



Dr Sasha Jenkins at the ABARES award ceremony with Dr Kim Ritman, ABARES Chief Scientist (left) and Senator the Hon. Joe Ludwig, Australian Government Minister for Agriculture, Fisheries and Forestry (right).

## DAFF award for waste management researcher

In March this year, The UWA Institute of Agriculture (IOA) scientist Dr Sasha Jenkins (School of Earth and Environment, UWA) became a recipient of the 'DAFF 2012 Science and Innovation Awards for Young People in Agriculture, Fisheries and Forestry', to support her cutting-edge research at UWA and DAFWA which will make Australia's pork industry more sustainable and profitable through better management of piggery waste in relation to antimicrobial use.

The awards are coordinated by Australian Bureau of Agricultural and Resource Economics and Sciences (ABARES) and covered 12 categories supported by Research Development Corporations; Dr Jenkins was the recipient of the Australian Pork Limited Award (APL).

Dr Jenkins research is important, because antimicrobials are widely used within the pork industry to treat pig health problems and improve feed conversion efficiency but are not always fully

digested by pigs and are excreted into the effluent waste water.

"There is currently limited knowledge about the microorganisms that govern the waste degradation process and how management practices can be altered to make the conditions more favourable for microbial activities," explains Dr Jenkins.

Effluent from piggeries is pumped into anaerobic pond digesters, which are now covered with a permeable material to reduce odour and greenhouse gas emissions. However, the presence of antimicrobials in piggery waste may be inhibitory to the microbes that control the waste treatment process in piggeries. "When microbes cannot break down waste, farmers are faced with the expensive task of removing the pond cover, emptying the waste and replacing the covered pond," says Dr Jenkins.

Her award-winning project will use innovative metagenomic sequencing to determine the impact of antimicrobials on key microbial populations,

their metabolic pathways and biogas yields during anaerobic digestion of piggery waste. Guidelines of best management practices and microbial diagnostic tools will be developed that lead to improved pond stability and bioenergy recovery. The findings of this project will help increase reliability and profitability of covered anaerobic pond digesters. This will encourage more producers to adopt the technology leading to reduced greenhouse gas emissions and increased on-farm profits through renewable energy and carbon credits. "Ultimately this will not only enhance the competitiveness of the Australian pork industry, but may also deliver benefits to other industries where effluent waste treatment is an issue including Dairy Australia, Meat and Livestock Australia and the abattoir and meat processing sector," says Dr Jenkins, "I am thankful to APL for their support which enables me to extend my skills and knowledge base and to engage in extension activities with the industry."



## Director's column

**Winthrop Professor Kadambot Siddique  
AM FTSE (kadambot.siddique@uwa.edu.au)**

The New Year has brought two major changes within our university.

Firstly, Professor Paul Johnson commenced his position as the 10<sup>th</sup> Vice Chancellor of UWA. Professor Johnson is aware of UWA's strength and international ranking in agricultural science teaching and research. In his various speeches, Professor Johnson has highlighted the importance of world class teaching and research in developing innovative solutions to ensure sustainable food production both within Australia and globally.

Secondly, our first cohort of students joined the university under the new curriculum framework and early indications suggest that 40-50 students will focus on Agriculture and related Natural Resource Management (similar numbers to the old degree program) by selecting Agriculture as a major within the general science degree program.

UWA's new undergraduate degree structure presents us with a golden opportunity to introduce young science students at UWA to the exciting developments and career choices around food sustainability in agriculture and the environment. Our carefully planned majors in the Faculty of Natural and Agricultural Sciences (FNAS) will ensure that every student enrolled in one of the FNAS majors will get some exposure to the key global and regional issues in agriculture and food production systems.

For 2012 this means, that over 300 students will get 'big picture' lectures and tutorials in food production systems in their first year, irrespective of their choice of major. As students only finalise their majors during their second year, this provides us with the opportunity to ignite interest in agriculture among science students who would not otherwise consider an agriculture major. Additionally we will positively promote the diversity of exciting employment opportunities (both domestic and international) for agriculture graduates.

Besides this new opportunity for commencing undergraduate (science) students, we are also encouraging graduates from other disciplines to seek postgraduate qualifications in agricultural science. Already this year an impressive number of PhD students (11) and several Masters students have commenced their studies in agriculture and related areas, especially under AusAID funded programs in Africa.

Our international collaborations have received a boost with the signing of an Agreement for

Academic Cooperation between Faculty of Veterinary Medicine, Universitas Gadjah Mada, Indonesia and IOA. A General Academic Agreement was also signed between College of Food and Agricultural Sciences, King Saud University, Riyadh, Kingdom of Saudi Arabia and the Faculty of Natural and Agricultural Science (cf page 10), UWA. Winthrop Professor Graeme Martin (IOA Deputy Director) met with leading universities in southern India and paved the way for collaboration between Kerala Veterinary and Animal Science University (KVASU), as well as strengthening IOA's existing collaboration with Kerala Agricultural University (cf page 14).

Our agricultural scientists participated in several regional and national crop updates in February/March. They delivered relevant research findings from their recent research (soil, crop and animal related) to Australian growers to ensure sustainability and profitability of the industry.

Finally, the high calibre and dedication of our staff has been recognised this year in an impressive number of awards achieved across diverse areas of agricultural science and natural resource management (cf page 15). Winthrop Professors Hans Lambers and Stephen Powles were recently elected as Fellows of the Australian Academy of Science (cf page 9). Professor Lambers election to the Academy is in recognition of his world class achievements in plant physiology and ecophysiology. His stellar contribution ranges from cellular to the whole plant, agricultural and ecosystem.

Professor Powles is renowned for foreseeing the problem of herbicide resistance and pioneering herbicide resistance science internationally. Professor Powles also works with the farming community and industry to develop ways to overcome herbicide resistance and to encourage sustainable cropping in Australia

Congratulations to Professors Lambers and Powles.

## IOA Deputy Director presents plenary lecture in USA

**Winthrop Professor Graeme Martin, IOA Deputy Director and Head of UWA's School of Animal Biology world-leader in his field is invited to present a plenary lecture, at the 38th Annual Conference of the International Embryo Transfer Society (IETS), in Phoenix, Arizona in January 2012.**

Professor Martin's chosen topic was "Modification of spermatozoa quality in mature small ruminants" (full paper: *Reproduction, Fertility and Development* (2012) 24, 13). He discussed the strong possibility that sperm quality is directly linked to sperm output and thus testicular mass because there is a change in the efficiency of sperm production when

the testis is growing or shrinking. When the testis is shrinking, less sperm survive in the ejaculate and it seems likely that those which do survive are damaged, further reducing fertility. This could be important because the testes of rams normally shrink during the mating season.

At the conference, Professor Martin also met with Professor Alex Evans who has just become Dean of the College of Agriculture, Food Science & Veterinary Medicine at the University College Dublin. His College faces very similar challenges to the Faculty of Natural & Agricultural Sciences at UWA. "We reached the conclusion that cooperation in undergraduate student exchange



Winthrop Professor Graeme Martin

may help to provide solutions for both institutions," said Professor Martin, "and initially we will explore these options in the field of animal reproduction.

## UWA Future Farm collaborates with architects and engineers



**Designed by the UWA's Advanced Timber Concepts Research Centre (ATC), and Optimum Resource Architects, construction of the 3 bedroom/2 bathroom residence for the UWA Future Farm Manager has been completed!**

Dubbed the 'ALVA house' because of ACT's affiliation with UWA's Faculty of Architecture, Landscape and Visual Arts (ALVA), the north-facing residence has a floor area of 172m<sup>2</sup> and is situated at the centre of the farm, far from the farm's current working buildings. This choice of location is part of a long term strategy for infrastructure that includes a new multi-purpose sheep shearing/laboratory facility. This new facility is currently being developed by ATC in collaboration with IOA.

The ALVA house features timber framing which provides greater shock-tolerances in earthquake-prone zones, such as Pingelly. In addition, the building is equipped with a low cost fibre-cement external wall cladding chosen for its ease of installation and high fire retardant capabilities.

Besides high quality fixtures and fittings, the residence also showcases innovative cutting-edge technologies, including an automated electrical wiring system which uses computer modules to control electrical loads. ACT's Research Assistant, Mr Domenic Trimboli, explains, "By passively

monitoring the physical activity, daylight levels and electrical use within the various areas of a house this system is able to optimise the use of appliances and fixtures within those spaces, including air-conditioning, security and light fittings."

The house now has water and electricity supplies – thanks to a 128,600L rainwater tank and the farm's 'off-grid' solar energy system (see below for further details) – so the residential construction is all but complete, as Mr Trimboli points out: "The only thing left in the final phase is the design of a water-efficient landscape and a series of well designed outdoor spaces."

Construction was made possible by key sponsors, BGC, Bluescope Steel, Philips, Philips-Dynalite and Light Application (Balcatta).

A stand-alone solar photovoltaic (PV) generator to supply electricity to the ALVA house is now in operation. This 10 KW system represents Phase I of the solar energy system planned at UWA's Future Farm and was developed by international solar energy expert Associate Professor Ricardo R  ther (Universidade Federal de Santa Catarina, Brazil) during his recent 8 month-sabbatical visit at UWA. The generator is actually an experiment comparing two types of solar panel, one with novel thin-film cells and one with and traditional crystalline silicon cells.

The solar generator is fitted with a number of temperature and solar irradiance sensors, together with a comprehensive data acquisition system, and the data can be accessed remotely via the internet. The data will display both energy and water consumption at the ALVA house and the existing shearing shed, as well as the production of solar electricity.

This data acquisition system has been made possible through collaboration with Infinite Energy, Q-Cells and Greensense and the project will be maintained by researchers at UWA's School of Electrical & Electronic Engineering.

The three companies have been invited to become an active part of the UWA Future Farm Australia 2050 Project. "The business arrangement with Infinite Energy, Q-Cells and Greensense will provide an excellent showcase and the data generated should be for a number of student projects at UWA," predicts Associate Professor R  ther, who concludes: "The project is now set to enter a period of monitoring and evaluation as the outcomes of Phase I will shape Phase II of the project – along with financial and political considerations – namely the development a large-scale solar farm that will pump large amounts of electricity into the grid."

# Going from strength to strength: research training between UWA and leading Chinese universities

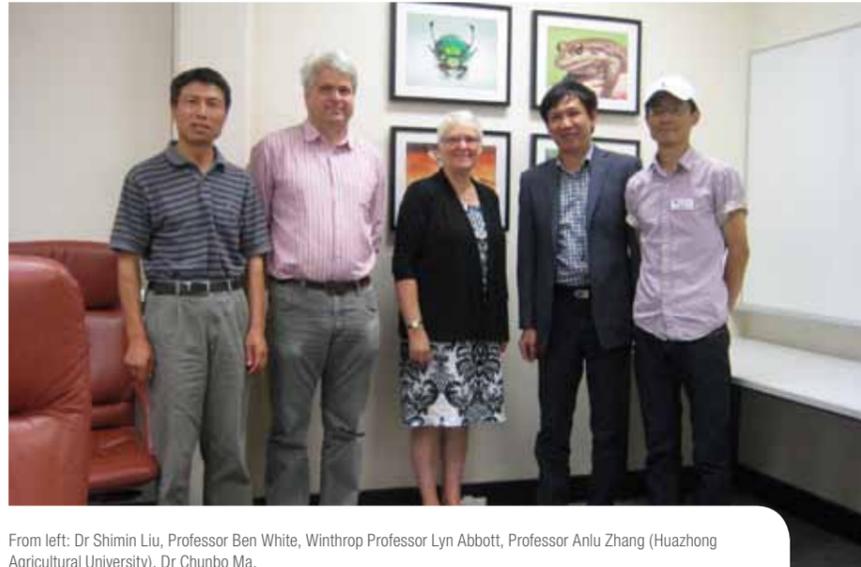
Res/Prof Shimin Liu (shimin.liu@uwa.edu.au)

UWA students in Agricultural and Resource Economics and Animal Science are the most recent winners from the strengthening collaboration in research training and education in agricultural areas between IOA and top universities in China.

