THE UNIVERSITY OF WESTERN AUSTRALIA
Achieve International Excellence

The UWA Institute of Agriculture

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LtoR: Matthew Nelson, Aneeta Pradhan, Sheng Chen, Jinling Meng, Wallace Cowling, Julie Plummer, Weijun Zhou, Annaliese Mason, Zaiyun Li, and Guijun Yan.

Brassica crop breeding blossoms at Australia-China workshop

Dr Sheng Chen (chens@cyllene.uwa.edu.au)
Prof Wallace Cowling
(wallace.cowling@uwa.edu.au)

Brassica species are some of the most important crops producing vegetables and oilseeds for both human and industrial purposes. During the first week of October 2010 Brassica experts from UWA, Huazhong Agricultural University (HZAU) and Zhejiang University (ZJU) explored innovative approaches to substantially improve Brassica crops, at a UWA hosted workshop entitled "Trigenomic bridges for Brassica improvement". During the workshop, supported by the School of Plant Biology and The UWA Institute of Agriculture, these Brassica experts discussed the new concept of using "trigenomic bridges" for Brassica crop improvement.

"Through trigenomic bridges, Brassica breeders aim to develop new Brassica crops for efficient production of food, oil and bioproducts in an era of global warming, increasing input costs, and decreasing soil fertility," Prof Wallace Cowling, Deputy Director of the International Centre for Plant Breeding Education and Research (ICPBER) at UWA said.

The three "basic" Brassica species are known as the turnip group (*B. rapa*), the cauliflower and cabbage group *(B. oleracea*), and Ethiopian mustard (*B. nigra*). They have similar sets of chromosomes which are called A genome (for *B. rapa*), B genome (for *B. nigra*) and C genome (for *B. oleracea*). They are related in a triangular fashion. In addition to these "basic" species are more complex species, which have two genomes. These include the famous canola or oilseed rape (*B. napus*), which has the genomes A and C. The scientists who attended the above workshop are highly experienced in crossing Brassica species in "U's" triangle. "They have joint research which is developing the world's first trigenomic Brassica species, with all three genomes A, B and C. This hypothetical trigenomic Brassica species could emulate trigenomic bread wheat in its adaptation and importance to humanity," Prof Cowling said.

The Chinese and Australian collaborators have produced the world's first hybrids between Australian and Chinese trigenomic Brassica plants, developed over the past two years in an Australia-China International Science Linkages project. This workshop aimed to draft an up-to-date review of the world's research in use of trigenomic bridges in Brassica breeding. This review should be completed before the end of 2010 and submitted to a high impact review journal.

The Chinese visitors delivered special seminar series during their visit to UWA. The first two speakers were Prof Jinling Meng and Prof Zaiyun Li from National Key Laboratory of Crop Genetic Improvement at HZAU.

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Director's column

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

This year the disciplines of Life and Agricultural Sciences at UWA were ranked the highest in Australia and 34th in the world according to the prestigious Academic Ranking of World Universities (ARWU; http://www.arwu.org/). Despite this strength, the world is rapidly changing and agriculture has to help set the pace. This was one of the key messages from Winthrop Professor Tony O'Donnell (Dean of the UWA Science Faculties), at Courses 2012 Agriculture Science at UWA to the Industry and Schools information evening held on November 16 (see page 3).

Performance in research and research leadership is a big consideration when calculating these world rankings. This year UWA's academics and students have received several awards. Winthrop Professor Zed Rengel, who recently received the prestigious Humboldt Research Award, was also honoured by the University of Zagreb, Croatia, with an Honorary Doctorate (see page 4). Dr Craig Scanlan, another soil scientist, received an award for best PhD thesis in soil science granted by an Australian university in 2009 (see page 16). In November Assist/Prof Graeme Doole from the Centre for Environmental Economics and Policy in the UWA School of Agricultural and Resource Economics along with former UWA PhD student Dr Lindsay Bell (CSIRO, Sustainable Ecosystems, Toowoomba) were named joint winners of the prestigious national award of "Australia's best young agronomist" at the annual dinner of the 15th Australian Society of Agronomy Conference (see page 14). Adj/Prof Mick Poole was recognised for his contribution to agriculture when he was named the 2010 Farrer Memorial Medal recipient (see page 19).

Continued International and national linkages are vital to the UWA Institute of Agriculture. I joined with Nobel laureate, W/Prof Barry Marshall and W/Prof Carmen Lawrence for Australia's National Science Week in Malaysia (see page 7) where UWA inspired nearly 3000 students to study science and take a career path to address some of the global challenges. The International Centre for Plant Breeding Education and Research (ICPBER) at UWA hosted several intensive training courses, including a Master Class for international plant breeders (see page 11). Our relationship with Kerala Agricultural University has strengthened even further since signing an MoU last year. Read more on page 5 about the launch of their integrated MSc climate studies program. Academics from UWA helped to develop the curriculum for this pioneering program.

On a national level we hosted the coping with climate change field day at UWA's Ridgefield farm. The UWA Future Farm Project showcased Australia's Farming Future Climate Change Research Programme which was well received by attendees. Read more on page 15).

In August, UWA Institute of Agriculture built relationships at the Dowerin Field Day as part of the Department of Agriculture and Food WA's (DAFWA) "Careers in Agriculture" display. (See page 12).

I would like to acknowledge all the student presenters who took part in our Postgraduate Showcase Frontiers in Agriculture, the industry leaders present at the Industry Forum entitled Agriculture training for the future, and the international and national scientists sharing their knowledge in our Food and Agriculture lecture series. All of these activities and more have been captured in our newly revamped website. For more information on The UWA Institute of Agriculture and its activities go to www.ioa.uwa.edu.au.

Please join me in applauding the outstanding level of teaching, research and leadership displayed in agriculture at UWA during this year. I look forward to your continued support in UWA Institute of Agriculture initiatives to work towards being recognised for excellence in serving agriculture and the management of natural resources through research, education and training in a regional, national and international context.

I wish you all a wonderful festive season and look forward to a peaceful and rewarding 2011.

Continued from page 1:

HZAU is one of the international leaders in Brassica breeding and molecular genetics. Prof Meng introduced his novel concept of intersubgenomic heterosis and its successful utilization in rapeseed production in China. Prof Zaiyun Li talked about nucleolar dominance and its potential effect on genome stabilization in interspecific or intergeneric Brassica hybrids. The last speaker Prof Weijun Zhou, the chair of Department of Agronomy and Plant Breeding at ZJU, gave a talk on microspore embryogenesis and its utilization for mutagenesis and transformation in Brassica napus. ZJU is domestically ranked in the top three by the China Academy of Management. The Brassica group in their Institute of Crop Science have made significant contributions in manipulation of microspore embryogenesis and diploidisation.

The AHRI team

Weeds initiative evolves nationally

During August 2010 the WA Herbicide Resistance Initiative (WAHRI) formally evolved into a national body called the Australian Herbicide Resistance Initiative (AHRI).

Funding of $5.5 million for the next five years (2010 – 2015) from the Grains Research and Development Corporation (GRDC) will underpin this UWA based, AHRI. AHRI will work closely with DAFWA, Department of Employment, Economic Development and Innovation (DEEDI) Queensland, University of Melbourne and University of Adelaide to understand the impact of herbicide resistance and facilitate a national approach to resistance management across Australia.

Winthrop Professor Stephen Powles, an internationally recognized authority on all aspects of herbicide resistance will continue to lead his world-class research team as Director.

"Herbicide sustainability is imperative for Australian crop production as herbicides are a cost effective tool for weed management, however a number of resistance problems exist and AHRI will work with its partners to address these," W/Prof Powles said.

AHRI research will continue to be delivered through publications in high ranking scientific journals, book chapters and reviews and disseminated via extension packages, field days, industry forums and the new AHRI website www.ahri.uwa.edu.au

W/Prof Tony O'Donnell and Ms Marjan Heibloem, Project Manager on the Faculty of Natural and Agricultural Sciences New Courses 2012 Implementation.

