UWA graduates excelled – again – at this year’s Young Professional in Agriculture Awards, claiming the top three awards as well as the prize for best presentation at this prestigious event, hosted annually by the Ag Institute of Australia (WA Division) and sponsored by the Department of Agriculture and food, WA (DAFWA).

In front of a packed auditorium at CSIRO Floreat, winner Kimberley Adams impressed judges and audience alike with her presentation on stubble retention and the impact of soil water repellence in sandy soils. Kimberley grew up on a broadacre farm in Mount Barker, a region in which non-wetting soils are a key factor limiting agricultural productivity. “I witnessed first-hand that this is a big issue, and decided to do a trial on my family’s farm, aiming to identify practices that reduce water repellence.”

Kimberley graduated with first class honours in UWA’s Bachelor of Science (Agricultural Science). Her supervisors were Dr Ken Flower (UWA), Dr Margaret Roper and Dr Phil Ward (both from CSIRO).

Kimberley now works as an agronomist in Northam and is keen to continue contributing to the productivity and viability of the farming sector. She will represent Western Australia in the national forum later in the year organised by Ag Institute Australia.

Runner-up Nikki Dumbrell also graduated with first-class honours, focusing on Environmental and Natural Resource Economics. Her presentation examined a range of carbon farming practices from the farmers’ perspective, to identify which practices farmers are most likely – and least likely – to adopt and determine the underlying reasons for these preferences. She was supervised by Assistant Professor Marit Kragt and Dr Fiona Gibson (both from UWA). “I had excellent support – my supervisors were always prompt and constructive with their feedback.” Nikki now works with the West Australian No-till Farmers’ Association to overcome the barriers to carbon farming practices.

Third place was claimed by Georgia Pugh, whose passion for beef production was sparked by her family’s cattle business. Her presentation explored the causes of ‘dark cutting’ beef, i.e. meat with a dark appearance and classified as unfit for human consumption. Her supervisors were Dr Peter McGilchrist (Murdoch University) and Professor Ross Kingwell (UWA).

Georgia is committed to improving the industry’s image and making it more efficient and sustainable in the future. She plans to become an agricultural consultant when she finishes the commerce component of her double degree with agricultural science at UWA.

Liam Ryan took out the ‘best presentation’ award for his engaging talk – and slides – on how he had used novel magnetic probes (ZIM Probe) clamped to the leaves of individual wheat plants to monitor their water hydration status and explore the factors affecting a plant’s capacity to maintain turgor.

Liam was supervised by Dr Helen Bramley and Professor Erik Veneklaas (both from UWA). Liam is currently working as an Environmental Officer at DAFWA Northam.

DAFWA Grains Industry Executive Director Mark Sweetingham presented the awards to the winners and commended the finalists on the high quality of their presentations. “The success of the WA agricultural sector is dependent on attracting young people such as those who made presentations here today, who are innovative, progressive and passionate, and possess impressive communication skills.”

“The future of the agriculture and food sector is with our young people and this forum provides a wonderful opportunity to promote the diverse careers the industry has to offer and to showcase WA’s promising young professionals.”

Ms Ully Fritsch
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In this issue Joint soils laboratory in China P3 Beating Fruitfly P7 MoU strengthens UWA-CAAS collaboration P9 Strategies for livestock farming P13
establishment of a joint soils laboratory between UWA and the Chinese Academy of Sciences (CAS) (see also page 2) and a Memorandum of Understanding between UWA and the Chinese Academy of Agricultural Sciences (CAAS) (see also page 9).

UWA’s strength in agricultural research and education has again been confirmed in a substantial number of prestigious awards claimed by our scientists (see also page 15) and students (see cover story). Congratulations to them all!

At local level, UWA’s Turf Research Group has continued its impressive run of highly successful outreach events (see also page 4) and the team at IOA is looking to continue to interact with the industry and community when presenting its annual Postgraduate Showcase (5 June) and Industry Forum (3 July) to share some of the latest agricultural research discoveries and provide a forum to debate a contemporary ‘hot topic’ in Australian agriculture (see also page 20).

Finally I would like to sincerely thank Ms Ully Fritsch for her excellent work and commitment as the Communication Manager of IOA during the past 3 years. I wish Ully all the best in her new position within UWA.

Centre of Excellence in Plant Energy Biology awarded $26 million

A $26 million Australian Research Council grant has enabled the establishment of a new national Centre of Excellence in Plant Energy Biology (CoE PEB) at UWA from 2014 to 2020.

National collaborators are The Australian National University, The University of Adelaide and La Trobe University. The CoE PEB is the only centre awarded to Western Australia in the ARC’s 2014 Centre of Excellence funding round and will develop new approaches needed in agriculture due to narrowing resources and a rising world population.

The Director of the CoE PEB is Winthrop Professor Harvey Millar and the centre will lead research to increase the efficiency of energy conversion and use by plants to make them more tolerant to environmental challenges and better at allocating resources.

Hackett Professor Kadambot Siddique AM
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Director’s column

Three months into 2014, there can be no doubt that this year heralds both significant changes and new opportunities at the UWA Institute of Agriculture (IOA).

Following IOA’s external review in late 2012, the Institute established an Executive Management Board (to replace the Executive Committee), led by Professor Robyn Owens, Deputy Vice-Chancellor (Research), and an Industry Advisory Board (to replace the External Advisory Board), led by Dr Terry Enright, Independent Director of the Australian Livestock Export Corporation (Livecorp), Director of Grain Producers Australia, in order to broaden its governance and ensure ongoing dialogue and input at executive level across disciplines at UWA and from core industry partners and funding agencies.

I am pleased to advise that the independent Review Panel commended IOA on a range of achievements, including lifting the profile of agriculture research and training internationally and developing a unified identity for agriculture research and teaching at UWA.

Early this year, IOA has held a strategic planning day in which representatives from across UWA exchanged their ideas regarding IOA’s strategic direction over the next five years, to capitalise on existing strengths and provide a focus for new initiatives and we will keep you informed of the developments as they arise.

One of the latest new initiatives has been the establishment of the first Critical Zone Observatory in the southern hemisphere based at UWA Farm Ridgefield (see also page 3), and our international collaborations have received a boost with the

Establishment of joint soils laboratory in China

A history of close collaboration between UWA and the prestigious Chinese Academy of Sciences (CAS) culminated in the launch of the two institutions’ first joint laboratory in December 2012.

The joint laboratory for Soil Systems Biology – an initiative of UWA’s Faculty of Science and CAS’s Institute of Subtropical Agriculture – aims is to harness the power of micro-organisms to increase soil productivity and protect the environment, using the latest molecular sequencing, imaging and isotope tracer techniques.

CAS’ and UWA’s wealth of expertise and experience in soil science and the (likely) benefits of sharing these assets have long been recognised by both institutions. Three UWA soil scientists have formal ties with CAS: Winthrop Professor Tony O’Donnell, Dean of UWA’s Faculty of Science, has been holding a Visiting Professorship for Distinguished International Researchers by CAS since 2012, Professor Daniel Murphy’s Visiting Professorship commenced in 2012, and Winthrop Professor Andy Whiteley, was awarded a Visiting Professorship with CAS at the launch of the joint centre.

“To meet the global scientific challenges and the key environmental issues successfully, we need an integrated, international approach, and the establishment of this centre represents an important step on this path”, says Whiteley. Besides conducting innovative, cutting-edge research, the laboratory will also play a key role in training the next generation of soil scientists.

For further information visit www.news.uwa.edu.au/201312176372/research/tiny-organisms-may-hold-key-global-food-supply
Soil Science teaching attracts students to UWA Farm Ridgefield

Assistant Professor Matthias Leopold
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Soils are undoubtedly at the core of agricultural production and UWA has been long known for its high reputation in Soil Science and Plant Nutrition. Add to this a growing public awareness of the importance of food and water security and it comes as no surprise that at UWA the number of under- and postgraduate students who want to learn more about the life-sustaining functions of soils is on the rise.

Besides specialised units dealing with soil-plant, soil-water or soil-atmosphere interactions, UWA also offers units in pedogenesis – the science and study of the processes that lead to the formation of soil.

In March 2014, UWA’s Assistant Professor Matthias Leopold (School of Earth and Environment and IOA) took over 80 students and staff from the Crawley and Albany campus to the UWA Farm Ridgefield at Pingelly over a weekend, to study the fundamental medium of agriculture – the soils. “It all starts with a general understanding of the landscape and ends with a profound knowledge about soil properties and functions,” says Leopold. “The UWA Farm offers ideal study opportunities, as the soils at the farm are highly diverse which allows students to gather extensive pedologic information in a short time.