Executive staff from two leading universities in China visited IOA in December 2011 to progress the expansion of current collaborative education arrangements in (to) most agricultural areas.

Professor Anlu Zhang, Dean of College of Agricultural Economics, Huazhong Agricultural University, and Professor Yuyin Chen of the College of Animal Sciences of Zhejiang University met with Winthrop Professors Lyn Abbott, Vice Dean of the Faculty of Natural and Agricultural Sciences (FNAS), Graeme Martin, Head of the School of Animal Science, and Ben White, Head of the School of Agricultural and Resource Economics, to discuss the expansion of collaborative education for undergraduate and Master students this year and to initiate collaborations in agricultural economics and resource management this year.

Research Professor Shimin Liu, Chinese Relations Coordinator at the School of Animal Biology, elaborates: "Zhejiang University is one of UWA's strategic partner university in China, and Huazhong Agricultural University already has a long-term strong relationship with UWA, particularly in areas



From left: Dr Shimin Liu, Professor Ben White, Winthrop Professor Lyn Abbott, Professor Anlu Zhang (Huazhong Agricultural University), Dr Chunbo Ma.

of soil and plant sciences, thanks to the great efforts of Winthrop Professor Lyn Abbott, Winthrop Professor Kadambot Siddique, Winthrop Professor Wallace Carling, Associate Professor Guijun Yan and Dr Ping Si."

Students in Animal Biology are among the most recent winners of the strengthening collaboration. While the ties in the areas of soil and plant sciences continue to strengthen, the collaborations in Animal Science and Agricultural Resource Economics are expanding rapidly: Barely three

months into 2012, three new PhD students from China have commenced their course in these areas. This comes as no surprise to Professor Liu: "The students and universities in China are aware of our tradition of academic excellence in agriculture and related areas, and they know we are very experienced in building successful international partnerships, and this is what ultimately makes our collaborations a win-win situation for all involved."



Mr Saiful Hamdani

## AHRI PhD student wins bursary to attend The 6th International Weed Science Congress

UWA based Australian Herbicide Resistance Initiative (AHRI) PhD student Mr Saiful Hamdani has won the International Weed Science Congress (IWSS) Larry Burrill award to attend the 2012 conference in Hangzhou, China.

The Larry Burrill award is presented to the student submitting the most outstanding papers as determined by the IWSS Graduate Students Award Committee.

Saiful Hamdani recently completed his studies with AHRI in which he focused on major resistance mechanisms to ACCase inhibiting herbicides. The results from this research will assist with the development of new methods to overcome resistance and thus control resistant weeds in the future.

# A remarkable life: Professor Clive M. Francis

In February 2012, more than 300 friends and colleagues paid their respects and final farewell to Professor Clive Francis, who has inspired agricultural researchers for more than three decades and who leaves behind an unsurpassed track record as a pasture scientist.

After completing his PhD at the University of Western Australia, he joined then Western Australian Department of Agriculture and commenced a distinguished career in agriculture, which would span 33 years and earn him both the Farrer Memorial Medal (1985) and Australian Institute of Agricultural Science Medal (1982).

Always willing to have a go, Professor Francis soon emerged as a free-thinker and iconoclast among his peers. Long-time friend and fellow scientist Dr Bob Clements reflects: "As early as 1966, Clive got stuck into the prevailing wisdom championed by Fred Morley and others that the only way to evaluate a pasture plant was under grazing. I recall being astonished that anyone would be brave enough to challenge Fred, who was a formidable character and pretty ruthless."

Professor Francis successfully promoted the new concept of free-seeding easily harvestable pasture varieties as an alternative to subclover and medics which resulted in no less than six new pasture species for Australian farmers.

As a gifted leader he was able to maximise scientific successes: From 1992 to 2010, Professor Francis was Deputy Director of UWA's Centre for Legumes in Mediterranean Agriculture (CLIMA) and made an outstanding contribution to CLIMA and the careers of many colleagues.

"Clive was a 'people-person' before the phrase was even invented," says current CLIMA Director Professor William Erskine. "He put himself on the line and brought out the best in everyone he worked with". These people-skills were very valuable in another field of special interest to Professor Francis: gathering and utilising a wide range of genetic resources. He developed strong links with the famous Vavilov Institute in Russia which resulted in over 4000 accessions of grain crops being introduced to Australian collections. He also travelled extensively on plant collection tours and was awarded the Vavilov Institute Memorial Medal in 1999.

Long-time friend Bob Ferrell sums up Professor Francis' achievements like this:

"Clive has left a record that may never be beaten by a pasture scientist: 29 plant collecting trips -last time I checked-; thousands of collections; twenty legume cultivars – maybe more-; millions of acres sown to your varieties; millions of dollars of benefits to Australia; countless enduring relationships -especially in central Europe and north Africa- and a few mates in the east."



Professor Clive McDonald Francis

"We are privileged to have had Clive work with us, and he has been instrumental in making CLIMA a leading centre in legume research as well as a great place to work in."



Dr Matiur Rahman (ACIAR Project Coordinator – Bangladesh) talking at a project field day in Kustia, Bangladesh.

## Western Australia to Western Bangladesh

Prof William Erskine (william.erskine@uwa.edu.au)

A travelling work shop and a field day was organised in western districts of Bangladesh as a part of a project funded by the Australian Centre for Agricultural Research (ACIAR) to intensify cropping in the rice-based system with short-duration food legumes. Researchers from the Bangladesh Agriculture Research Institute (BARI), 45 farmers from western Bangladesh and Prof. William Erskine (Director, CLIMA, UWA), Dr Ken Flower (Plant Biology, UWA), Dr Imran Malik (CLIMA, UWA) participated in these events from 12-19 February, 2012.

During the workshop the group visited various field sites and discussed with farmers the crop intensification trials. Project leader Prof. Erskine after returning from Bangladesh said, "Enthusiastic participation of farmers in the cropping intensification project was overwhelming".

Farmers are keen to adopt the relay sowing of lentil or field pea into the standing rice crop, Prof. Erskine added. The project aims to increase resource capture in the cropping system by fitting in short-duration food legumes (lentil, field pea and mung bean) between successive rice crops.

This was the first winter cropping season of the project which is in collaboration with International Rice Research Institute (IRRI) in Bangladesh with researchers from BARI and input from the national extension system and non-government organisations (NGO). Dr. Matiur Rahman (Project co-ordinator, IRRI, Bangladesh) concluded the field day by saying, "The travelling workshop and field day was a success as it focused farmers and researchers on options to diversify cropping beyond rice and increase legume production."

# Improving wheat seedlings to survive transient water-logging

Ms Alice Trend (alice.trend@uwa.edu.au)

What do rat liver cells have in common with wheat seedlings?

UWA PhD student Ms Rachel Shingaki-Wells has found that both cope with oxygen starvation better when fed three amino acids: glycine, serine and alanine. Amino acids are the building blocks of proteins, which are large molecules that carry out functions in the cell.

Ms Shingaki-Wells' research sheds new light on how to maintain the seedling health of wheat when floods become a threat, and her exciting findings have been recently published in the leading international plant science journal *Plant Physiology* (DOI: 10.1104/pp.111.175570).

"Most crop plants are devastated during flood events because they can't get enough oxygen and in effect they start to drown," said Ms Shingaki-Wells. "In animals, a lack of oxygen is likely to result in death after only a few minutes. Remarkably, some plants can survive for several weeks without oxygen."

Due to its long cultivation underwater, rice has adapted to become the most flood-tolerant crop plant on earth.

"At a molecular level, rice plants undergo a lot of changes during flooding, including significant increases in the production of serine, glycine and alanine and the molecules used to make these amino acids," said Ms Shingaki-Wells. "Rice is very busy trying to survive. Unfortunately the same cannot be said for wheat; its response is more laid-back and if oxygen doesn't return swiftly, it's likely to die."

She continued, "When I reviewed medical research online, I came across something really interesting: It turns out that when rat liver cells were given these same three amino acids, they were better able to cope with oxygen deprivation."

Armed with this information, said Ms Shingaki-Wells set out to investigate the effect in wheat. And remarkably, it worked: Wheat seedlings had lower tissue damage when fed with these amino acids. What was particularly intriguing was that when rice was fed these amino acids, nothing happened.

"It seems that rice's biology is set up to respond to flooding and doesn't need our help. Wheat is



Ms Rachel Shingaki-Wells

another story; it benefits from external assistance," Ms Shingaki-Wells added.

"This was a really exciting discovery, and I hope that in the long run it will help us find out how to decrease losses in all types of crops during transient water-logging".

Rachel's supervisor, Winthrop Professor Harvey Millar, from UWA's ARC Centre of Excellence in Plant Energy Biology confirmed the significance of Ms Shingaki-Wells' research: "This kind of basic research, to find out how plants work on a molecular level, is very important. This information can provide a new target for plant breeders, as they work to improve the tolerance of wheat plants to everything that weather and climate throws at them. We are grateful for the funding support from the Grains Research Development Corporation (GRDC) to advance this type of research."

## City kids embrace agriculture through 'outdoor classrooms'

Dr Susan Knights (susan.knights@uwa.edu.au)

A new hands-on approach is sweeping Perth schools and kindling a passion for agriculture in young city kids.

While the next generation is becoming more and more computer literate and technologically savvy, there is a growing concern that it will be increasingly disconnected from nature. Enter 'the kitchen garden' scheme:

Launched in a bid to improve nutrition and introduce authentic learning opportunities into schools, growing a kitchen garden at primary or secondary school adds learning opportunities across the curriculum for students at all levels.

But the scheme's benefits reach further, as illustrated at Oberthur Primary School in Bull Creek, where students and teachers have gone a step further by adding agricultural crops to their kitchen garden. One of the scheme's champions, Dr Sue Knights, elaborates: "Staff and students see their growing area as more than a garden; they call it an outdoor classroom where they learn history, science, maths, English, art, civics and agriculture through many learning activities."

The outdoor classroom was constructed in August 2011, by a group of parents with the support of enthusiastic teachers. Its popularity with the students became apparent almost immediately. Dr Knight recalls:

"When the soil was ready for planting, a mystery bag of seeds was given to Year 3 students to

grow. After the seeds germinated and emerged, the students identified it as everything from lettuce to broccoli. As it developed the students suddenly realised it looked like grass; it was in fact a member of the grass family; barley.

The school then arranged a plant breeder from an Australian cereal breeding company to come to the school and discuss with the students the history of crop improvement and the move of our society from hunting and gathering to the farming society as we know it today.

Students tended the barley crop through to harvest, and a Year 3 student commented that the awns or plant bristles felt smooth when she ran her fingers one way but sticky in reverse. This led to a discussion about methods of seed dispersal and how the hairs on awns help the seed heads get caught in animals' coats, spreading further away. The conversation developed further into the history of the technological development of Velcro. It was a revelation to students to realise a company has made an lot of money by copying from a plant!"

Dr Knights concludes: "Kitchen gardens and agricultural plants really broaden a school's scope for teaching the curriculum in a hands-on way. Students get to explore the environment of an outdoor classroom and discover the fascination of the plant world."