Knowledge for a changing world

Erika von Kaschke
(erika.vonkaschke@uwa.edu.au)

UWA has a distinguished history of close to 100 years in agriculture teaching. This year the disciplines of Life and Agricultural Sciences at UWA were ranked the highest in Australia and 34th in the world according to the prestigious Academic Ranking of World Universities (ARWU) in 2010. Despite this great track record, times are changing by the second and we have to not only keep up with the pace, but to set it.

Rethink what and how we teach, increase the efficiency and effectiveness of our teaching, integrate the use of online technology, and attract the exceptionally talented were some of the key messages delivered by Winthrop Professor Tony O'Donnell, Dean of the Faculties of Science, at a Courses 2012 Industry and Schools agriculture information evening on November 16.

Around fifty industry leaders and Careers Advisors from prominent schools attended the function. Attendees could voice their questions and give feed back during the event.

Did you know that the top in-demand jobs in 2010 did not exist in 2004? Or that we are currently preparing students for jobs that may not yet exist, to be able to use technologies that haven't been invented, in order to solve problems we don't know are problems yet. It is estimated that an estimated 4 Exabyte of unique information will be generated this year. That is more information than in the previous 5000.

Through the new Courses 2012 agriculture graduates from UWA will be trained to process this onslaught of mega-information and will embrace the need for innovation.

"The challenge for agriculture is simple, how do we double production on existing land over the next 40 years whilst addressing the demand for clean, green and ethical agricultural production? "W/Prof O'Donnell said. The complex agriculture industry requires graduates that understand the scientific principles behind production and have the ability to evaluate profitability, sustainability and risk.

From 2012, every UWA undergraduate student will be enrolled in one of four 3-year courses in Arts, Science, Commerce or Design or in the prestigious 4-year Bachelor of Philosophy. These new courses will include at least one degree-specific major, as well as broadening and complementary units

UWA draws some of the brightest and best students to agriculture. It also offers a variety of entry pathways that facilitate access to mature age students (http://www.studyat.uwa.edu.au/10182), country students (http://www.studyat.uwa.edu.au/10198) and those with a completed TAFE Diploma (considered equivalent to an ATAR of 80). While a minimum ATAR of 80 is normally required, the majority of UWA agriculture students (80%) enter with an ATAR score of more than 85%.

New Courses 2012 will enable the University to match what is attractive to students with what the industry needs. Increasingly, this includes preparing them for international practice in a global environment; this will be encouraged by the introduction of new broadening units that will enable students to understand better the cultures, traditions, and languages of countries where they might work. The three year majors will be broad but can be combined to provide depth allowing students to specialise via the Masters programme.

"Emphasis will be placed on inquiry-based learning and research skill development, introducing students directly to the research culture of the Faculty and fostering independent study," W/Prof O'Donnell said.

Winthrop Professor Zed Rengel receives his Honorary Doctorate from the University of Zagreb Vice-Chancellor, Prof.Dr. Aleksa Bjelis.

Croatia honours UWA Professor

Winthrop Professor Zed Rengel has received the highest honour from the University of Zagreb in his native country, Croatia, for his contribution to "the basic and applied knowledge in plant biology and biotechnology, specifically soil-plant interactions in the rhizosphere, aluminium toxicity and plant tolerance, and genotypic differences in nutrient efficiency".

The University of Zagreb is an institution with a rich history dating back to its establishment in 1669. Being in its 341st academic year, the University of Zagreb is the oldest and largest university in South-Eastern Europe. It offers a wide range of academic degree courses in arts, biomedicine, biotechnology, engineering, humanities, and natural and social sciences.

On average, this prestigious university awards only one Honorary doctorate or Doctor Honoris Causa once every couple of years. "The Ceremony was quite special I must admit because, contrary to how we do honorary doctorates over here in Australia, the whole ceremony was just for me," W/Prof Rengel reminisced.

Many dignitaries were invited, including all Pro-Rektors (that would be about the same as UWA's Deputy Vice-Chancellors), all Deans, and the Australian ambassador amongst others.

As the 93rd recipient, W/Prof Rengel joins an esteemed list of University of Zagreb Honorary Doctorates like Nikola Tesla (inventor), Nobel laureates Lavoslav Ruzicka and Vladimir Prelog (both Croatians), Niels Bohr (contributions to understanding atomic structure and quantum mechanics), Linus Pauling (influential chemist), Albert Fert (one of the discoverers of giant magnetoresistance), Margaret Thatcher (politician), and movie producer Branko Lustig (Oscars for *Schindler's List* and *Gladiator*).

Ms Emma Mainprize, Mr Blair Humphry, Mr Braden Lange and Mr Brodey Philips were the winners of the Royal Agricultural Society prize for agricultural studies at tertiary level.

UWA student receives Royal Agricultural Society prize

Mr Blair Humphry, a Moora farmer's son, was one of four winners of Royal Agricultural Society (RAS) prize of $2000 for students studying agriculture.

The RAS hopes to enourage and foster agriculture education through these awards.

Mr Humphry, a second year agricultural science student at UWA, said that he will put the $2000 prize money towards a new computer and text books.

He said he can see himself travelling and working in various overseas farming environments. "I want to get to know other farming practices, possibly in Asia or the United States, to broaden my own knowledge," he said.

Mr Humphry believes that farmers need to be more flexible as the climate and weather becomes more unpredictable. He intends to go back to the family farm in the end.

The other recipients were Mr Braden Lange (Narrogin), Emma Mainprize (Kardinya) and Brodey Phillips (Maylands).

W/Prof Alan Robson, Mr Peter Forby, Regional Director, Government of WA, WA Trade Office, India and W/Prof Kadambot Siddique are among the dignitaries who look on as Minister Dr Thomas Isaac, Mr Chacko (MP), and Vice-Chancellor of KAU light the lamp to launch the new Masters of science of climate change at KAU.

Masters of climate change Kerala Agricultural University-UWA partnership

Floods in Pakistan, drought in Australia, wild fires and drought in Russia, unusual wet conditions in Canada, and more disastrous weather in parts of China and Europe indicates that climate change is not only a buzz word, but it is really happening. Kerala Agricultural University (KAU) is a front runner in preparing the next generation of agricultural scientists with KAU launching its Master of Science Climate Change Adaptation Course at Kerala, India on September 6, 2010.

KAU's new Integrated Climate Change Adaptation Degree Program (3 plus 2 program) will be the first of its kind in India and Asia. UWA has provided significant input into the development of this course. W/Prof Kadambot Siddique, Assoc/Prof Karl-Heinz Wyrwoll and W/Prof Peter Davies from UWA provided advice in developing the course structure and contents.

At the new course launch, dignitaries included Dr T.M. Thomas Isaac (Honourable Minister for Finance, Govt. of Kerala), Sri K.R. Viswambharan (Vice-Chancellor of Kerala Agricultural University), Sri P.C. Chacko, MP; Sri Rajaji Mathew (MLA & Executive member KAU); Sri Raveendranath (MLA & Executive member KAU), and distinguished guests representing the Government of Kerala and Kerala Agricultural University. Some eight hundred people attended the lauch and it was widely covered in the printed media and television channels.

In his inaugural address W/Prof Alan Robson (Vice Chancellor, UWA) described the different challenges both Australia and India face in terms of climate change. He said that UWA and KAU will collaborate to find strategies by which farmers and people around the world can adapt to these immense challenges.

"KAU and UWA will be working together in climate change adaptation strategies through crop simulation models, smart genetics, agronomic packages, eco-system management and decision support systems," he said. Other partners in the course includes: Indian Space Research Organisation (ISRO), Kochin University of Science and Technology (KUSAT) and International Crops Research Institute for the Semi-Arid Tropics (ICRSAT).

