for Semi Arid Tropics (ICRISAT), India, was further strengthened during a recent visit by scientists Dr Pooran Gaur, Principal Scientist (Chickpea Breeding) and Dr Vincent Vadez, Principal Physiologist from ICRISAT.

The focus of the visit was to discus the progress achieved in three areas of chickpea research; (i) accelerated genetic improvement of desi chickpeas, an international alliance between UWA/DAFWA/ICRISAT and Council of Grain Growers Organisation Ltd (COGGO); (ii) salinity and boron tolerance in chickpeas, a COGGO sponsored project; and (iii) an ARC Linkage Project (with COGGO an industry partner) on salinity tolerance in chickpeas.

A highlight of the visit involved attending a field day at Mr Geoff and Mrs Sue Ludemann's property at Bolgart, a major site for the chickpea breeding project, run in partnership with COGGO, and the only project site that had survived the drought ravaged 2007 growing season.

"The Bolgart site plays a key role in the breeding program where all germplasm can be reliably examined and multiplied with minimum risk of crop failure due to drought" Prof Kadambot Siddique, IOA Director said.

At the site, the group examined chickpea genetic material that had been developed in the project as well as some outstanding ascochyta resistant lines.

Mr Ludemann showed his commercial chickpea crop and briefed the group on his experiences with chickpeas and how they now form an important component of his cropping system.

Mr Geoff Smith, CEO, COGGO said the chickpea breeding project is the best managed of all its projects and he was very impressed with the progress made and the communication within the project and between the three projects including excellent operational arrangements that operate internationally.

"These annual visits from ICRISAT scientists strengthen those ties and ensure that project planning and execution runs like clock-work," he said.

Exploiting varietal differences to optimise K

Prof Zed Rengel zrengel@fnas.uwa.edu.au

A new approach to fertiliser management that investigates how different wheat and canola genotypes respond to fertilisers will help grain growers develop better nutrient management practices and reduce the financial and environmental costs of wasted fertiliser.

Recognising that fertiliser is a grain grower's greatest single expense, with annual farm input cost at 16 percent, the IOA Crop Nutrition group, led by Prof Zed Rengel, is examining the optimal management of potassium (K), nitrogen (N), sulphur (S) and phosphorus (P) for wheat, barley and canola.

A novel approach to optimising K management measures genotypic tolerance to soils with low K availability.

IOA researcher, Mr Paul Damon, investigated the magnitude of K efficiency variation of canola and wheat genotypes and discovered that managing this genetic variation could enhance the productivity and sustainability of cropping systems.

"While canola genotypes responded differently to K availability and varied in K efficiency during vegetative growth in the Grains Research and Development Corporation (GRDC) supported trials, varieties Wesbarker and Rainbow were K-efficient and could improve canola yields on soils with low K availability," he said.

Grain yield and shoot biomass of wheat varieties also differed significantly in response to low soil K availability during the vegetative growth phase and at maturity.

"While Nyabing and Nabawa could tolerate low K concentrations in shoot tissue, Carnamah and Wyalkatchem were able to maintain a high harvest with low soil K availability," Mr Damon said.

Split applications of a compound PKS fertiliser (phosphorus, potassium and sulphur) at different depths could also increase crop growth and yield.

Mr Damon said fertiliser depth affected wheat crop nutrient absorption and grain production.

Collaboration with the DAFWA in a 2006 GRDC supported Corrigin trial on a loamy sand soil investigated the residual value of fertiliser.

Department of Agriculture and Food WA Technician Mr Tim Hilder, Corrigin farmer Mr Des Hickey, DAFWA technician Mr Reg Lunt and UWA IOA Crop Nutrition group leader Prof Zed Rengel assess a site for the deep fertiliser placement trials.

Photo by Brendon Cant

"Split placement of a PKS fertiliser the previous season, half drilled at seven cm depth and half drilled at 18 cm, increased plant growth and grain yield compared to drilling all fertiliser at seven or 18 cm.

"The residual value of PKS split placement from the previous year can be maximised by additional surface application of K fertiliser four weeks after sowing on a K-responsive soil," Mr Damon said.

UWA School of Earth and Geographical Sciences PhD student, Ms Tatjana Balint, in collaboration with the Department of Industry and Resources Chemistry Centre, WA, discovered Australian canola germplasm differed significantly in growth and N and S efficiency.

Her Australian Research Council (ARC) supported research identified Wesway and Surpass 300 TT as N efficient at maturity, while breeding lines IB 1363 and IB 1368 showed high S efficiency at maturity.

Prof Rengel said some genotypes used in the trials were no longer in significant commercial production, for example Wesway, while others were used as parental lines in the current breeding programs, such as Surpass 300, for early maturity.

"In future it would be interesting to test advanced breeding lines for N and S efficiency," he said. "There was little consistency in N and S efficiency in canola genotypes from vegetative stage to grain maturity, so it's necessary to test breeding material for these efficiency traits at maturity."

Soil nutrient management is an essential and cost-effective feature of modern farm management, with plant and soil analyses costing growers less than one percent of total fertiliser expenditure.

"Breeding and ultimately growing nutrient-efficient genotypes will be an important management option for growers to improve fertiliser utilisation, reduce input cost and minimise environmental impacts," Prof Rengel said.

Tiny technology cuts soil sampling down to size

Mid-infrared (MIR) is used by laboratories across Australia to help deliver a large number of soil sample results cheaply and quickly – and more improvements are promised

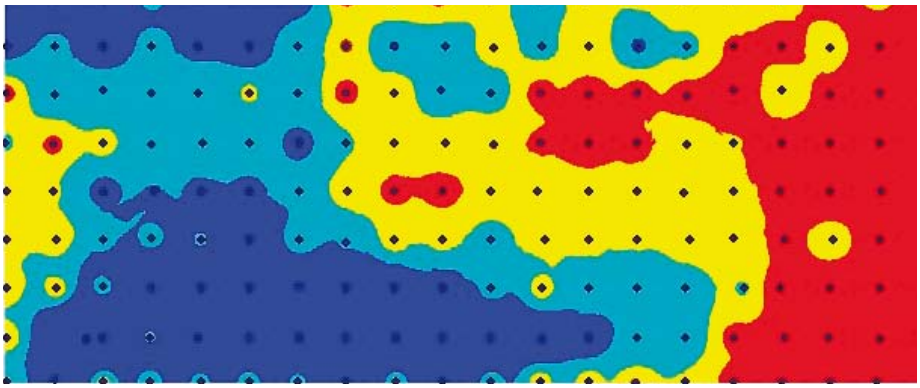
By Emma Leonard, reproduced with permission from the GRDC from the *Ground Cover* Innovation and Technology supplement - November-December 2007 edition, page 4.