At undergraduate level – in a unit named ‘Land Use Management’ (EART3338) – involves digging a hole in the ground and describing and sampling the physical and chemical properties of the solum in a professional way.

Leopold is excited about other unique opportunities which the UWA Farm holds for soil science students: “2014 is the first time where parts of the information by the students will be integrated in the new web-based GIS system of the UWA Farm. This will help to manage crop production, restoration and water management and ensure that the soil data will be available to future students and the wider community.”

The web-GIS is part of an Improving Student Learning (ISL) grant at UWA, co-sponsored by IOA and led by Assistant Professors Bryan Boruff, Matthias Leopold, Emeritus Professor Lyn Abbott and Associate Professor Dominique Blache. It will ensure availability of elaborate soil data (and other information) to students and the community in the future.
Ms Uly Fritsch  
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A record crowd of 160 people braved sweltering heat to participate in this year’s UWA Turf Research Program Open Day, held at UWA’s Shenton Park Research Station in February.

The UWA Turf Research Program has been working in partnership with the Australian Turf Industry since 1995, and the Open Day has become a ‘must-go’ event for industry groups, local government representatives and sporting associations, entrusted with caring for our parks, sporting ovals and similar public places under increasingly challenging conditions arising from our changing climate.

“Public open spaces such as parks, sports ovals and recreation grounds provide an enormous benefit to the health, lifestyle and social well-being of West Australians,” says Associate Professor Louise Barton, “However, with the drying climate in WA’s south-west and reduced water availability in many areas, turf managers and home owners are under increasing pressure to decrease their water use. It is crucial we look at ways to do this while still maintaining green public open spaces and this is the focus of the UWA Turf Research Program.”

The team has adopted a two-pronged approach, investigating (i) how Local Government best utilise water allocation to maintain their turfgrass areas and (ii) the efficacy of a range of soil amendments to decrease watering requirements of turfgrass.

Barton leads the project investigating approaches to best manage current and future water allocation to turfgrass in public open spaces, with the view to optimise irrigation schedules and to reduce the incidence of soil water repellence. Using a series of 10m² plots, combinations of water allocation amounts, watering schedules and soil wetting agent are being used to determine (i) if turfgrass can be maintained with a water allocation, and the implications of further lowering the allocation; (ii) how an annual water allocation is best distributed during the year and (iii) if applying a wetting agent improves the effectiveness of water allocation.

Findings-to-date indicate that turfgrass quality can be maintained on the current water allocation to Local Government (7500 kL/ha per year), but only if the irrigation system is efficient and wear-and-tear is not excessive. Applying a good wetting agent can further improve the effectiveness of a water allocation, and may potentially lower the amount of water required to maintain turfgrass.

While the water allocation project is in its third year, the group’s soil amendment project only started in late 2013: “This is the first time, that different soil amendments are being scientifically examined and evaluated for the Perth Metropolitan area, by an independent body of researchers” says Associate Professor Pieter Poot, who leads the project. “We anticipate that by the end of this (three-year) field experiment we will have independent evidence of the efficacy of a range of recommended soil amendments in decreasing the irrigation requirements for turfgrass, and we will know what mechanisms are responsible for the variation in efficacy of different treatments. In addition, we will know the amount of water that can potentially be saved by using soil amendments, and the resulting turfgrass quality.”

Based on industry recommendation and cost factors, six soil amendments – bentonite, compost, kaolinite, ready grit™, spongelite, zeolite- have been selected for (characterisation in) this field experiment. Using a series of 2.5 x 3.5 m² plots, twelve amendment treatments (i.e. all products by themselves, combined with compost and a control) are tested at two irrigation rates, with four replicates. Below-ground access tubes allow obtaining pictures of the developing root system and measure moisture levels. In addition the team will record turfgrass growth, colour, nutrient content and leaf surface temperatures. “This state-of-the-art technology has already provided new insights,” says Poot. “The below-ground pictures taken one week after laying the turf showed that the root system had already developed to a depth of 60 cm. The leaf surface temperature will be measured with an infra-red camera and provide the data to evaluate how water stress is developing.”

Barton and Poot are quick to point out that the value of this project and the success of the Open Day is founded on far more than cutting edge technology: “We are lucky to have fantastic support from Horticulture Australia, who in partnership with the Turf Industry and various State and Local Government groups and WA State Government, provide financial and in-kind support to the projects.”
Mike Carroll Travelling Fellowship winner aims to boost sheep fertility

Ms Ully Fritsch
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The opportunity to expand one’s skills at a world-class laboratory under the guidance of leading researchers is a dream shared by most young researchers.

This dream recently became reality for a PhD candidate Ms Yongjuan Guan as the winner of the 2013 Mike Carroll Travelling Fellowship award.

The Fellowship enabled Yongjuan to learn new techniques and develop new skills at the University of Alberta, Canada, where she spent four months to progress her research on the relationship between under-nutrition and low fertility in merino rams.

Such research is highly relevant to Western Australia, considering the consistently low fertility of WA merino flocks and the fact, that under-nutrition is typical for Australian rams as the normal breeding season for sheep falls in Autumn.

In a departure from the traditional research focus (on the link between sperm quantity and fertility), Yongjuan hypothesised that, when the testis is shrinking because of under-nutrition, eggs are not fertilised because the sperm cells are damaged, or embryo development fails because the genes in the sperm are damaged.

Yongjuan’s stay at the University of Alberta helped her assess the quality of the sperm cells using the latest computer-aided imaging techniques and study the functional integrity of the cells using molecular and cellular techniques.

“I am very grateful to Associate Professor Leluo Guan and her PhD student Guanxiang Liang, from the Department of Agriculture, Food and Natural Sciences at the University of Alberta. They provided resources at the miRNA laboratory and taught me bioinformatics for data analysis ‘from scratch’. I am deeply honoured that I was selected for the Mike Carroll Travelling Fellowship which has taken my research to a whole new level.”

The Mike Carroll Travelling Fellowship commemorates the late Dr Mike Carroll, former Director General of the Western Australian Department of Agriculture, who placed a high value on international relationships and was passionate about improving the Western Australian farming sector.

Upon her graduation, Yongjuan plans to return to China and continue her research on male animal reproduction. Her supervisors at UWA are Winthrop Professor Graeme Martin, Associate Professor Irek Malecki and Dr Penny Hawken, from UWA’s School of Animal Biology and IOA.

‘Microblitz’ takes community by storm

‘MicroBlitz’, is a ‘Citizen Science’ project which is rapidly capturing the interest of the wider WA community. The brainchild of UWA soil scientist Winthrop Professor Andy Whitely, the project enlists young and old ‘volunteer scientists’ to investigate the genetic biodiversity, distribution and functionality of microbial communities within Western Australian soils.

Key tools to engage the citizen scientists include a soil sampling kit developed by Whiteley and his team, and the Microblitz website (www.microblitz.com.au). Registering to become a sampler is easy, simply visit the website and sign up to receive your free sampling kit and instructions.

“MicroBlitz engages volunteer citizen scientists throughout WA by connecting them with the natural environment as they collect soil samples, which are then sent to a centralized laboratory for DNA sequencing and basic chemical analysis,” says Whiteley.

“In the first ten months of the program we issued over 750 kits to registered participants from a range of community sectors including school groups, farmers, conservation groups and ‘the Grey Nomads’.”

Whitely attributes the rapid uptake of the project to the successful partnerships with a range of community organisations, including Life Tech, Grow Safe AMF, The Sunday Times, Bunnings Warehouse Subiaco and the Perth Caravan & Camping Show.

“These partnerships also generated significant media interest including radio interviews, newspaper articles and a spot on GWN TV news.”

The team is currently working on an ‘app’ for data capture in the field, the release of a short film and the generation of more opportunities for volunteers to engage in the project.

The MicroBlitz project app will be formally launched in Perth later this year.

For further information visit www.microblitz.com.au.