Professor Robson said it is imperative that we undertake climate change adaptation in agriculture and allied sectors to minimise the impact under projected climate scenarios. He said that forecasting tools will play an important role to predict extreme weather events and prepare people to combat them, and to minimise losses.

"There must be a focussed effort from developed and developing countries to raise awareness, domestically and beyond, of climate change and ways in which to reduce greenhouse gases emission," he said.

"Globally there are few technical personnel in the field of climate change adaptation, particularly in South Asian countries. Definite policies in climate change research and education are urgently needed," he said.

KAU has selected its first batch of 20 outstanding students for the course. These students will be trained to analyse and interpret the risk and opportunities associated with climate and climate change, understanding the processes and activities that influence climate; and to make recommendations on future adaptation and mitigation strategies.

"I believe that this program will be a model for other educational institutions across the globe for multi-institutional collaboration in next generation courses," W/Prof Alan Robson said.

In his speech W/Prof Kadambot Siddique said that this new program provides an integrated approach to the analysis of climate change and processes in the context of agriculture and its allied sectors including environmental management.

He said that on-going climate change poses an increasing threat to agriculture and food production, requiring urgent implementation of novel agronomic and smart genetic means of addressing this threat.

"The challenge is not only to increase food production, but to do so in a way that is sustainable, reducing our greenhouse gas emissions and preserving biodiversity. A further challenge is that of ending hunger; currently around 1 billion people are hungry, and we must work to ensure that this number decreases rather than increases in the future. Meeting challenges will involve social and political solution as well as those based on natural and agricultural sciences," he said.

He said that "to address problems of agricultural production in relation to climate change, an on-farm approach is necessary, with involvement of the local farming community 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 agriculture production technology."

Ground penetrating radar unlocks clay

Dr Michael Simeoni and W/Prof Bob Gilkes, from the UWA School of Earth and Environment, and Dr Paul Galloway of DAFWA used a procedure called ground-penetrating radar (GPR) to create accurate maps of the depth of sand over clay in duplex soils in the Great Southern, near Esperance. This will give growers a precise picture of the depth to clay, and help combat crop yield variability.

Between half to two thirds of the 19 million hectares of all agricultural land in south-west Australia is made up of duplex soils. They are 'texture contrast' soils and can be divided into red, yellow, brown, dark and gleyed soils on the basis of subsurface soil colour. In some areas they are made up of sandy topsoil with heavier clay below. The depth to the clay layer can be quite different, and cause differences in crop yield.

Ground-penetrating radar is a non-destructive geophysical method that uses radar pulses to image the subsurface. GPR instruments are small, rugged and easy to use in the field. If linked to a GPS, it provides coordinate data at the same time. During the trials a portable commercial GPR was pushed across the paddocks by hand.

"It looks at structures and features under the soil surface in the same way that conventional radar is used to locate aircraft. It sends pulses of radio waves into the soil and records their reflections, which bounce off subsoil layers, to create an 'image' of those layers", W/Prof Gilkes said.

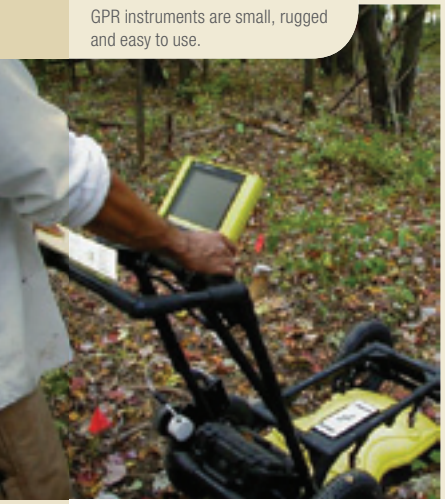
The EM38 and DualEM, which uses electromagnetic induction (EMI) are the most common electromagnetic instruments for soil mapping but they are used for mapping salinity, soil water and clay content, and are not well adapted to mapping depth to soil horizons.

Thus far not many researchers have worked on the GPR's potential application in agriculture in Australia. The equipment used had a depth range of between 25 and 200 cm. This meant that layers between the surface and 25cm down could not be located. However, equipment could be modified to measure soil horizons at shallower and greater depths. It is not suitable for very deep strata.

After they collected the field data, the team created a system to identify the duplex horizons and interpolate that information across the entire length of the paddock. Dr Adam O'Neill, from DownUnder GeoSolutions helped create contour maps of the subsurface horizon.

A comparison of GPR results with soil profiles from across all sites found that GPR can accurately measure the depth to the clay horizon of duplex soils to within 10cm. GPR works well for most soil conditions, but it is severely restricted for saline soils with bulk soil conductivity greater than about 300mS/m (milliSiemens per metre) or where standing water is present.

GPR instruments are small, rugged and easy to use.



The conductivity of saline soils and water is high and affects the electromagnetic signals from the GPR. EMI is also ineffective in these situations.

Although this method requires quite complex equipment and expertise, it provides a very exciting breakthrough in the delivery of more rapid and spatially detailed soil information. The trials were funded by the GRDC and the National Heritage Trust and were supported by South Coast Natural Resource Management Inc.

Assist/Prof Paul Close sampling fish on the banks of the Yellow River.

UWA assist in the management of China's rivers

UWA's Centre of Excellence in Natural Resource Management (CENRM) is involved in developing methods for managing the environmental health of China's rivers.

As a partner in the International Water Centre (IWC), CENRM is currently working with Chinese management agencies and research institutions on the Australia-China Environmental Development Partnership (ACEDP). This partnership, funded by the Australian Government AusAID and People's Republic of China Initiative, aims to provide practical solutions to immediate water management challenges.

CENRM's Winthrop Prof Peter Davies and Assist/Prof Paul Close are involved in the ACEDP's River Health and Environmental Flow Project, which aims to develop frameworks and methodologies for measuring river health and assessing environmental water requirements. "River health assessments provide scientific understanding of the threats to sustainable river function, using a range of indicators such as fish, aquatic macroinvertebrates and riparian vegetation, to support the implementation of targeted management actions. Assessment of a rivers environmental water requirement is also fundamental to sustainable management river health, as well as the management and allocation of water resources," Prof Davies said.

This project is relying on a variety of tools and frameworks developed in Australia for assessing and reporting on river health and determining environmental water requirements. Over the project's two-year time frame the researchers will trial international approaches to river health monitoring and environmental flow determination; develop a draft national framework for Environmental Flow and Ecological Restoration; and build technical capacity in China to independently conduct and further development river management strategies.

Assist/Prof Paul Close has undertaken several trips to China to visit sites for three case-studies in Pearl, Yellow and Liao River catchments. Working along-side Chinese researchers, monitoring protocols have been trialed and a range of suitable indicators of river health identified. Expert panel workshops have also been held to develop environmental water requirements for the Yellow River. Over the past few months, researchers from China have visited Australia to collaborate with IWC researchers in developing monitoring programs and analyzing data.

The IWC undertakes education, training research and consulting to promote whole-of-water cycle approach to water management. IWC is a joint venture between UWA, Monash University, Griffith University and the University of Queensland.

LtoR: W/Prof Carmen Lawrence, W/Prof Barry Marshall and W/Prof Kadambot Siddique on the panel at the UWA Science for our future festival.

Science for our future inspires Malaysia

"Enthusiastic and inspired by sciences" is an understatement in describing the spirit of more than 3000 students, teachers, alumni and members of the public attending the three-day UWA Science for our future festival held in Kuala Lumpur, August this year as part of Australia's National Science Week. The program was coordinated by Mr Shaun Welbourne-Wood from UWA's Faculty of Natural and Agricultural Sciences and Faculty of Life and Physical Sciences

Federal Land Development Agency (FELDA) Malaysia in collaboration with the WA Trade Office, Kuala Lumpur (WATOKL) and UWA promoted science and sent a clear message that society needs scientifically literate graduates. The drawing cards for students were meeting Nobel Laureate, W/Prof Barry Marshall, former WA Premier W/Prof Carmen Lawrence, School of Psychology and W/Prof Kadambot Siddique, Director of the UWA Institute of Agriculture.