On-the-go measurement of physical, chemical and some biological soil properties is moving closer to reality, thanks in part to investment by the US military, which enlisted Prof John Dell, Prof of Electrical Engineering at UWA, to develop systems to track missiles. He is now applying the same techniques to gather data in the field.

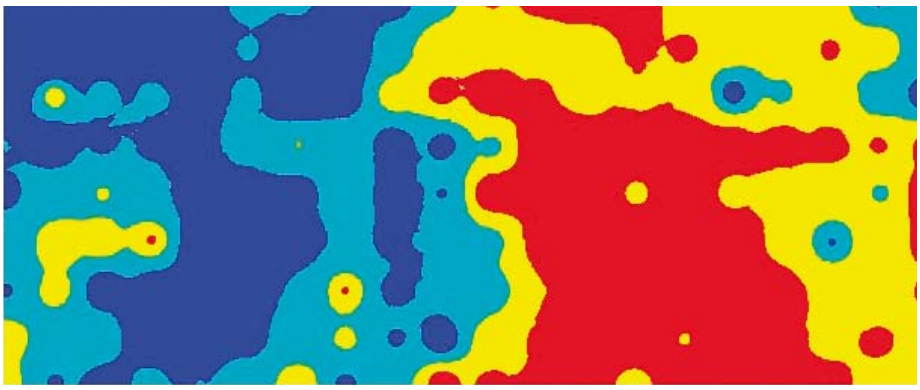
Prof Dell's data-collection device uses infrared spectroscopy. However, it differs considerably from the infrared spectrometers found in the laboratory.

A spectrometer shines a beam of light, which consists of infrared wavelengths, and measures how much of each wavelength is transmitted, scattered or reflected from whatever is being assessed. The collected data are called the spectra. The amount of light collected at each wavelength provides a signature for specific properties. For example, organic matter (OM) reflects different wavelengths to clay (Figure 1).

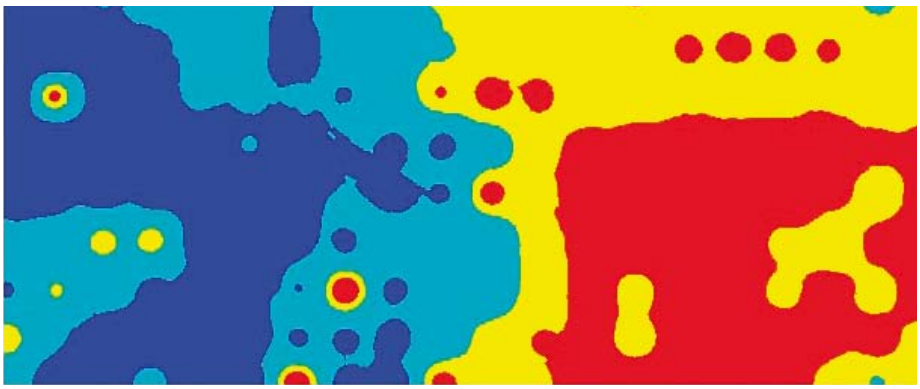
Figure 1 Spacial maps of;



A – Soil Mineral N (NH4+ + NO3-) and grid sampling points,



B – Measured potentially mineralisable nitrogen and



C – Mid Infrared prediction of potentially mineralisable nitrogen for the 0-10cm layer of a WA agricultural soil.

"Laboratory equipment for measuring mid and near infrared is relatively large and expensive, and contains sensitive moving parts," Prof Dell says. "Using microelectronic technology we have reduced the size of the spectrometer to about the size of your thumbnail."

The revolutionary spectrometer design has only one tiny moving part. Instead, a small tuneable filter is inserted in front of the detector. The tuneable filter selects wavelengths from the near infrared (NIR) and some of the mid infrared (MIR) spectrum to be detected by the optical sensor, and is the heart of the micro-spectrometer.

Because of their small size and weight, the micro-spectrometers are robust and unaffected by movement and vibration, which are problems faced by conventional spectrometers. Their size and design makes them relatively cheap and they are able to acquire data rapidly. All four factors are required for on-the-go sensors for agriculture; low cost is especially important for applications that require multiple sensors.

"We know our micro-spectrometer design can rapidly, reliably and repeatedly collect spectra, but we have yet to establish if it can detect the spectral information required from a soil sample," Prof Dell says.

Laboratory equipment gathers spectra data at a finer resolution and for a greater range of wavelengths than the micro-spectrometer. The next phase of Prof Dell's research is to establish if the micro-spectrometer is able to provide sufficient data for useful assessment of soil characteristics. "Calibrations for soil characterisation based on MIR and NIR data are still required, and there is much modelling needed before we will know if the device is sufficiently sensitive."

Prof Dell is working in parallel with Dr Daniel Murphy, leader of the IOA Soil Biology group at UWA, who is gathering calibration data for chemical, physical and biological properties of WA (Figure 1) and some eastern-state soil and several other GRDC-funded projects looking at the use of infrared spectroscopy for soil analysis.

More information:

Mr Paul Meibusch, New Farm Products and Services, GRDC (02) 6166 4500

Prof John Dell (08) 6488 3112
johnd@ee.uwa.edu.au

Dr Daniel Murphy
dmurphy@cyllene.uwa.edu.au

Postgraduates on show

The inaugural IOA Postgraduate Showcase 'Frontiers in Agriculture and Resource Management', with official opening and introduction by Prof Robyn Owens, UWA Pro-Vice Chancellor, Research and Research Training and attended by approximately 60 people, was held on September 12, 2007 at UWA.

Focussing on 'Innovative land management and animal production systems', as well as 'Plant production for the future', the sessions were an opportunity to showcase high quality research and for students to interact with the industry and potential employers.