This project is funded by UWA and the Office of Science, Department of Premier and Cabinet.
Consultative Group for International Agricultural Research (CGIAR) grain legumes program met in India

Hackett Professor Kadambot Siddique
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The Independent Advisory Committee (IAC) of CGIAR’s Grain Legumes Program held its first meeting at the International Crops Research Institute for the Semi-Arid Tropics (ICRISAT) during 20 – 21 February in Hyderabad, India. Hackett Professor Kadambot Siddique attended the meeting with other international members of the IAC. The committee comprised of eight members:

- Dr Raj S. Paroda, Executive Secretary, APAARI, Bangkok 10110, Thailand (Chair, IAC)
- Dr Joyce Mulilla-Mitti, Crops Officer, Crop Production and Protection, FAO Regional Office, Accra, Ghana
- Dr Ousmane Ndoye, Program Manager, Non Staple Crops, CORAF/WECARD, Dakar, Senegal
- Dr Sayyed Hossain Sabaghpou, Director General, Agricultural Research and Natural Resources Center of Hamedan Province, Hamedan, Iran
- Professor Kadambot Siddique, Hackett Professor and Director, The UWA Institute of Agriculture, The University of Western Australia, Crawley, WA, Australia
- Professor Francis Wachira, Deputy Executive Director, ASARECA, Entebbe, Uganda (representing Dr Fina Opio, Executive Director, ASARECA)
- Professor Fred Muehlbauer, USDA-ARS Grain Legume Genetics and Physiology Research Unit, Washington State University, Pullman, USA
- Dr Jill Findeis, Director, Division of Applied Social Sciences, University of Missouri, Columbia, USA

The members discussed the Terms of Reference (ToR) of the IAC as articulated by the Consortium Board for Grain Legumes and sought clarification from Dr Noel Ellis, the CRP Grain Legumes Director and Dr Philippe Ellul, Senior Science Officer, CGIAR Consortium.

The IAC members valued the opportunity to listen to presentations from Dr Noel Ellis, Director, CRP Grain Legumes, and the eight Product Line Coordinators. Clarifications were sought by IAC on the program structure, progress to date, quality of science and anticipated outputs and outcomes as well as the budget. The two days meeting clearly provided IAC members with first-hand information regarding the Grain Legumes program and its future strategic directions.

IAC made several recommendations including improved communication between product lines, stakeholders, end users and funding agencies. There is an urgent need to develop and circulate a regular e-newsletter, regularly update the Grain Legumes Program website (http://grainlegumes.cgiar.org/), identify and publicise success stories, and prepare timely media statements.

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WA’s agricultural expertise ‘goes international’

In a recent visit to Western Australia, a group of scientists from South East Asia embraced the opportunity to learn more about WA’s agriculture in an effort to help advance the industry in their own countries with the new knowledge and skills gained.

The five scientists from Laos, Indonesia, Papua New Guinea, the Philippines and Pakistan were chosen under the Australian Centre for International Agricultural Research’s (ACIAR) John Dillon Memorial Fellowship initiative, which aims to develop leadership skills in outstanding mid-career scientists of ACIAR partner organisation.

During their five-day visit, the scientists were hosted by the Department of Agriculture and Food, WA (DAFWA) and introduced to a range of best-practice organisations central to Australia’s agricultural research, extension, teaching and policy making.

They toured a range of facilities and met with representatives from The University of Western Australia (UWA), Department of Fisheries, WA and industry representatives from a range of farming enterprises.

DAFWA’s Irrigated Agriculture and Diversification Executive Director, Terry Hill emphasized the win-win nature of the initiative: “While our guests gained insights about the latest Australian agricultural developments, their visit provided our scientists with a unique opportunity to learn about advancements and issues being addressed in Asia, and a forum for developing new relationships and networks that could lead to future projects or collaborations.”

Dr Craig Lawrence, an Adjunct Associate Professor at UWA and Principal Research Scientist (Biodiversity and Biosecurity Branch, Department of Fisheries, WA) added: “We have developed expertise and UWA facilities that now place us in a unique position to share this with researchers from around the world; whether it be aquaculture to alleviate food shortages; fish to control mosquito borne diseases; and/or endangered species captive breeding and restocking programs to conserve biodiversity.”

After leaving WA the group met with Australia’s Foreign Affairs Minister Julie Bishop in an award ceremony at Canberra to celebrate the important role and the success of agricultural skill development in Australia’s aid program. For further information see www.abc.net.au/news/2014-03-04/australia-aid/5296060?section=act.

(from left) Dr Craig Lawrence (Principal Research Scientist, Biodiversity and Biosecurity Branch, Department of Fisheries, WA); Dr Hassan Warriach, (Project Manager, University of Veterinary & Animal Sciences, Lahore, PAKISTAN); Ms Maria Lilia Vega, (Research Project Coordinator, Visayas State University, PHILIPPINES); Mr Gideon Pama, (Manager – Freshwater Aquaculture, National Fisheries Authority, Port Moresby, PAPUA NEW GUINEA); Dr Mulavanh Chittavong, (Vice Head of Faculty of Agriculture, National University of Laos, LAO PDR), Ass’t/Prof Mick Considine (UWA), Dr Andrew Taylor (DAFWA), W/Prof Kadambot Siddique (UWA).
Collaboration on crop stress resistance

The UWA Institute of Agriculture (IOA) and Guangzhou University’s School of Life Sciences have been collaborating on crop stress resistance and genomic approaches with emphasis on barley. Their joint research has led to two key recent publications (PLoS One, 7 (5): e 37573. doi:10.1371/journal.pone.0037573; PLoS ONE 8(2):e56816. doi:10.1371/journal.pone.0056816).

Winthrop Professor Kadambot Siddique visited Guangzhou University in March and met with researchers and senior management and discussed strategies for future collaboration including the progress of a joint ARC-Linkage project application. While at Guangzhou University Siddique delivered several lectures to postgraduate students. He also visited the Guangdong Academy of Agricultural Sciences Crop Research Institute.

Professors Kadambot Siddique and Peiguo Guo (Guangzhou University) with students following the lectures.

Mediterranean fruit fly (Ceratitis capitata), also known as ‘Medfly’, causes massive losses to Australian fruit growers each year and can devastate entire fruit growing areas if not controlled in time.

Unfortunately, even the most stringent measures taken by a grower to eradicate Medfly on individual property are likely to fail, unless the entire community participates in the effort.

PhD student Isabel Arevalo-Vigne (DAFWA Staff), from UWA’s School of Agricultural and Resource Economics, is rising to this challenge: Her research project aims to identify the factors and obstacles that prevent people from adopting and participating in control measures to eradicate Medfly in urban, peri-urban and rural areas, and to investigate incentives that can facilitate community participation to solve the Medfly problem in Western Australia.

"Medfly cannot be controlled on a single property with a single control method. They can survive in backyards of private households, so successful eradication from a whole growing area depends strongly on the actions of household owners, now more so than ever before," says Isabel and explains the urgency of the situation:

“The impending ban of the traditional pesticide cover sprays Dimethoate and Fenthion has increased the pressure on commercial and backyard growers to adapt and adopt alternative measures to safeguard future production of quality produce.”

Isabel sees the solution in the adoption of sustainable control measures on a large scale – as conceived in Area Wide Management (AWM). “Once we understand what drives people to participate cooperatively and actively in Medfly eradication initiatives, we can tailor our initiatives accordingly.”

Isabel conducted a state wide survey among commercial fruit growers, small landholders and the general public and found that less than 50% of people growing fruit trees applied control methods.

“Achieving community engagement is a complex matter, and there are indications that a person’s likelihood to participate in or adopt control methods depends just as much on their understanding of the ecological issues involved as on (other) factors which may diminish their motivation (eg financial costs, time required). When we explained the benefits of controlling Medfly collectively, 65% of survey respondents agreed to implement control methods in the next six months – including those without fruit trees.”

Isabel suggests that eradicating Medfly does not have to be complicated, but that it will take time and commitment from anybody growing fruit trees – and an understanding of the enemy and its survival strategies.

In a pilot project, Isabel has selected the community of Bridgetown to analyse in-depth the issues that have emerged from the survey and from interviews with government officers, industry representatives and the general public. This information will be used to design and test a strategy for community engagement to control Medfly in Bridgetown which can serve as a model for other areas in the Southwest and which can be applied to fight plant biosecurity threats.

This project is supported by UWA, CRC Plant Biosecurity, FruitWest and DAFWA. Isabel’s supervisors are Professors Ben White and Ross Kingwell, Assistant Professor Amin Mugera (School of Agricultural and Resource Economics and IOA), Professor Nancy Longnecker (Science Communication, School of Animal Biology and IOA) and Professor Iain Walker (CSIRO).

Beating fruitfly – are we up to the challenge?

Ms Isabel Arevalo-Vigne
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Isabel Arevalo-Vigne (left) interviewing Vivienne and Hugh Litson at their property in Bridgetown.
Lupin prospects improve with pinpointed disease causation

Black Pod Syndrome (BPS) is a severe necrotic disease of lupin pods which causes large crop losses and prevents many WA farmers from growing lupin, especially in the south-west coastal area of the state.