National Science Week is an Australian Government initiative to promote the study of science, and the role it plays in society. It showcases Australia's leading scientists to the world, and encourages interest in science.

Themes included the prevention, diagnosis and treatment of disease; restoring and maintaining a balance within natural environments; ensuring food sustainability; and the need for science graduates to contribute to these areas. Presenters inspired students with flames, hydrogen explosions, and infections. W/Prof Kadambot Siddique aspired maize into a ball of flames to demonstrate the conversion of food into fuel. Students also saw bubbles filled with hydrogen explode as a segue into alternative fuels, and disease transmitted under UV lights.

Gifted science students could discuss their ideas and science issues, and ask challenging questions over lunch with W/Prof Barry Marshall, W/Prof Carmen Lawrence, and W/Prof Kadambot Siddique. Some of the students were amongst the top ten performing high school graduates in Malaysia.

W/Prof Barry Marshall was impressed with the students' enthusiasm. He said: "I liked the genuine interest in science and their good humour. They certainly have spirit."

Lau Kherr Siong (18) from Sibu, Sarawak said: "Through the discussion with W/Prof Siddique, I gained knowledge about the relationship between our food resources, the world population and land scarcity. Prof Carmen Lawrence explained the relationship between science and politics. Professor Barry Marshall also cleared my doubts about the DNA of *helicobacter pylor sp.* can reveal where we and our ancestors actually come from. These are the things that amazed me."

UWA's program with the Ministry of Education schools will be telecast to all Ministry of Education schools throughout Malaysia. This takes the UWA science message to more than five million students in more than 9000 schools.

The Australian High Commissioner to Malaysia, Mr Miles Kupa, said that UWA's Science festival was timely as it addressed the needs of the 10th Malaysia Plan through which Malaysia aimed to raise the academic standard in students and graduate competence to achieve a knowledge-based economy.

Assist/Prof. Deirdre Gleeson and PhD student, Ms Jennifer Carson, investigating the effect of water content on soil biodiversity.

Water may be a key controller of soil's vast biodiversity

Assist/Prof Deirdre Gleeson (deirdre.gleeson@uwa.edu.au)

Researchers at the UWA Institute of Agriculture have found evidence that water is a key controller of soil's vast microbial biodiversity. This research, funded by an Australian Research Council Discovery Projects grant, helps us understand how climate change may impact soil biodiversity and thus the soil microbial processes that are vital to food production.

Soil is a living system with an enormous biodiversity. In fact, soil is literally teeming with life and is the habitat with the greatest biodiversity on the planet. "The true value of soil biodiversity to our society is far greater than most people would ever have imagined" said Assist/Prof Deirdre Gleeson, from the UWA Institute of Agriculture, "in fact our very existence may depend on it."

Humans depend on the diverse array of microorganisms in soil for food production because they perform processes like releasing nutrients from organic matter. Not only that, soil microorganisms help control the earth's climate by emitting and consuming greenhouse gases such as carbon dioxide, nitrous oxide and methane (CO_2, N_2O and CH_4 respectively).

"Soil biologists are still intrigued by how so many different bacterial species can coexist in soil" says Assist/Prof Gleeson. Recent findings by Professor Gleeson and PhD student, Ms Jennifer Carson, have shown that bacterial diversity in soil increases as water levels decrease. "This is an important finding as soil, particularly in Australia – one of the driest places on earth, is generally unsaturated and therefore likely to be particularly diverse."

It is important that we understand how changing climate patterns are likely to influence microbial populations in soil. Climate change is projected to make rainfall more variable, which will influence key microbial populations in soil, particularly those that control soil fertility and are involved in the production of the greenhouse gases.

This research at UWA is using cutting edge technologies to study these microscopic organisms that we depend on. The project makes use of a nanoSIMS (nano-scale secondary ion mass spectrometry), located at UWA and the only one of its kind in the southern hemisphere. "This instrument allows us to see individual microorganisms without disturbing their soil habitat," says Assist/Prof Gleeson.

"We are also working with collaborators at Lawrence Berkley National Laboratories in the US using a technique that allows up to 9000 different bacteria and archaea to be characterised simultaneously, thus allowing us to track their response to changing soil water availability," she said.

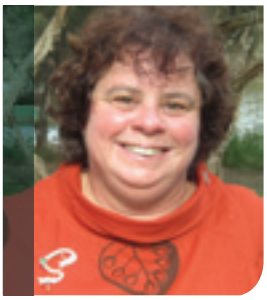
For more information go to http://www.uwa.edu.au/people/deirdre.gleeson or http://www.teri.fnas.uwa.edu.au/

New faces on board

The UWA Institute of Agriculture's External Advisory Board (EAB) provides the Institute with industry feedback on agricultural industry needs and issues, and provides independent advice to The UWA Institute of Agriculture Director on policy and direction.

Mr Dawson Bradford
Farmer, Chair of Lambex, and Chairman, WAMMCO

Mr Dawson Bradford owns and manages "Hillcroft Farms". He and his wife Greta started running this family business in 1967. Hillcroft is a diversified and integrated family business which makes the most of the natural resources available. "Hillcroft Farms" consists of 10,000 acres in the 18" rainfall zone, 165km south east of Perth and 32km northwest of Narrogin. Hillcroft Farms is recognised as one of the highest quality meat terminal sire breeds of sheep in Australia. Mr Bradford and his son are currently developing a high performance wool shedding maternal/terminal line based on the Poll Dorset and Dorper breeds. The Bradfords founded the Poll Dorset stud in 1972. Their enterprises include a cropping program consisting of 6,000 acres, to barley, wheat, oats, lupins and hay; a self-replacing merino sheep flock (surplus ewes are used for crossing with Poll Dorset rams for prime lamb production); a 1800 ewe pure Poll Dorset flock for breeding terminal meat breeding sires; a 650 sow breeding to finishing piggery; and a 1000 ewe wool shedding self replacing meat breed in advanced developmental stage.



Ms Verity Klemm
Strategic Project Manager, Department of Water

Ms Verity Klemm has 25 years experience across a wide range of technical, strategic, political and organisational aspects of water. She has an integrated knowledge of rivers and estuaries management (from pollution control to nutrient management and riparian improvement with the community to policy development). Over the past 10 years she has coordinated the Department of Water's activities in natural resource management, facilitated community engagement and involvement in these activities; and contributed to the development and implementation of state NRM policy and programs. She coordinates the department's science activities and develops science directions. Ms Klemm was WA's representative on the National Rivers Consortium for 2 years. She chaired the National Working group for advancing reconciliation in NRM and primary industries for two and a half years. She chaired the National Working Group for Advancing Reconciliation in NRM and Primary Industries (NWG) for three years.

LtoR: Mr Luke Abatania,, Mr Donkor Addai, Mr Willis Gwezi, Mr Freddy Obed Madiba, Mr George Swella and Mr Bernard Phillimon.

UWA takes lead on capacity building in African agriculture

Africa's leaders are intensifying efforts to find "sustainable solutions" to end hunger and poverty in a continent that faces many challenges. They see agriculture as the engine to overcome this, and UWA is playing an important role in capacity building.

Six African gentlemen, Mr Luke Abatania, Mr Donkor Addai, Mr Willis Gwezi, Mr Freddy Obed Madiba, Mr George Swella and Mr Bernard Phillimon came to UWA to gain the knowledge and leadership skills to make a real difference back home.