Prof Owens said UWA, as a member of the Australian Group of Eight research intensive universities, had a reputation for leading edge research and was recently ranked 37th in the world for agricultural science.

"In 2006, UWA attracted $140 million dollars from external grants for research and had increased international scholarships five-fold and local scholarships three-fold," Prof Owens said.

"Enhancing research is part of UWA's strategic policy and FNAS is one of UWA's most research-intense faculties."

Recent IOA postgraduates, Mr Nader Danehloueipur, Dr Ben Biddulph, Mr Terry Rose and Mr Chris Jones.

Such research on show under the 'Innovative animal production and pasture management systems' theme included Mr Peter Hutton, presenting on, 'Can bioactive plants of Australia control ruminant acidosis?', Ms Megan Chadwick speaking on, 'Salt tolerant sheep for salt tolerant plants', Ms Sam Bickell presenting on, 'Temperament and maternal behaviour in sheep' and Dr Graeme Doole on 'Value of French serradella (*Ornithopus sativus* Brot.) pastures for the control of *Lolium rigidum* Gaud. in the Central Wheatbelt of Western Australia'.

The second session 'Plant production for the future' showcased Mr Chris Jones presenting on 'Indian Sandalwood *Santalum album* L.; genetic diversity and essential oil biochemistry', Mr Nader Danehloueipour speaking on 'Chickpea improvement through genetic analysis and QTL mapping of ascochyta blight resistance using wild *Cicer* species', Dr Ben Biddulph presenting 'Solutions for sprouting in wheat' and Mr Terry Rose speaking on 'Deep placed phosphate fertiliser for canola crops'.

Summarising the 'Frontiers in Agriculture and Resource Management' showcase, Prof Graeme Martin, IOA School of Animal Biology and Animal Production Systems Program Leader said part of the Institute's role was training the next generation of agricultural scientists.

"With 70 postgraduates enrolled in my school alone and more than 200 PhD students enrolled in the Faculty, the future of agricultural research and succession planning in WA looks good," Prof Martin said.

To view and hear the entire program from the Showcase visit:

www.ioa.uwa.edu.au/events/postgraduate_showcase_archive/frontiers_in_agriculture_presentations

front cover

Mr Bruce Piper farmer, Bindi Bindi and IOA External Advisory Board Chairman (front), Ms Sam Bickell, Mr Peter Hutton and Ms Megan Chadwick at the IOA Postgraduate Showcase 'Frontiers in Agriculture and Resource Management'.

New Staff Profiles

Miss Susan Hall has recently begun work at the Grower Group Alliance as a Project Officer, joining Project Leader Tracey Gianatti. Among other activities, she will be responsible for all of the GGA communication activities including the Calendar of Events, Newswire and revamped website due to be launched soon. Susan is from a farming family and has a strong background in communications. Until recently she was working as a Communications Officer at DAFWA and also has experience working in public relations in the agricultural industry.

e-mail **sahall@fnas.uwa.edu**
phone **(08) 6488 7937**

Miss Hayley Newberry has recently joined the Institute of Agriculture as Personal Assistant to the Director and is already an integral part of the organising, planning and support of the IOA and its activities. Hayley has worked at UWA for the past three years in Facilities Management, where her roles have ranged from administration to working within the Directorate. Hayley is located in the IOA main office, Room G103, FNAS, UWA.

e-mail **hayley.newberry@fnas.uwa.edu.au**
phone **(08) 6488 4717**

Turf research greens up

Dr Louise Barton lbarton@cyllene.uwa.edu.au

UWA Turf Research Program Researchers (from left to right): Dr Louise Barton, Assoc Prof Tim Colmer, Ms Renee Buck, Mr Michael Schwarz and Mr George Wan.

'Environmental Turf Management' was the theme of the 4th UWA Turf Research Seminar Day held on June 28, 2007 at The University Club, UWA.

Dr Jim Gill, CEO, WA Water Corporation who sponsored the day, opened the event attended by approximately 100 people, representing the golf course industry, turfgrass producers, lawn mowing contractors, local government, state water and environmental authorities and the fertiliser industry.

Dr Louise Barton of the UWA Turf Research Program commented that major topics that delegates were interested in were; technology that assists with improving turfgrass water use efficiency, access to and the viability of using alternative water sources to irrigate turfgrass and publicising the message that turfgrass is not necessarily a source of nutrients to surrounding surface and ground waters.

Findings from Western Australian and nationally based research were presented. Dr Barton discussed findings from the Kikuyu Research Project in her presentation 'Fertiliser strategies for Minimising Nitrogen Leaching from Turfgrass', while Assoc Prof Tim Colmer discussed turfgrass water use in his presentation 'Update on Soft-leaf Buffalo Trials and Review of Management Factors Influencing Water Use'. Mr Ghazi Abu Rumman presented preliminary findings from his PhD examining the performance of four turfgrass species irrigated with saline groundwater. These research projects in the UWA School of Plant Biology are funded by Horticulture Australia Limited (HAL), or ARC-Linkage, in collaboration with industry groups.

The UWA Turf Research Seminar Day takes place every two to three years. For further information on the UWA Turf Research Program please visit: **www.fnas.uwa.edu.au/turfresearch**

Super Brassicas to result from Chinese collaborations

Dr Guijun Yan gyan@plants.uwa.edu.au

Prof Jinling Meng, Prof Liyong Hu and Prof Guozgeng Yang from Huazhong Agricultural University and Prof Weijun Zhou from Zhejiang University, a Chinese academic delegation, visited UWA from September 6-9, 2007.

The delegation was welcomed by UWA Senior Deputy Vice Chancellor, Prof Margaret Seares, IOA Director, Prof Kadambot Siddique and the IOA Head of School of Plant Biology, Prof Hans Lambers.

The visitors had a series of discussions on existing activities and future potential collaboration between UWA and their Universities.

They also delivered three seminars: Prof Zhou on interspecific hybridization of Brassica, Prof Meng on heterosis of canola by subgenomic recombination and Prof Yang on canola production and farming systems in China.

UWA will collaborate with Zhejiang University and Huazhong Agricultural University in the development of a project on breeding of Super Brassicas for increased oil seed and/or vegetable production.

The delegation also participated in the 15th Australian Research Assembly on Brassicas (ARAB) in Geraldton.

