



WUN delegates at UWA

UWA hosts Global Farm Platform workshop

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Delegates representing ten universities and three research agencies met at UWA in September for an intensive, week-long Worldwide Universities Network (WUN) workshop.

During the workshop sessions, Dr Sute Mwakasungula presented the work of the Small Scale Livestock Livelihoods Program (SSLLP) with smallholder livestock producers and explained the importance of livestock in Malawi in providing food, income, manure, animal traction and social security. About 1.4 million farm families (85% smallholders) own one or more of various types of livestock, which provide an efficient way of transforming crop residues and reducing competition for food between humans and livestock.

Professor Michael D'Occhio and Dr Beverley Henry presented the work of the new 'Livestock in Landscapes' group at the Centre for Carbon, Water and Food of the University of Sydney Faculty of Agriculture and Environment.

They explained how engineering and robotic science, including new and emerging sensing, imaging and monitoring technologies, might help achieve the transformation in production systems required to meet the increase in demand for animal protein, whilst not imposing excessive demands on natural resources. They introduced automated and remote animal recording systems that will have particular application in the management of production, health and wellbeing in extensive livestock systems.

Professor Nicolás López-Villalobos of the Massey University Institute of Veterinary, Animal & Biomedical Sciences discussed trends in the New Zealand dairy industry including a shift in breed composition from predominantly Holstein-Friesian cattle to an increasing proportion of Jersey and Jersey-cross animals, in part driven by milk pricing based on solids (i.e. protein and fat content) rather than volume.

Another interesting emerging trend is that of once a day milking which, for many farmers, is a lifestyle choice, freeing valuable time otherwise spent in the milking parlour for leisure activities.

Surprisingly, data obtained from Massey's Dairy Farm No. 1, which made the switch in 2013, showed that once a day milking results in a relative small reduction in yield, in many cases more than outweighed by the benefits of the reduced labour requirement.

Delegates spent a day visiting the UWA Farm Ridgefield at Pingelly. The tour of the farm included demonstration of methodologies for measurement of greenhouse gas emissions from sheep under a variety of experimental grazing conditions including ryegrass/clover mixes, *Biserulla* and *Serradella*. The visitors also inspected experimental paddocks planted with the anti-methanogenic shrub, *Eremophila glabra*.

The meeting culminated in the signing of a Statement of Intent by IOA Director, Hackett Professor Kadambot Siddique. This statement was finalised by the workshop participants, and sets out the Vision, Mission and Plan for the Global Farm Platform.



Director's column

Hackett Professor Kadambot Siddique
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Agriculture at UWA has received substantial recognition over the past 12 months. In this year's Shanghai Jiao Tong University's internationally recognised Academic Ranking of World Universities (www.shanghairanking.com), Life and Agricultural Sciences at UWA has climbed to 24th in the world, the highest ranking in Australia. Overall, UWA was ranked 88th in the world.

When judged against performance ranking of scientific papers for world universities 2014, released by the National Taiwan University Ranking (<http://nturanking.lis.ntu.edu.tw>), agricultural sciences climbed five places to 35th worldwide.

UWA's plant and agricultural scientists too have been recognised locally and internationally (see page 20). Professor Ian Small was named WA Scientist of the Year 2014 and Professor Ryan Lister has been awarded a Prime Minister's Prize for Science (see page 15).

In order to continue raising the national and international standing of agriculture at UWA, The UWA Institute of Agriculture (IOA) held a strategic planning day earlier in the year, during which key members of the University and agriculture industry discussed IOA's strategic direction for the next five years. Feedback from these sessions and from the Industry Advisory Board, Executive Management Board and recent agriculture mapping exercise at UWA has been consolidated and the Strategic Plan 2014-2018 is currently being

finalised. The Institute's performance objectives will be met through its strategies of integrating, communicating, connecting and resourcing.

To achieve these objectives, Professor Phil Vercoe and Professor Daniel Murphy have agreed to take on the roles of Associate Directors of IOA commencing in 2015. They have both contributed significantly to IOA as Program Leaders and I look forward to having them even more involved with the Institute's strategic direction.

We welcome back Professor Graeme Martin who has returned from a year-long sabbatical at Oxford University. Professor Martin will lead the overall strategic direction of UWA Farm Ridgefield. Much progress has been made on the Farm this year with a newly built dam functioning well to improve water security (see page 3). In September, we welcomed international delegates to the Farm for the Global Farm Platform workshop (see cover story).

In keeping with IOA's mission to advance research, education, training and communication in agriculture, over the last three months IOA has held a number of successful outreach activities to engage with various stakeholders. We held an Agricultural Adjunct Academics Networking event (see page 8), Industry Forum (see page 9), attended the Dowerin Field Days (see page 7) and engaged with farmers at various Field Days (see page 2).

I would like to thank the IOA Industry Advisory Board, the Executive Management Board, Program Leaders, UWA Farm Ridgefield Committees, IOA members and staff for their hard-work and dedication over the last 12 months. I also thank Emeritus Professor Lyn Abbott for her tireless efforts during the past one year as the Deputy Director of IOA. We have a great support team and 2015 is set to be an even better year.

Season's greetings to you and your family and happy holidays.



Professor Kadambot Siddique discussing the role of chemical fallow and rotational crops with the Corrigin Farm Improvement Group

Corrigin farmers receptive to growing chickpea

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The Corrigin Farm Improvement Group (CFIG) held a field day in Corrigin on 18 September 2014. Hackett Professor Kadambot Siddique and Professor Tanveer Khan from IOA, along with Mr Alan Meldrum from Pulse Australia were invited to share their research with growers and agribusiness personnel who attended the event.

Funded by the Council of Grain Growers Organisations (COGGO), their research is aimed at accelerating grower adoption of chickpea in Western Australia.

Professor Khan and Mr Meldrum demonstrated the new chickpea varieties that are resistant to ascochyta blight, a devastating disease of chickpea. The new varieties are also higher yielding than the older variety. Management options to maximise yield and profit were discussed.

Professor Siddique addressed the marketing issues including the international demand for chickpea and price variables. He also discussed quality and stressed the need for developing a "Brand Australia" for grain commodities in general and pulses in particular.

Corrigin, including higher rainfall areas in south-western Australia, are not traditional chickpea growing areas. However, experimental evidence from IOA suggests that chickpea may offer a viable option in view of the availability of disease resistance in new chickpea varieties.

Mr Simon Wallwork of CFIG thanked the speakers from IOA and offered full cooperation in efforts to rejuvenate the pulse industry in Western Australia. The field day was a great success with over 35 receptive growers and agribusiness personnel participating in the discussions.

Water Security at UWA Farm

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Water security in contemporary farming in the WA grainbelt has been and probably always will be a matter of concern requiring careful planning and investment.

At UWA Farm Ridgefield in the Shire of Pingelly, the site of the UWA Institute of Agriculture Future Farm 2050 project, two major associated steps have recently been taken to ensure water security on the farm for future research and commercial operations.

In 2011 a deep dam was excavated after extensive drill testing across the farm to find a site where sufficient depth could be excavated close to potential catchment sites. The dam has a capacity in excess of 20,000 cubic metres and is the primary source of fresh water on the farm. Combined with two older dams that are scheduled to be renovated, the farm will have a reliable water supply into the future.



UWA Farm Ridgefield dam at 75% capacity

The dam is currently at 75% capacity after the winter rains. The new dam is fed from a 5 hectare low profile 'roaded' catchment, the first 3 hectares of which were completed in July of this year. This catchment is founded in an excellent clay layer which renders the surface quite impermeable. The roads have a very low profile in comparison to conventional dams slowing the rate of water run-off in rain events and thus minimising erosion.

Both the dam banks and the catchment profile are compacted in layers to improve the water retention performance of the dam and catchment. It is expected that the catchment will deliver a flow into the dam with as little as a 3mm rain event.

Overall, this catchment should represent an improvement in performance of 400% over conventional constructed catchments.

Students plant trees on UWA Farm

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A group of students, mainly residents of UWA University Hall contributed to planting 2,500 native trees and shrubs during an overnight visit to UWA Farm Ridgefield in July.

A roaded catchment around a large dam was built on the farm earlier this year to ensure water security for farm operations (see page 3). The trees were planted as part of the final phase of the project to enhance the biodiversity value of surrounding remnant vegetation.

Dr Mike Perring (School of Plant Biology and IOA) who supervised the tree planting with Mr Tim Morald from the School of Plant Biology said the exercise was a perfect opportunity to introduce students to the Farm, and enhance links between the University and regional Western Australia.

Singaporean undergraduate student Beiqing Zhao said he tries not to pass up on opportunities to visit rural WA.