"It is such a simple and effective way of inspiring (city) children from a very young age



Year 3 students in their kitchen garden at Oberthur Primary School, Bullcreek

to the wonders of agriculture – and what a promising outcome in a country that is becoming increasingly urbanised and more reliant on a city-based society to provide the bright young brains for the agricultural sector."

## Dr Ian Williams retirement symposium

Asst/Prof Harriet Mills (harriet.mills@uwa.edu.au)

Colleagues, friends and family of Dr Ian Williams joined together for a symposium on 15th December 2011 to celebrate his long and distinguished career. Dr Williams retired from UWA last year after 33 years of service as a scientist and Senior lecturer in the School of Animal Biology (formerly the Animal Science Group). The symposium was opened by the then Vice Chancellor, Professor Alan Robson, and speakers included Dr Williams' first PhD student, Dr Ray King, and his current PhD student, Ms

Chelsea Fancote. Speakers and members of the audience included many industry representatives, reflecting Dr Williams's strong collaborative links with the WA Department of Agriculture, CSIRO, the WA Department of Fisheries, Murdoch University and the pork industry.

Students who have encountered Dr Williams over the years will remember his formidable capacity for calculating energy budgets and his insistence on hypothesis testing, tempered by his wonderful sense of humour and fondness for a drop of red wine. Many students have also benefited over the years from Ian's advice for how best to cure a hangover – based on sound principles of biochemistry and nutrition, of course!

Over the years Dr Williams has amassed an impressive number of scientific publications

and has supervised numerous honours and PhD students. Over the past two years Dr Williams took on the role of developing UWA's 'Future Farm' near Pingelly, and his contribution to teaching and research at UWA will be missed.

The symposium was followed by a dinner at the University Club, with an after dinner speech delivered by Ian's former UWA colleague, Emeritus Professor David Lindsay. The day was enjoyed by all, and it was a fitting tribute to a well-loved and respected UWA colleague. Dr Williams plans to continue collaborating with staff and students in the School of Animal Biology (at a more relaxed pace) and to enjoy having more time to spend on his farm at Beverley.



Strong ties on display: Dr Dean Revell, Dr Ian Williams and Professor Phil Vercoe

# Drought, heat and salinity tolerance in chickpea

W/Prof Neil C. Turner (neil.turner@uwa.edu.au)

In January 2012, Winthrop Professors Kadambot Siddique and Neil Turner travelled to the International Crops Research Institute for the Semi-arid Tropics (ICRISAT) in Hyderabad, India and to Panjab University in Chandigarh, India, for a meeting of the Australia-India Strategic Research Fund (AISRF) project 'Securing chickpea productivity under conditions of stress due to heat, drought and salinity'. Meeting first at ICRISAT, Professors Siddique and Turner saw experiments conducted by partners Drs Vincent Vadez, Pooran Gaur and Rajiv Varshney designed to evaluate the phenotypic and genotypic basis of salt tolerance, heat tolerance and drought tolerance, alone and in combination, of a range of chickpea genotypes. Director General of ICRISAT, Dr William Dar commended the strength and productivity of the relationship between UWA and ICRISAT which has resulted in several joint projects and publications over the past decade.



Harsh Nayyar, Neil Turner, Vincent Vadez and students inspect heat tolerant chickpeas at Panjab University, Chandigarh, India

The team then traveled to Chandigarh in northern India to see the research on heat tolerance by Professor Harsh Nayyar, another partner in the AISRF project. Professor Nayyar and his students are evaluating the influence of high temperatures on the reactive oxygen species and antioxidant enzyme activity in chickpea genotypes known to differ in heat tolerance. Working in controlled environment facilities at Panjab University, the

biochemical basis of heat tolerance is being unravelled.

The next project meeting will be held in Perth in September 2012 when experiments on salinity tolerance in the field at Bindi Bindi and in the glasshouse at UWA conducted by Winthrop Professors Tim Colmer, Kadambot Siddique, Neil Turner, and Mr John Quealy will be viewed and discussed.

# Sheep's 'rhythm of life' controlled by the brain

W/Prof Graeme Martin (Graeme.Martin@uwa.edu.au)

Visiting Professor Gerald Lincoln (University of Edinburgh) shared some of his innovative ideas with IOA's Animal Production Systems group in an inspiring seminar this February, on the brain processes underpinning seasonal changes in animal reproduction, appetite control and pelage.

Professor Lincoln is a world leader in the basic biology of animal reproduction and much of his work has been done on sheep, with a recent focus on the fascinating phenomenon of circannual rhythms.

Circannual rhythms are innately timed -or 'built-in' - long-term (≈12 months) cycles of physiology and behaviour. They are labelled 'rhythms' because, if all external cues are removed, they are still expressed. For example, if male sheep are maintained under continuous 12-hour days

for several years in succession, and thus receive no information regarding the changes in season, the seasonal cycles in sperm production continue. These circannual rhythms are crucial for life in habitats ranging from the equator to the Poles.

Professor Lincoln and his colleague, Professor David Hazelrigg (University of Aberdeen, Scotland) have recently proposed a revolutionary hypothesis to explain how these rhythms are generated and maintained in the brain. They were inspired by work over the past 10-15 years that has led the scientific community to reject the dogma that brain cells do not divide. Professors Lincoln and Hazelrigg extended this view to propose that circannual rhythms generated in the brain depend on cycles of cell division, cell differentiation, and cell death (apoptosis). "We used to think these rhythms were all caused by hormones, but we now know that the hormones are mere messengers," said Professor Lincoln. "Circannual rhythms are controlled by the same process as tissue



A Soay ram in June (summer), during transformation of phenotype from 'winter' (long coat, sexually inactive) to 'summer' (short coat, sexually active).

development in the fetus. Signals including day length, nutrition, and social factors act on brain cells to synchronize these (biological) rhythms through hormonal influences, notably via the thyroid and glucocorticoid axes."

The methodology for detecting cell division within the brain involves staining newly synthesised DNA. The same technique has been used by a team of UWA scientists (Dr Penny Hawken, Assoc/Prof Jenny Rodger, Assoc/Prof Dominique Blache and W/Prof Graeme Martin) to show that the smell of a novel male induces cell division in the memory centres of the female sheep.

# UWA scientists elected to the Australian Academy of Science

The Australian Academy of Science represents Australia's leading research scientists and each year it honours a small number of Australian scientists for their outstanding contributions.

This year, the honour was bestowed on three scientists from The University of Western Australia, and IOA is proud to count two of them amongst its ranks:

Winthrop Professor Hans Lambers is Head of the School of Plant Biology and an expert in plant mineral nutrition and the physiological basis of variation in plant growth and productivity. His work has revealed the mechanisms by which plants function and grow in different and challenging environments. His interests include the phosphorus nutrition of Australian native plants and the uptake and use of phosphorus by plant crops. One of his books on plants has been translated into Chinese and Persian. He hopes his work on Australian native plants, which thrive in poor soil, will lead to a more sustainable agriculture in WA;



Winthrop Professor Hans Lambers in Katalapi Park, Chile, during a break from teaching a postgraduate course.



Winthrop Professor Stephen Powells demonstrating germination of herbicide resistant seeds and herbicide susceptible seeds

Winthrop Professor Stephen Powles is Director of the Australian Herbicide Resistance Initiative (AHRI) and renowned for foreseeing the problem of herbicide resistance and pioneering herbicide resistance science nationally and internationally. In this capacity he will travel to USA and South America in May, as an invited keynote speaker at two international events: the US National Academy of Sciences Summit in Washington DC and, the Brazil, Argentina, Paraguay, Uruguay Summit on Herbicide Resistance in Buenos Aires.

As well as his fundamental research, Professor Powles works with the farming community and industry to develop ways to overcome herbicide resistance and to encourage sustainable cropping across Australia (see also p12).

The third UWA scientists to be elected to the Academy this year is Winthrop Professor Michael Tobar, who leads the Frequency Standards and Metrology Research Group based in the School of Physics.

The new Fellows will be formally admitted to the Academy and present summaries of their work at the Academy's three-day celebration in Canberra on 2<sup>nd</sup> May.

## King Saud University and UWA collaborate on dryland agriculture



Professor Salem Alghamdi (KSU) and Winthrop Professor Kadambot Siddique (UWA) discussing water use efficiency improvement in faba bean, a staple food of Saudis

College of Food and Agricultural Sciences, King Saud University (KSU), Riyadh, Kingdom of Saudi Arabia and Faculty of Natural and Agricultural Sciences, The University of Western Australia recently signed an agreement recognising the mutual benefits and desire to establish an international academic and research collaboration between the two Universities. Winthrop Professor Kadambot Siddique (IOA) visited KSU late last year (as part of his Distinguished Visiting Professorship with KSU) and met with KSU senior management which led to signing of the above MoU.

KSU is one of the leading universities in the Kingdom and in recent years has made significant investments in higher education and research. The Kingdom is seriously concerned about the future sustainable food production in the region while minimising impact on natural resources especially precious ground water.

Both universities will collaborate on dryland agriculture, crop and animal improvement, water use efficiency, food science and natural resource management. Special emphasis will be given on postgraduate research training and joint research projects of mutual benefits.

## UWA Agricultural Science graduate at CHOGM dinner

Passion, drive and initiative throughout her course at UWA earned Agricultural Science and Commerce graduate Ms Dani Whyte an invitation from the Prime Minister's Office to represent UWA at the 2011 CHOGM dinner and panel discussion focusing on 'Empowering Women in Leadership'.

"I was absolutely awed when I received the invitation", recalls Ms Whyte, "and that feeling continued when I arrived at the Hyatt for the event and suddenly found myself in a room full of politicians and dignitaries from all over the world. It's the most bizarre feeling!"

Among the highlights for Ms Whyte was the opening address by Her Excellency Governor General of Australia Quentin Bryce, who drew on her childhood in rural Queensland to describe how women's leadership has made an impact on her life. Equally memorable was her conversation over dinner with the European Union Ambassador to Australia and New Zealand, Mr David Daly. "I sat next to him and we got talking about our backgrounds. Upon hearing I was from a farming family and had just completed my Agriculture and Commerce degrees, he was extremely interested in knowing the farm type, size and my role on the farm. When I googled him the next day I discovered he had been with the Irish Department of Agriculture before joining the EU."

The subsequent panel discussion, however, made the biggest impression on Ms Whyte. "The panel members were women in leading positions from all over the world, including three Prime Ministers" says Ms Whyte.

"Ms Kamla Persad-Bissessar, Prime Minister of Bangladesh, shared how her family was reluctant to allow her an education as she was only going to marry and have children. She is married and has children, but also holds together a coalition of five political parties as Prime Minister."



Ms Dani Whyte and her dog Trigg

The discussion focused on grassroots development, allowing girls' choice, making education a right and not the privilege of a few. "One of the interesting facts to emerge in the panel discussion was that when women (in developing countries) were given land ownership, access to technology and credit, crop yields increased by twenty percent.

For Ms Whyte, the event held a clear message: "I realised is that not everyone has the opportunity to have a voice, to sit on committees and be heard. The reason I was at the dinner was because I am empowered; I sit on committees and have my say and I can make a difference, so empowerment at grass-root level is critical to drive change and improvements in agriculture and beyond.

Ms Whyte has been an 'agent of change' and continuous improvement throughout her academic career at UWA:

She served as treasurer and chairperson on the Student-Staff Consultative Committee (SSCC) of UWA's Faculty of Natural and Agricultural Sciences for three years, to promote continuous improvement of the quality of courses and teaching, through ongoing communication between students and staff. In the same role Ms Whyte organised regular industry and career nights for students in Agriculture which were a big hit with students and prospective employers alike. "By getting involved in this way I have met the most interesting people and developed a huge network of industry contacts", says Ms Whyte, "and since graduating in 2011, I have been approached by four different employers with job offers."