Prof Zhou (right) and Prof Meng (second from left) visited WANTFA field site at Meckering with UWA Assoc Prof Wallace Cowling (second from right), also the CEO of Canola Breeders WA and Dr Guijun Yan (left), UWA Senior Lecturer and Deputy Leader of IOA Crop Production Systems Program.

World supply of food and fuel: Potential in plants

The WA Centre of Excellence for Plant Metabolomics was launched on October 15, 2007 by Industry and Enterprise Minister Francis Logan at UWA with funding of $1.5million from the Government of WA.

Plant metabolomics world leader and Centre Director Prof Steven Smith and his international team of scientists have already begun research into the processes of metabolism and uncovering exactly how plants direct their energy into different products, organs and life processes.

The aim is to then enhance the metabolic processes that result in production of useful materials for food or fuel, even under environmental extremes, through plant selection and breeding or genetic modification.

The team have already been reporting promising results. By modifying one aspect of the metabolic process of *Arabidopsis thaliana*, a close relative of canola, they have increased plant size by about 50 per cent and increased seed yield by a similar amount.

Prof Smith said these results are potentially very important for food, biomass, biodiesel and bioethanol production from plants.

"Of course, this is a laboratory situation and transferring these results to crops in the field is a long was off, but it is a good start."

The Centre hopes to continue to attract local and international scientists to increase the innovation and expertise in plant metabolomics in the State and the University, including breeding programs within the UWA IOA, in particular Canola Breeders WA, to further the role of plants in securing the future supply of world food and energy.

Minister for Industry and Resources Mr Fran Logan, Prof Doug McEachern, UWA Deputy Vice-Chancellor (Research and Innovation) and Dr Sarah Purdy, Centre Research Associate at the launch of the Centre of Excellence for Plant Metabolomics.

IOA at Dowerin Field Days

Showcasing the IOA at the Dowerin Field Days from August 29-30, 2007 with the aid of an eye-catching display to the visitors to the Education Marquee was IOA Director, Prof Kadambot Siddique, former IOA Personal Assistant, Ms Angela Fielder, former IOA Communications Officer, Ms Kerry Regan and the Faculty of Natural and Agricultural Sciences (FNAS) Prospective Students Officer, Mrs Chris Hale.

Ms Beth Paganoni and Dr Carolina Vinoles Gil of the IOA School of Animal Biology also helped with displays to promote the Institute, the Faculty and UWA on the day.

On display were IOA and FNAS course information, brochures and newsletters as well as salt resistant wheat, representing research being undertaken by Assoc Prof Tim Colmer of IOA School of Plant Biology, Glyphosate resistant ryegrass kindly supplied by WAHRI, pasture species being worked on by Mr Richard Bennett and a sheep ultrasound demonstrated by Ms Paganoni.

The IOA team had many enquiries from interested past and prospective students and parents and shared information on undergraduate and postgraduate courses and opportunities for study within the agricultural disciplines at UWA.

IOA Director Prof Kadambot Siddique (centre) and Bindi Bindi farmer and IOA External Advisory Board Chairman Mr Bruce Piper (right), meet prospective students and parents at the Dowerin Field Days.

Alumni Profiles

Senator Rachel Siewert senator.siewert@aph.gov.au

The Australian Greens

I graduated from UWA in 1984 with a Bachelor of Science in Agriculture.

Straight out of university I joined the WA Department of Agriculture as a trials technician in Jerramungup and six months later became a research officer on the Mallee Road Sump project working on salinity and soil conservation issues.

I lived in Jerramungup for nearly four years when the opportunity to take on the role of Coordinator for the Conservation Council of WA came up. I jumped at the chance to take on a role that I was passionate about – although I'm not sure I really knew what I was getting myself into… which was 16 years as the voice of conservation in WA.

In 2001 I narrowly missed winning a Senate seat for the Greens, only to succeed on my second try in 2004. I took up my seat in July 2005 and currently hold the portfolios of industrial relations, community services, disabilities, aboriginal affairs, water, agriculture and natural resource management. I am also the deputy chair of the Rural and Regional Affairs and Transport Committee.

Now is a critical time for agriculture and water management in Australia and the lack of a clear national approach to these issues makes it an important time to be a Green Senator. I continue to work hard in the Senate to raise awareness of the need for a national strategy for the future of agriculture and our rural communities in a hotter, drier climate and push for research funding.

I was really pleased, just before the election was called, to get a Senate inquiry into this issue established on my third attempt.

Sadly I am one of the few members of the Senate with a science degree, despite the importance of science to the decisions we have to make.

Professor Nanthi S Bolan nanthi.bolan@unisa.edu.au

Chair in Environmental Science, University of South Australia

I completed a PhD in soil science at UWA in 1983. My PhD thesis examined the role of mycorrhizal fungi in the mobilization and phytoavailability of phosphorus and was supervised by Prof Alan Robson and Dr Jim Barrow.

After completing my PhD degree at UWA I moved to Massey University, New Zealand and worked there first as a Research Scientist and then as the Director of Postgraduate Studies and Prof of Soil Science teaching soil chemistry, nutrient dynamics, soil fertility management and soil pollution.

In February 2007 I moved to the University of South Australia as Chair in Environmental Science, based at the Centre for Environmental Risk Assessment and Remediation (CERAR). The Centre was established to provide innovative solutions and technologies for environmental contamination problems. I have initiated a number of research projects that include recycled water for irrigation, phytostabilization of lead, biosolid as a source and sink for heavy metals, environmental applications of coal combustion by-products, mycorrhizal mobilization of heavy metals and dissolved organic carbon as a vehicle for metal transport. Currently I am serving as a member of the Editorial Board of Nutrient Cycling in Agroecosystem and Environmental Geochemistry and Health and as an Associate Editor of the Journal of Environmental Quality.

My research interests include agronomic value of manures, fertilisers and soil amendments, soil acidification, nutrient cycling, pesticide and metal pollutants interactions in soils, soil remediation and waste water management.

I am a Fellow of the New Zealand Soil Science Society and was awarded the Communicator of the Year (1998) award by the New Zealand Institute of Agricultural Sciences and New Zealand Society for Horticultural Sciences. More recently I have been awarded the Massey University Research Medal (2005) for excellence in postgraduate supervision and M.L. Leamy Award (2004) by the New Zealand Soil Science Society in recognition of the most meritorious contribution to soil science published in 2002-2004.