Native shrubs are planted using a potiputkis

"I have not spent much time on farms before so the visit to UWA Farm Ridgefield was a great way to broaden my horizons. We learnt about sustainable farming practices, and why it is important to choose native plants over other species," Beiqing said.

"Tim and I were very impressed at the commitment from all the students. I'm glad the weather obliged in the end and that they got to enjoy their wheatbelt experience," Dr Perring said.

The tree planting exercise was supported by UWA Facilities Management as part of their carbon offset commitment.

Emeritus Professor Lyn Abbott who also attended the event said there are plans to get more of the UWA community involved with the Farm.



Professor Moto Ashikari and Dr Keisuke Nagai during measurements of partially submerged deepwater rice in a tank in a glasshouse at the Nagoya University Field Station

UWA-Nagoya University collaboration on submergence tolerance in rice

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Floods resulting in submergence of rice crops are a major cause of yield loss in several parts of south and south-east Asia, with devastating effects on food supplies and economic sustainability of small holder farming communities.

UWA Institute of Advanced Studies Professor-at-Large Ole Pedersen has been researching oxygen microelectrode methods and the importance of leaf gas films for submerged rice, in collaboration with Professor Tim Colmer from the School of Plant Biology and IOA. A gas film is the thin layer of air retained on the superhydrophobic leaf surfaces when submerged. This layer assists rice with gas-exchange when under water.

The gas films result in improved entry of carbon dioxide from the floodwaters during the daytime so that rates of underwater photosynthesis are higher than if these films are lost. They also enhance the inwards diffusion of oxygen to sustain plant respiration during the darkness of night.

Professors Ole Pedersen and Tim Colmer and Dr Imran Malik visited Nagoya University in August 2014 to conduct experimental work on underwater photosynthesis and internal aeration of selected rice genotypes with Professor Moto Ashikari, Dr Keisuke Nagai and PhD student Yusuke Kurokawa.

Two main experiments were conducted during the visit. Oxygen in the stems of submerged plants was measured over time using miniaturised oxygen probes inserted into intact plants. This measured the internal aeration of deepwater rice and will assist in understanding the conditions in stem internodes, which respond with rapid extension growth when submerged. The influence on internal oxygen status of when leaf tips re-establish air-contact was also monitored.

The second study characterised the submergence responses of rice mutants with altered cuticle properties resulting in lower surface hydrophobicity, and rapid loss of surface gas when submerged. The mutants clearly displayed reduced underwater photosynthesis, as compared with the wild type. Professor Ashikari's group at Nagoya University will use these mutants to characterise the genetic basis of the cuticle properties influencing gas film retention on leaves of submerged rice.

Further joint experiments are planned for 2015 to complete the detailed studies of the oxygen status in stems of submerged deepwater rice. The team aim to combine molecular genetic and physiological approaches to improve understanding of submergence tolerance in rice and to identify possible traits useful for future breeding.

Executive Leadership Program for Co-operatives and Mutuals launched

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UWA's Co-operative Enterprise Research Unit (CERU) launched an Executive Leadership Program for Co-operatives and Mutuals (ELP-CM) in September 2014.

The 5-day residential program takes senior managers through a series of modules and draws upon the research on the Co-operative enterprise business model conducted at UWA in 2010.

The above research, on which the executive leadership program is based, was conducted by researchers from The UWA Business School and IOA. Led by Professor Tim Mazzarol, the team examined the impact of organisational and financial structures, governance and management practices, and member communication and engagement on the resilience of co-operative enterprises. It was funded under an Australian Research Council (ARC) Linkage Grant between UWA, Co-operatives WA, Co-operative Bulk Handling, Capricorn Society and Ravensdown Fertiliser Co-operative.

CERU Director Professor Tim Mazzarol said the executive leadership program was very well received by industry.

"The Executive Leadership Program for Co-operatives and Mutuals has the support of CBH Group, Co-ops WA and the BCCM," said Professor Mazzarol.

"We are focused on research and education projects that enhance our understanding of the co-operative and mutual enterprise business model; its structure, operations, competitiveness and sustainability."

CERU's work will be incorporated into the IOA's research program focusing on rural economy, policy and development. CERU and IOA have already commenced work targeted at enhancing rural farming communities in WA as well as South East Asia using Co-operative enterprise principles.

For more information on CERU including the research exchange and publications arising from this work visit www.cemi.com.au/node/514



Prof Steve Powles at the National Academy of Sciences Herbiicide Resistance Summit

Diversity disrupts resistance evolution

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Diversity disrupts resistance evolution was the key message Professor Stephen Powles conveyed at the US Herbiicide Resistance Summit held at the US National Academy of Science, Washington DC, in September 2014.

The US is facing the world's biggest herbicide resistance problem. Millions of hectares of land are infested with glyphosate resistant weeds. Professor Powles, Director of UWA's Australian Herbicide Resistance Initiative (AHRI) who was a plenary speaker, said that a big focus by growers, researchers and advisors on weed control in the USA has been herbicides. This strategy has clearly failed and the future will need to be different.

"Get some diversity and other herbicides into the system. Use pre-emergent herbicides and different crops; anything that makes economic sense," Professor Powles said.

"It's about trying to use as many different tools as possible and good agronomy within the economic reality of farming for profit."

He explained that diverse weed management strategies including full label rates and rotating herbicide modes of action must be coupled with non-herbicide weed control tools like crop competition and harvest weed seed control.

In Australia, millions of hectares of ryegrass were planted to feed sheep. This created a massive weed resistance problem when farming systems shifted to cropping. Although the USA's weed resistance problem has been caused by the total reliance on glyphosate, the solutions are remarkably similar for both countries.

"Some of the potential technology to improve diversity discussed at the Summit include RNAi technology, integrating weed seed destruction into the combine harvester at purchase, "green from green" weed detection, switching off metabolic resistance and regulation of herbicide resistance weeds," Professor Powles said.

"It will be of a benefit to grain growers worldwide if the USA can utilise their resources to help develop new, non-herbicide weed control tools to improve diversity."

ACIAR Policy Advisory Council visits UWA

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The Policy Advisory Council (PAC) to the Australian Centre for International Agricultural Research (ACIAR) visited UWA on 3 September 2014.

ACIAR is part of Australia's international development cooperation program. Its principal goals are to reduce food insecurity, improve livelihoods and care for the natural resource base for agriculture.

The PAC members help ACIAR advance Australia's national interest by assisting developing countries to reduce poverty and achieve sustainable development. In attendance were representatives from Indonesia, Philippines, Laos, Cambodia, India, Pakistan and Kenya.

The delegation met with Emeritus Professor Lyn Abbott, Professor William Erskine, Associate Professor Dominique Blache and Professor Keith Smettem.

They visited the UWA glasshouses where Professor Neil Turner, Dr Jiayin Pang and Mr John Quealy gave an overview of the large chickpea experiment on drought resistance and salinity tolerance.

In a letter to IOA Director Hackett Professor Kadambot Siddique, ACIAR CEO Dr Nick Austin thanked IOA members for providing excellent insight to the research capabilities and current research work of the University.

"It was great to learn about UWA's involvement in international agriculture research," he wrote.

"The visit to the chickpea experiments gave a particularly interesting example of research in action."

He added that the PAC members were interested in the discussions on the importance of research to universities and the common issue of attracting new students to agriculture related studies.



ACIAR PAC members visit UWA



Adj/Prof Upadhyaya receiving the award from Dr Baltensperger, President of the Crop Science Society of America

Another win for Crop Science

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IOA Adjunct Professor Hari D Upadhyaya has received a prestigious International Service in Crop Science Award from the Crop Science Society of America. He received the award in person during the annual meeting at Long Beach, California, USA on 3 November.

The International Service in Crop Science Award recognises creativity and innovation in bringing about specific changes in practices, products and programs in the crops area at the international level.

Dr Upadhyaya said the award was an acknowledgment of his work in developing a large number of peanut breeding lines with improved characteristics, early-maturity, tolerance to drought, and resistance to foliar diseases and aflatoxin.

"To date, 31 such breeding lines have been released as 44 cultivars in 22 countries, contributing to food and nutritional security in these countries," Dr Upadhyaya said.

"I have also registered 23 elite peanut genetic stocks with improved characteristics that further benefit the global peanut research community."

A genetic resource specialist at the International Crops Research Institute for the Semi-Arid Tropics (ICRISAT), Dr Upadhyaya proposed the mini core concept and developed mini core collections for chickpea, peanut, pearl millet, pigeonpea, and sorghum, as well as for finger and foxtail millets.

"The evaluation of peanut, chickpea, sorghum, pearl millet, pigeonpea and finger millet mini core collections has allowed us identify new sources of variations with agronomically beneficial traits, which breeders of these crops at ICRISAT and national programs are using in breeding program to develop new varieties with improved characteristics and adaptation to specific agroecologies," Dr Upadhyaya said.