Mr Luke Abatania came to the UWA School of Agricultural and Resource Economics (SARE) in March 2009. After completing his studies he intends to return to his job as Research Fellow at the Institute of Agricultural Research in the College of Agriculture and Consumer Sciences, University of Ghana.

In 2008 Luke won a special scholarship from UWA Vice-Chancellor, Professor Alan Robson to undertake his PhD studies at UWA. The scholarship was initiated following a MoU between UWA and the University of Ghana. Luke's research interests include the sustainability of agricultural technologies, adoption and impact of improved agricultural technologies on farm household income / welfare and farm productivity analysis. "I believe my current research focusing on identifying performance bench marks for Ghanaian farm households through efficiency analysis will improve the lives of farmers in Ghana," he said.

Another Ghanian, Mr Donkor Addai, was also attracted to pursuing his PhD at SARE. He is researching "The economics of technological innovation for adaptation to climate change by broadacre farmers in WA.

"I like UWA very much. Some of the outstanding features are highly skilled and friendly academic staff, great study environments, closeness to city centre, first class facilities and supportive professional staff," he said.

Mr Bernard Phillimon is doing a MSc in Geographic Information Systems (GIS) within School of Earth and Environment. His research interest is on the use of geo-spatial technology in wildfire risk modelling and post-fire assessments. Bernard hopes his research will answer questions from the prescribed burning debate by assessing the impacts of prescribed fires relative to wildfires. The project takes advantage of high temporal resolution satellite data from the Moderate Resolution Imaging Spectroradiometer (MODIS).

"I want to take the experience gained through the research to Botswana where millions of hectares are burnt by wildfires annually. Quantifying the impacts of the fires will be vital in policy formulation based on the best available science," he said.

Mr Freddy Madiba's MSc (Soil Management) is looking at the *The effect of biochar application on the retention and availability of phosphorus (P) on wheat crop*. "My findings should improve understanding of the role of biochar in P dynamics (leaching, retention and availability) and mycorrhizal symbiosis, especially in sandy soils of Limpopo province," he said.

The application of biochar increase the efficiency of fertilisers used. This will be a huge benefit for South African farmers because fertilizers are expensive. Higher yields can be expected per unit of fertiliser applied along with biochar. Leaching losses can be prevented by applying biochar and thus minimizing environmental pollution.

Mr George Swella from Tanzania is working with the Tanzania Official Seed Certification Institute. He is undertaking PhD studies within the School of Plant Biology and hopes to make a contribution to conservation cropping systems research (especially no-tillage technology) and to continue this work when he goes back home.

"Most seed production areas in our country are limited by water stress. By incorporating this knowledge in our seed production programmes, it is possible to achieve increased seed yield and high seed quality with maximum water use efficiency and with additional environmental benefits. Such work has not been done in Tanzania and could lead to further research and international collaboration in relation to seed production," he said.

Mr Willis Gwenzi from Zimbabwe is finishing up his PhD in ecohydrology of land disturbed by mining activities within the School of Earth and Environment. The title of his PhD is 'Vegetation and Soil Controls on Water Redistribution on Recently Constructed Ecosystems in Water-limited Environments.'

"UWA offers an unrivalled PhD research experience in earth sciences, and PhD graduates from this university get things done. With a PhD in Soil Science from UWA, I will aim for the moon because even if I miss it, I will still fall among the stars.

"Despite the challenges of the past decade, Zimbabwe is endowed with vast untapped mineral and land resources. Whether or not I work in the resource or agriculture industry and university system, Zimbabwe requires skilled people in earth sciences now more than ever. Equipped with a PhD from UWA, Zimbabwe can count on me, and I am ready to take a plunge and make a contribution," he said.

New soils book flying off the shelf

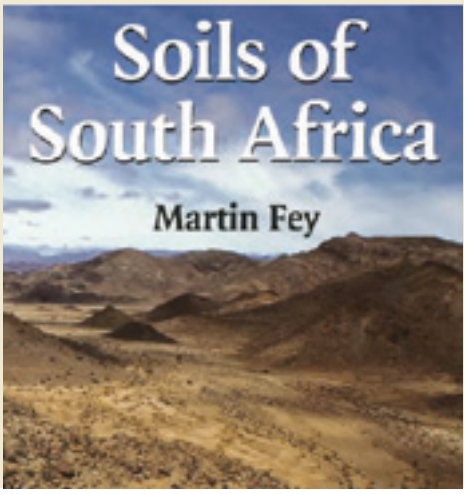
Since launching his book in September at the University of Stellenbosch (RSA), Prof Martin Fey's new book, *Soils of South Africa: their distribution, properties, classification, genesis, use and environmental significance*, is flying off the shelf with more than 700 copies already sold.

This book comes at a time where farmers are particularly interested in soils. It is the first book in seventy years that provides a comprehensive account of the 73 South African forms of soil. Prof Fey has provided maps showing distribution and abundance throughout South Africa; descriptions of morphological, chemical and physical properties; a detailed account of classification and its correlation with international systems; and a discussion of soil genesis which includes a review of relevant research papers.

The book also provides an appraisal of soil quality from a land use perspective as well as for its ecological significance for each group. The book includes illustrative examples of soil profiles with analytical data and accompanying interpretations.

Prof Fey has been praised in the media for the fascinating account of the special relationship that exists between South African animals and soil environments and how this interaction could give farmers and managers a better understanding of mineral imbalances in their livestock. In one of the most interesting accounts Prof Fey and his collaborators write about the importance of holes made by spiders in the vicinity of Clanwilliam where one such hole was so deep that it could not be filled by five litres of water.

Prof Fey joined the UWA School of Earth and Environment last year after an academic career at the Universities of Kwa-Zulu/Natal, Cape Town and Stellenbosch (Head of the Soil Science Department), South Africa.



The delegation at the Second International Ecosystem Assessment and Management (EAM) workshop at Lanzhou University, China.

Climate change and dryland agricultural ecosystem management

A delegation from UWA was amongst renowned experts from around the world invited to report on current developments on global climate change and ecosystem management, at the Second International Ecosystem Assessment and Management (EAM) workshop in China in June this year. The theme of the workshop was 'improvements to the productivity and sustainable development of fragile arid and semi-arid agro-ecosystems under the conditions of global climate change'.

Lanzhou University hosted the 1st International Workshop on Ecosystem Assessment and Management workshop four years ago. That 3-day workshop, also sponsored by "111" Program, funded by the State Administration of Foreign Experts Affairs and the Ministry of Education (MoE) of China, MoE Key Laboratory of Arid and Grassland Ecology of Lanzhou University and UWA Institute of Agriculture, focused on agricultural productivity in arid and semi-arid northwest China, vegetation, water and soil loss, water scarcity and poverty.

UWA has been one of the major partners in the "111" Program. Over the last four years, 20 experts from UWA have visited LZU and worked almost 300 days in total. This was reciprocated by over twelve visitors from LZU, including Professors Fengmin Li, Xiaogang Li, Ruijun Long, YouCai Xiong who visited UWA with "111" project support.

The workshop looked at agricultural development in China's western arid and semi-arid areas and the status quo of the ecological environment and social development of the region. Members from Australia, China, Canada, Japan and the USA gave scientific presentations and participated in field tours in the Gansu Province. Presenters from UWA included W/Prof Kadambot Siddique, W/Prof Neil Turner, W/Prof Richard Hobbs, W/Prof Zed Rengel, Assoc/Prof Guijun Yan, Dr Qifu Ma and Adj/Assoc/Prof Jairo Palta (CSIRO), Dr Sasha Jenkins and Dr Gavan McGrath

Workshop participants toured typical semi-arid agricultural/ecological landscapes and protective agricultural ecosystems at Beishan Experimental Station. They saw rainwater-harvesting practices and the dry and eroded Loess Plateau, and visited a water-scarce agricultural region in Minqin County, Gansu Province. Near Wuwei they saw a typical oasis landscape and irrigated agriculture. It was a good example of restoration and water-saving measures in a seriously-drought stricken and degraded oasis ecosystem.