BPS causes the pods on lupin plants to turn dark brown or black and halts or reduces seed production.

UWA PhD researcher Monica Kehoe says the study has been able to cement suspicions that researchers have had on the cause of BPS.

“The most important result of the research is the confirmation that late infection with Bean yellow mosaic virus [BYMV] is the cause of BPS in narrow-leafed lupins,” Ms Kehoe says.

BYMV is mostly found in high rainfall grainbelt zones and is endemic in south-western Australia.

The virus can infect clover plants next to pastures of lupin and is spread by aphids. It is especially difficult to control as it can survive from one growing season to the next in the infected clover.

Ms Kehoe says her research – which involved PCR and ELISA testing of lupin in five locations, and greenhouse cultivar studies – shows the timing of infection of the virus plays a large part in causing BPS.

“If the BYMV infection occurs before the primary pods are forming, the plant will turn fully necrotic and die as we would expect with a typical early BYMV infection,” she says.

“Infection after the primary pods have developed leads to symptoms of BPS ... and yields are greatly reduced.”

Now that the cause has been found Ms Kehoe says farmers can more confidently plan prevention strategies to stop BPS from causing major losses.

“Ultimately a new variety of narrow-leaved lupin with resistance to BPS is the goal,” Ms Kehoe says.

“The lupin breeding team at DAFWA screens huge numbers of accessions each year for a number of molecular markers that have already been located for various other traits including disease resistances.

So finding a molecular marker for BPS that can be incorporated into that process is the next logical step.”

There is currently one variety of lupin - Jenabillup- that exhibits partial resistance to BPS and Ms Kehoe says resistance is something that DAFWA researchers are looking at.

Ms Kehoe’s research has been supported by a GRDC scholarship, an Australian Postgraduate Award and in-kind support by DAFWA.

For more science news go to www.sciencewa.net.au

‘Lupin Foods Australia’ a winner in the Middle East

Western Australian Company ‘Lupin Food Australia’ took out the award for ‘best new environmentally sustainable initiative’ and was runner up for “Best new Health Food or Beverage” at the Gulfood Awards 2014, hosted by the Dubai World Trade Centre on 28 February.

Gulfood is the world’s biggest annual food and hospitality trade exhibition, attracting over 4,500 exhibitors and 20,000 brands this year.

More than 250 entries from 19 countries competed for twenty accolades including: best newcomer brand or business, best new halal food, best environmentally sustainable initiative.

Innovation was a key feature of this year’s exhibition and ranked highly with the judging panel of international, independent industry experts.

Lupin Foods Australia is a wholly owned subsidiary of Co-operative Bulk Handling Limited (“CBH Group”), an organisation owned by the grain growers of Western Australia. “Being a part of the CBH Group means that Lupin Foods Australia has a direct stake in ensuring that the lupins we process are sourced from growers employing the most sustainable farming systems,” says General Manager David Fienberg, who is also a member of the Industry Advisory Board at UWA's Institute of Agriculture. “The recognition from Dubai shows that our approach is working and is testament to the bright future our lupin food products have in the global arena.”
Farmer turns entrepreneur in Bangladesh

A farmer becoming an entrepreneur – is not very common in rural Bangladesh. However, when scientists from UWA’s Centre for Plant Genetics and Breeding (PGB) visited western Bangladesh as part of a travelling workshop they found Mr Minto, a demonstration farmer retaining seeds of field pea after green pod harvest to sell next season to interested growers.

The Rice-Pulse Project (funded by ACIAR), led by Professor William Erskine, focuses on developing new systems for peas in western Bangladesh to increase production, including “squeezing in” a crop of short-season (60 day) large-seeded vegetable peas – between Bangladesh’s two annual rice crops. “Bangladesh has a narrow window between the harvest of monsoonal rice in late October and the transplanting of spring irrigated rice early February,” explains Erskine. “In the previous three years the project focused on trials conducted at research farms, but this year we have started to involve Bangladeshi farmers – all of them small landholders.”

The farmers were given short-season field pea seeds to plant on their land after the harvest of the monsoonal rice with the instruction, to harvest the green pods after 60 days, at which time they are ready to eat. The field pea seeds grew so well, that one of the farmers – Mr Minto – decided to delay planting the spring rice crop by two weeks, and leave his field pea crop in the ground for another two weeks to form seeds. “Mr Minto stands to make a tidy profit from his initiative,” says Erskine. “He very quickly recognised, that this short duration field pea variety was very-well suited to the local conditions and seasons and could lift production significantly; he anticipated the demand for seeds from other farmers, and the proceeds from selling the field pea seeds he grew far outweighed (will far outweigh) the yield decrease in his subsequent rice crop caused by the delayed planting.”

The project ‘Introduction of short duration pulses into rice-based cropping systems in western Bangladesh’ is in its fourth year – notwithstanding the socio-political unrest in late 2013 – and aims to intensify winter cropping in Bangladesh using lentil and pea to intensify rice based cropping systems. Progress was monitored at 30 demonstration sites through a travelling workshop (9-14 February, 2014), attended by Erskine, Drs Ken Flower and Imran Malik (UWA), Dr Eric Huttner (ACIAR Research Programme Manager) and Dr M. Matiur Rahman (IRRI-Bangladesh) along with the Pulses Research Centre (PRC) team.

Not surprisingly, Erskine and his team were delighted with what they saw: “Farmers are starting to take up newly developed technology options on field pea and lentil in rice-based systems – and Mr Minto could be described as a trailblazer: Can there be a more promising indication for a project’s success than adoption by the local farmers ahead of schedule?”

New MoU strengthens UWA-CAAS collaboration

Six senior executives from the prestigious Chinese Academy of Agricultural Sciences (CAAS) visited UWA in February this year, to formalise a Memorandum of Understanding (MoU) designed to strengthen existing links and develop new collaboration between the two institutions.

The delegates were Professor Li Jiayang, Vice Minister of Agriculture and President of CAAS; Professor Zhang Lubiao, Director General, Department of International Cooperation, CAAS; Professor Mei Xurong, Director General, Department of Research Management, CAAS; Professor He Zhonghu, Institute of Crop Sciences, CAAS and Chief Scientist, International Maize and Wheat Improvement Center, Beijing; Professor Tom Guangzhi, Director General, Shanghai Institute of Veterinary Research, CAAS; Mr Niu Minjie, Secretary to CAAS President.

The visitors were welcomed by UWA’s Winthrop Professor Tony O’Donnell, Dean of the Faculty of Science; Winthrop Professor Kadambot Siddique, Director of IOA; Professor Steven Smith, ARC with some of UWA’s leading agricultural scientists across diverse disciplines, including Genetics and Breeding; Animal Production; Land and Water Management; Plant Diseases, Weeds and Pests; Bee Research; Plant Energy Biology and Plant Chemical Biology.

The delegates met with some of the key stakeholders in the agricultural sector in western Bangladesh, including the Bangladesh Agricultural Research Institute (BARI), the Bangladesh Rice Research Institute (BRRI), the Bangladesh Wheat Research Institute (BWRI), the Bangladesh National Bureau of Animal Resources (BNBR), the Bangladesh Agricultural Research Council (BARC), the Bangladesh Marine Fishery Research Institute (BMFRI), the Bangladesh National Institute of Animal Health (BNIAH) and the Bangladesh Institute of Animal Resources (BIAR).

The visitors were delighted with what they saw: “Farmers are starting to take up newly developed technology options on field pea and lentil in rice-based systems – and Mr Minto could be described as a trailblazer: Can there be a more promising indication for a project’s success than adoption by the local farmers ahead of schedule?”

Not surprisingly, Erskine and his team were delighted with what they saw: “Farmers are starting to take up newly developed technology options on field pea and lentil in rice-based systems – and Mr Minto could be described as a trailblazer: Can there be a more promising indication for a project’s success than adoption by the local farmers ahead of schedule?”

continued on page 10
New MoU strengthens UWA-CAAS collaboration

continued from page 9

These meetings served to develop a collaboration strategy, in joint consultation, to provide a stocktake of current collaborations and outlines future initiatives, a major focus of which is ‘Dryland Agriculture and Food Production Systems’.