Dr Upadhyaya is the Principal Scientist (Groundnut Breeding) and Head of Genebank at the International Crops Research Institute for the Semi-Arid Tropics (ICRISAT) based in Hyderabad, India. IOA appointed him an adjunct position in 2014 in recognition of his contribution to crop science and joint supervision of postgraduate research students between ICRISAT and UWA in agriculture and related areas.

Agricultural Science students represent UWA in Crops Competition

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In September, five agricultural science students from UWA went to the regional town Temora in New South Wales to participate in the 2014 Australian Universities Crops Competition (AUCC).

The AUCC is a three-day competition held by Grain Growers that exposes students to all aspects of the agriculture industry, from input costs, variety selection, yield potential and end user.

UWA was among seven universities to participate including five Australian universities, and two from the USA. Competitors were examined individually and as university teams in both competitive and non-competitive components.

One example was a farm management simulation in a program called ProductionWise. This farm management tool was used to examine how each competitor would manage a particular crop in a particular situation, with the key outcome being production of a high yielding crop.

Also assessed was the competitor's ability to grade grain using machines from GrainCorp, identify yield potential of a live crop, analyse foliar diseases and identify weeds. There was also a business management component, identification of grain seeds and assessment of knowledge on cereals, oilseeds and pulses crops.

Incoming president of the UWA Students in Natural and Agricultural Sciences (SNAGS) club Ms Rachel Asquith said that although they did not win the competition, they learnt how other countries and states undertake agriculture and research, and formed great friendships.

"This was an incredible opportunity for us to expand our understanding on a diverse range of topics applicable to agricultural science and test both our theoretical and practical knowledge of industry, science and innovation," Rachel Asquith said.



Students Rachel Asquith, Sophie Hooper, Georgia Reid, Andrew Smith and Lachlan Hunter represent UWA at AUCC



E/Prof Lyn Abbott demonstrates the soil biology display at Dowerin Field Days

Dowerin Field Days celebrates its 50th year

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Starting with just six exhibitors in 1964, the Dowerin Field Days have grown exponentially to a peak of approximately 650 exhibitors at this year's semi-centennial celebration. A record 24,000 visitors came from all across Western Australia and the eastern states to attend the two-day event on 27 and 28 August 2014.

Soil Quality was the theme of IOA's display this year. Emeritus Professor Lyn Abbott and IOA Communications Officer Diana Jasudasen who attended both days, distributed factsheets from the website soilquality.org.au.

[Soilquality.org.au](http://soilquality.org.au) is a portal where soil biological, chemical and physical properties through Australia's agriculture regions can be examined. Much of the research on the website has been developed by Professor Daniel Murphy from IOA and the School of Earth and Environment and his team, in collaboration with DAFWA, NRM groups and in particular Wheatbelt NRM and GRDC's Soil Biology Initiative II that is rolling the soil quality research and extension program out across Australia.

"The main message being communicated was that a healthy soil has biological, chemical and physical properties that promote the health of plants, animals and humans whilst maintaining environmental quality," E/Prof Abbott said.

There was considerable interest in the University's Farm Ridgefield, from farmers who were keen to hear about the latest research, and from high school students looking to pursue agricultural science at UWA.

"The Dowerin Field Days continues to be one of Australia's largest and most impressive agricultural expos because it connects growers, industry, scientists and the community. The relationships built and conversations held go a long way towards strengthening best practices," E/Prof Abbott said.

Strengthening agriculture teaching links between UWA and Chinese universities

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Students and academics from Northwest Agriculture & Forestry University (NWAUFU) and South China Agricultural University (SCAU) spent the month of July at UWA for an intensive training and cultural program organised by UWA Extension.

The students came to learn about the agricultural systems in Western Australia and the cutting-edge research and teaching carried out by UWA in these areas. These students were particularly interested in the sheep and dairy farming, UWA's efforts into breeding crops against environmental stresses, herbicides and pesticides, and management of natural resources.

The visit included a trip to UWA Farm Ridgefield in Pingelly to learn how to integrate farming practices with dryland ecosystem management. They were especially impressed by the greenhouse gas mitigation and ecosystem restoration research programs at UWA Farm.

The study tour showed students not just what research institutions are doing, but what a private groups such as the Bouverie Farm can do in the development of sustainable agricultural systems.

Hackett Professor Kadambot Siddique and other academics gave presentations on the major agricultural issues facing both Australia and China. The Department of Agriculture and Food WA hosted the students at the Manjimup Research Station.

"I learned that people need a vision to develop production while not destroying this planet," NWAUFU student Kaipeng Zhang wrote in his report.

Another student, Yiping Zhu from SCAU said, "We need to prepare over a long period of exploring how to develop sustainable agriculture systems. If we do not take action as soon as possible, our environment will possibly suffer great damage, which will cost much more to rescue than investing in the new model of agriculture."

In a letter thanking UWA Extension and all staff involved, SCAU program leader Professor Daqian Huang said he felt the program had improved year after year and that he looks forward to long term collaboration with UWA.

These study tours could not run without the strong support from IOA, Schools of Animal Biology, Plant Biology, and Earth and Environment, Plant Breeding and Genetics Centre, and the Centre of Excellence for Natural Resource Management (Albany).



SCAU students with Professor Kadambot Siddique and Associate Professor Qin Yu



E/Prof Alan Robson, Drs Phil Nichols, Don McFarlane and Phil Ward

Agricultural adjunct academics networking event

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The University appoints adjunct positions to provide recognition to persons who make a regular and significant contribution to the activities of the University. At UWA, adjunct academics make up 25% of the Faculty of Science.

IOA hosted a networking event on 16 October 2014 to acknowledge the contribution that adjunct academics in agricultural and related areas play in research and teaching. The event provided an opportunity for attendees to provide suggestions on how IOA and the University can enhance the partnership with adjuncts.

In his opening address, Emeritus Professor Alan Robson, reflected on the days when everyone stopped for morning and afternoon tea. He said the informal interaction in the tea rooms provided collegiality and open discussions that led to great collaboration.

Professor Robson also said that adjunct academics can play an important role in increasing the research and student base and stressed the importance of having a strong IOA presence.

Adjunct Senior Lecturer Phil Ward and Adjunct Senior Lecturer Phil Nichols, both from the School of Plant Biology and Adjunct Senior Research Fellow Don McFarlane from the School of Earth and Environment gave brief presentations about their association with UWA and discussed some of the research they have been able to conduct as a result.

Dr Phil Ward, a senior research scientist with the CSIRO said his adjunct position has given him access to students and access to expertise that there may not be at CSIRO. However, he felt it could at times be difficult as an adjunct to break in and maintain links.

Dr Phil Nichols, a senior pasture scientist at the Department of Agriculture and Food WA said that his adjunct appointment has given him the opportunity to contribute to teaching of pasture science.

"Teaching is something I am very passionate about and enjoy," Dr Nichols said.

"It is my way of giving back to the University and there's a sense of pride in that, particularly as we see UWA's international rankings rise, maybe I've had a bit of a role in contributing to that."

Dr Don McFarlane, a senior research scientist with the CSIRO said his adjunct position makes it more likely that joint research and joint events take place but there needs to be two-way communication between the adjunct academics and University staff for timelines to match up.

"Personal links are really important. It is important for both sides to be proactive," Dr McFarlane said.

IOA Director Kadambot Siddique said that many adjuncts would like to do more guest lectures, postgraduate co-supervision and research and encouraged open lines of communication so that both the adjuncts and the University can benefit from the appointment.

UWA Turf Research Program's inaugural 'winter' Open Day

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An 'Open Day' was held at the UWA Turf Research Facility at Shenton Park on Wednesday 13 August 2014.

The Turf Industry was invited see how summer water allocations were affecting turfgrass quality in mid-winter. Over 50 people attended the day, with representatives from local government, schools, and other government departments. Attendees were able to inspect the turfgrass plots after a brief presentation from the project leader, Associate Professor Louise Barton.

Local government and other groundwater users in Perth are currently allocated 7500 kL of ground water per hectare of parks and gardens. The UWA Turf Research Program is assessing how effectively turfgrass growth and quality can be maintained on the current allocation, and what the implications are if the allocation is lowered.

The morning provided UWA staff with an opportunity to discuss the implications of lowering water allocations with turfgrass managers in an informal setting, plus receive feedback from the industry which is funding the research in partnership with Horticulture Australia Limited (HAL).



Attendees inspecting turfgrass plots at the UWA Turf Research Program 'Winter' Open Day

Record numbers attend IOA's Industry Forum 2014

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On 29 July 2014, IOA hosted its largest Industry Forum since the annual event began eight years ago. The packed venue was largely to do with currency of the topic: 'Potential for food production in northern Western Australia'.