Playground to paddock

Mr Warwick Mathews warwickmat@gmail.com

Shearing sheep on the sports oval using Bioclip® wool harvesting technology; working dog demonstrations; designing, planting and tending a vineyard and bud grafting wine varietals onto root stock; and investigating sheep rumen fluid at the UWA Faculty of Natural and Agricultural Sciences laboratories.

These are just some of the activities Mr Warwick Mathews has been engaging his Shenton College science students in and for which he was recently awarded the prestigious Premier's Prize for Excellence in Science Teaching.

Mr Mathews' role at UWA is an initiative of and jointly funder by the Faculty of Natural and Agricultural Sciences and the Department of Education, Science and Training. He is promoting new science, including biotechnology and the latest investigative techniques, with a primary industries focus, to secondary school students.

"I interpret cutting edge research from UWA laboratories and scientific journals and bring it into the classroom to help teachers move away from teaching outdated science or risk missing out on exciting new developments," Mr Mathews said.

"The activities are different every year and can involve master classes with academics from UWA, bringing the students to UWA and establishing mentor relationships between UWA staff and students in Shenton College's gifted and talented education program."

"The focus is on broadening the awareness of the students and encouraging them to consider a science career in the primary industries and related fields."

The Institute of Agriculture congratulates Mr Mathews on his award and important work in promoting agricultural and related sciences as an exciting and rewarding career path.

Photo : Paul Ricketts

Mr Warwick Mathews, recipient of the 2007 Premier's Prize for Excellence in Science Teaching.

IOA backs BioGENEius brains

Dr Michael Considine mickcons@cyllene.uwa.edu.au

The Department of Industry and Resources BioGENEius Challenge aims to link students, who will work on their own projects, with researchers who will mentor them in all aspects of biotechnology applications and skills required to perform their research. The opportunity will see the participating students perform a research project that will be entered in the prestigious biotechnology conference, BIO, in the USA and competing with international students.

The opportunity to participate in the 2008 pilot of the project has been seized by Shenton College students and their science teacher Mr Warwick Mathews. Miss Bindhu Holavanahalli, Miss Yvonne Kong and Mr Vinayak Hutchinson are the first WA entrants to become involved. They will be applying cutting-edge molecular research under the mentorship of Prof Jim Whelan and Dr Aneta Ivanova, Australian Research Council (ARC) Centre of Excellence in Plant Energy Biology and Dr Michael Considine, UWA School of Plant Biology.

Their research will link with a Federally funded grant held by Prof Jim Whelan and Dr Considine, which is investigating health-related antioxidants in table grapes and the way these compounds are affected by treatment processes that occur after being picked from the vine.

"It's a good opportunity for the students to develop skills in high level science but in the context of crops and foods, hopefully breaking the void between the basic sciences and the applied" Dr Considine said of the project.

"It gives them the chance to see that this high level science can be applied to real world situations and industries".

For more information, please visit the website: **www.plantenergy.uwa.edu.au**

Photo : Paul Ricketts

Premier of Western Australia and Minister for Science Mr Alan Carpenter (left), participant Miss Yvonne Kong (far left), Shenton College science teacher Mr Warwick Matthews (right), participant Miss Bindhu Holavanahalli (far right).

Institute of Agriculture Food and Agriculture Lectures

The Coming Famine

Adj Prof Julian Cribb
University of Technology Sydney

Friday, March 7, 2008
4.00 – 5.00 pm
Molecular and Chemical Sciences Lecture Theatre (G.33), UWA (Fairway Entrance No. 4, Car Park 14 and 21).

Based on his paper that explores current challenges and constraints to global food production in an overpopulated, affluent and resource-scarce world, Adj Prof Cribb will warn of the potential impact of likely regional food shortages, put a new case for greater prioritisation of agricultural science in Australia and globally and identify opportunities for research to address the main challenges.

"Sustaining productive agriculture for a growing world"

Research & Industry Recognition

Name	Award
Prof Lyn Abbott, School of Earth & Geographical Sciences	Carrick Institute Award for Outstanding Contributions to Student Learning.
Ms Annaliese Mason, PhD Student, School of Plant Biology	Canola Breeders WA Best Student award at the 15th Biennial Australian Research Assembly on Brassicas, Geraldton, for research into 'Molecular characterisation of a population derived from microspores of *Brassica napus* x *Brassica carinata* hybrids' supervised by Dr Matthew Nelson, Dr Guijun Yan and Assoc Prof Wallace Cowling.
Mr Warwick Matthews Faculty of Natural & Agricultural Sciences	Premier's Prize for Excellence in Science Teaching.
Ms Aneeta Pradhan Student, School of Plant Biology	Canola Breeders WA Best Student award at the 15th Biennial Australian Research Assembly on Brassicas, Geraldton, for research into 'Synthesis of hexaploid Brassica from *B. napus* and *B. nigra*' supervised by Dr Guijun Yan, Assoc Prof Julie Plummer and Assoc Prof Wallace Cowling.
Dr Julia Wilson Research Officer, Centre for Legumes in Mediterranean Agriculture, Faculty of Natural &Agricultural Science	Best poster, at the 6th Europe Conference on Grain Legumes - Integrating legume biology for sustainable agriculture, for poster entitled 'Progress towards crop improvement in lupin with interspecific hybridisation' with Jon Clements, John Quealy and Hu'uan Yang as co-authors
Dr Tony Fischer IOA External Advisory Board Member and Honorary Fellow, CSIRO's Division of Plant Industry, Canberra	2007 Farrer Memorial Medal