UWA’s existing collaborations extend across six CAAS Institutes: The Oilseed Crop Research Institute (canola drought, heat and disease tolerance screening); the Institute of Vegetables and Flowers (germplasm of vegetable crucifers); the Institute of Plant Protection (genetics and breeding of disease resistant wheat, barley and canola); the Institute of Crop Sciences (wheat drought and heat tolerance); the Institute of Agricultural Resources and Regional Planning (grassland animal production); the Institute of Animal Science and Veterinary Medicine (Reduction of methane emissions for livestock/livestock products).

The discussions also identified two further CAAS research institutes that have counterparts at UWA, which makes them a logical choice for future collaborations where the respective expertise and infrastructure complement each other and can drive innovation.

The CAAS Institute of Crop Sciences is set to collaborate with the UWA Institute of Agriculture in the area of genetics and breeding for terminal drought and heat tolerant wheat under dryland conditions... The two institutes will also collaborate on the characterization of phenotypic plant responses and in plant breeding programs.

The CAAS Bee Research Institute and the UWA Centre for Integrative Bee Research (CIBER) combine a tremendous amount of expertise between them, with different technologies and platforms on both sides, which has great potential to speed up scientific progress in honey bee research (see also page 12).

The CAAS Institute of Quality Standard and Testing Technology for Agro-Products and the UWA Centre for Forensic Science will collaborate on food safety and traceability.

In addition, visitors and hosts agreed to incorporate postgraduate training, student exchanges and training of early career researchers in all collaborations.

It was also decided to hold a joint workshop on integrated dryland agricultural production systems in 2015.

Fulbright Scholar names roots as key to next ‘green revolution’

Winthrop Professor Zed Rengel
Email: zed.rengel@uwa.edu.au

A scientist from UWA’s School of Earth and Environment and Institute of Agriculture, has received a prestigious Fulbright Senior Scholar award sponsored by Kansas State University (KSU), USA, to share and advance his research at KSU from July to December this year.

Winthrop Professor Zed Rengel is an internationally renowned expert in nutrient uptake and ion toxicity in the soil-plant-water-microbe continuum whose research aims to improve the efficiency with which (crop) plants make use of the soil resources – nutrients- in order to achieve a sustained increase in food production.

“Food security is one of the biggest global challenges facing mankind,” says Rengel. “While global population growth, climate change and variability pose significant problems, food security is also threatened by a decline in (average) yield increases of staple crops in recent years.” He is convinced that a shift in thinking is required to address these challenges successfully: “The next ‘green revolution’ – with corresponding increases in crop yields – is likely to come from breeding for improved root systems, which are capable of efficient acquisition of water and nutrients from soils, because the arable area in the world is limited and continues to decline.”

In Rengel’s view the pathway to achieve this is clear: “Some of our existing crop genotypes do have a degree of tolerance to soil-related stresses, but this is mostly due to inadvertent (lucky) selection in the breeding process. What we need instead is a targeted breeding effort to transfer and accumulate defined tolerance traits into elite germplasm from which we can produce commercial varieties adapted to heterogeneous soils with resource-related stresses. Such targeted development of crop genotypes with increased efficiency of water and nutrient capture hinges on a better understanding of root structure and function followed by identifying molecular markers for root traits.”

Rengel’s research at KSU will focus on the identification of molecular markers associated with specific wheat root traits and the incorporation of that knowledge into a cost-effective computer simulation model.

“Simulation modelling plays an important role in understanding the complex root-soil interactions,” says Rengel. “It provides an opportunity to investigate spatially and temporally dynamic processes at the rhizosphere, plant and whole-crop scales. We have developed and used the 3-D models to successfully simulate root architecture and function of diverse crop genotypes. The next significant innovation will be to incorporate existing genetic information on root traits into these 3-D root models to search for optimum root architecture and function in diverse environments. This will help us in breeding improved crop genotypes which are more efficient in taking up water and nutrients from soils.”

Rengel’s three KSU hosts cover a range of relevant disciplines, including crop physiology (Associate Professor Vara Prasad), soil science and agronomy (Professor Rob Aiken) and molecular genetics (Professor Guihua Bai), which complement Rengel’s expertise in soil-root interactions, genetics and simulation modelling.

Rengel is looking forward to the work ahead: “This collaboration will enhance multidisciplinary capabilities of all staff involved because the project transcends the traditional boundaries between these disciplines by using computer simulation modelling (mathematics and computer science).”

Cluster roots: the answer to increase crop yield and conserve phosphorus?

Ms Xing Wang
Email: wangx11@student.uwa.edu.au

A fascination with the strategies plants evolved to thrive under adverse conditions, especially a low availability of soil phosphorus (P), and a desire to learn from the best, attracted PhD student Ms Xing Wang to UWA, to research how plants develop ‘desirable’ traits that can help increase crop yield and conserve environmental resources.

Her research revolves around the P uptake of plants, and she explains her interest in this area. “Phosphorus (P) plays a critical role in crop yield, and with the world’s rock P reserves for fertilisers dwindling, the scarcity of P may become a factor limiting crop production.”

Wang’s project focused on cluster roots and their functioning. “Many soils contain substantial levels of total P, but in forms not readily available for most crops like wheat and canola,” explains Xing. “Cluster roots however, – in Lupinus as crop plants and some Australian/Chilean Proteaceae species – have an increased root surface area and are able to mobilize and absorb P from the soil where other plants fail. Therefore, the specialised cluster root structures and their functioning under a low soil P availability, are considered desirable traits which we aim to exploit for future crops in order to sustain high crop yield in the long-term for a growing population world and to conserve resources.”

Wang’s project investigated the cause of variation in cluster-root formation among cluster-root forming Lupinus species, and whether the variation in biomass allocation to cluster roots is an environmentally or genetically regulated process in different Lupinus species. She has submitted her thesis and one of her findings was recently published in Annals of Botany (2013) 112: 1449-1459.

Good-bye from IOA News Editor

Dear All,

This is my last newsletter as editor of IOA News and I want to say a big thank you to you, the readers, for your constructive feedback; and to you, the scientists, research students and other IOA collaborators and supporters, for your stories, your research and your awards, without which there would have been no IOA News. My thanks also go to IOA director Kadambot Siddique, for his guidance, support …and not least of all for his patience with my endless queries and at times, unorthodox approach. I am equally indebted to Siddique’s Executive Assistant Cora Castens, who has kept me sane – more or less – and who helped me out any time I asked.

I will continue to follow the IOA development and next round of achievements closely – I will remain at UWA – and have no doubt that the combined efforts of the many outstanding people involved with IOA will do agriculture at UWA proud in the years to come. Best wishes, Ully Fritsch.
CAAS visit to UWA fast-tracks soil collaboration

Soil scientists from the renowned Chinese Academy of Agricultural Sciences (CAAS) have paid a 1-week-visit to UWA to fast-track collaboration focused on developing sustainable agricultural systems that underpin feeding the world.

Led by Professor Minggang Xu, Professor of Soil Science, Deputy Director General, Institute of Agricultural Resources and Regional Planning, Beijing CAAS, the scientists met with key researchers at UWA at a ‘mini-workshop’ in which scientists from both institutions presented an overview about their soil-related research and activities:

Professor Dan Murphy who holds a Visiting Professorship at CAAS and is Chair in Soil Science and Program Leader at the UWA’s Institute of Agriculture (IOA) outlined existing UWA-CAAS collaborations; Winthrop Professor Tony O’Donnell, Dean of UWA’s Faculty of Science, outlined the plans for a ‘Soils Cooperative Research Centre’; Winthrop Professor Kadambot Siddique, IOA Director, presented an overview of agriculture at UWA and IOA engagement in China; Associate Professor Louise Barton, leader of UWA’s Soil Biology and Molecular Ecology Research Group and IOA, talked about UWA’s research strengths in soil biology and molecular ecology and about opportunities for collaboration. Dr Frances Hoyle, Senior Research Scientist (DAFWA), and Adjunct Research Fellow (UWA) presented soil carbon sequestration work in Western Australia, while Associate Professor Wenju Zhang (CAAS) discussed soil carbon sequestration in arable land of China. Associate Professor Matthias Leopold (UWA) outlined ‘Critical Zone science’ (see also page 3) and Winthrop Professor Andrew Whiteley talked about an initiative focused on below-ground biodiversity of Western Australian soils.

Presentations by the visitors complemented the program, with Professor Jizheng He (University of Melbourne and Chinese Academy of Sciences) discussing new mechanisms of nitrification in acid soils and Professor Minggang Xu providing an overview of long-term experiments, soil fertility involvement of arable land in China and possible collaborations.

Following the information exchange, hosts and visitors discussed future activities, staff collaboration and student exchanges.