Following a well-earned though brief holiday, Ms Whyte will take up a position as an Agronomist for Landmark in at Merredin in the eastern grain belt of WA.

## Girlpower: UWA Ag Science graduate portrays the new look of agriculture

Agriculture is undergoing a major image makeover at the hands of a recent UWA Agricultural Science graduate. Miss Stephanie Coombes is dazzling peers and industry representatives alike with her sophisticated website [www.ausagcareers.com](http://www.ausagcareers.com).

The website focuses on the modern face of agriculture, featuring profiles of people working, studying and training in more than 50 agriculture-related categories. In addition, the website lists job vacancies, internships, links to related facebook, youtube and twitter postings all of which combine to shake some of the most common misconceptions about agriculture.

Stephanie perceived the need for such a website as a result of her own background. She explains: "I was born and raised in the suburbs of Perth and didn't really know anything about agriculture except the anecdotal stories of farmers on tractors out in the paddock, and shearers shearing sheep." While Stephanie still has trouble explaining why she chose to study Agricultural Science at UWA and, by her account, had no idea what she was letting herself in for when she enrolled, she is very clear on what happened next: "Once I got into my degree, I discovered this whole other world, and I haven't turned back since. Initially I became really interested in soil science, and by my second year I was hooked! However, in the winter holidays of my second year I went out mustering to a cattle station for their annual 6 week muster. It was then and there I decided that beef cattle was the area I

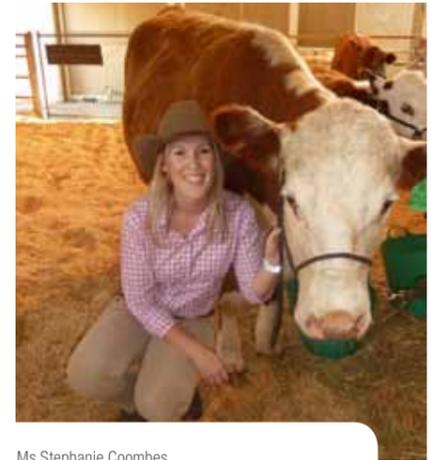
wanted to pursue. However, each time I took another unit, pasture science, cropping systems, grain marketing etc., I could easily imagine myself having a career in any of these industries."

In 2011, Stephanie graduated with first class honours and sums up her journey: "The things I have learnt and experienced throughout my degree, not to mention the places I have been and the people I have met, make me feel very lucky. Throughout my studies and my work in agriculture I have been able to get up each day and do something that I enjoy and be a part of something that actually interests me."

Stephanie also attributes her motivation to create [www.ausagcareers.com](http://www.ausagcareers.com) to outdated clichés about agriculture and to the increasing disconnection between city and country.

"It's time people realized that workers in agriculture are a team of people from all walks of life – not only farmers – who through their combined efforts ensure that Australian produce gets from the paddock to our plate (and wardrobe): they live in the city and the country, they work in boardrooms and the bush, and now anyone can get to know them and find out what they do, simply by hopping on the website."

Following the website's impressive debut – more than 1100 visitors in its first week – Stephanie was invited to the National Farmer Federation Round the table conference in Canberra in February this year, to discuss the issues of education, skills and labour



Ms Stephanie Coombes

shortages in the agricultural industry. This enabled her to further extend her network of industry contacts which she values greatly, comparing them to a springboard for aspiring students for whom she has the following advice: "if you read about someone who has a job you are interested in... make contact: Email or call them, ask them questions and what advice they have. Most people are usually very willing to help out someone who is driven, passionate and most of all, shows initiative!"

Stephanie is spending the rest of this year mustering on Yarric cattle station, to hone her practical skills, after which she plans get involved in the live export industry, in animal production and welfare in overseas destination markets.

## "Slow and steady" the key to building soil carbon

Dr Jennifer Carson  
([jennifer.carson@uwa.edu.au](mailto:jennifer.carson@uwa.edu.au))

Researchers from the UWA Institute of Agriculture (IOA) were recently in Esperance to announce the first West Australian results from the national stocktake of soil carbon. The key message was that farmers wishing to build soil carbon should aim for a slow and steady increase over time.

Researchers from the IOA and from the Department of Agriculture and Food WA (DAFWA) measured carbon levels in pasture soils at more than 100 sites on the Esperance sand plain. They then compared soil carbon levels to model simulations for carbon storage in these soils. The research was funded by the Australian



Sampling a pasture soil for the carbon stocktake of the Esperance sand plain.

Government's Climate Change Research Program, the Grains Research and Development Corporation and the Australian Centre for International Agricultural Research.

The findings were announced to the farmers involved in the national research project by Professor Daniel Murphy and Dr Andrew Wherret from the IOA and Mr David Hall from DAFWA.

The research found that soils under annual and perennial pasture for 30 years had carbon stocks averaging 45 t C/ha to a depth of 30 cm.

Modelling using realistic management scenarios suggested perennial pastures could reach on average 60 t C/ha over 40 years and that there would be no further increase under annual pasture.

According to Professor Daniel Murphy, an increase of 15 t/ha over 40 years, or 0.4 t C/ha each year, represented only a small gain in soil carbon stocks.

While Mr David Hall (DAFWA) suggested that these results would be of interest to farmers hoping to

continued on page 12

## Smart crop management to combat seed dormancy in ryegrass

Research by the UWA's- Australian Herbicide Resistance Initiative (AHRI) has shown there is a strong link between intensive cropping, annual ryegrass 'dormancy' and herbicide resistance in the Western Australian grain belt.

The GRDC-funded research represents the first large scale study to demonstrate this link.

Dormancy refers to the situation where viable seed does not germinate under ideal germination conditions.

The research findings suggest growers should, where possible, delay seeding crop paddocks where there is dormant ryegrass, so they can use knockdown herbicides to kill the maximum number of weeds before the crop is planted.

This is because dormant ryegrass is more likely to be resistant to selective in-crop herbicides, and therefore more difficult to control when it emerges later in the crop.

The research examined ryegrass seeds collected from 406 populations across the WA grain belt.

"For each population, initial dormancy and change in dormancy over a six-month period were measured, and the resistance status of seedlings to four herbicides was assessed," explained AHRI researcher Ms Mechelle Owen.

"We tested a total of four Group A and Group B herbicides, and for all of them greater seed dormancy correlated with higher levels of herbicide resistance."

Ms Owen stressed that ryegrass resistance did not itself cause dormancy, and that crop management factors may be selecting for both traits independently.

"Further research we conducted examined the causes of the relationship between resistance and dormancy, and found that higher dormancy levels were associated with more intensive cropping," she said.

"Generally, ryegrass from paddocks with a longer and more frequent cropping history was slower to germinate and had a lower proportion of seeds that were able to germinate."

As dormant ryegrass seeds pose a significant problem to growers AHRI's findings provide further evidence of the risks inherent in using the same crop management practices every year without any variation.



Photo: Michelle Owen



AHRI researcher Ms Mechelle Owen inspects petri-dishes containing dormant ryegrass seeds, left, and ryegrass seeds which are germinating normally. Ryegrass seeds outside the petri-dishes have not been exposed to moisture.

Photo: Nereea Martinez

## "Slow and steady" the key to building soil carbon

continued from page 11

increase carbon sequestration, he also cautioned: "The Esperance results show that changes in soil carbon stocks might be small and are likely to occur slowly over time."

As Professor Murphy explained: "The amount of organic carbon a soil can store changes between regions and is controlled by soil type, climate and management." He said that larger increases in soil carbon on the sandy soils of the Esperance sand plain were unlikely due to their low clay content.

"In soils with low clay content, organic matter is less physically protected from breakdown by microorganisms. This means they have a smaller capacity for carbon storage compared to soils with more clay".

Mr Hall pointed out that farmers wishing to build soil carbon in sandy soils also had another option. "One way to increase the capacity of sandy soil

to store carbon is to apply clay. Clay amendment is common on the Esperance sand plain and has lifted carbon storage by 2 t C/ha over 10 years when clay content of topsoil was increased from 1 to 6%," he said.

Individual paddocks measured on the Esperance sand plain had soil carbon stocks from 30 to 80 t C/ha, highlighting the large variation that is possible within the same soil type and region.

These are the first results for WA from the national Soil Carbon Research Program, which is also assessing carbon stocks at Young River, South Stirling, Kalgan-Woogenellup, Kojonup, Bunbury-Busselton, Northam-Avon and Mingenew-Irwin.

Further information can be obtained at [www.soilquality.org.au](http://www.soilquality.org.au) (Fact sheet on "Carbon storage and the Esperance sand plain, WA") or from Dr Jennifer Carson [jennifer.carson@uwa.edu.au](mailto:jennifer.carson@uwa.edu.au)

## The real cost of salt in wheat production

Ms Alice Trend ([alice.trend@uwa.edu.au](mailto:alice.trend@uwa.edu.au))

Wheat is one of the three major world food grains. However, salinity problems now affect up to 69% of Australia's grain belt, leading to crop losses worth \$2 billion a year.

The problem with saline soils is that plants have to use energy to adapt to or exclude salt because salt is toxic.

Mr Richard Jacoby – a PhD student and intrepid field researcher at the ARC Centre for Excellence in Plant Energy Biology at UWA – is trekking around to wheat fields near Ballidu trying to establish the real "cost" of salinity to wheat plants. Under salinity, large stores of carbon are diverted into a process called respiration, which helps the plant deal with problems created by salinity. However, this means that less carbon is available for the plant's growth processes, therefore decreasing grain yield and quality.

Mr Jacoby is comparing several wheat varieties (such as Hartog, Halberd and Yitpi) in low-lying saline fields and higher non-saline fields. This work was made possible by a collaboration with Department of Agriculture and Food WA (DAFWA), who set up extensive field trials in order to collect data on grain yield of wheat varieties, and also to characterise variations in soil salinity throughout the growing season.

Mr Jacoby's findings indicate that wheat varieties differ in their response to salinity:

"Salt sensitive species 'freak out' when they detect dangerous salt levels and respond in one of two ways", explains Mr Jacoby. "Some salt-sensitive species increase internal processes until they burn out their carbon supplies, while other salt sensitive species go into 'shut down mode' and decrease photosynthesis, therefore running out of essential



Mr Richard Jacoby preparing to collect samples from a wheat field and freeze them in liquid nitrogen

energy and detoxification requirements at a critical time."

Salt-tolerant species, too, have two different ways in which they respond to high levels of salt, and are known as 'adaptors' or 'excluders', depending on which type of response they use:

"Adaptors appear to minimise salt damage by 'ramping up' protective biochemical processes," says Mr Jacoby, "while plants that fall into the 'excluders' category pump salt back out. Adaptors and excluders both require energy to be diverted from photosynthesis and growth into respiration, but in the long term, can bring benefits to the plants."

Mr Jacoby and his team believe that the respiration process holds the key to many stress responses in plants; they have identified two antioxidant proteins produced by adaptors during respiration – alternative oxidase (AOX) and a 'beefed up' version of superoxide dismutase (MnSOD) – and these proteins act like bodyguards in the cell and

minimise the spread of damage from the salt.