The purpose of the Industry Forum is to bring together some of Western Australia's leading farmers, key industry leaders and researchers to discuss a current topic in agriculture.

This year's topic could not have been more timely with WA Minister for Water and Forestry Hon Mia Davies announcing plans to help expand WA's agricultural sector in the West Kimberly region just one day earlier. Mr Vincent Catania (MLA), Parliamentary secretary to the Minister formally opened the Industry Forum and expanded upon the Water for Food program that had been announced.

Executive Director, Irrigated Agriculture and Diversification at the Department of Agriculture and Food, Western Australia (DAFWA), Terry Hill gave the key note address and noted that there is a greater understanding of risks in the north.



Panel of speakers Dr Richard George, Graham Laitt, Terry Hill, Steve Meerwald, Christian Bloecker and Jeff Wilke field questions from the audience

Steve Meerwald, Agricultural Connections Australia discussed the challenges and opportunities in the beef industry in the north, and Ord River farmer Christian Bloecker, Bothkamp Australia Farm discussed their experiences with crop and cropping systems in the region.

An agribusiness perspective to investment and risk in the northwest was delivered by Graham Laitt, Managing Director, Milne AgriGroup who explained how risks could be managed through diversification in the agribusiness sector. This point was also touched on by Jeff Wilkie, Manager Pastoral Stations and Agricultural Projects, Rio Tinto who gave a perspective from the resources sector and the synergies between mining and agriculture.

Water, environment and sustainable development issues related to potential food production in

northern WA was addressed by DAFWA's principal research scientist Dr Richard George.

Consultant Kevin Goss facilitated the panel discussion and summarised the forum proceedings. He noted that all speakers indicated that lessons had been learned and that the probability of success in WA's north is greater as a result.

IOA Director Hackett Professor Kadambot Siddique said "Feedback from the attendees has been extremely positive. The success of this event is directly related to the calibre of the speakers so we are grateful that they were able to give up their time and in some cases travel to Perth for the forum."

A copy of all presentations and summary from the forum can be found at www.ioa.uwa.edu.au/publications/industry-forum

UWA well-represented at International Legume Research Conference

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UWA showed its strength in legume research and development at the sixth International Food Legumes Research Conference and seventh International Conference on Legume Genetics and Genomics in July 2014 at Saskatoon, Saskatchewan in Canada.

Several researchers from UWA's Centre for Plant Genetics and Breeding and IOA travelled to Canada to give talks, present posters or learn more about the latest legume research insights.

IOA Director Hackett Professor Kadambot Siddique gave the key note presentation titled Abiotic Stress

in Cool Season Grain Legumes: Genetic and Agronomic Approaches and chaired the session on Abiotic Stress. Professor William Erskine, Assistant Professors Janine Croser and Lars Kamphuis, as well as Dr Parwinder Kaur and Dr Imran Malik also spoke at the conference.

Other UWA participants were Emeritus Professor Craig Atkins, Associate Professor Matthew Nelson, Assistant Professor Ping Si and Dr Jose Jimenez-Lopez.

"UWA has strong capacity in legume genetics and physiology, and this was evident by the number of our researchers invited to present," said Professor Siddique.



Prof Siddique with Professor Istvan Rajcan at the University of Guelph in Canada

"These conferences are a great opportunity to brainstorm ideas with like-minded scientists and forge strong collaborative relationships."

Whilst in Canada, Professor Siddique took the opportunity to visit the University of British Columbia and the University of Guelph to interact with research partners and potential collaborators.



Jennifer Vu processes returned soil samples

Faculty of Science enhances collaboration with Brazil

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Commitment to long-term collaborative engagement with UWA alumni in Brazil and their home universities played a big part in the success of the Faculty of Science's visit to the world's fifth largest country in August 2014.

With the aim of strengthening relationships with key Brazilian Institutions, Pro-Vice Chancellor Professor Peter Davies, Dean of Science Professor Tony O'Donnell and IOA Director Hackett Professor Kadambot Siddique travelled down the east coast of Brazil from Rio de Janeiro to Porto Alegre, stopping in at Curitiba, Campinas and São Paulo along the way.

Also part of the delegation was Head of the School of Plant Biology Professor Tim Colmer, Professor Andrew Whitely from the School of Earth and Environment and Faculty of Science International Development Manager Annabel Turner.

Memoranda of Understanding (MOU) were signed with two universities: Universidade Federal Rio de Janeiro (UFRJ) in Rio de Janeiro, and Universidade Federal do Paraná (UFPR) in Curitiba. They mark the first memorandum that either university has signed with an Australian university and signal their strong interest in collaborating with UWA.

A third MOU was requested by the Dean of ESALQ, the agricultural faculty of University of São Paulo. IOA Director Kadambot Siddique said Brazil faces similar agricultural challenges to Australia, so the opportunities are vast.

"Our preliminary discussions identified potential areas for collaboration such as rumen microbiology and methane emission reduction, abiotic stress, climate-ready crops and management of difficult soils," Professor Siddique said.

"Joint research, staff and student exchanges were discussed and we look forward to further meaningful engagement with our new partners in Brazil."

"The success of this mission was largely due to the effective use of relationships between UWA academics and returned PhD students," Annabel said.

At each university we held joint research workshops attended by both academics and potential future PhD students. "We hosted a series of Friends of UWA and Future Friends events in each city which helped attract students for further study and build our alumni network.

Student volunteers behind the scenes at MicroBlitz

Deborah Bowie
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MicroBlitz, UWA's School of Earth and Environment's citizen science project, is uncovering the microbial diversity of WA's soils and in the process is getting the wider community and UWA students excited about science.

The ambitious project seeks to map the biodiversity of soil microbes in WA and relies heavily on the involvement of citizen scientists: regular people, doing science. These citizen scientists or Microblitzers, collect soil samples, and return them to UWA for analysis, to reveal the amazing biodiversity that is found underground.

As the project grows, further opportunities for volunteers have opened up to assist with the behind-the-scenes operations of the project and keep up with the high response the project has had. There are currently over 30 student volunteers who assist in preparing sampling kits for distribution, processing soil samples, social media campaigning and running stalls at events.

Student volunteers will receive training and experience in cutting edge biotechnology techniques such as DNA extraction, DNA sequencing and bioinformatics analyses in the new MicroBlitz laboratory commissioned in November 2014.

In addition, UWA's science communication students enrolled in the Exhibition and Interpretation unit are currently working on developing a transportable MicroBlitz display. Science communication undergraduate Jeremy Stark has spent the last semester assisting with the community engagement arm of the project.

"Working with Microblitz has given me valuable insights. Despite the project appearing fairly straightforward on the surface, I now realise just how much work goes into effectively communicating our messages in ways which our audience respond to," said Jeremy.

Jennifer Vu, one of the MicroBlitz volunteer interns said she really enjoys volunteering with MicroBlitz.

"MicroBlitz has a great vibe and working in the office, lab and at events not only gives me valuable work experience in an area I'm really interested in – it's fun!" said Jennifer.

To find out more about volunteer opportunities at MicroBlitz visit www.microblitz.com.au



Prof Tony O'Donnell signs a MOU with UFRJ in Rio de Janeiro

Barley research takes root

Dr Yinglong Chen
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Barley is an important grain crop in Australia and Germany. In both countries, production is limited by drought and low-phosphorus or low-nitrogen soils.

Breeding for water- and nutrient-use efficient barley cultivars for increased adaptation to these environmental stresses is an important strategy.

Support from Group of Eight Australia-Germany Joint Research Cooperation Scheme and a UWA Collaboration Award has allowed researchers from UWA, Forschungszentrum Juelich (FZJ) in Germany and Pennsylvania State University in the USA to work together to explore phenotypic variation in barley root anatomy, architecture and root system plasticity in different environments.

This collaborative project combines intensive phenotyping of root traits with modelling simulation of root architecture and growth in order to map



Dr Yinglong and Dr Tobias Wojciechowski assessing root traits of barley grown at University of Bonn field research station

phenotypic variability and understand how this variability influences nutrient and water acquisition and eventually crop growth.

Dr Yinglong Chen made a visit to FZJ in June 2014 and assessed root traits related to water- and nitrogen-use efficiency and grain yield under German field environments. In return, Dr Tobias Wojciechowski and third-year PhD candidate Miss Vera Hecht of FZJ visited UWA in August 2014 to evaluate root trait variation among selected Australian and German barley cultivars using the novel semi-hydroponic phenotyping system.