Visitors to Institute of Agriculture

Name of the Visitor	Visitors' organisation and country	Host details	Dates	Host contact Email
Dr Ibrahim Abdallah	Postdoc fellowship 'herbicide resistance in weeds'. University of Cairo, Egypt.	Prof Steve Powles, WAHRI	June-Dec 2007	spowles@plants.uwa.edu.au
Dr Christophe Délye	French National Institute for Agricultural Research (INRA), Dijon, France.	Prof Steve Powles, WAHRI	Sept 2007	spowles@plants.uwa.edu.au
Prof Liyong Hu	Huazhong Agricultural University, China.	Dr Ping Si, CLIMA Dr Guijun Yan, School of Plant Biology	6-9 Sept 2007	pingsi@cyllene.uwa.edu.au
Ms Céline Lenoury	Institut National Agronomique Paris-Grignon (INA-PG), France.	Dr Dominique Blache, School of Animal Biology	April-Sept 2007	dbla@animals.uwa.edu.au
Prof Jinling Meng	Huazhong Agricultural University, China.	Assoc Prof Wallace Cowling Dr Guijun Yan, School of Plant Biology	6-9 Sept 2007	wcowling@cyllene.uwa.edu.au
Dr Raymond Nowak	Institut Nationale de la Recherche Agronomique, Nouzilly, France.	Dr Dominique Blache, School of Animal Biology	Sept 2007	dbla@animals.uwa.edu.au
Prof Fred Provenza	Wildland Resources, Utah State University, USA.	Dr Phil Vercoe, School of Animal Biology	20-25 Aug 2007	pvercoe@animals.uwa.edu.au
Prof Guozgeng Yang	Huazhong Agricultural University, China.	Dr Ping Si, CLIMA Dr Guijun Yan, School of Plant Biology	6-9 Sept 2007	pingsi@cyllene.uwa.edu.au
Prof Weijun Zhou	Zhejiang University, China.	Dr Guijun Yan, School of Plant Biology Prof Kadambot Siddique, IOA	6-9 Sept 2007	gyan@plants.uwa.edu.au, ksiddique @fnas.uwa.edu.au

New Research Projects

Title	Funding Period	Funding Body	Supervisor(s)
Elucidation of genetic and physiological factors controlling biosynthesis of sesquiterpenoids in sandalwood, Santalum spp.	2008-2011	Australian Research Council (ARC) Linkage with partners UWA and Forest Products Commission.	Assoc Prof JA Plummer; Assoc Prof EL Ghisalberti; Dr EL Barbour; Assoc Prof J Bohlmann
Defining the evolutionary processes of resistance to the new mode of action herbicide, pyroxasulfone	2008-2010	ARC Linkage with partners UWA and Kumiai Chemical Industry Co., Ltd.	Prof SB Powles; Dr M Walsh; Mr T Ambe
Investigation of the metabolism, molecular targets and environmental fate of the seed germination stimulant, butenolide	2008-2012	ARC Linkage with partners UWA, Botanic Gardens and Parks Authority, Worsley Alumina Pty Ltd, Iluka Resources, Extension Hill/Mt Gibson Iron and Alcoa World Alumina.	Prof SM Smith; Assoc Prof EL Ghisalberti; Dr KW Dixon
Ecophysiology of stem succulent halophytes subject to changes in salinity and water availability: distinguishing natural dynamics from potential mine-related impacts	2008-2010	ARC Linkage with partners UWA, Fortescue Metals Group Ltd, Department of Environment and Conservation (WA Herbarium).	Assoc Prof Tim Colmer, Dr EJ Veneklaas, Dr K Shepherd, Dr G Barrett
Identification of Australian-bred apple and plum varieties with enhanced health attributes	2008-2010	ARC Linkage with partners UWA and Department of Agriculture and Food Western Australia.	Dr JM Hodgson; Prof KD Croft; Dr M Considine; Dr SC Tan
A cryopreparation facility for Western Australia	2008	ARC Linkage Infrastructure, Equipment and Facilities with partners UWA, Murdoch University and Edith Cowan University.	Prof CA Atkins; Dr OK Babourina; Dr BC Baer; Dr PL Clode; Dr KW Dixon; Prof SA Dunlop; Dr H Eubel; Dr L Filgueira; Dr MR Kilburn; Prof SP Klinken; Prof JJ Kuo; Assoc Prof NG Laing; Prof PJ Leedman; Dr M Ludwig; Assoc Prof DJ Macey; Prof AH Millar; Dr F Pixley; Dr M Saunders; Prof K Siddique; Prof K Sivasithamparam; Assoc Prof TG St Pierre; Prof RC Thompson; Prof JM Whelan; Assoc Prof MH Zheng; Dr M Ziman

Publications Aug-Dec 2007

Refereed journals

Alvarez RL, Zarco QLA, Galindo F, Blache D and Martin GB (2007) Social rank and response to the 'male effect' in the Australian Cashmere goat. Animal Reproduction Science **102**, 258-266.

Berger JD (2007) Ecogeographic and evolutionary approaches to improving adaptation of autumn-sown chickpea (*Cicer arietinum* L.) to terminal drought: the search for reproductive chilling tolerance. Field Crops Research **104**, 112-122.

Boersma JG, Buirchell BJ, Sivasithamparam K and Yang H (2007) Development of a PCR marker tightly linked to *mollis*, the gene that controls seed dormancy in *Lupinus angustifolius* L. Plant Breeding **126**, 612—616.

Boersma JG, Buirchell BJ, Sivasithamparam K and Yang H (2007) Development of two sequence-specific PCR markers linked to the le gene that reduces pod shattering in narrow-leafed lupin (*Lupinus angustifolius* L.). Genetics and Molecular Biology **30**, 623-629.

Bramley H, Turner NC, Turner DW and Tyerman SD (2007) Comparison between gradient-dependent hydraulic conductivities of roots using the root pressure probe: the role of pressure propagations and implications for the relative roles of parallel radial pathways. Plant, Cell and Environment **30**, 861-874.

Celi P, Walkden-Brown SW, Széll AZ, Blache D, Wilkinson HM and Martin GB (2007) Twin efficiency for reproductive variables in monozygotic twin sheep. Theriogenology **68**, 663-672.

Chagas LM, Bass JJ, Blache D, Burke CR, Kay JK, Lindsay DR, Lucy MC, Martin GB, Meier S, Rhodes FM, Roche JR, Thatcher WW and Webb R (2007) New perspectives on the roles of nutrition and metabolic priorities in the sub-fertility of high-producing dairy cows. Journal of Dairy Science **90**, 4022-4032.

Collins M, Brundrett M, Koch J and Sivasithamparam K (2007) Colonisation of jarrah forest bauxite-mine rehabilitation areas by orchid mycorrhizal fungi. Australian Journal of Botany **55**, 653–664.