Participants assessed important progress in international EAM cooperative projects; management of semi-arid rainfed agro-ecosystems; the main issues of agro-ecosystems in arid and semi-arid areas of Northwest China; and development and adaptation of rainfed agricultural systems in semi-arid areas to name a few. The proceedings of the workshop will be published in special issues of Plant and Soil, Crop and Pasture Science and Ecologica Sinica.

Soon after the workshop a parliamentary delegation of WA, headed by Mr Grant Woodhams, speaker of the WA Legislative Assembly, visited Key Laboratory of Arid and Grassland Ecology at LZU, followed by a meeting with Prof Xuhong Zhou, President of LZU, and Professor Tao Jing, Vice-President of LZU.

Mr Grant Woodhams was very pleased about the cooperation and scientific exchange between LZU and UWA. He praised the fruitful cooperation in eco-agriculture field between the two institutions, and encouraged further cooperation and exchange between the two universities.

Dr Terry Enright, Hon Terry Redman and Prof Willie Erskine at the opening of the Master Class.

Master class in participatory breeding

Plant breeders from Afghanistan, Australia, Bangladesh, China, East Timor, Ethiopia, India, Indonesia, Iran, Nepal and Tanzania gathered at the International Centre for Plant Breeding Education and Research (ICPBER) at UWA for a Master Class on November 22, 2010.

The course was officially opened by the Hon Terry Redman, Minister of Agriculture and Food WA. In his address Hon Redman said that the State government was committed to making WA the grains hub of Australia.

Dr Terry Enright (Chair of WA Crawford Fund committee) welcomed the trainees and guests on behalf of WA Crawford Fund. Mr Neil Young, representing the GRDC Western Panel, said that the GRDC invested a large portion of its funding to plant breeding, and will continue to do so in future.

The focus of the master class was participatory breeding with farmer interaction particularly for marginal areas in the developing world untouched by the effects of the Green Revolution. The major sponsor was the Crawford Fund. It promotes and supports agricultural research designed to benefit the developing world.

Other sponsors included the Australian Centre for International Agricultural Research (ACIAR), Grains Research and Development Corporation (GRDC) and the International Centre for Agricultural Research in the Dry Areas (ICARDA), Syria.

Plant Breeders attending the Master class are working on a huge spectrum of crops from rubber to maize and from cassava to almonds and barley. In addition to sharing experience improving the outputs from breeding using farmer interaction, participants were exposed to new paradigms in the statistical analysis of on-farm trials of the SAGI project (Statistics for Australian Grains Industry). Presenters came from ICARDA (Syria), Bangladesh, South Africa and Australia.

Dr Kiddo Mtunda, tuber crop breeder from Tanzania said: "The Master Class is really useful in broadening my horizons in participatory breeding and of great relevance to my on-going cassava improvement program back home."

"The Crawford Fund is particularly pleased that this master class is being held in Australia so that a group of experienced and practicing Australian plant breeders can benefit and join colleagues from developing countries," said Dr Eric Craswell, Crawford Fund Director of Training.

The ICPBER has recently celebrated its second anniversary since it was launched by the then State Minister of Agriculture, Mr Kim Chance, and the UWA Vice-Chancellor, W/Prof Alan Robson on 29 August 2008. ICPBER was established to address an emerging national and international need for training in genetics and plant breeding and to train 'Tomorrow's Plant Breeders'.

Some of its achievements include 4 PhD's and 1 MSc in 2008, 7 PhD's and 3 MSc's in 2009. These numbers increased to 31 postgraduates enrolled as plant breeding-related postgraduates.

"From 2008 we have had 17 new research grants in the area of plant breeding and genetics from eight funding bodies for an overall total of $8,565,450 awarded to ICPBER staff," Prof Erskine said proudly.

In 2009 there were a total of 27 refereed journal articles, 4 edited book chapters, and 2 books published on plant breeding/genetics.

Last year ICPBER ran the first OECD Conference in WA entitled Exploiting genome-wide association in oilseed Brassicas in search of a model for genetic improvement of major OECD crops for sustainable future farming with 80 attendees from seven countries.

To date ICPBER has run five short courses for in-service trainees with a total of 128 participants.

Ms Megan Meates and Ms Susan Hall

Still spreading the alliance

Ms Megan Meates (megan.meates@uwa.edu.au)

WA grower groups have gained further support through the Grower Group Alliance (GGA) after the UWA-based organisation was refunded for another three years by the Grains Research and Development Corporation (GRDC).

This will take the GGA into its fourth phase of funding since its inception in 2002, continuing the ongoing support in linking WA grower groups in a network with research and industry partners through to 2013. The not-for-profit farmer driven organisation, hosted by the UWA Institute of Agriculture, supports more than 40 grower groups across WA, which are estimated to involve 50 per cent of WA grain growers.

The UWA Institute of Agriculture Director, Winthrop Professor Kadambot Siddique is the project supervisor and on the project's strategic advisory group, along with four farmer members, a consultant and representatives from DAFWA and CSIRO. Ms Susan Hall will continue to lead the project, working with Ms Megan Meates.

Ms Hall said the project will continue its three aims of expanding the network of grower groups, researchers and industry partners; enhancing the participation of grower groups in collaborative projects and participatory research; and improving the effectiveness and efficiency of groups to provide value to members.

"From feedback from an evaluation of the GGA project, the new phase will also address issues regarding the varying levels of support amongst the different sized groups and focus on a more reactive approach to this support. The development of the larger network and the utilisation of the project's critical mass and industry leaders will also be key aspects of the new project," she said.

The GGA began when grower groups from various parts of the state recognised the advantages of networks and the benefits of actively forming partnerships to maximise opportunities for collaboration, but wanted a better way to share information and knowledge.

Since the beginning, the project has seen networks of farmer groups providing partners with opportunities of greater impact, well beyond partnerships with one or two farmer groups. It was the first project of its kind in Australia, but from its success has since seen similar models of the project developed in other states.

The GGA has pioneered the first ever Australian publication and distribution of the Grower Group Toolkit, within WA and nationally, and throughout agricultural industries. "Nationally this Toolkit has attracted a lot of interest from grower groups and the agriculture industry," Ms Hall said.

More achievements over the past three years include the development of a number of collaborative projects; the development of the WA node of the Grain & Graze 2 project; an interstate study tour with 16 farmers from 13 grower groups to NSW; three annual forums; and support of groups, from assisting with strategic planning, through to tours, guest speakers, project development and more. For more information on the Grower Group Alliance, visit www.gga.org.au.

A field day goer looks at the microscopic bugs in the soil and microbes found in the stomach of sheep under a microscope while Dr Megan Chadwick looks on.

UWA agriculture on display at Dowerin Field Day 2010

Ms Aprille Chadwick (Aprille.chadwick@uwa.edu.au)

The UWA Institute of Agriculture was one of the coalition of agriculture industry organisations who formed part of the Department of Agriculture and Food WA's "Careers in Agriculture" display at the Dowerin Field Day in August.

"Dowerin 2010 was a great success for UWA in terms of building relationships with the community," Ms Aprille Chadwick, organiser for The UWA Institute of Agriculture, said. Over the course of the two day event the Institute promoted its current and future research.

"It was great to see field day visitors engage with UWA scientists about research in a variety of areas, that will assist farmers in animal production (reducing methane emissions), weed management (herbicide resistance), soil management (soil carbon) and new crop varieties (salt tolerant plants)," Ms Chadwick said. UWA showed that its agricultural research was committed to finding novel innovations in sustainable agriculture. Amongst the items on display was an interactive display for visitors to take a look at microscopic bugs in the soil and microbes found in the stomach of sheep. The new Harrington Seed Destructor was showcased by the Australian Herbicide Resistance Initiative(AHRI), and WA No-Till Farming Association (WANTFA) displayed their latest techniques for conservation cropping. There was also a lot of interest in the newly developed salt tolerant chickpea species, located at the Council of Grain Growers Organisation (COGGO) display.