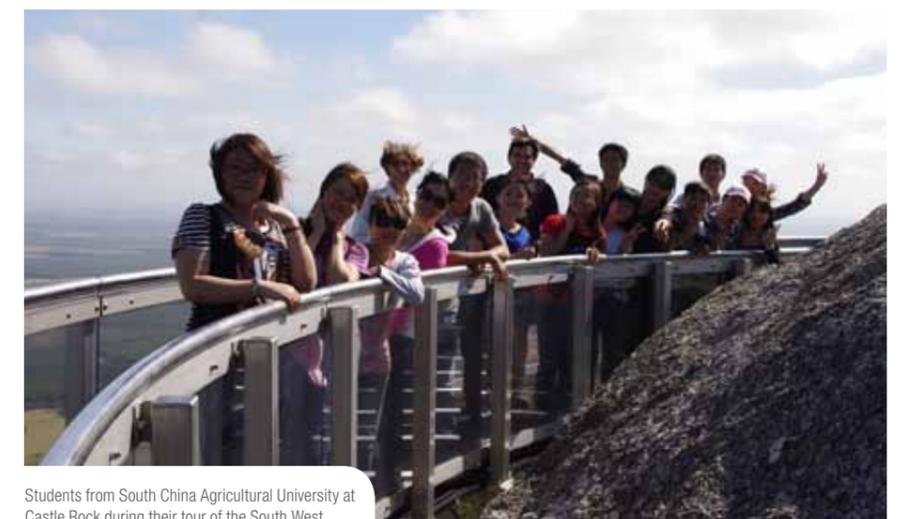
"We know in this case that MnSOD is a key player in salinity tolerance," says Chief Investigator Winthrop Professor Harvey Millar, "and we aim to identify (a long list of) wheat proteins linked to salinity tolerance to assist breeders in cutting down the breeding time for (new) salt-tolerant wheat varieties. The presence of proteins linked to salinity tolerance could be used to help predict whether a new cross of wheat might be salt-tolerant, thereby taking a bit of chance out of the breeding game."

While breeders stand to benefit much from this research, growers may benefit even more: "Laboratory scientists have learned much about plant stress responses under controlled environment conditions, but farmers cannot control the conditions in their fields. So we have ventured out of the lab to bridge the gap between lab-based molecular research and the Australian wheat breeders, to deliver some real solutions to growers faced with salinity problems."

## South China Agricultural University Students visit UWA

Fifteen star students from South China's Agricultural University (SCAU) had the time of their life during their one month visit to UWA in February this year.

They participated in a tailor-made program which combined 'cultural immersion' with English Language studies at the Centre for English Language Studies (CELT) and University studies



Students from South China Agricultural University at Castle Rock during their tour of the South West

continued page 14

# IOA extends collaborations in Kerala, India

In a recent visit to India, IOA Deputy Director, Winthrop Professor Graeme Martin, has paved the way to extend collaborations between UWA, Kerala Agricultural University (KAU) and Kerala Veterinary and Animal Science University (KVASU).

A Memorandum of Understanding (MoU) between KAU and UWA was signed in 2008 and was specifically focused on the KAU Academy of Climate Change Education and Research (see also page 11, IOA Newsletter December 2011).

At that time the disciplines of veterinary and animal sciences resided in KAU but, in April 2011, this college was separated to form KVASU, a small highly-specialized university. "We are very keen to ensure that KVASU animal sciences remain involved with UWA," said Professor Martin, "and my visit in February enabled me to explore ways to achieve this."

During his five day visit, Professor Martin presented an invited paper on "Natural methods for increasing reproductive efficiency in small ruminants – the 'Clean, Green and Ethical' concept in action, in the National Seminar on One Health Initiative in Addressing Food Safety Challenges. This seminar is run as the Annual Conference of the Indian Association of Veterinary Public Health Specialists. Professor Martin also gave a guest lecture to Master of Climate Change students at KAU, held a workshop for academic staff and postgraduate students at KVASU, visited the KVASU Livestock

Research Station, and met with academics and senior officials from both universities.

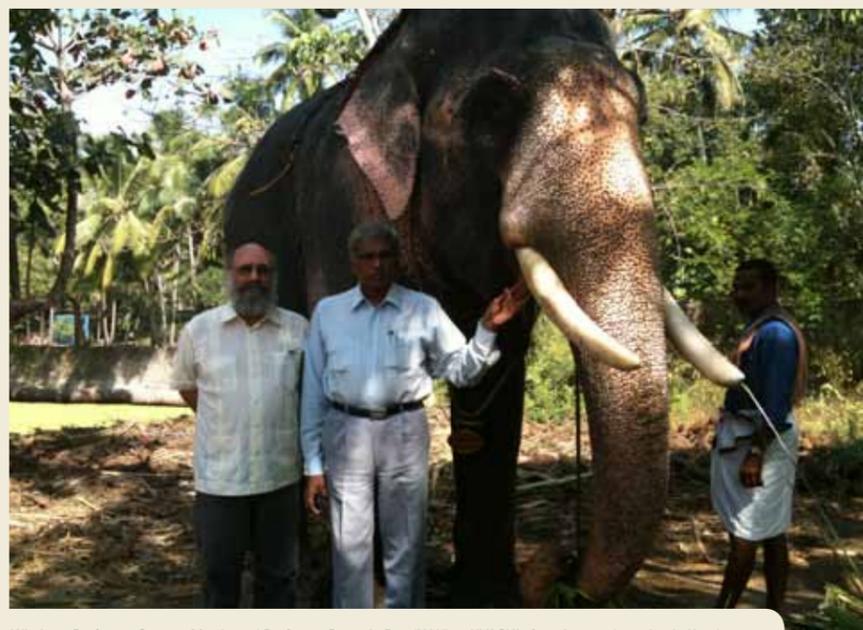
Professor Martin addressed the general theme of adaptation of agriculture to climate change through its implications for animal production, in particular the methane issue, focusing on the UWA concept of 'Clean, Green and Ethical' animal production and on the UWA Future Farm Australia 2050 (see also page 3).

"It was a very rewarding visit," said Professor Martin, "that resulted in an agreement to pursue further engagement with KAU and to establish formal collaboration arrangements with KVASU".

The collaboration with KVASU will initially target three areas:

- Animal nutrition with respect to methane emissions;
- Animal physiology with an emphasis on stress and environmental temperature;
- Linking KVASU's farm in 'Thiruvazhankunnu' to the UWA Future Farm 2050 project.

The development of links between academics and their engagement in shared projects is also likely to lead to more high quality postgraduate students coming to UWA by taking advantage of the UWA-India, Endeavour and IPRS scholarship programs: "I have already experienced strong interest from prospective students during my visit," confirmed Professor Martin.



Winthrop Professor Graeme Martin and Professor Prasada Rao (KAU) at KVASU's farm/research station in Kerala

## South China Agricultural University Students visit UWA

continued from page 13

in the areas of Agriculture, Animal Biology, Plant Biology and Agricultural Resource Economics – the fields in which these students excel at their home university.

This study visit represents one of the outcomes of the Memorandum of Understanding which has been in place between UWA and SCAU since 2009. The program was developed by the UWA Extension, in collaboration with Research Professor Shimin Liu (School of Animal Biology, UWA), Associate Professor Qin Yu (Australina Herbicide Resistance Initiative, UWA) and with Professor Daqian Huang (SCAU).

"The South China Agricultural University is very keen to promote this program," said Professor Huang, "and has set aside funds to continue bringing our top students each year to UWA to expose them to leading agricultural scientists and cutting edge research on agricultural ecosystems."

In partnership with UWA's Centre of Excellence in Natural Resource Management (CENRM), the students toured much of the Great Southern region with local agencies like South Coast Natural Resource Management, Department of Agriculture & Food, and DEC showcasing initiatives in agriculture, restoration ecology, management of dryland salinity as well as the conservation of threatened bird and mammal species.

"The support from local agencies and organisations, such as South Coast NRM, was invaluable in making the trip to Albany a big success with the students," observed Mr Randall Jasper, Business Manager at CENRM, and some of the students already started talking about returning to the South Coast one day to conduct a research project with one of these organizations."

Back on Crawley campus, special seminars for the visiting students were hosted by scientists from IOA, Schools of Plant Biology, Animal Biology, and Agricultural and Resource Economics.

"The students really liked the wide variety in the program – apart from learning about agricultural research and education at UWA and experiencing Western Australian rural sites, they also visited King's Park and Botanical Gardens, the sustainable Grove Library and got a taste of Indigenous art & culture, authentic bush tucker lunch and award-winning wines, concludes Professor Liu, "I would not be surprised if we will see some of these students return in the future to undertake postgraduate education at UWA."

## New research funded projects

TITLE	FUNDING PERIOD	FUNDING BODY	SUPERVISORS
Coping with flooding – nutrient transport in oxygen deprived roots	2012 – 2014	ARC Discovery Projects	Prof Timothy Colmer Assoc/Prof Sergey Shabala Prof Mikio Nakazono
Strategies and tools for monitoring carbon and water dynamics in vegetation	2011	National ICT Australia Ltd (NICTA)	Dr Stephen Burgess
Wheatbelt workforce development plan	2011	WA Department of Training and Workforce Development	Prof Matthew Tonts
The food security biosecurity multiplier	2011 – 2012	CRC Plant Biosecurity	Assoc/Prof David Cook
Communicating uncertainty in biosecurity for Agriculture	2011 – 2012	CRC Plant Biosecurity	Assoc/Prof David Cook
Tedera plant improvement project	2011 – 2013	Future Farm Industries CRC	Assoc/Prof Matthew Nelson Asst/Prof Janine Croser
Managing soil borne diseases with a focus on Rhizoctonia	2011 – 2013	GRDC	Mr William MacLeod Prof Martin Barbetti Asst/Prof Janine Croser
National integration of crop sequence strategies and tactics	2011 – 2014	CSIRO ex GRDC	Assoc/Prof Michael Renton
Expanding the Brassica Germplasm Base through collaboration with China and India	2011 – 2014	University of Melbourne Ex GRDC	Prof Martin Barbetti
Effectively utilizing water allocations for managing turfgrass in open spaces	2011 – 2015	Horticulture Australia Ltd Research and Development Programs	Assoc/Prof Louise Barton W/Prof Tim Colmer
Phosphorus transfer between <i>Proteaceae</i> and Mycorrhizal plants in nutrient poor soil	2012	Australian Institution of Nuclear Science and Engineering Ltd	Dr Francois Teste
Selecting biosecurity R&D projects for post harvest grain security	2012	CRC Plant Biosecurity	Prof Benedict White
Understanding the origin and maintenance of megadiverse plant communities	2012 – 2014	ARC Discovery Early Career Researcher Awards	Dr Etienne Liliberte
Plant adaptation to extreme environments – A transcriptomic approach for crop improvement	2012 – 2014	ARC Discovery Early Career Researcher Awards	Dr Maheshi Dassanayake
Quantifying the contribution of leaf vascular networks to leaf economics in natural and agricultural species	2012 – 2014	ARC Discovery Early Career Researcher Awards	Asst/Prof Charles Price

## Research and industry recognition

TITLE	SUPERVISORS
Dr Sasha Jenkins	2012 Science and Innovation Award for Young People in Agriculture, Fisheries and Forestry To study the effect of antimicrobials on the anaerobic digestion of piggery waste
W/Prof Harvey Millar	Fenner Medal for distinguished research in biology by a scientist under 40
Adjunct Professor James Ridsdill-Smith	Inaugural AW Howard Medal for lifetime achievements and contributions to the Australian pasture industries, and the quality of his research and professional leadership
Dr Md Sayed Iftekhar	Australian Agricultural and Resource Economics Society (AARES) national award for best PhD thesis 2011
W/Prof Neill Turner	Chancellor's Medal for his work with IOA and his role in establishing the Cooperative Research Centre for Legumes in Mediterranean Agriculture at UWA and in setting up a research partnership between UWA and Lanzhou University in China
E/Prof Craig Atkins	Chancellor's Medal for service to UWA well beyond the expectations of his academic appointment as a researcher and teacher, namely in the areas of Animal Ethics, Institutional Biosafety and Radiation Safety.
W/Prof Lynette Abbott	Appointment to the new expert panel ' Domestic Offsets Integrity Committee', established to assess proposed methods for developing carbon credits under the Carbon Farming Initiative
W/Prof Hans Lambers	Elected as Fellow of the Australian Academy of Science for world class achievements in plant physiology and ecohydrology
W/Prof Stephen Powles	Elected as Fellow of the Australian Academy of Science for world class herbicide resistance research and pioneering herbicide resistance science internationally
Mr Saiful Ahmad Hamdani	International Weed Science Congress (IWSS) Larry Burrill award, presented to the student submitting the most outstanding paper presented by a student as determined by the IWSS Graduate Students Award Committee