“The visit was very productive for both sides and will definitely help with future collaborations,” says Professor Dan Murphy, who coordinated the program. “We gained a better understanding of each other’s current research interests and priorities and soil carbon research is clearly an area of particular interest to both institutions.”

“China is the now the largest user of inorganic fertilisers in the world. The increasing use of inorganic fertiliser and corresponding decline in the use of traditional inputs of organic plant residues and animal manures will lead to a future decline in C stocks. UWA – CAAS collaborations in this area are well advanced and focus on using climate models to predict future climate scenarios and expected future changes in soil carbon stock.”

Following the CAAS visit to UWA, Murphy and Hoyle travelled to China to advance these collaborations further.
A new burst of life to wine production

Ms Ully Fritsch
Email: ully.fritsch@uwa.edu.au

Interest in wine – and its appreciation – is on the rise to the point where some even argue that “wine is the new golf”: It generates employment, pleasure and many hobby connoisseurs ready to argue the merits of colour and bouquet.

In recent years, considerable attention has focussed on vine biology, particularly flowering and fruiting; few people realise, however, that the ability of the vine to spring to new life after winter is one of its most important properties and of critical interest to the wine maker.

Scientists from UWA and the University of Leeds (UK) have teamed up to explore the process responsible for the ability of the vine to develop buds that can not only survive winter but can make the rapid transition from the dormant state to the vigorously growing vine once the good weather returns.

Assistant Professor Michael Considine explains: “Many winegrowers agree that this property underpins the successful vine and its sustainability: In nature, the buds burst randomly but the winegrower requires that all the buds burst within a few days of each other, so that the shoots and fruit develop together, which is essential to quality wine production and consistency.”

The bud is very important, because it houses the embryonic flowers, leaves and fruiting bodies.

Being able to awaken after a long winter sleep poses many problems for the embryo (that are poorly understood), including the need to handle oxygen.

“Oxygen metabolism is tricky for all living organisms,” says Professor Christine Foyer, Considine’s UK partner and Winthrop Research Professor at UWA. “Oxygen can even be toxic and all organisms that exist in air have developed the ability to use oxygen for respiration while protecting themselves against the potentially harmful side effects of oxygen chemistry.”

The present research focus on how the bud handles oxygen to make this transition from the dormant state to the vigorously growing vine has provided Considine, Foyer and their team with early indications which suggest that oxygen radicals – which accumulate within hours of warming following a winter chill – might act as the wake-up signal.

“We are now exploring this exciting possibility with two PhD students, Mrs Karlia Meitha and Ms Yazhini Velappan (both UWA),” says Considine, “and thanks to their contributions and expert supervision across the continents we are making rapid progress and are looking forward to deliver new knowledge that that can be used to help the grower achieve synchronous bud burst and generate lasting benefits for viticulture industry.”

Finaly, the authors explain how a network of research farms – known as farm platforms, exemplified at Rothamsted Research, North Wyke, UK; UWA Farm Ridgefield, Perth Australia, and Silent Valley, Kerala, India – is starting to evaluate economic and environmental benefits of these and other farming practices.

“In order to answer questions about sustainability of agriculture, scientists are increasingly dependent on the few remaining long-term research platforms around the world. This paper is a welcome reminder of the need for long-term strategic investment to secure future global food supply. Only by studying the behaviour of the whole production system, including total inputs, total outputs and its productivity over sufficiently long time can we eliminate unintended consequences such as intolerable levels of soil degradation, greenhouse gas emissions and biodiversity loss. The long-term research platforms are capable of providing all the necessary data, and the global network ensures the widest possible translation of research into practice change.”

To read the comment piece, visit www.nature.com/news/agriculture-steps-to-sustainable-livestock-1.14796.

Strategies for efficient and sustainable livestock farming

Eight strategies to make ruminant livestock a more sustainable part of the food supply chain were recently outlined in a Comment paper published in the prestigious journal Nature by a team led by Professor Mark Eisler, University of Bristol UK and Winthrop Professor Graeme Martin, from The University of Western Australia’s Institute of Agriculture.

Among other partners in the project is Rothamsted Research, UK, which is the longest running agricultural research station in the world which Martin visited recently to establish further collaboration with UWA.

The authors emphasize the importance of keeping livestock in ways that work best for individuals, communities and the planet. Choosing appropriate feed is a good starting point. They point out that too much ‘human food’ is fed to livestock unnecessarily: “About 70 per cent of the grains used by developed countries are fed to animals but some of this is avoidable. Ruminants graze pastures and can eat hay, silage and high-fibre crop residues that are unsuitable for human consumption.”

Other strategies include the use of simple dietary supplements to help to boost productivity. “Dietary supplement can alter microbes in the rumen to improve animals’ nutrition, which means, that in some cases animals can produce more milk and meat for proportionally less greenhouse gas.”

Furthermore, they urge producers to focus their efforts on boosting yields from local breeds, rather than importing breeds that are successful elsewhere but may not adapt well to local conditions.

From left: Johan Greeff (DAFWA) and Graeme Martin (UWA) visiting Rothamsted Research.

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To read the comment piece, visit www.nature.com/news/agriculture-steps-to-sustainable-livestock-1.14796.
Zinc fertilization – a silver bullet against cadmium toxicity in food grains?

Mr Asif Naeem Email: scoutaf@gmail.com

A prestigious research fellowship from the Higher Education Commission (HEC) of Pakistan took PhD candidate Asif Naeem, Junior Scientist at the Nuclear Institute for Agriculture and Biology (NIAB) Faisalabad, Pakistan, to UWA, where he was hosted by Winthrop Professor Zed Rengel (School of Earth and Environment and IOA) and his group to work on the role of zinc (Zn) in alleviating cadmium (Cd) toxicity and decreasing Cd concentration in barley grain.

Naeem explains why Cadmium needs special attention: “It is one of the most toxic heavy metals, because of its high mobility in the soil-plant systems and toxicity to living organisms at very low concentration. Cadmium is listed as a (Class I) human carcinogen and in, extreme cases can also cause bone demineralisation, renal tubular dysfunction and shortness of breath.”

Cadmium contamination of plant-based foods accounts for at least 70% of Cd intake by humans.

Even though Cd contamination of soil above a certain (threshold) level may cause significant plant growth inhibition and yield loss, a number of crop species can accumulate considerable amounts of cadmium without any significant yield loss, and thereby contribute significantly towards dietary intake of Cd by humans. Leading international health organisations have proposed a limit of 0.1 mg Cd kg-1 of grain.

Cadmium enters the soil through untreated sewage water irrigation, application of contaminated phosphate-fertilizers and atmospheric deposition. Its uptake from soil and translocation within plant is regulated by a number of soil, environmental and plant factors.

During his stay at UWA, Naeem examined the soil factors involved in this process, focusing on the role of Zn. “Our hypothesis was, that low plant-available Zn could promote Cd uptake from soil and its translocation within plants,” says Naeem. “We set out to determine whether Zn fertilization would lower the concentration of toxic Cd in addition to enhancing food grain quality through Zn-fortification. For this purpose we assessed yield response and Cd uptake in Zn-efficient and Zn-inefficient barley genotypes, both on low and optimum Zn-fertilized soil.”

The glasshouse experiment showed that Zn alleviated Cd stress in both genotypes. “Under Cd stress, grain yield of Zn-fertilized plants was considerably higher. For Zn-efficient genotype Zn fertilization decreased Cd concentration in all plant parts i.e. roots, straw and grain, whereas for Zn-inefficient genotype, a decrease in Cd concentration was observed only in roots.”

The results led to the conclusion that Zn-efficient plant genotypes could efficiently exclude Cd from getting into grains and help produce Cd-free food grain.

“It has been a privilege to have the guidance of an internationally renowned expert in this field and access to UWA’s excellent facilities. My time at UWA has given me a deeper insight into the mechanisms underpinning decreased Cd concentration through Zn fertilization/fortification and I look forward to putting this new-found knowledge to good use to help improve the quality and yield of food grains in my home country.”

Agricultural economist delivers advice to global farmers

Geoff Vivian Email: vivian@kimberleypage.com.au

A LOCAL agricultural economist has been leading a research team working to help developing countries choose economically viable soil conservation practices.

Winthrop Professor David Pannell, from UWA’s School of Agricultural and Resource Economics and Institute of Agriculture says there is a serious need for improved soil conservation in Africa and south Asia, where loss of soil and nutrients cause long-term productivity loss and can gradually clog up rivers and water reservoirs.