Publications Aug-Dec 2007 continued

Cookson WR, O'Donnell AJ, Grant CD, Grierson PF and Murphy DV (2007) Impact of ecosystem management on microbial community level physiological profiles of postmining forest rehabilitation. Microbial Ecology (available on-line) doi: 10.1007/s00248-007-9278-2.

Cookson WR, Osman M, Marschner P, Abaye DA, Clark I, Murphy DV, Stockdale EA and Watson CA (2007) Controls on soil nitrogen cycling and microbial community composition across land use and incubation temperature. Soil Biology and Biochemistry **39**, 744-756.

Cowling WA (2007) Genetic diversity in Australian canola and implications for crop breeding for changing future environments. Field Crops Research **104**, 103–111.

Damon PM and Rengel Z (2007) Wheat genotypes differ in potassium efficiency under glasshouse and field conditions. Australian Journal of Agricultural Research **58**, 816-825.

Davies A (2007) Organic or orchestrated: the nature of leadership in rural Australia. Journal of Rural Society **17(2)**, 139-154.

Davies A and Tonts M (2007) Employment in the wheatbelt: regional trends, issues and challenges. Geowest 33, School of Earth and Geographical Sciences, The University of Western Australia, Crawley.

Davies A and Tonts M (2007) Population dynamics and locational choices amongst young people: an examination of the Western Australian wheatbelt. Geowest 32, School of Earth and Geographical Sciences, The University of Western Australia, Crawley.

De Sousa-Majer MJ, Hardie DC, Turner NC and Higgins TJV (2007) Bean alpha-amylase inhibitors in transgenic peas inhibit development of pea weevil larvae. Journal of Economic Entomology **100**, 1416-1422.

Fortescue JA and Turner DW (2007) Changes in seed size and oil accumulation in Brassica napus L. by manipulating the source-sink ratio and excluding light from the developing siliques. Australian Journal of Agricultural Research **58**, 413-424.

Gianatti TM and Carmody P (2007) The use of networks to improve information flows between grower groups and researchers. Field Crops Research **104**, 165-173.

Hawken PAR, Beard AP, Esmaili T, Kadokawa H, Evans ACO, Blache D and Martin GB (2007) The introduction of rams induces an increase in pulsatile LH secretion in cyclic ewes during the breeding season. Theriogenology **68**, 56-66.

Heazlewood JL, Verboom RE, Tonti-Filippini J, Small I and Millar AH (2007) SUBA: The *Arabidopsis* subcellular database. Nucleic Acids Research **35**, D213-8.

Herrmann AM, Clode PL, Fletcher I, Nunan N, Stockdale EA, O'Donnell AG and Murphy DV (2007) A novel method for the study of the biophysical interface in soils using Nano-Scale Secondary Ion Mass Spectrometry. Rapid Communications in Mass Spectrometry **21**, 29-34.

Herrmann AM, Ritz K, Nunan N, Clode PL, Pett-Ridge J, Kilburn MR, Murphy DV, O'Donnell AG and Stockdale EA. (2007) Nano-scale secondary ion mass spectrometry – a new analytical tool in biogeochemistry and soil ecology. Soil Biology and Biochemistry **39**, 1835-1850.

Hertzler G (2007) Adapting to climate change and managing climate risks by using real options. Australian Journal of Agricultural Research **58**, 985–992.

Hoyle FC and Murphy DV (2007) Microbial response to the addition of soluble organic substrates. Australian Journal of Soil Research **45**, 559-567.

Huddleston P and Tonts M (2007) Agricultural development, contract farming and Ghana's oil palm industry. Geography **92(3)**, 264-275.

Issarakraisila M, Ma Q and Turner DW (2007) Photosynthetic and growth responses of juvenile Chinese kale (*Brassica oleracea* cv alboglabra) and Caisin (*Brassica rapa* subsp parachinensis) to waterlogging and water deficit. Scientia Horticulturae **111**, 107-113.

Jones DL and Murphy DV (2007) Microbial response time to sugar and amino acid additions to soil. Soil Biology and Biochemistry **39**, 2178-2182.

Jones RAC, Coutts BA and Hawkes J (2007) Yield-limiting potential of Beet Western Yellows Virus in *Brassica napus*. Australian Journal of Agricultural Research **58**, 788–801.

Junaidi A, Williamson PE, Martin GB, Stanton PG, Blackberry MA, Cummins JM and Trigg TE (2007) Pituitary and testicular endocrine responses to exogenous GnRH and LH in male dogs treated with GnRH agonist implants. Reproduction, Fertility and Development **19**, 891-898.

Khangura R, Speijers J, Barbetti MJ, Salam MU and Diggle AJ (2007) Epidemiology of blackleg (*Leptosphaeria maculans*) of canola (*Brassica napus*) in relation to maturation of pseudothecia and discharge of ascospores in Western Australia. Phytopathology **58**, 935-946.

Kingwell R and Cook S (2007) Farmers' attitudes and investment intentions regarding land drainage in a salinising Australian landscape. The International Journal of Interdisciplinary Social Sciences **2**, 169-185.

Lee MJ, Pate JS, Harris DJ and Atkins CA (2007) Synthesis, transport and accumulation of quinolizidine alkaloids in *Lupinus albus* L. and *L angustifolius* L.. Journal of Experimental Botany **58**, 935-946.

Li H, Stone V, Dean N, Sivasithamparam K and Barbetti MJ (2007) Breaching by a new strain of *Leptosphaeria maculans* of anatomical barriers in cotyledons of *Brassica napus cv* Surpass 400 with resistance based on a single dominant gene. Journal of General Plant Pathology **73**, 297–303.

Liu SM, Adams NR, Briegel J, Smith TL and Martin GB (2007) Circulating insulin-like growth factor-1 and leptin in Merino sheep resistant to gastrointestinal nematodes. Australian Journal of Experimental Agriculture **47**, 905-911.

Liu X, Dong M, Chen X and Yan G (2007) Antioxidant activity of an endophytic *Xylaria* sp. from *Ginkgo biloba*. Food Chemistry **105**, 548-554.

Macdonald AJ, Murphy DV, Mahieu N and Fillery IRP (2007) Labile soil organic matter pools under a mixed grass/lucerne pasture and adjacent native bush in Western Australia. Australian Journal of Soil Research **45**, 333-343.