Field trials with selected barley cultivars differing in root architecture traits will be set up in Western Australian soils in 2015. Collaborators from UWA

(Professor Rengel, Professor Siddique and Dr Chen) and FZJ (Dr Postma and Dr Wojciechowski) will travel to USA to meet Professor Jonathan Lynch and his colleagues to evaluate research outcomes and discuss project development at a joint workshop in late 2015.

Collaboration between the Australian, German and US partners provides a unique opportunity to achieve the research objectives because each partner has specific expertise in root phenotyping and physiology in the field and as well as under controlled environments. Research outcomes will make an important contribution towards understanding the barley root phenotype with respect to water and nutrient acquisition in dry and low-fertility soils.

Farmer involvement needed to raise food production



Prof Siddique at 5th Seed Science Congress, Dicle University, Diyarbakir, Turkey

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In his closing address at the 5th International Seed Science Congress, held at Dicle University, Diyarbakir, Turkey in October 2014, IOA Director, Hackett Professor Kadambot Siddique said an on-farm approach, with involvement of the local farming community is necessary to increase food production.

"A top-down approach in delivering technology to resource-poor smallholder farmers causes discontinuities between research, extension and farmers, and thus hindering movement of technology to these rural communities," Professor Siddique said.

"Farmers need to be engaged from the diagnosis and research phase, and merging into the

evaluation, extension and adoption phases.

The challenge is for resource-poor farmers to take ownership of innovations in seed production technology and systems."

The four day conference, which was attended by 175 delegates including 30 overseas participants, covered various aspects of genetics, breeding, biotic stress and abiotic stress tolerance, seed science and technology, seed production systems and delivery to farmers and the industry.

"Crop improvement through breeding brings immense value relative to investments and offers an effective approach to improving crop productivity," Professor Siddique said.

He also stressed that crop breeders need to focus on traits with greatest potential to increase yield. New technologies must be developed to accelerate breeding through improving genotyping and phenotyping methods and by increasing the availability of genetic diversity in breeding germplasm.

"The most gain will come from delivering these technologies in developing countries, but the technologies will have to be economically accessible and readily disseminated."



Prof Roger Jones (centre) with former and current APS presidents, Michael Boehm (left) and George Abawi (right)

Professor Roger Jones awarded prestigious fellowship

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Professor Roger Jones has been named a Fellow of the American Phytopathological Society (APS), an honour rarely given to non-American APS members. The award was presented to Professor Jones in person at the annual APS meeting in Minneapolis, USA in August 2014.

Professor Jones received the prestigious fellowship in recognition of his substantial contribution to plant pathology over three decades, where he has focussed on addressing practical aspects of virus diseases of significance to global agriculture.

In a congratulatory message, Immediate Past APS President, George Abawi (pictured) who presented the award said Professor Jones was well worthy of the fellowship.

"Your outstanding research on plant virus epidemiology and integrated virus disease management together with your leadership as Chairman of the International Plant Virus Epidemiology Committee of the International Phytopathological Society, are particularly noteworthy and, together with your other numerous achievements, make you highly deserving of the Fellow Award," the message stated.

Professor Jones, who currently holds a joint appointment between School of Plant Biology and the Department of Food and Agriculture WA (DAFWA) said he would not have received the award without the support of his family, co-workers and collaborators.

"Over the last 28 years, I have benefited from very productive collaborations and importantly an excellent team of dedicated and highly professional staff to work with," Professor Jones said.

Biochar not a good greenhouse gas mitigation strategy in coarse-textured soil

Professor Daniel Murphy
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Biochar did not alter nitrous oxide emissions from semi-arid agricultural coarse-textured soil, according to research presented at the 4th International Conference on Carbon Sequestration and Climate Change Mitigation in Agriculture in Yangling, China in September 2014.

ARC Future Fellow and IOA researcher Professor Daniel Murphy is studying the impact of climate change on soil organic matter and greenhouse gas emissions in Australia and China in a bid to help protect the environment and maximise agricultural efficiency.

A randomised-block design with three field replicates was used to assess the impact of lime application in combination with poultry litter biochar. They concluded that biochar is not a management option for mitigating nitrous oxide emissions from the freely draining, acidic, sandy agricultural soil.

"Based on these findings I hope to further advance understanding of the mechanisms of soil organic matter stabilisation, identify the exact microbial populations responsible for greenhouse gas emission from dry land farming systems and then assess how these populations respond to climate and anthropogenic changes," Professor Murphy said.

"In turn, this could improve farming systems management – maximising soil carbon storage and minimising greenhouse gas emissions."

Soil delivers the ecosystem services on which human life depends. It provides functions imperative to society, such as food and fibre production, water filtration, and the recycling of carbon by the decomposition of plant and animal residues. These processes, with many being carried out by microorganisms in the soil, are also linked to some of the greatest challenges facing humanity.

"Consequently, the ability to deal with these challenges directly depends on our understanding of these microbes and how they interact with the minerals and plant roots in soil, the rhizosphere," Professor Murphy said.

"A better understanding of this soil powerhouse could even enable us to engineer this layer to increase nutrient uptake by plants and reduce agricultural greenhouse gas emissions."



Prof Dan Murphy (left) and collaborator Prof Jianbin Zhou (far right) at trial site in Western Australia

Women in Agriculture celebrations

Ms Rebecca Kempin
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This year the UWA Students of Natural and Agricultural Science (SNAGS) initiated the first Women in Agriculture breakfast at the UWA University Club, Crawley.

The event, held on 13 August, was extremely successful, with a sell-out crowd of 100 students and industry members joining us for breakfast. Students from UWA, Curtin, Murdoch and Muresk Institute attended and enjoyed interacting with industry groups.

The purpose of the breakfast was to promote the role of women within the agriculture industry. Ms Lucy Anderton, an agricultural economist from the Department of Agriculture and Food Western Australia (DAFWA) in Albany, and Lynne Johnston, a current UWA PhD candidate were invited to speak on their experiences in the industry and impart some advice to the next generation of agriculture professionals.

Lucy and Lynne gave an overview of their work and described the many challenges they have faced on their journey. Their presentations sparked interesting discussions on what can be done to increase the numbers of women in senior management positions within a traditionally male dominated industry.

The event was sponsored by the CBH Group and supported by IOA.



From left: Tiffany Davey, Zoe Bennett, Lachlan Hunter and Guy Coleman enjoying the morning's guest speakers



Agricultural research and development through capacity building

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The past twenty years has seen a 50 per cent decline in Iraqi agricultural production. War, drought and limited access to technological advances are largely to blame for the negative impact on an industry that provides 20 per cent of Iraq's employment.

Access to information is something many of us take for granted. In Iraq, isolation from the Internet and information technology has resulted in significant gaps in the agricultural knowledge of their research community.

IOA Director Hackett Professor Kadambot Siddique is involved in a project to help close these gaps by providing the Iraqi Government with assistance to improve the nation's food security. He says the key is capacity building.

"The gaps in agricultural development and productivity can be closed with training, new equipment and study tours to countries facing technical issues in agriculture similar to those in Iraq," said Professor Siddique.

"Local agricultural agencies have received technical training to plan, implement and monitor research and development programs. So far, local growers have widely adopted these conservation cropping systems."

Visiting Research Fellow, Dr Moyassar Aziz has been at UWA since July 2014. He has come to

Australia from the University of Mosul in Iraq as part of a short-term training program funded by the Australian Centre for International and Agricultural Research (ACIAR).

Moyassar is involved in three activities at UWA. He is involved in a long term field trial at Cunderdin looking at rotation, stubble management disease and pest dynamics. He is also looking at improved drought tolerance in wheat yield with application of anti-transpirants. In a third project, Moyassar is studying roots architecture of wheat varieties using mini-rhizotrons.

"In collaboration with Adjunct Professor Jairo Palta and Hackett Professor Kadambot Siddique I am working on a small project to see if breeding for yield in Australia has changed the rooting patterns in wheat. I have grown several cultivars in mini-rhizotrons and frequently I trace the root system using plastic paper. I then scan the images into the computer for analysis," says Dr Aziz.

"The traditional farming methods we use to grow wheat in Iraq do not even meet half the national demand. By selecting improved crop varieties and with better management practices we can help Iraqi farmers increase their wheat yield."

The project partners include the Ministry of Agriculture and the University of Mosul (Iraq), the International Centre for Agricultural Research in the Dry Areas (ICARDA), UWA and the University of Adelaide. The project is funded by the Australian Government through ACIAR.



Fungus vector that transmits viruses globally found in WA by Belinda Cox

Wheat virus vector discovered in Western Australia

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***Polymyxa graminis*, a virus-transmitting fungus, has been detected in the roots of wheat plants at widely dispersed locations in south-west Australia.**

Research officer Ms Belinda Cox, who conducted the research with Professor Roger Jones from the School of Plant Biology and IOA, said that although *P. graminis* is not considered a serious plant pathogen in its own right, its presence poses a significant threat to agriculture.