The team identified a number of these complexities, assigning numerical values to each that could be applied to various scenarios and circumstances in African farms in a new computer application.

They trialled this in a case study in northern Zimbabwe.

“We looked at four different farm sizes with different levels of resource availability, different levels of labour, different levels of capital,” he says.

Pannell says the size of the farms and resources available turned out to be critical, and they found that the economics of conservation agriculture were adverse for smaller, poorer farmers.

“The existing conservation agriculture package does need to be targeted to particular regions and/ or particular types of farms and probably to larger wealthier farms in these regions,” he says.

“For other farmers, further development of more appropriate soil conservation practices is needed,” he says.

“Our modelling tool can easily be adapted to other regions to assess the local viability of conservation agriculture.”

For more science news go to www.sciencewa.net.au
New staff

Dr Rémi Crété
Email: remi.crete@uwa.edu.au
Dr Rémi Crété has been appointed as a Research Associate within the School of Plant Biology. He holds a PhD from the University of Angers, France, and has been investigating the factors affecting the spread of Apple Scab in the French region of the Loire valley. In his new role he will be working on a GRDC & DAFWA project investigating the spread of the fungus-borne ‘blackleg’ disease in canola, which causes significant yield loss.

Dr Hui Liu (Helen)
Email: hui.liu@uwa.edu.au
Dr Hui Liu has been appointed as a Research Officer within the School of Plant Biology and IOA, where she is known as ‘Helen’. She completed her PhD at UWA and acquired postdoctoral experience at the National Institute of Floricultural Science, which forms part of the National Agriculture and Food Research Organization, Japan.

Prior to joining UWA, Helen worked as a Research Officer at Canola Breeders WA. In her new role at UWA she works on the Wheat/Barley Fast Generation Project and will focus on developing a ‘fast generation’ plant breeding system in Australian wheat and barley varieties.

Emeritus Professor Lyn Abbott
Email: Lynette.abbott@uwa.edu.au
Leading soil scientist, Professor Lyn Abbott has been lured out of a short-lived retirement to take up the honorary position of Deputy Director of The UWA Institute of Agriculture.

Previously she was Vice Dean of UWA’s Faculty of Natural and Agricultural Sciences and Winthrop Professor in the School of Earth and Environment. Her appointment follows the (temporary) departure of former Deputy Director, Winthrop Professor Graeme Martin, who is spending a year on sabbatical leave in the United Kingdom (see also page 13). Professor Abbott’s career includes an impressive track record in agricultural research, teaching and extension in soil biology related to land management and nutrient use efficiency.

Dr Hari D. Upadhyaya
Dr Hari D. Upadhyaya, from the International Crops Research Institute for the Semi-arid Tropics (ICRISAT) has been appointed as an Adjunct Professor within IOA. At ICRISAT Dr Upadhyaya holds the position of Principal Scientist and Head of the Genebank.

His expertise encompasses groundnut breeding, grain legumes, crop genetic resources and their utilisation in crop improvement including the use of molecular techniques.

Dr Upadhyaya has published over 219 journal articles and is an Adjunct Professor at Kansas State University. His appointment as Adjunct Professor within IOA will greatly strengthen research and joint supervision collaboration of postgraduate research students between ICRISAT and UWA in agriculture and related areas.

Staff awards and industry recognition

<table>
<thead>
<tr>
<th>NAME</th>
<th>AWARD</th>
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<tbody>
<tr>
<td>Res/Assoc/Prof Ramin Rafei</td>
<td>Viticulture and Oenology 2014 Science and Innovation Award for Young People in Agriculture</td>
</tr>
<tr>
<td>Prof Ryan Lister</td>
<td>Tall Poppy WA Award recognizing the brightest young scientists in WA. <a href="http://www.news.uwa.edu.au/201311276286/awards-and-prizes/biological-scientist-named-states-tall-poppy">www.news.uwa.edu.au/201311276286/awards-and-prizes/biological-scientist-named-states-tall-poppy</a></td>
</tr>
<tr>
<td>W/Prof Zed Rengel</td>
<td>Fulbright Scholar Award (see also page 10)</td>
</tr>
<tr>
<td>Dr Mike Perring</td>
<td>Winner of Alan Robson Medal, awarded for research excellence in agriculture and related areas. Title of his winning paper: The Ridgefield Multiple Ecosystem Services Experiment: Can restoration of former agricultural land achieve multiple outcomes?</td>
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<tr>
<td>Asst/Prof Marit Kragt</td>
<td>Winners (as a team) of the 2013 AARES Quality of Research Communications Award. <a href="http://www.news.uwa.edu.au/201403066498/awards-and-prizes/uwa-team-wins-quality-research-communication-award">www.news.uwa.edu.au/201403066498/awards-and-prizes/uwa-team-wins-quality-research-communication-award</a></td>
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<tr>
<td>W/Prof Martin Barbetti</td>
<td>Elected Fellow of the Society for Rapeseed-Mustard Research of India for his contributions to Brassica research.</td>
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<tr>
<td>W/Prof Roger Jones</td>
<td>Elected Fellow of The American Phytopathological Society for his many and significant contributions to plant virology.</td>
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New postgraduate research students

<table>
<thead>
<tr>
<th>STUDENT NAME</th>
<th>TOPIC</th>
<th>SCHOOL</th>
<th>SUPERVISOR(S)</th>
<th>FUNDING BODY</th>
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<tbody>
<tr>
<td>Ms Anna Aryani Amir</td>
<td>Effects of plant extract and plant secondary compounds (PSC) from grazing shrubs on in vitro oocytes maturation, embryo development and ovulation rate in ewes.</td>
<td>Animal Biology and IOA</td>
<td>W/Prof Graeme Martin, Assoc/Prof Dominique Blache</td>
<td>self-funded</td>
</tr>
<tr>
<td>Ms Karen Frick</td>
<td>Genomic approaches to improve narrow-leaved lupin as a human food.</td>
<td>Plant Biology, IOA and CSIRO</td>
<td>W/Prof Kadambot Siddique, Dr Rhonda Foley (CSIRO), Assist/Prof Lars Kamphuis (CSIRO and IOA)</td>
<td>UPA and UWA safety-net top-up scholarship</td>
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Visitors

<table>
<thead>
<tr>
<th>VISITOR</th>
<th>VISITORS’ ORGANISATION, COUNTRY</th>
<th>HOST DETAILS/PURPOSE</th>
<th>DATES</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dr Yanlei Du</td>
<td>Institute of Arid Agroecology, School of Life Sciences, Lanzhou University, Lanzhou, China</td>
<td>W/Prof Neil Turner, W/Prof Kadambot Siddique, W/Prof Tim Colmer, Dr Jiayin Pang</td>
<td>15 Jun – 15 Dec 2014</td>
</tr>
<tr>
<td>Ms Junlan Xiong</td>
<td>Institute of Arid Agroecology, School of Life Sciences, Lanzhou University, Lanzhou, China</td>
<td>W/Prof Neil Turner, W/Prof Kadambot Siddique</td>
<td>Mar 2014 – Mar 2015</td>
</tr>
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Agriculture online and on the air

<table>
<thead>
<tr>
<th>TOPIC</th>
<th>ACCESS FROM</th>
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<tbody>
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<td>720 Perth Radio interview of Isabel Arevalo-Ligne with Sabrina Hahn about how to ensure community-wide participation in fruit-fly control initiatives</td>
<td><a href="http://www.abc.net.au/local/audio/2013/11/16/3912539.htm">www.abc.net.au/local/audio/2013/11/16/3912539.htm</a></td>
</tr>
<tr>
<td>A selection of interviews with leading UWA scientists involved in agricultural and related research</td>
<td><a href="http://www.ioa.uwa.edu.au/publications/videos">www.ioa.uwa.edu.au/publications/videos</a></td>
</tr>
<tr>
<td>Professor Dan Murphy talks about the GRDC Soil Initiative II</td>
<td><a href="http://www.soilquality.org.au/videos">www.soilquality.org.au/videos</a></td>
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New research funded projects