## New research students

PHD STUDENTS	TOPIC	SCHOOL	SUPERVISOR/S	FUNDING BODY
Mr Goh Sou Sheng	Investigation of the fitness costs associated with glyphosate resistance	AHRI and Plant Biology	W/Prof Stephen Powles Dr Roberto Busi Dr Martin Vila-Aiub	Malaysian Rubber Board
Ms Chandima Hanchapola Ariyaratna	Rice-wheat comparative and functional analysis of novel genes associated with salt tolerance	Plant Biology	W/Prof Tim Colmer	UWA SIRF and UIS (University International Stipend); UIS top-up
Ms Chandima Ranawana	Assessing the role of transpiration in ameliorating canopy temperature and heat stress in wheat	IOA and Plant Biology	W/Prof Kadambot Siddique Dr Helen Bramley Adjunct A/Prof Jairo Palta (CSIRO-UWA)	Australian Endeavour PhD Scholarship
Ms Liu Fan	Improving yield of lean meat in lamb through a novel feed additive	Animal Biology	Prof Phil Vercoe Assoc/Prof Dominic Blache	UWA China Scholarship
Mrs Qiu Xiaoyan	New reproductive technologies	Animal Biology	W/Prof Graeme Martin	UWA International Stipend
Mr Joseph Steer	Explanation of the unknown variation contributing to flystrike resistance from <i>Lucila cuprina</i> in merino sheep	Animal Biology	Prof Phil Vercoe	University Postgraduate Award
Mr Hameed Alsamadany	Heat and drought tolerance in wheat	Plant Biology	Assoc/Prof Guijun Yan Adj/Assoc/Prof Chunji Liu	Government Saudi-Arabia
Ms Leila Heidarvand	Developing molecular markers for wheat tolerance to ion toxicity	Earth and Environment	W/Prof Zed Rengel Asst/Prof Hossein Khabaz-Saber Assoc/Prof Susan Barker	UWA International Postgraduate Research Scholarships
Mr Govinda Prasad Sharma	TBA	Agricultural and Resource Economics	Assit/Prof Ram Pandit Prof Ben White	Australian Endeavour PhD Scholarship
Ms Asha Gunawardena	TBA	Agricultural and Resource Economics	Assit/Prof Ram Pandit Prof Ben White	Australian Endeavour PhD Scholarship
Ms Katrina Davis	The economics of conservation in the developing world	Agricultural and Resource Economics	W/Prof David Pannell Dr Steve Schilizzi	APA & UWA Safety Net Top-up Scholarship

MASTERS STUDENTS	TOPIC	SCHOOL	SUPERVISOR/S	FUNDING BODY
Ms Fei Ren	Development of near isogenic lines for yellow spot resistance in wheat	Plant Biology	Assoc/Prof Guijun Yan Adj/Assoc/Prof Chunji Liu	Self funded
Mr Xuechen Zhang	Nutrient use efficiency in wheat	Plant Biology	Assoc/Prof Guijun Yan	Self funded

## Publications 2011 (not reported previously)

### Refereed journals

Alghamdi SS, Al-Fafi S, Migdadi HM, Ammar MH and Siddique KHM (2011). Inter-Simple Sequence Repeat (ISSR)-based diversity assessment among faba bean genotypes. *Crop and Pasture Science* **62**: 755–760.

Anderson JP and Singh KB (2011). Interactions of *Arabidopsis* and *M. truncatula* with the same pathogens differ in dependence on ethylene and ethylene response factors. *Plant Signaling and Behaviour* **6** (4): 551–552.

Bennett RG, Ryan MH, Colmer TD and Real D (2011). Prioritisation of novel pasture species for use in water-limited agriculture: a case study of Cullen in the Western Australian wheatbelt.

*Genetic Resources & Crop Evolution* **58**: 83–100.  
Bin Q, Zhao C, Youn E and Nansen C (2011). Use of weighting algorithms to improve traditional support vector machine based classifications of reflectance data. *Optics Express* **19** (27): 26816–26826.

Bonato M, Rybnik PK, Malecki IA, Cornwallis CK and Cloete SWP (2010). Between male variation in semen characteristics and preliminary results on the dilution of semen in the ostrich. *South African Journal of Animal Science* **40**: 438–441.

Bonato M, Rybnik PK, Malecki IA, Cornwallis CK and Cloete SWP (2011). Twice daily collection yields greater semen output and does not affect male libido in the ostrich. *Animal Reproduction Science* **123**: 258–264.

Chen S, Nelson MN, Chèvre A, Jenczewski E, Li Z, Mason S, Meng J, Plummer JA, Pradhan

A, Siddique KHM, Snowdon RD, Yan G, Zhou W and Cowling WA (2011). Trigenomic bridges for *Brassica* improvement. *Critical Reviews in Plant Sciences* **30**: 524–547.

Chen YL, Dunbabin VM, Diggle AJ, Siddique KHM and Zengel R (2011). Assessing variability in root traits of wild *Lupinus angustifolius* germplasm: basis for modelling root system structure. *Plant Soil* DOI: 10.1007/s11104-011-1050-1.

Chien SH, Sikora FJ and Gilkes RJ, McLaughlin MJ (2011). Comparing of the difference and balance methods to calculate percent recovery of fertilizer phosphorus applied to soils: a critical discussion. *Nutr Cycl Agroecosyst* DOI 10.1007/s10705-011-9467-8.

Colmer TD and Greenway H (2011). Ion transport in seminal and adventitious roots of cereals during O<sub>2</sub> deficiency. *Journal of Experimental*

## Visitors to IOA

VISITOR	VISITORS' ORGANISATION, COUNTRY	HOST DETAILS/PURPOSE	DATES
Dr Jun Ji	Chinese Academy of Science visiting scientist, Endeavour Fellowship and Crawford Fund	Dr Guijun Yan Prof. Martin Barbatti W/Prof Kadambot Siddique	Nov 2011 – Apr 2012
Ms Jing Zhang	Huazhong Agricultural University, visiting researcher	Dr Guijun Yan	Dec 2011 – Dec 2013
Dr Saif Shahid	University of Agriculture, Faisalabad, Pakistan	W/Prof. Zed Rengel	July 2011 – Dec 2011
Mr Shahid Hussain	University of Agriculture, Faisalabad, Pakistan	W/Prof Zed Rengel	Oct 2011 – Apr 2012
Dr Yunfeng Yin	College of Geographical Sciences, Fujian Normal University, China	Assoc/Prof. Dan Murphy	Jan 2012 – Dec 2012
Mr Pu Shen	Institute of Agricultural Resources and Regional Planning Chinese Academy of Agricultural Sciences, visiting researcher	Assoc/Prof. Dan Murphy	Jan 2012 – Dec 2013
Prof Anlu Zhang	College of Agricultural Economics, Huazhong Agricultural University	W/Prof Lyn Abbott W/Prof Graeme Martin Prof Ben White	Jan 2012 – Dec 2012
Yuyin Chen	College of Animal Sciences of Zhejiang University	W/Prof Lyn Abbott W/Prof Graeme Martin Prof Ben White	Dec 2011 – Jan 2012
Ms/Dr Rosalia Nuñez-Pastrana	Centro de Investigacion cientifica de Yukatan, Mexico; visiting researcher	W/Prof Karam Singh Assistant Professor Jonathan Anderson	Feb 2012 – Jan 2013
Prof Daqian Huang	South China Agricultural University	Assoc/Prof Guijun Yan W/Prof Kadambot Siddique	9 Feb 2012
Prof Ulrich Zimmermann	Universität Würzburg, Dep. of Biotechnology and and ZIM Plant Technology Pty Ltd, Berlin, Germany	W/Prof Kadambot Siddique	Mar 2012
Dr Suvarna	Special Commissioner for the Department of Rural Development, India	W/Prof Kadambot Siddique	13 Feb 2012
Prof Nina Fedoroff	Nina Fedoroff, Distinguished Professor King Abdullah University of Science & Technology and Evan Pugh Professor, Penn State University	W/Prof Tim Colmer	22 Feb 2012
Prof Gerald Lincoln	University of Edinburgh, Scotland	W/Prof Graeme Martin	2 Feb 2012
Prof Mahfuza Begum	Department of Agronomy, Bangladesh Agriculture University, Mymensingh	W/Prof Kadambot Siddique and W/Prof Stephen Powles	19 Mar 2012
Sri. K.P. Mohanan	State Minister for Agriculture and Animal Husbandry, Government of Kerala, India; Director, Advanced Centre for Climate Change Research, Kerala Agricultural University, India	W/Prof Kadambot Siddique	23-24 April 2012
Prof Rob Melis	University of KwaZulu-Natal, South Africa	Asst/Prof Jon Clements	5-18 May 2012

*Botany* **62**: 39–57.

Coutts BA, Kehoe MA, Webster CG, Wylie SJ and Jones RAC (2011). Zucchini yellow mosaic virus: biological properties, detection procedures and comparison of coat protein gene sequences. *Archives of Virology* **156**: 2119–2131.

Coutts BA, Kehoe MA and Jones RAC (2011). Minimising losses caused by Zucchini yellow mosaic virus in vegetable cucurbit crops in tropical, sub-tropical and Mediterranean environments through cultural methods and host resistance. *Virus Research* **159**: 141–160.

Dunbabin VM, Airey M, Diggle AJ, Renton M, Rengel Z, Armstrong R, Chen Y and Siddique KHM (2011). Simulating the interaction between plant root, soil water and nutrient flows, and barriers and objects in soil using ROOTMAP. In: Anderssen RS, Chan F and Marinova D (eds).

19th International Congress on Modelling and Simulation. *Modelling and Simulation Society of Australia and New Zealand*, Dec 2011, 975–981. <http://mssanz.org.au/modsim2011>.

Eshraghi L, Aryamanesh N, Anderson JP, Shearer B, McComb JA, Hardy GESTJ, O'Brien PA (2011). A quantitative PCR assay for accurate *in-planta* quantification of the necrotrophic pathogen *Phytophthora cinnamomi*. *European Journal of Plant Pathology* **131**: 419–430.

Eshraghi L, Anderson JP, Aryamanesh N, Shearer B, McComb J, Hardy GESTJ and O'Brien PA (2011). Phosphite primes defence responses in *Phytophthora cinnamomi*-infected *Arabidopsis thaliana* and enhances expression of defence genes. *Plant Pathology* **60**: 1086–1095.

Fang XW, Turner NC, Li FM, and Guo XS (2011). *Caragana korshinskii* seedlings maintain positive

photosynthesis during short-term, severe drought stress. *Photosynthetica* **49** (4): 603–609.

Farooq M, Bramley H, Palta JA and Siddique KHM (2011). Heat stress in wheat during reproductive and grain-filling phases. *Critical Reviews in Plant Sciences* **30**: 491–507.