"*P. graminis* transmits agronomically important soil-borne viruses that cause severe diseases in crop species such as wheat, barley, oats and sorghum," Belinda said.

"*P. graminis* produces motile zoospores which move from root to root in moist soils and resting spores which persist for many years in the soil. Both types of spore transmit viruses from infected to healthy plants" she said.

No soil-borne viruses were detected in a small-scale survey involving randomly collected wheat samples and wheat samples infected with the fungus. However, presence of the vector provides a warning of the potential for major yield reduction from such viruses.

Soil-borne viruses could easily be imported via contamination of wheat seed with infected resting spores of *P. graminis* from infected regions such as Europe, Asia, North America and New Zealand.

Since the vector is already established in south-west Australia and Queensland, the viruses could become a potential threat to cereal production, especially in high rainfall zones.

"More extensive sampling of wheat crops, especially targeting those growing in high rainfall grainbelt zones prone to waterlogging is warranted before any conclusions can be drawn about the presence or absence of soil-borne wheat viruses in the region," Professor Jones said.

Fungal virus-vectors like *P. graminis* make eradicating viruses from the soil very challenging because of the resilience of resting spores. Development of virus-resistant cultivars is the best way to control them effectively once they become established.

This research was recently published in the journal *Plant Disease*. It was funded by the GRDC and undertaken in the South Perth Facilities of the Department of Food and Agriculture WA (DAFWA).

Free online course on Agriculture, Economics and Nature

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The University of Western Australia is offering a free online course on the economics of agriculture, natural resources and the environment.

This course is about agricultural production and the interaction between agriculture and the environment. The material presented can help us understand changes that have occurred in agriculture, and support improved decision making about things like agricultural production methods, agricultural input levels, resource conservation, and the balance between agricultural production and its environmental impacts.

The course will be presented by Professor David Pannell, who is one of Australia's leading economists working in the area of agriculture, natural resources and environment. His research includes work on the economics of farming systems, land conservation, farmers' behaviour, agri-environmental policy, risk in agriculture, weed management, and environmental management. At the University of Western Australia David is Head of the School of Agricultural and Resource Economics, and Director of the Centre for Environmental Economics and Policy.

The course will be presented over six weeks, starting 2 February 2015, with a different focus each week. A set of lecture videos, mostly between 5 and 10 minutes in length, are provided each week, together with readings, activities, student forums, quizzes and a final exam. No prerequisites or prior knowledge is needed. Certificates will be provided to those who successfully complete the course.

The course is made possible through the generous support of Yara Pilbara.

To register, go to <http://courses.class2go.uwa.edu.au/ageconnature>. The site includes a brief video that provides an overview of the course.

Register now and we will provide reminders when the course is starting. If you have any questions about the course, email mooc-are@uwa.edu.au.



Prof Ian Small becomes WA Scientist of the Year

UWA agriculture acknowledged in WA Premier's Science Awards

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Research benefiting agriculture and related areas at UWA was recognised in three awards at the 2014 Premier's Science Awards in August and a fourth in the Prime Minister's Prize for Science in October.

Professor Ian Small, was named the WA Scientist of the Year, the University's Centre for Integrative Bee Research (CIBER) won the Chevron Science Engagement Initiative of the Year, and Emeritus Professor Alan Robson AO was inducted into the Hall of Fame. Professor Ryan Lister received the prestigious Frank Fenner Prize for Life Scientist of the Year.

Professor Small is a chief investigator at UWA's ARC Centre of Excellence Plant Energy Biology and his research on how plants capture, store and release energy has contributed to sustainable agriculture production and global food security.

CIBER was awarded the Science Engagement Initiative of the Year for their success in raising community awareness about the importance of honeybees in our environment. One of the highlights includes assisting with the Academy Award-nominated documentary *More than Honey* which aired in Perth cinemas at the Audi Festival of German Films in May 2013.

Emeritus Professor Alan Robson was inducted into the Hall of Fame for his work on mineral nutrition of plants and soil fertility which continues to contribute to the prosperity of farming communities in Western Australia.

"Professor Robson has had a long and distinguished career at the forefront of agricultural science and as Vice-Chancellor of UWA. I am delighted to see him inducted into the Hall of Fame," WA Premier Colin Barnett said.

Professor Lister, a Future Fellow at UWA's ARC Centre of Excellence Plant Energy Biology received national recognition for his work at the forefront of epigenetics that will transform medicine and revolutionise agriculture. Professor Lister pioneered new techniques that use large-scale DNA sequencing to rapidly produce whole-genome maps. In agriculture, this work has the potential to enable the development of nutritionally richer, higher-yielding crops better suited to the changing environment.

IOA Director Professor Kadambot Siddique said he was proud that UWA scientists are being recognised for their dedication to research that really matters.

"Discoveries do not happen overnight. Research can be tedious and unrewarding at times, so we must celebrate the wins, and always remember what the bigger picture is," he said.

Conservation agriculture in Iraq project deemed a success

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Achievements, lessons learned and future prospects for the expansion of conservation agriculture in Iraq were reviewed in a final meeting by participants of the project 'Development of conservation agriculture in the drylands of northern Iraq', held on 8-10 October in Amman, Jordan.

The project which was supported by the Australian government through the Australian Center of International Agricultural Research (ACIAR) to develop and promote conservation agriculture

in Iraq was led by the International Center for Agricultural Research in Dry Areas (ICARDA).

The meeting, was attended by project collaborators from Iraqi universities and Ministry of Agriculture in the governorates of Ninevah, Anbar, Salahaddin, Kirkuk and Erbil, and The University of Western Australia and University of Adelaide.

Through experiments on research stations and in farmers' fields at multiple locations in northern Iraq, Syria and Jordan, the project unambiguously established that the elimination of plowing plus direct sowing with zero-tillage seeder provided significant benefits to the dryland cropping

systems of the Middle-East. In particular, conservation agriculture reduces the risk of crop failure due to dry conditions and the effects of climate change.

IOA Director, Hackett Professor Kadambot Siddique who attended the meeting said Iraq now has a major opportunity to exploit the benefits of this successful project by utilising the enhanced Iraqi expertise empowered by the project to extend and disseminate the project's results widely.

"Iraq would benefit from the establishment of a conservation agriculture unit that provides training, research programs and conducts field days and workshops to collect, collate and share information," Professor Siddique said.

"ICARDA and the Australian collaborators are willing to provide ongoing technical support to help achieve some of the recommendations we have proposed at the project meeting."

Although the project has come to an end, there are still a number of training programs and students who are learning about conservation agriculture systems at Australian Universities.

The project partners offer ongoing technical support to Iraqi government



GRDC Chairman gets update on UWA grains research

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On a recent visit to Western Australia, Mr Richard Clark, Chairman of the Grains Research and Development Corporation (GRDC) Board stopped in to visit UWA.

The informal meeting which also included GRDC Western Regional Panel Chair, Mr Peter Roberts and IOA Industry Advisory Board Chair Dr Terry Enright, gave IOA Director Hackett Professor Kadambot Siddique the opportunity to brief the visitors about ongoing grains industry related research at UWA, and the future strategic directions of agricultural research and teaching.

In a short tour of the glasshouses, Professor Siddique showed the research being conducted on heat stress in canola led by Dr Sheng Chen funded by GRDC.

Research Associate Dr Jiayin Pang was present to answer questions on the chickpea experiments on drought resistance and salinity tolerance. They were also shown how studies of wheat roots are being used to determine if breeding for yield in Australia has changed the rooting patterns in this important cereal crop (see also page 13).



Prof Siddique points out different chickpea varieties tolerant to drought and salinity to the visitors

What controls the variation in flowering time in canola varieties?

Professor Wallace Cowling and Associate Professor Matthew Nelson
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Australian canola is quite distinct from its Canadian and European counterparts. This distinction arose because it was genetically-isolated from the rest of the world for over 30 years. Nowadays, plant breeders cannot simply transfer varieties from Canada or Europe into Australia – they flower much too late for our environment.

Associate Professor Matthew Nelson from IOA and the School of Plant Biology was puzzled by this phenomenon and asked why, “What makes Australian canola flower early?” This is a very important question for Australian canola breeders who would like to exploit international germplasm in their breeding programs.

In a paper recently published in *PLoS ONE*, Associate Professor Nelson and his colleagues identified that heat-responsive genes are responsible for flowering time in Australian spring-type and European summer-type canola. This is the first time such genes have been reported to influence flowering time in canola.