Primary Industry Centre for Science Education (PICSE) at UWA provided a sugar concentration display using a spectrometer and was a winner with young and old. "This fun display gave an opportunity to talk with students about what Faculty of Natural and Agricultural Sciences (FNAS) at UWA has to offer," Ms Chadwick observed. Industries with new innovations and grower groups were also keen to develop relationships with researchers at UWA. "Sustainable agriculture is a common goal for all and it is achieved not only by good science but by having good relationships with producers, community and industry. UWA's presence at Dowerin helped foster these good relations," she said.

COURTESY OF THE COUNTRYMAN

UWA and CSIRO research group in one of four climate change simulation tunnels at UWA's Shenton Park Field Station. Winthrop Professor Kadambot Siddique with Dr Jairo Palta, Mr Sam Henty (CSIRO), Mr Eduardo DIAS de Oliveira and Dr Helen Bramley.

Climate ready cereals

Despite climate change and variability across Australia's grainbelt, with increased ambient carbon dioxide (CO_2) and temperature and reduced rainfall, very little attention has been paid to the interactive effects of high temperature, CO_2 and soil moisture on crop growth and yield.

That's about to change thanks to experiments by CSIRO Plant Industry and The UWA Institute of Agriculture, with a research team at UWA's Shenton Park Field Station using four state-of-the-art poly tunnels to inform wheat breeders about how climate change and variability will affect the genetic traits they select for.

The sealed tunnels were designed and built as part of the 'Climate Ready Cereals' project funded by the Federal Department of Agriculture, Forestry and Fisheries (DAFF) and the WA component is managed by CSIRO in collaboration with The UWA Institute of Agriculture.

According to CSIRO Principal Research Scientist, Dr Jairo Palta, most previous studies showed individual effects on wheat yield of increased CO_2, higher temperature and drought, but was unclear about how the three variables interacted and affected grain yield for different cultivars.

"The CSIRO and UWA research team should unravel the impact of this interaction during wheat growth and the critical stages of flowering and grain filling," Dr Palta said.

Tunnel temperatures vary from ambient to six degrees celsius above ambient and CO_2 levels vary from ambient (approx 380ppm) to about double at 700ppm. WA, Australia's largest grain-producing state, is forecast to become drier, while all regions will likely be exposed to higher temperatures and elevated CO_2.

The UWA Institute of Agriculture Director, Winthrop Professor Kadambot Siddique, said that grain productivity and quality must be sustained or increased in the face of increasing demand for food, stockfeed and fuel for WA to maintain its cereal supplies and competitive export status.

According to Dr Palta, while elevated CO_2 had some advantages for crops such as wheat, it was likely to suffer yield loss from increased temperature and frequency of terminal drought.

The UWA Institute of Agriculture and CSIRO PhD candidate from Brazil, Eduardo DIAS de Oliveira, is doing most of the 'hands-on' physiological research in the UWA climate tunnels.

The UWA Institute of Agriculture Research Fellow, Dr Helen Bramley and Australian Endeavour Research Fellow, Dr Muhammad Farooq, from the University of Agriculture, Faisalabad, Pakistan, are researching high temperature and drought, which complements the 'Climate Ready Cereals' project.

"Water is the bulk constituent of most plant cells and is needed for biochemical processes, cell expansion or growth, dissolution of many compounds and conveying essential nutrients.

"Although dryland crop plants, such as wheat, have an evolved mechanism to conserve water, when taking up CO_2 for photosynthesis water vapour is lost via evaporation through open stomata.

"This water must be continually replenished from water taken up from the soil by roots, to prevent the shoot from dehydrating," Dr Bramley said.

Dr Farooq is evaluating the role of nitric oxide (NO) in heat and drought stress resistance in wheat. NO is emerging as an important signalling molecule, with multiple biological functions.

Dr Farooq's findings should background the mechanism of NO-induced stress tolerance in wheat and help develop a quick test to screen genotypes for stress resistance.

Cart, crush or cremate weed seeds?

Ms Neree Martinez
(neree.martinez@uwa.edu.au)

Should I cart, crush or cremate my weeds seed this harvest? This was the question asked by several farmers at the Australian Herbicide Resistance Initiative (AHRI) hosted workshops delivered during October.

With support from the GRDC, Wheatbelt NRM and the South West Catchment Council three half day seminars were held in Wubin, Corrigin and Kojonup focusing on harvest weed seed management techniques. These workshops addressed the importance of harvest weed seed management and how to successfully implement a chaff cart, windrow burning, baling and harvest weed seed destruction system.

Researchers, Assoc/Prof Michael Walsh (AHRI, UWA) and Dr Peter Newman (DAFWA) covered how to optimize weed seed management systems and discussed the successful use of weed seed targeting systems in an integrated weed management program. Darkan farmer and inventor of the Harrington Seed Destructor (HSD), Mr Ray Harrington spoke about the HSD, a unique seed destruction system that has helped him to achieve lower weed levels across his farm. Finally, Corrigin grower, Mr Lance Turner, discussed the benefits of using a chaff cart and how this has enabled him to drive down weed numbers in his farming operation.

"The benefit of harvest weed seed management is the ability to drive weed numbers down, which consequently enables early or dry sowing," said W/Prof Steve Powles, Director of AHRI, UWA. Although not all farming systems are the same, there are several harvest weed seed management options available, allowing growers to choose one that best suits their individual farming operation. Importantly, employing some form of harvest weed seed management will assist in the sustainability of cropping production systems in Australia.

LtoR: Mr Ray Harrington, W/Prof Steve Powles (AHRI, UWA) and Assoc/Prof Michael Walsh (AHRI, UWA) pictured with the third GRDC funded HSD prototype.

Assist/Prof Graeme Doole. Insert: Dr Lindsay Bell

UWA economist wins national agronomist award

At the annual dinner of the 15th Australian Society of Agronomy Conference held at the Convention Centre in Christchurch, New Zealand on 16 November, Assist/Prof Graeme Doole from the Centre for Environmental Economics and Policy in the UWA School of Agricultural and Resource Economics was a joint winner of the prestigious national award of "Australia's best young agronomist".

"In many ways this is a remarkable achievement, as Assist/Prof Doole himself observed in his acceptance speech," Professor Ross Kingwell, who was present at the award ceremony, recalled. Tongue-in-cheek, Assist/Prof Doole hinted that qualifying as "Australia's best young agronomist' was some feat as he was not so young, he was a New Zealander and he was an economist.

"This award means a lot to me since it recognises that my studies of the issues of Australian agriculture from an economic perspective are well developed and of industry relevance. I would like to thank the Australian Society of Agronomy for this recognition and look forward to continued interaction with agronomists in future research," Assist/Prof Doole said after receiving the award.

Strange as it may seem, the award was well-deserved as Assist/Prof Doole has worked on a range of agronomic and economic issues and has published several crop-related research papers. He is already renowned for his bio-economic modelling skills and regularly works with agronomists and animal scientists. His research output and quality is already of a particularly high standard so this award recognises that excellence. Assist/Prof Doole completed his PhD from UWA in 2007 under the supervision of Winthrop Professor David Pannell and Dr Clinton Revell from the Department of Agriculture and Food Western Australia. In his acceptance speech, he recognised the valuable input of UWA staff into his development as a researcher, particularly Winthrop Professor David Pannell and Professor Ross Kingwell from the School of Agricultural and Resource Economics. Assist/Prof Doole was the Deputy Program Leader of Rural Economy, Policy and Development Program of the UWA Institute of Agriculture during the 2007-08 period.