Foley RC, Gao L-L, Spriggs A, Soo LYC, Goggins DE, Smith PMC, Atkins CA and Singh KB (2011). Identification and characterization of seed storage protein transcripts from *Lupinus angustifolius*. *BMC Plant Biology*, **11**: 59, <http://www.biomedcentral.com/1471-2229/11/59>.

Gao LL, Hane J, Kamphuis LG, Foley RC, Shi B-J, Atkins CA and Singh KB (2011). Development of genomic resources for the narrow-leaved lupin (*Lupinus angustifolius*): construction of a Bacterial Artificial Chromosome (BAC) library and BAC-end sequencing. *BMC Genomics* **12**: 521.

Gleason CA, Foley RC and Singh KB (2011). Mutant and transcriptomic analysis in *Arabidopsis* provides insight into the molecular mode of action of the auxinic herbicide dicamba. *PLoS ONE*, **6** (3): e17245.

Gleason CA, Huang S, Thatcher LF, Foley RC, Anderson CR, Carroll AJ, Millar AH and Singh KB (2011). Complex II has a key role in production of mitochondrial-derived reactive oxygen species influencing plant stress gene regulation and defence. *Proc. Natl. Acad. Sci. USA*. www.pnas.org/cgi/doi/10.1073/pnas.1016060108.

Islam S, Ma W, Ma J, Buirchell BJ, Appels R and Yan G (2011). Diversity of seed protein among the Australian narrow-leaved lupin (*Lupinus angustifolius* L.) cultivars. *Crop & Pasture Science* **62**: 765–775.

Jorre de St Jorre T, Hawken PAR and Martin GB (2011). Role of male novelty and familiarity in male-induced LH secretion in female sheep. *Reproduction, Fertility and Development* (on line http://dx.doi.org/10.1071/RD11085).

Kehoe MA and Jones RAC (2011). A proposal to help resolve the disagreement between naming of potato virus Y strain groups defined by resistance phenotypes and those defined by sequencing. *Arch Virol* **156**: 2273–2278.

Kennedy AJ, Ferguson MB, Martin GB, Thompson AN and Pannell DJ (2011). Different mature ewe sizes require different stocking rates and lamb slaughter weights to maximise whole-farm profit. *Proceedings of the Association for the Advancement of Animal Breeding and Genetics* **19**: 339–342.

Li Y, Barton L and Chen D (2011). Simulating response of N<sub>2</sub>O emissions to fertiliser N application and climatic variability from a rain-fed and wheat cropped soil in Western Australia. *J Sci Food Agric* **2012**; 92: 1130–1143.

Li YP, You MP, Khan TN, Finnegan PM and Barbetti MJ (2011). First report of Phoma herbarum on Field Pea (*Pisum sativum*) in Australia. *Plant Disease* **95** (12): 1590–1590.

Luo H, Wylie SJ, Coutts B, Jones RAC and Jones MGK (2011). A virus of an isolated indigenous flora spreads naturally to an introduced crop species. *Ann Appl Biol* **159**: 339–347.

Martin GB and Greeff JC (2011). Genetic frontiers in the development of 'clean, green and ethical' management systems for the extensive sheep industry. *Proceedings of the Association for the Advancement of Animal Breeding and Genetics* **19**: 143–150.

Malik AI, Islam AKMR, Colmer TD (2011). Transfer of the barrier to radial oxygen loss in roots of *Hordeum marinum* to wheat (*Triticum aestivum*): evaluation of four *H. marinum*-wheat amphiploids. *New Phytologist* **190**: 499–508.

Mugera AW and Langemeier MR (2011). Does farm size and specialization matter for productive efficiency? Results from Kansas. *Journal of Agricultural and Applied Economics* **43** (4): 515–528.

Nansen C and Meikle WG (2011). The economic injury level and the action threshold in stored-product systems. *Stewart Postharvest Review* **3**: 7 published by Stewart Postharvest Solutions (UK) Ltd.

Nio SA, Cawthray GR, Wade LJ and Colmer TD (2011). Pattern of solutes accumulated during leaf osmotic adjustment as related to duration of water deficit for wheat at the reproductive stage. *Plant Physiology and Biochemistry* **49**: 1126–1137.

Nyalugwe EP, Wilson CR, Coutts BA, Jones RAC (2011). Biological properties of potato virus X in potato: Effects of mixed infection with potato virus S and resistance phenotypes in cultivars from three continents (2011). *Plant Disease* **96** (1):43–54.

Pang J, Tibbett M, Denton, MD, Lambers H, Siddique KHM and Ryan MH (2011). Soil phosphorus supply affects nodulation and N:P ratio in 11 perennial legume seedlings. *Crop and Pasture Science* **62**: 992–1001.

Pazos-Navarro M, Dabauza M, Correal E, Hanson K, Teakle N, Real D and Nelson MN (2011). Next generation DNA sequencing technology delivers valuable genetic markers for the genomic orphan legume species, *Bituminaria bituminosa*. *BMC Genetics* **12**:104.

Pedersen O, Pulido C, Rich SM and Colmer TD (2011). In situ O<sub>2</sub> dynamics in submerged *Isoetes australis*: varied leaf gas permeability influences underwater photosynthesis and internal O<sub>2</sub>. *Journal of Experimental Botany* **62**: 4691–4700.

Pedersen O, Rich SM, Pulido C, Cawthray GR, Colmer TD (2011). Crassulacean acid metabolism enhances underwater photosynthesis and diminishes photorespiration in the aquatic plant *Isoetes australis*. *New Phytologist* **190**: 332–339.

Rengel Z and Zhang F(2011). Phosphorus sustains life. *Plant and Soil (Guest ed.)* **349**: 1–2.

Rich SM, Ludwig M and Colmer TD (2011). Aquatic adventitious roots of the wetland plant *Meionectes brownii* can photosynthesize: implications for root function during flooding. *New Phytologist* **190**: 311–319.

Richardson AE, Lynch JP, Ryan PR, Delhaize E, Smith FA, Smith SE, Harvey PR, Ryan MH, Veneklaas EJ, Lambers H, Oberson A, Culvenor RA and Simpson RJ (2011). Plant and microbial strategies to improve the phosphorus efficiency of agriculture. *Plant and Soil* **349**:121–156.

Rogers ME, Colmer TD, Nichols PGH, Hughes SJ, Frost K, Cornwall D, Chandra S, Miller SM and Craig AD (2011). Salinity and waterlogging tolerance amongst accessions of Messina (*Melilotus siculus*). *Crop & Pasture Science* **62**: 225–235.

Rosales Nieto CA, Ferguson MB, Macleay CA, Briegel JR, Martin GB and Thompson AN (2011). Selection for superior growth advances the onset of puberty in merino ewes. *Proceedings of the Association for the Advancement of Animal Breeding and Genetics* **19**: 303–306.

Salam MU, Davidson JA, Thomas GJ, Ford R, Jones RAC, Lindbeck KD, MacLeod WJ, Kimber RBE, Galloway J, Mantri N, Van Leur JAG, Coutts BA, Freeman AJ, Richardson H, Aftab M, Moore KJ, Knights EJ, Nash P and Verrell A (2011). Advances in winter pulse pathology research in Australia. *Australasian Plant Pathology* **40**: 549–567.

Samineni S, Siddique KHM, Gaur PM and Colmer TD (2011). Salt sensitivity of the vegetative and reproductive stages in chickpea (*Cicer arietinum* L.): Podding is a particularly sensitive stage. *Environmental and Experimental Botany* **71**: 260–268.

Savage D, Barbetti MJ, McLeopd WJ, Salaam MU, Renton M (2011). Modelling the effects of release timing on the windassisted dispersal of passive propagules. *19th International Congress on Modelling and Simulation, Perth, Australia, 12–16 December 2011*; http://mssanz.org.au/modsim2011.

Shiono K, Ogawa S, Yamazaki S, Isoda H, Fujimura T, Nakazono M and Colmer TD (2011). Contrasting dynamics of radial O<sub>2</sub>-loss barrier induction and aerenchyma formation in rice roots of two lengths. *Annals of Botany* **107**: 89–99.

Simpson RJ, Oberson A, Culvenor RA, Ryan MH, Veneklaas EJ, Lambers H, Lynch JP, Ryan PR, Delhaize E, Smith FA, Smith SE, Harvey PR and Richardson AE (2011). Strategies and agronomic interventions to improve the phosphorus-use efficiency of farming systems. *Plant Soil* **349**:89–120.

Simpson RJ, Richardson AE, Riley IT, McKay AC, McKay SF, Ballard RA, Ophel-Keller K, Hartley D, O'Rourke TA, Li H, Sivasithamparam K, Ryan MH and Barbetti M (2011). Damage to roots of *Trifolium subterraneum* L. (subterranean clover), failure of seedlings to establish and the presence of root pathogens during autumn–winter. *Grass and Forage Science* **66**: 585–605

Singh RP, Sastry KVH, Pandey NK, Singh KB, Malecki IA, Farooq U, Mohan J, Saxena VK and Moudgal RP (2011). The role of the male cloacal gland in reproductive success in Japanese quail (*Coturnix japonica*). *Reproduction, Fertility and Development* (available on line http://dx.doi.org/10.1071/RD11057).

Sood S, Malecki I.A, Tawang A. and Martin GB (2011). Response of spermatozoa from the emu (*Dromaius novaehollandiae*) to rapid cooling, hyperosmotic conditions and dimethylacetamide (DMA). *Animal Reproduction Science* (available on line: doi:10.1016/j.anireprosci.2011.10.010).

Sood S, Tawang A, Malecki IA and Martin GB (2011). Artificial insemination technology for the emu – Improving sperm survival. *Reproductive Biology* **11** (3): 43–49.

Teakle NL, Armstrong J, Barrett-Lennard EG, Colmer TD (2011). *Aerenchymatous phellem* in hypocotyl and roots enables O<sub>2</sub> transport in *Melilotus siculus*. *New Phytologist* **190**: 340–350.

Weaver DM and Wong MTF (2011). Scope

to improve phosphorus (P) management and balance efficiency of crop and pasture soils with contrasting P status and buffering indices. *Plant and Soil* **349**:37–54.

Winkel A, Colmer TD and Pedersen O (2011). Leaf gas films of *Spartina anglica* enhance rhizome and root oxygen during tidal submergence. *Plant, Cell & Environment* **34**: 2083–2092.

You MP, Colmer TD and Barbetti MJ (2011). Salinity drives host reaction in *Phaseolus vulgaris* (common bean) to *Macrophomina phaseolina*. *Functional Plant Biology* **38**: 984–992

## Book chapters

Cloete SWP and Malecki IA (2011). Breeder welfare: the past, present and future. In: Glatz PC, Lunam CA and Malecki I (eds). *The Welfare of Farmed Ratites*, Springer-Verlag Berlin, Heidelberg, Germany, pp 13–44.

Malecki A and Rybnik-Trzaskowska PK (2011). Natural mating and artificial insemination. In:

Glatz PC, Lunam CA and Malecki I (eds). *The Welfare of Farmed Ratites*, Springer-Verlag Berlin, Heidelberg, Germany), pp. 45–64.

Turner NC and Meyer R (2011). Synthesis of regional impacts and global agriculture adjustments. In Yadav SS, Redden RJ, Hatfield JL, Lotze-Campen H and Hall AE (eds). *Crop Adaptation to Climate Change*, Wiley-Blackwell, Oxford, UK.