European summer-type canola was crossed with Monty, a typical early flowering Australian variety and the progeny was analysed for variation in flowering time. There was a huge variation from about 30 days to 160 days in the typical Australian environment. This took the group by surprise and indicated there might be several forms of these heat-responsive genes controlling flowering time.

Until now, most researchers assumed that long summer days in Europe and Canada triggered flowering. In fact, long days are only a minor part of the story. Now we know the European plants required much more accumulated heat (thermal time) to flower than the Australian plants.

Canola breeders need this information to re-establish the correct flowering time in canola when they cross between Australian types and summer annual types in the northern hemisphere. Normally, crop breeders cross different breeding lines and then grow the offspring in different environments to see where they would be best suited to grow. This is a very expensive and inefficient approach.

“The tests we use are DNA-based so we only need samples from very young plants, which would allow breeders to target each breeding line to suitable environments even before the plants have ever flowered,” said Matthew. “Such marker tools combined with understanding the genetic networks controlling flowering time would save significant costs to breeding programs.”

Since daylength and therefore accumulated heat is directly related to the latitude and the date of sowing, the research team can now begin to develop models to predict the best latitudes and sowing dates for any given breeding line.

Associate Professor Matthew Nelson in the field with different canola varieties



Engaging farmers and agronomists at Lind Farm Field Day

Are we going against the grain in training?

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As agricultural scientists, we spend a lot of time trying to find ways for farmers and growers to protect their crop against harsh and changing conditions. But how much do we really know about communicating our research in a way that results in on-farm uptake?

Dominie's PhD in Science Communication looks at this question and asks “Are we going against the grain in training?” She is developing an adult education framework for teaching growers and agronomists in rural areas, in a way best suited to how this group of experts learn.

In August, Dominie returned from a six-week trip to the USA, including three weeks at Washington State University and three weeks at Kansas State University. Both universities have a long history of collaborating on Australian agricultural projects and her goal was to look at the Universities' extension services.

She attended several field days, mini-conferences and other end-user engagement activities held by the Universities to observe how these activities are organised, and what strategies they use to engage with farmers and agronomists to facilitate knowledge transfer. Dominie was able to interact with participants, interview them and conduct a survey to examine their level of knowledge before and after the event.

She also interviewed academics from both Universities to discuss their views on engagement, and what techniques they find most useful.

These observations will be compared to field days held in Western Australia and recommendations will be made on how to improve engagement at field days and other extension activities with growers and agronomists.

Dominie's project is supported by Council of Grain Growers Organisations (COGGO) and Grains Research Development Corporation (GRDC) PhD student top-up scholarship and UWA.



Prof Harvey Millar gives the delegation a tour of the ARC Centre of Excellence Plant Energy Biology

Tarim University Delegation to UWA

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A delegation of six Professors from Tarim University in Xinjiang, China visited UWA in August 2014. The purpose of the visit was to continue the highly successful collaboration known as the Three Brothers Program. The three brothers involved in the partnership are UWA, Tarim University and Zhejiang University.

A focus of the partnership is joint research and postgraduate training between the three universities. Joint applications for grants such as one from the Worldwide Universities Network

(WUN) and other sources were proposed during the meeting. In addition, a student from Tarim University is applying for a China UWA Scholarship to undertake a PhD at UWA.

Associate Professor Guijun Yan and Associate Professor Mick Considine arranged a visit to horticulture and agricultural areas of mutual interests such as the Swan Valley.

Professor Harvey Millar gave the delegation a tour of the ARC Centre of Excellence Plant Energy Biology showing them their high-tech equipment and the strong links between basic research and applied outcomes.

In addition, the delegation met with UWA Study Abroad and Student Exchange Program to explore opportunities to establish student exchange between UWA and Tarim University.

An area of particular interest to the group was the UWA Crowd Research Program. Dr Campbell Thomson, Director of the Office of Research Enterprise introduced the concept and how it can be used to link scientific research at tertiary institutions with the public.

Overall, the visit was very successful and the three brothers will meet again at a joint workshop in October 2015.

Brenda Coutts in the glasshouse with potato plants and her award



Spudding researcher gets national recognition

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PhD candidate Brenda Coutts with the School of Plant Biology and IOA has been named Researcher of the Year at the 2014 AUSVEG National Awards for Excellence for her research that has advanced the potato industry and offered long-term benefits.

Brenda's research has identified a number of potato industry risks associated with the potential spread of geographically isolated strains of Potato Virus Y

Australia-wide. The prestigious Researcher of the Year Award also recognises researchers who have actively communicated their research outcomes and encouraged uptake on-farm.

Brenda has engaged with industry members at potato research and development workshops across the country in Victoria, South Australia and Western Australia where she presented the practical outcomes of her work.

"It is important for us to share the knowledge with growers so they can understand how the virus is transmitted and how it survives between growing seasons for example, so we can improve current practices," said Brenda.

This component of Brenda's project was funded by Agricultural Produce Commission – Potato Producers Committee (APC-PPC) and the Department of Agriculture and Food Western Australia (DAFWA). She is supervised by Professor Roger Jones from DAFWA and UWA.

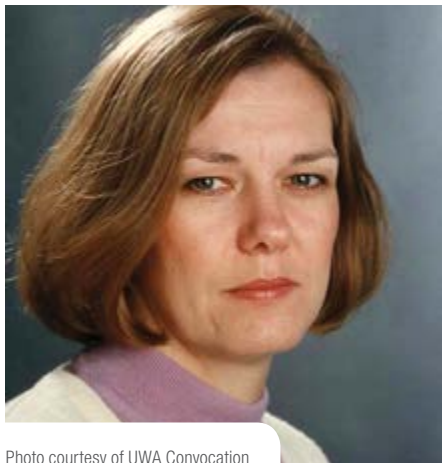


Photo courtesy of UWA Convocation

Vale Dr Suzanne Baker (20 June 1955 – 12 August 2014)

Hackett Professor Kadambot Siddique
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UWA agriculture graduate and adjunct academic Dr Suzanne Baker has passed away. Sue devoted many years of her life to the University. She received a Bachelor of Science in Agriculture with First Class Honours in 1979 and completed a PhD in rumen microbiology in 1985 under the supervision of Professor Reginald Moir.

In 1986, Sue was jointly appointed a lectureship by the CSIRO and UWA which she held for eight years. In recognition of her regular and significant contribution to the University, she was appointed an Adjunct within the Animal Production group where she will be remembered as an enthusiastic postgraduate supervisor and dedicated lecturer to undergraduate students in animal nutrition, rumen microbiology and the environmental impact of livestock.

Sue served as Warden of Convocation for a period of nine years and is the second longest serving Warden in Convocation's history. She undertook her role as Warden with great dedication and was a true ambassador of the University. She was awarded the UWA Chancellor's Medal in 2010.

To honour something which was always close to Sue's heart, a convocation travel scholarship for postgraduate students has been set up in her name. **Contributions can be made by making a gift to Student Support at www.development.uwa.edu.au/donate and directing the gift to the Dr Sue Baker Postgraduate Travel Scholarship.**

Sue will be sadly missed by her colleagues in the Faculty of Science and all around the university.

Mycorrhizal expert visits UWA

Dr Yinglong Chen
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Plants and fungi engage in mutually beneficial relationships. The importance of arbuscular mycorrhizal (AM) fungi in alleviating crop's environmental stresses is widely recognised. It is known as one of the most widespread plant-fungi symbiosis. Wheat is one of Australia's most important crops and is a common host for AM fungi.

In several regions of Australia, wheat yield reductions are caused as a direct result of frost injury. To explore the role of AM fungi in wheat growth and its mechanisms under frost conditions, UWA has welcomed visiting expert, Dr Zhaoyong Shi from Henan University of Science & Technology, China.



Visiting AM fungus expert Dr Zhaoyong Shi visits a farm at Wongan Hills in WA

Dr Shi obtained his PhD from China Agricultural University in 2006, and has devoted his research career to studying the diversity and function of AM fungi.

Whilst at UWA, Dr Shi will be working with Professor Zed Rengel and Dr Yinglong Chen to provide some new insights into improving wheat production in frosty conditions thanks to funding provided by the Chinese Scholar Council and GRDC.

New Staff



Dr Maggie Triska

Maggie Triska has been appointed as a Research Associate within the School of Plant Biology. Maggie recently submitted her PhD at UWA in the Ecosystem Restoration and Intervention Ecology (ERIE) research lab within the School of Plant Biology.

Maggie also holds a Masters degree in Wildlife Biology from Frostburg State University in Maryland, USA. Her past research has focused on assessing variations in species distribution over time in response to anthropogenic and landscape influences.

Maggie will be working with Assoc/Prof Michael Renton on a Plant Biosecurity Cooperative Research Centre project assessing optimal surveillance strategies for biosecurity threats in Australia; focusing on three case studies, potato-cyst nematode, grape phylloxera and the Mediterranean fruit fly.