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<thead>
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<th>FUNDING BODY</th>
<th>SUPERVISORS</th>
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</thead>
<tbody>
<tr>
<td>Molecular mechanisms underlying extensive replacement of phospholipids by galactolipids and sulfolipids in Hakea prostrata during leaf development</td>
<td>2014 – 2016</td>
<td>ARC Discovery Projects</td>
<td>W/Prof Hans Lambers, Assoc/Prof Patrick Finnegan, Dr Patrick Giavalisco</td>
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<tr>
<td>Revealing novel mechanisms conferring evolution of resistance to glufosinate and glyphosate in Eleusine indica</td>
<td>2014 – 2016</td>
<td>ARC Discovery Projects</td>
<td>W/Prof Stephen Powles, Assoc/Prof Qin Yu</td>
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<td>Measuring protein turnover in vivo in plant mitochondria and chloroplasts to identify protease targets</td>
<td>2014 – 2016</td>
<td>ARC Discovery Projects</td>
<td>W/Prof Andrew Millar, Dr Shaobai Huang, Dr Adriana Pruzinska</td>
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<tr>
<td>Unique epigenetic states in plant stem cell niches for safeguarding genome integrity</td>
<td>2014 – 2016</td>
<td>ARC Discovery Projects</td>
<td>Prof Ryan Lister</td>
</tr>
<tr>
<td>Understanding the biological functions of the karrikin-responsive signaling system of plants in growth, development and responses to the environment</td>
<td>2014 – 2016</td>
<td>ARC Discovery Projects</td>
<td>W/Prof Steven Smith</td>
</tr>
<tr>
<td>Characterizing the regulators of mitochondrial biogenesis in Arabidopsis thaliana</td>
<td>2013 – 2017</td>
<td>ARC Future Fellowships</td>
<td>Dr Monika Murcha</td>
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<tr>
<td>Dissecting novel roles of succinate dehydrogenase in stomatal aperture and root elongation in plants</td>
<td>2013 – 2017</td>
<td>ARC Future Fellowships</td>
<td>Dr Shaobai Huang</td>
</tr>
<tr>
<td>Evolutionary adaptation of the chemical language of nutrient acquisition strategies in higher plants</td>
<td>2014 – 2016</td>
<td>ARC Discovery Early Career Researcher Awards</td>
<td>Dr Margaretha van der Merwe</td>
</tr>
<tr>
<td>Round 2 Nitrate and sulphate rich shrubs to reduce methane and increase productivity</td>
<td>2013 – 2015</td>
<td>CSIRO ex DAFF Carbon Farming Futures Filling Research Gap</td>
<td>Dr Hayley Norman, Assoc/Prof Philip Vercoe, Prof Edward Barrett-Lennard, Assoc/Prof John Milton</td>
</tr>
<tr>
<td>Options for improved insecticide and fungicide use and canopy penetration in cereals and canola</td>
<td>2013 – 2015</td>
<td>GRDC</td>
<td>Assoc/Prof Christian Nansen</td>
</tr>
<tr>
<td>Long term no-till farming systems</td>
<td>2013 – 2015</td>
<td>GRDC</td>
<td>Dr Kenneth Flower</td>
</tr>
<tr>
<td>Phenotyping and simulation of barley root architecture for edaphic stress adaption</td>
<td>2014 – 2015</td>
<td>Group of Eight DAAD German Research Cooperation</td>
<td>W/Prof Zed Rengel, Dr Johannes Postma, Dr Yinglong Chen</td>
</tr>
<tr>
<td>ARC Centre of Excellence in Plant Energy Biology 2014 (CPEB2)</td>
<td>2014 – 2020</td>
<td>ARC Centres of Excellence</td>
<td>W/Prof Andrew Millar, Dr Barry Pogson, Prof Stephen Tyerman, Prof Ian Small, Prof James Whelan, Assoc/Prof Justin Borevitz, Prof Ryan Lister, Dr Owen Atkin, Adj/Prof Rana Munns</td>
</tr>
<tr>
<td>Scientific visits to Japan - Meeting future Australian pasture crop challenges: whole genome sequence of subterranean clover</td>
<td>2014</td>
<td>Australian Academy of Science</td>
<td>Dr Parwinder Kaur</td>
</tr>
<tr>
<td>PhysiTrace: Retailer standard compliance and logistics and implementation plan</td>
<td>2014</td>
<td>Australian Pork Limited</td>
<td>W/Prof Garry Lee, W/Prof Roger Watling, Ms Heather Channon</td>
</tr>
<tr>
<td>Reassessing the value and use of fixed nitrogen</td>
<td>2013 – 2015</td>
<td>CSIRO ex GRDC</td>
<td>Assoc/Prof Michael Renton</td>
</tr>
<tr>
<td>Upskilling the Western Australian grains industry in disease surveillance for a more productive and biosecure future</td>
<td>2014 – 2016</td>
<td>COGGO</td>
<td>Prof Nancy Longnecker, Ms Dominie Wright</td>
</tr>
<tr>
<td>Synthetic restorer genes for creation of hybrid wheat</td>
<td>2014 – 2015</td>
<td>Groupe Limagrain Vilmorin &amp; Cle</td>
<td>Prof Ian Small</td>
</tr>
<tr>
<td>Organics metals salts interactions in food safety and environment protection - combined experimental and modelling approach</td>
<td>2013 – 2014</td>
<td>Marie Curie Fellowship</td>
<td>Prof Davor Romic, W/Prof Zdenko Rengel</td>
</tr>
<tr>
<td>Round 2 Innovative livestock systems to adapt to climate change and reduce emissions</td>
<td>2013 – 2015</td>
<td>Meat &amp; Livestock Australia</td>
<td>Assoc/Prof Phillip Vercoe</td>
</tr>
<tr>
<td>CRC Impact grain industry delivery sites</td>
<td>2013 – 2016</td>
<td>Mingenew Irwin Group ex CRC Plant Biosecurity</td>
<td>Assoc/Prof Christian Nansen</td>
</tr>
<tr>
<td>Enhancing immune competency to improve lamb and weaner survival</td>
<td>2013 – 2014</td>
<td>Murdoch University ex Meat &amp; Livestock Australia</td>
<td>Prof Shimin Liu</td>
</tr>
<tr>
<td>Floor laying as welfare and economic issues in duck farming</td>
<td>2013 – 2016</td>
<td>Poultry CRC Ltd</td>
<td>Assoc/Prof Dominique Blache, Prof Shane Maloney, Assoc/Prof Ireneusz Malecki</td>
</tr>
</tbody>
</table>
### IOA Publications 2013 (November onwards)

**Refereed journals**


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### Title: Domestication of Kakadu Plum Terminalla Ferdinandianna

**Funding Period:** 2014 – 2016

**Funding Body:** Rural Industries Research & Development Corporation

**Supervisors:** Dr Liz Barbour, Adj/Asso/Prof Margaret Byrne, Mr Kim Courtenay, Dr Isabela Konczak, Mr Julian Gorman, Mr Cameron McConchie

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### Title: Transitioning to resilient perennial pasture systems to abate greenhouse gases and sequester carbon

**Funding Period:** 2013 – 2016

**Funding Body:** Terneis Agricultural Consulting ex DAFF Carbon Farming Futures Action on the Ground

**Supervisors:** Assoc/Prof Philip Vercoe

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### Title: Development of salinity tolerant wheat and barley

**Funding Period:** 2013 – 2015

**Funding Body:** University of Adelaide ex GRDC

**Supervisors:** Prof Ed Barnett-Lennard, W/Prof Timothy Colmer, Dr Roy Stuart

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### Title: National Variety Trials project (NVT)

**Funding Period:** 2013 – 2014

**Funding Body:** University of Wollongong ex GRDC

**Supervisors:** Dr Aanandini Ganesalingam

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### Title: Putting the Focus on Profitable Break Crop and Pasture Sequences in WA

**Funding Period:** 2013

**Funding Body:** DAFWA ex GRDC

**Supervisors:** Assoc/Prof Michael Renton, Dr Arthur Diggle

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### Title: Building soil carbon in cropping systems and impact on greenhouse gas emissions using cattle feedlot compost

**Funding Period:** 2014 – 2017

**Funding Body:** WA Lot Feeders Association (WALFA) ex DAFF Carbon Farming Futures Action on the Ground

**Supervisors:** Dr Zakaria Solaisan, E/Prof Lynette Abbott, Mr Steve Jones

---

### Title: UWA led ancient soils and modern land use: A challenge for Critical Zone Science international workshop and summer school

**Funding Period:** 2013

**Funding Body:** Worldwide Universities Network (WUN)

**Supervisors:** Asst/Prof Matthias Leopold, Assoc/Prof Deirdre Gleeson, Dr Gavan McGrath, Assoc/Prof Andrew Rate
on arterial stiffness and blood pressure in healthy volunteers. *Nitric Oxide* **35**:125-130.


**Book Chapters**


**IOA Publications 2014 (to March)**


**Book Chapters**


**Books**