Vadez V, Kholova J, Choudhary S, Zindy P, Terrier M, Krishnamurthy L, Kumar PR and Turner NC (2011). Responses to increased moisture stress and extremes: Whole plant response to drought under climate change. In Yadav SS, Redden RJ, Hatfield JL, Lotze-Campen H and Hall AE (eds). *Crop Adaptation to Climate Change*, Wiley-Blackwell, Oxford, UK.

## Books

Glatz PC, Lunam CD, Malecki I (eds.) *Welfare of Farmed Ratites*, Springer-Verlag Berlin Heidelberg, Germany.

## Publications 2012 (January to March)

### Refereed journals

Ahmad-Hamdani MS, Owen MJ, Yu Q, and Powles SB (2012). ACCase-inhibiting herbicide-resistant Avena spp. populations from the Western Australian grain belt. *Weed Technology* **26**:130–136.

Alghamdi S, Migdadi MH, Ammar MH, Paull GJ and Siddique KHM (2012). Faba bean genomics: current status and future prospects. *Euphytica* DOI 10.1007/s10681-012-0658-4.

Barbetti MJ, Banga SS and Salisbury PA (2012). Challenges for crop production and management from pathogen biodiversity and diseases under current and future climate scenarios – Case study with oilseed Brassicas. *Field Crops Research* **127**: 225–240.

Berger JD, Buirchell BJ, Luckett DJ and Nelson MN (2012). Domestication bottlenecks limit genetic diversity and constrain adaptation in narrow-leaved lupin (*Lupinus angustifolius* L.). *Theor Appl Genet* **124**: 637–652.

# New recruits at Canola Breeders

Dr Susan Knights (susan.knights@uwa.edu.au)

As the second decade of operation for Canola Breeders (CB) dawns the company is proud to announce several new recruits to its WA team.

UWA is a founding partner in CB together with the Grains Research and Development Corporation (GRDC) and a significant international partner; Norddeutsche Pflanzenzucht Hans-Georg Lembke KG (NPZ), who has operations in eastern and western Europe, the United Kingdom and Canada.

In August 2011 Dr David Tabah joined the CB team at the UWA Shenton Park campus in the role of Senior Plant Breeder. Born in the Canary Islands, Dr Tabah is a dual citizen of Spain and the UK and very familiar with Mediterranean climates and agriculture. He is an experienced plant breeder of species across a number of plant families including Brassicaceae, Aizoaceae, Alliaceae, Apiaceae and Asteraceae and has worked for companies based in the UK and Spain, most recently as a tomato breeder.

In addition, Dr Tabah has a background in academic research, applied and commercial plant breeding and molecular breeding and brings to CB a comprehensive knowledge of hybrid systems, molecular analysis, the use of doubled haploids and sophisticated methods of analysis of complex data sets.

The second new recruit, Dr Sue Knights succeeded outgoing Program Manger Dr Janet Wroth late last year. Raised in Victoria, Dr Knights

studied and worked extensively for the University of Melbourne and GRDC) and has run her own business for 10 years focusing on development of the oilseed, soybean and sunflower industries on the east coast of Australia. Sue brings strong project management, communication and capacity building skills to CB.

Both Dr Tabah and Dr Knights hold Adjunct positions with the UWA Institute of Agriculture and are keen to become involved in research and relevant teaching.

Ms Robyn Butler joined CB's Administrative Team based in South Perth and brings with her a wealth of experience and knowledge acquired in her previous long-standing and pivotal administrative role with the Council of Grain Growers Organisations (COGGO) Ltd. Through COGGO, Ms Butler has been associated with CB and with WA growers for over a decade.

CB is proud to count these new recruits among its outstanding asset base in WA: Many of CB's established staff are embedded in UWA, including CB Research Director, Winthrop Professor Wallace Cowling, Associate Professor Matthew Nelson, Dr Sheng Chen, Dr Hui Liu and Ms Helen Bowers, creating an innovative symbiosis between CB and UWA. Winthrop Professor Kadambot Siddique who is one of the Directors of CB (representing UWA) sums up the arrangement: "CB provides a unique model for public-private partnerships and is at



Dr Susan Knights and Dr David Tabah

the forefront of canola science and technology. The company is delivering high performing canola varieties to Australian growers with the addition of key new recruits it will continue to provide invaluable context-based learning opportunities through research and teaching for UWA students."

George N, Turngate K, Beeck, C and Stamm H (2012). Exploring genotype by environment interaction in Winter Canola in North Carolina. *Journal of Agricultural Science* **4** (2):237–244.

Bondonno C, Yang X, Croft KD, Considine MJ, Ward NC, Rich L, Puddey IB, Swinny E, Mubarak A, Hodgson JM (2012). Flavonoid-rich apples and nitrate-rich spinach augment nitric oxide status and improve endothelial function in healthy men and women: a randomized controlled trial. *Free Radical Biology & Medicine* **52**: 95–102.

Considine MJ, Wan Y, D'Antuono MF, Zhou Q, Han M, et al. (2012). Molecular genetic features of polyploidization and aneuploidization reveal unique patterns for genome duplication in *diploid Malus*. *PLoS ONE* **7**(1): e29449. DOI:10.1371/journal.pone.0029449.

Dempster DN, Jones DL and Murphy DV (2012). Organic nitrogen mineralisation in two contrasting agro-ecosystems is unchanged by biochar addition. *Soil Biology & Biochemistry* **48**: 47–50.

Garbuio FJ, Jones DL, Alleoni LRF, Murphy DV and Caires EF (2011). Carbon and nitrogen dynamics in an Oxisol as affected by liming and crop residues under no-till. *Soil Sci Soc Am J* **75**: 1723–1730.

Gea XT, Li YP, Wan ZJ, You MP, Finnegan PM, Banga SS, Sandhu PS, Garg H, Salisbury PA, Barbetti MJ (2012). Delineation of *Sclerotinia sclerotiorum* pathotypes using differential resistance responses on *Brassica napus* and *B. juncea* genotypes enables identification of resistance to prevailing pathotypes. *Field Crops Research* **127**: 248–258.

Heping Han H, Yu Q, Edison Purba E, Li M, Walsh M and Powles SB (2012). A novel amino acid substitution Ala-122-Tyr in ALS confers high-level and broad resistance across ALS-inhibiting herbicides. *Pest Management Science*, (wileyonlinelibrary.com) DOI 10.1002/ps.3278.

Holmes, KW, Wherrett A, Keating A and Murphy DV (2012). Meeting bulk density sampling requirements efficiently to estimate soil carbon stocks. *Soil Research* **49**: 680–695.

Jones DL, Rouska J, Edwards-Jones G, DeLuca TH and Murphy DV (2012). Biochar-mediated changes in soil quality and plant growth in a three year field trial. *Soil Biology & Biochemistry* **45**: 113–124.

Jones DL, Willett VB, Stockdale EA, Macdonald AJ and Murphy DV (2012). Molecular weight of dissolved organic carbon, nitrogen, and phenolics in grassland soils. *Soil Sci Soc Am J* **76**: 142–150.

Li YP, You MP, Finnegan PM, Khan TN, Lanoiselet V, Eyres N and Barbetti MJ (2012). First report of Black Spot caused by *Boeremia exigua* var. *exigua* on Field Pea in Australia (Disease notes). *Plant Disease* **96** (1): 148.

Martin GB, Jorre de St Jorre, T, Al Mohsen FA and Malecki IA (2012). Modification of spermatozoa quality in mature small ruminants. Reproduction, *Fertility and Development* **24**: 13–18.

Pandey MK, Emmanuel Monyo E, Ozias-Akins P, Liang X, Guimarães P, Nigam SN, Upadhyaya HD, Janila P, Zhang X, Guo B, Cook DR, Bertoli DJ, Michelmore R and Varshney RK (2012). Advances in *Arachis* genomics for peanut improvement. *Biotechnology Advances* **30**: 639–651.

Savage D, Barbetti MJ, McLeod WJ, Salaam MU, Renton M (2012). Mobile traps are better than stationary traps for surveillance of airborne fungal spores *Crop Protection* **36**: 23–30.

Savage D, Barbetti MJ, McLeod WJ, Salaam MU, Renton M (2012). Seasonal and diurnal patterns of spore release can significantly affect the proportion of spores expected to undergo long-distance dispersal. *Microb. Ecol.* **63**: 578–585.

Shi P, Abbott LK, Banning NC and Zhao B (2012). Comparison of morphological and molecular genetic quantification of relative abundance of *arbuscular mycorrhizal fungi* within roots. *Mycorrhizal* DOI 10.1007/S00572-011-0425-8 (online only).

Siddique KHM, Johansen C, Turner NC, Jeuffroy M-H, Hashem A, Sakar D, Gan Y and Alghamdi SS (2012). Innovations in agronomy for food legumes. A review. *Agronomy for Sustainable Development* **32**: 45–64.

Solaiman ZM, Murphy DV and Abbott LK (2012). Biochars influence seed germination and early growth of seedlings. *Plant and Soil* DOI: 10.1007/s11104-011-1031-4 (online only).

Teakle NL, Bowman S, Barrett-Lennard EG, Real D and Colmer TD (2012). Comparisons of annual pasture legumes in growth, ion regulation and root porosity demonstrate that *Melilotus siculus* has exceptional tolerance to combinations of salinity and waterlogging. *Environmental and Experimental Biology* **77**: 175–184

Turner NC and Hartung W (2012). Dehydration of isolated roots of seven *Lupinus* species induces synthesis of different amounts of free, but not conjugated, abscisic acid. *Plant Growth Regulation* DOI 10.1007/s10725-011-9650-6.

Verboven P, Pedersen O, Herremans E, Ho QT, Nicolai BM, Colmer TD and Teakle N (2012). Root aeration via aerenchymatous phellem: three-dimensional micro-imaging and radial O<sub>2</sub> profiles in *Melilotus siculus*. *New Phytologist* **193**: 420–431

Vessal S, Jairo A, Palta JA, Atkins CA and Siddique KHM (2012). Development of an assay to evaluate differences in germination rate among chickpea genotypes under limited water content. *Functional Plant Biology* **39**: 60–70.

Wells T, Hancock GR, Dever C. and Murphy D. (2012). Prediction of vertical soil organic carbon profiles using soil properties and environmental tracer data at an untilled site. *Geoderma*, doi: 10.1016/j.geoderma.2011.11.006.

Williams R, Andersen R, Marcal A, Pereira L, Almeida L and Erskine W (2012). Exploratory agronomy within participatory varietal selection: the case of peanut in East Timor. *Expl Agric* **48** (2): 272–282.

Zhang H, Turner NC, Poole ML (2012). Increasing the harvest index of wheat in the high rainfall zones of southern Australia. *Field Crops Research* **129**: 111–123.

## UPCOMING MEETINGS AND EVENTS

### The UWA Institute of Agriculture events

#### Postgraduate Showcase 2012

Thu 7 June 2012

#### Industry Forum

TBA

### Other events

#### Agriculture Networking and Careers Night @ UWA

Tue 22 May 2012

Email: 20918769@student.uwa.edu.au

Mobile: 0439968930

#### Dowerin Field Days

28-29 August 2011

Dowerin, WA

www.dowerinfielddays.com.au

## HELP US REDUCE WASTE



To receive this newsletter in electronic format only, please send an email to [ioa@uwa.edu.au](mailto:ioa@uwa.edu.au)

## UWA IOA MISSION

To advance research, education, training and communication in agriculture and resource management, for the benefit of mankind.

## CONTACT DETAILS

Editor: Uly Fritsch

Email: [uly.fritsch@uwa.edu.au](mailto:uly.fritsch@uwa.edu.au)

The UWA Institute of Agriculture

Tel: +61 8 6488 3756

[www.ioa.uwa.edu.au](http://www.ioa.uwa.edu.au)

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