Professor Jacqueline Batley

ARC Future Fellow Jacqueline Batley has been appointed to the School of Plant Biology and IOA.

After receiving her PhD from the University of Bristol, UK in 2001, Professor Batley moved to Australia to work at the Department of Primary Industries, Victoria. She joins UWA from the University of Queensland where she has been since 2007.

Professor Batley's initial focus will be on Brassica resistance to the devastating fungal disease commonly known as 'blackleg', but she will also contribute more widely to crop genomics research.

Staff awards and industry recognition

NAME	AWARD
Professor Roger Jones	Fellow of the American Phytopathological Society
Adjunct Professor Hari D Upadhyaya	Crop Science Society of America International Award 2014
Associate Professor Megan Ryan	Australian Research Council Future Fellowship
Emeritus Professor Alan Robson	Western Australian Science Hall of Fame Inductee
Professor Ian Small	WA Scientist of the Year 2014
Centre for Integrative Bee Research (CIBER)	Chevron Science Engagement Initiative of the Year 2014
Adjunct Associate Professor Muhammad Farooq	Best Young Scientist Award from Higher Education Commission of Pakistan
Professor Ryan Lister	Prime Minister's Prize for Science 2014 – Frank Fenner Prize for Life Scientist of the Year

Visitors to Institute of Agriculture

VISITOR	VISITORS' ORGANISATION, COUNTRY	HOST DETAILS/PURPOSE	DATES
Ms Xiong Junlan	MOE Key Laboratory of Grassland and Ecology, School of life science, Lanzhou University	Hackett Prof Kadambot Siddique and Prof Neil Turner	May 2014–April 2015
Dr Yanlei Du	MOE Key Laboratory of Grassland and Ecology, School of life Science, Lanzhou University	Hackett Prof Kadambot Siddique and Prof Neil Turner	May–Nov 2014
Dr Moyassar Aziz	ICARDA, Iraq	Hackett Prof Kadambot Siddique, Dr Kenneth Flower	July 2014–Jan 2015
Ms Kasia Wyrwa	Polish Academy of Science, Institute of Plant Genetics	Assoc/Prof Matthew Nelson	July 2014–Jan 2015
Dr Stephen Loss	ICARDA, Iraq	Hackett Prof Kadambot Siddique	11–15 August 2014
Dr Yigezu Atnafe Yigezu	International Center for Agricultural Research in the Dry Areas (ICARDA), Amman, Jordan	Asst/Prof Amin Mugeru	22 August–3 September
Dr Saad Hatem Mohammed	Ministry of Agriculture, Baghdad, Iraq	Asst/Prof Amin Mugeru	22 August–3 September
Prof Zhijun LI, Prof Jiangsheng GAO, Prof Cuiyun WU, Prof Chongzhi XU, Prof Renci XIONG, Prof Minjuan LIN	Tarim University, China	Asst/Prof Michael Considine, Assoc/Prof Guijun Yan	23–25 August 2014
Prof Hongqiang Yang	Shandong Agricultural University, China	Dr Yinglong Chen	24–27 August 2014
Dr Tobias Wojciechowski	Forschungszentrum Juelich, Germany	Prof Zed Rengel, Dr Yinglong Chen	27 August–8 September 2014
Miss Vera Lisa Hecht	Forschungszentrum Juelich, Germany	Prof Zed Rengel, Dr Yinglong Chen	27 August–8 September 2014
Dr Xinghua Shao	Shangrao Normal University, China	Prof Daniel Murphy	August 2014–August 2015
A/Prof Zhaoyong Shi	Henan University of Science and Technology, China	Prof Zed Rengel, Dr Yinglong Chen	18 October 2013– 15 October 2014
Dr Xin Cao	Experiment Center of Northwest University for Nationalities, Lanzhou, Gansu, China	Prof Graeme Martin, Dr Penny Hawken	October 2014–October 2015

Memoranda of Understanding (MoU) with External Organisations

TITLE	ORGANISATION
Worldwide Universities Network (WUN) Global Challenge Responding to Climate Change and the UK-USA Global Innovations Initiative	September 2014 Global Farm Platforms for Sustainable Ruminant Livestock: Statement of Intent

New postgraduate research students

STUDENT NAME	TOPIC	SCHOOL	SUPERVISOR(S)	FUNDING BODY
PhD				
Thayse Figueiredo Nery	Optimal land-use change to increase water quality, quantity and biodiversity outcomes	Agricultural Resource Economics and IOA	Prof Ben White and Assoc/Prof Steven Schilizzi	Science Without Borders – Brazilian federal government
Ali Mohammed Oumer	Incentives for Successful Livelihood Adaptation to Agricultural Risks in Maize Farming System in Ethiopia: Pathways to Sustainable Agricultural Intensification	Agricultural Resource Economics and IOA	Assoc/Prof Atakelty Hailu and Assist/Prof Amin Mugeru	Australian Centre for International Agricultural Research (ACIAR)
Tuan Trung Pham	Improving agricultural co-operative models of production and business practice for better member livelihoods in developing countries. An application to An Giang Province, Vietnam.	Agricultural Resource Economics and IOA	Assoc/Prof Steven Schilizzi, Assoc/Prof Md Sayed Iftekhar, Prof Tim Mazzarol and Assist/Prof Elena Mamouni Limnios	AusAid Scholarship
Yaseen Khalil	Conservation Agriculture in Drylands	Plant Biology and IOA	Dr Ken Flower, Hackett Prof Kadambot Siddique, Dr Phil Ward, Dr Stephen Loss and Dr Colin Piggins	John Alwright Fellowship, Australian Centre for International Agricultural Research (ACIAR)
Ahmed Rashid Sukkar Alsharmani	Dynamics of arbuscular mycorrhizal fungi in perennial and annual pasture	School of Earth and Environment and IOA	E/Prof Lyn Abbott and Dr Zakaria Solaiman	Higher Committee for Education Development in Iraq, Government of Iraq

New Research Funded Project (Since July 2014)

VISITOR	FUNDING PERIOD	FUNDING BODY	SUPERVISORS
Novel business structures for adaptation to a changing climate	2013/14–2015/16	DAFF	Prof Ross Kingwell
Building better brassicas understanding disease resistance mechanisms across the brassicaceae	2014–2017	ARC Future Fellowships	Assoc/Prof Jacqueline Batley
Pre breeding in annual legumes	2013–2016	DAFWA ex MLA	Prof William Erskine, Asst/Prof Janine Croser and Dr Parwinder Kaur
Characterising root traits for efficient water and nutrient acquisition in barley	2015	UWA Research Collaboration Awards – Pennsylvania State University	Dr Yinglong Chen, Prof Zed Rengel and Hackett Prof Kadambot Siddique
Crops for a phosphorus scarce future: plant adaptation to fluctuating phosphorus availability	2014–2017	ARC Future Fellowships	Assoc/Prof Megan Ryan
Making clover pastures permanently resistant to Phytophthora root disease	2014–2017	Australian Wool Innovation Ltd	Prof Martin Barbetti

Innovation of Farms 2013 to 2018 Round 1 Maximising Benefit from Crop Residues Practical Stubble Retention Practices in Mixed Farming Systems of WA	2014–2016	Blackwood Basin Group ex South West Catchments Council	Dr Zakaria Solaiman and Felicity Willett
Use of Chemicals to Increase Frost Tolerance in Australian Crops	2014–2015	GRDC	Prof Stephen Powles, A/Prof Roberto Busi, Dr Kenneth Flower and Prof Jack Christopher
Development of Molecular Markers for Application in Australia Canola Breeding	2014	NSW DPI ex GRDC	A/Prof Sheng Chen, Hackett Prof Kadambot Siddique and Prof Wallace Cowling
Provision of Advanced Statistical Advice on Genetic Analysis of Canola Breeding Data and Optimum Design of Trials	2012–2013	University of Wollongong ex NPZ Australia	A/Prof Katia Stefanova
Introducing Diverse Perennial Pastures into Potato/Pasture Rotations to Improve Soil Health and Pasture and Potato Yield and Quality	2014–2017	Water Corporation ex South West Catchments Council	Dr Zakaria Solaiman, Kathy Dawson and Deb Archdeacon
Evaluation of <i>musa acuminata</i> subsp. <i>Malaccensis</i> for resistance to Fusarium wilt of banana	2014	UWA-UQ Partnership Research Collaboration Award	Assoc/Prof Jacqueline Batley
Characterising genes for wheat quality	2014	UWA-UQ Partnership Research Collaboration Award	Prof David Edwards

IOA Publications 2014 (July – November)

Refereed journals

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