Publications Aug-Dec 2007 continued

Murphy DV, Stockdale EA, Poulton PR, Willison TW and Goulding KWT (2007) Seasonal dynamics of carbon and nitrogen pools and fluxes under continuous arable and ley-arable rotations in a temperate environment. European Journal of Soil Science **58(6)**, 1410-1424.

Nasar-Abbas SM, Plummer JA, Siddique KHM, White PF, Harris D and Dods K (2007) Cooking quality of faba bean after storage at high temperature and the role of lignins and other phenolics in bean hardening. Article in press. Available on line www.sciencedirect.com

Nasar-Abbas SM, Plummer JA, Siddique KHM, White PF, Harris D and Dods K (2007) Nitrogen retards and oxygen accelerates colour darkening in faba bean (*Vicia faba* L.) during storage. Postharvest Biology and Technology **47(1)**, 113-118.

Neuhaus A, Turner DW, Colmer T, Kuo J and Eastham J (2007) Drying half the root-zone of potted avocado (*Persea americana Mill.* cv Hass) trees avoids the symptoms of water deficit that occur under complete root-zone drying. Journal of Horticultural Science and Biotechnology **82**, 679-689.

Nichols PGH, Loi A, Nutt BJ, Evans PM, Craig AD, Pengelly BC, Dear BS, Lloyd DL, Revell CK, Nair RM, Ewing MA, Howieson JG, Aurichth GA, Howieh JH, Sandralf GA, Carr SJ, de Koning CT, Hackney BF, Crocker GJ, Snowball R, Hughes SJ, Hall EJ, Foster KJ, Skinner PW, Barbetti MJ and You MP (2007) New annual and short-lived perennial pasture legumes for Australian agriculture—15 years of revolution. Field Crops Research **104**, 10-23.

Owen MJ, Walsh M, Llewellyn RS and Powles SB (2007) Widespread occurrence of multiple herbicide resistance in Western Australian annual ryegrass (*Lolium rigidum*) populations. Australian Journal of Agricultural Research **58**, 711–718.

Pracharoenwattana I, Cornah JE and Smith SM (2007) Arabidopsis peroxisomal malate dehydrogenase functions in beta-oxidation but not the glyoxylate cycle. The Plant Journal **50**, 381-390.

Revell C and Revell D (2007) Meeting 'duty of care' obligations when developing new pasture species. Field Crops Research **104**, 95-102.

Thatcher LF, Carrie C, Andersson CR, Sivasithamparam K, Whelan J and Singh KB (2007) Differential gene expression and subcellular targeting of Arabidopsis Glutathione S-Transferase F8 is achieved through alternative transcription start sites. The Journal of Biological Chemistry **282**, 28915–28928.

Turner NC, Palta JA, Shrestha R, Ludwig C, Siddique KHM and Turner DW (2007) Carbon isotope discrimination is not correlated with transpiration efficiency in three cool-season grain legumes (pulses). Journal of Integrative Plant Biology **49**, 1478–1483.

Vadez V, Krishnamurthy L, Serraj R, Gaur PM, Upadhyaya HD, Hoisington DA, Varshney RK, Turner NC and Siddique KHM (2007) Large variation in salinity tolerance in chickpea is explained by differences in sensitivity at the reproductive stage. Field Crops Research **104**, 123-129.

Vila-Aiub MM, Balbi MC, Gundel PE, Ghersa CM and Powles SB (2007) Evolution of glyphosate-resistant Johnsongrass (*Sorghum halepense*) in glyphosate-resistant soybean. Weed Science **55**, 566–571.

Vinale F, Sivasithamparam K, Ghisalberti EL, Marra R, Woo SL and Lorito M (2008) *Trichoderma*–plant–pathogen interactions. Soil Biology & Biochemistry **40**, 1–10.

Walsh MJ and Newman P (2007) Burning narrow windrows for weed seed destruction. Field Crops Research **104**, 24-30.

Walsh MJ, Owen MJ and Powles SB (2007) Frequency and distribution of herbicide resistance in *Raphanus raphanistrum* populations randomly collected across the Western Australian wheatbelt. Weed Research **47**, 542–550.

Webster CG, Coutts BA, Jones RAC, Jones MGK and Wylie SJ (2007) Virus impact at the interface of an ancient ecosystem and a recent agroecosystem: studies on three legume-infecting potyviruses in the southwest Australian floristic region. Plant Pathology **56**, 729–742.

Williams MG, Magarey PA and Sivasithamparam K (2007) Differences in zoospore germination and host penetration in response to temperature among Western Australian isolates of *Plasmopara viticola*. Australian Journal of Agricultural Research **58**, 702–710.

Wu H, Zheng S, He Y, Yan G, Bi Y and Zhu Y (2007) Diploid female gametes induced by colchicine in Oriental lilies. Scientia Horticulturae **114**, 50-53.

Yu Q, Collavo A, Zheng M, Owen MJ, Sattin M and Powles SB (2007) Diversity of acetyl-coenzyme A carboxylase mutations in resistant *Lolium* populations: Evaluation using clethodim. Plant Physiology **145**, 547–558

Book chapters

Barbetti MJ and Allen JG (2007) Toxigenic *fusarium* species on annual medic pastures and reduced feed intake by sheep in Western Australia. In: Panter KE, Wierenga TL and Pfister JA Eds. "Poisonous Plants: Global Research and Solutions" CABI, UK pp 313-317.

Jones DL, Farrar JF, Macdonald AJ, Kemmitt SJ and Murphy DV (2007) Dissolved organic nitrogen in agricultural systems. In: Ma L, Ahuga L and Bruulsema T Eds. Quantifying and understanding plant nitrogen uptake systems modeling. SSSA-CSSA-ASA Publication.

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Editor:
Sally Porter sporter@fnas.uwa.edu.au

Institute of Agriculture
The University of Western Australia
MDG M082
35 Stirling Highway
Crawley, WA, 6009
Australia

Tel: +61 (08) 6488 4717
Fax: +61 (08) 6488 7354
Email: ioa@fnas.uwa.edu.au
Web: www.ioa.uwa.edu.au

INSTITUTE OF AGRICULTURE
THE UNIVERSITY OF WESTERN AUSTRALIA

Cricos provider No. 00126G

Design and production: duit@cyllene.uwa.edu.au