Dr Lindsay Bell, a PhD graduate from UWA, was the other recipient of the Australia's best young agronomist award. He currently works for the CSIRO Sustainable Ecosystems as pasture agronomist and legume specialist.

Iraqi researches, extension specialists and farmers inspecting adoption of No-Till technology in Ninevah province, northern Iraq.

Iraqi zero-till technology uptake on the increase

ACIAR/AusAID funded project, on "Development of conservation cropping systems in the drylands of northern Iraq" is making excellent progress.

This project set to run from 2008 until 2011, aims to increase crop productivity, profitability and sustainability in the drylands of northern Iraq through the development, evaluation and promotion of conservation cropping technologies involving zero-tillage, stubble mulching, improved crop cultivars and better crop management.

Thus far growers in Ninevah province have widely adopted conservation cropping systems. Local villagers have been trained to produce and market seed and zero-till machinery. Local agricultural agencies have received technical training to plan, implement and monitor research and development programs.

The program holds regular demonstrations to promote uptake of "best-bet" improved varieties and crop management systems for wheat, barley and pulse and forage legumes. In Iraq alone overall 31 farmers grew approximately 1800ha of zero-till crops. Last year in Syria 160 farmers grew 6575ha of zero-till crops using local zero-till seeders.

According to W/Prof Kadambot Siddique, Director of the UWA Institute of Agriculture, ICARDA research furthered understanding of conservation cropping. "We have seen an increase in the uptake of zero-till by farmers, mainly because they can see that crop yields were favoured by zero-till, early sowing, low seed rates, and 4-6cm depth of seeding," he said. The same performance from zero-till was seen in wheat, barley, oat, chickpea, lentil, faba bean and field pea varieties.

Manufacturers and farmers in Iraq and Syria were able to do excellent fabrication and/or modification of zero-till seeders. ICARDA, UWA, DAFWA and University of Adelaide will continue to do extensive training and capacity building of Iraqi researchers, extension workers and farmers in ICARDA and Australia.

Tedera trials at Buntine

Trialing new pastures for WA wheat-sheep zone

Assoc/Prof Megan Ryan (megan.ryan@uwa.edu.au)

Drier seasons and increased feed demand urges researchers to look for new options for pasture.

A recent collaborative project between DAFWA / FFI CRC (Dr Daniel Real) and UWA (Assoc/Prof Megan Ryan, Mr Lalith Suriyagoda, Assist/Prof Michael Renton), funded by Rural Industries Research and Development Corporation (RIRDC), examined the survival and productivity over two years of tedera and *Cullen australasicum* as perennial pasture legumes for the wheat-sheep zone in WA. *Bituminaria bituminosa var. albomarginata* (tedera) originates from the Canary Islands. *Cullen australasicum* is an Australian native with a wide distribution through arid and semi-arid areas.

"Two accessions of each species were examined. Replicated trials were established from seedlings at Newdegate, Merredin and Buntine in June 2008. Final harvest was done in August 2010," Assoc/Prof Ryan said. Unfortunately, the trial at Merredin was destroyed by rabbits. Rainfall in the first year (June 2008-May 2009) was 370 mm at Newdegate and 355 mm at Buntine. It rained less in the second year (June 2009-August 2010) with the rain guage lower being 340 mm at Newdegate and 335 mm at Buntine. "The trials examined survival and shoot biomass production under four cutting frequencies to a 5 cm height (1, 2, 3 or 4 cuts per year) and five plant densities (1, 2, 4, 8, 16 plants m-2)," she said. No fertiliser was applied.

There were few differences between the accessions of each species at Newdegate and Buntine and little effect of cutting frequency. The highest density was generally the most productive, especially in the wetter first year. Shoot dry weight was highest at Newdegate, reaching up to 6.0 t ha-1 in year 1 and 3 t ha-1 in year 2 for tedera, and 5.5 t ha-1 in year 1 and 1.5 t ha-1 in year 2 for C. *australasicum*. At Buntine, shoot dry weight for tedera was up to 2.2 t ha-1 in year 1 and 1.3 t ha-1 in year 2 and, for C. *australasicum*, up to 1.7 t ha-1 in year 1 and 0.4 t ha-1 in year 2. The lower productivity of C. *australasicum* was a reflection that few survived. Volunteer annual pasture established under all treatments.

"We believe that the results were quite exciting in terms of the high summer/autumn productivity," Assoc/Prof Ryan said. Tedera produced 2.4 t ha-1 at Newdegate and 0.6 t ha-1 at Buntine in year 1 between November and May and 0.35 t ha-1 at Newdegate and 0.32 t ha-1 at Buntine in year 2 between December and April. C. *australasicum* summer/autumn yields were lower, except at Newdegate in year 2 (0.75 t ha-1).

Measures of nutritive value for plant components (leaves, edible stems and non-edible stems) did not vary greatly between the two species, with the exception of "edible stem" which was considerably more nutritious for tedera. At Newdegate, C. *australasicum* consistently had a lower proportion of leaf (~ 20%) than tedera (50-80%), while at Buntine there was little difference especially at the highest cutting frequency.

Overall, the results suggest that tedera is the more promising of the two species. Tedera warrants further development as a perennial pasture for the drier areas of the WA graintbelt.

The UWA Institute of Agriculture's External Advisory Board members and field day goers.

UWA Future Farm adapts to climate change

Despite the fact that 2010 has been one of the driest years on record in WA, and many producers were forced into harvesting crops early, not for grain but for hay, nearly one hundred people attended the Coping with climate change field day on October 1, 2010 UWA "Future Farm" Ridgefield farm, Pingelly WA.

This field day focused on showcasing the Reducing Emissions from Livestock Research Program (RELRP) as part of DAFF's Climate Change Research Program. It was also integrated with other projects that are underway at Ridgefield and that are related to green house gas mitigation and adaptation on the farm. In an attempt to show the entire DAFF Climate Change Research Program more broadly, the reforestation project for the farm's non-arable land and a second DAFF project, the National Adaptation and Mitigation Initiative (NAMI), co-funded by the Grains Research and Development Corporation (GRDC) were also presented.

Field day participants were keen to see the 'ALVA House', a newly designed house with a vision for energy efficiency for the farm infrastructure. It was designed and constructed by UWA's Faculty of Architecture, Landscape Architecture and Visual Arts (ALVA), through the Advanced Timber Concepts Research Centre, in collaboration with Optimum Resource Architects. The UWA School of Electrical, Electronic & Computer Engineering was also present at the field day.

Winthrop Professor Kadambot Siddique welcomed the guests and provided the overall objective of the UWA Future Farm. Winthrop Professor Robyn Owens (the Deputy Vice-Chancellor Research UWA) and Honorable Philip Gardiner (MLA) opened the day and expressed the commitment of the University and state government to the initiatives at Ridgefield. Prof Phil Vercoe introduced the main aim of the day as well as an overview of the RELRP program and the various activities that have been initiated at Ridgefield and that are linked to RELRP and more generally to the CCRP.

The main presentations started after lunch with a number of 'on site demonstrations' at specific locations around Ridgefield, which allowed attendees to interact with the researchers. The emphasis was on how the research dealt with climate change within the context of farming enterprises and how the results will lead to new farm management practices. The day finished with a brief summary and barbeque to allow interaction amongst attendees.

PHOTO: ALBANY ADVERTISER

Julie Roberts of Mt Barker Community College won the most innovative in agriculture award.

Great Southern region investigates science

Mr Augustine Juliano Kang Bacale (augustine.kangbacale@uwa.edu.au)

Students in the Great Southern region have taken their dreams to the next level and scientifically tested some fascinating questions such as: Can you grow a chocolate-flavoured lettuce? Which tyre pressure allows you to accelerate fastest on gravel roads? What is the best thing to naturally attract and then kill snails in your veggie patch?

The event saw 95 Year 10 students from four Great Southern schools display 40 science projects at the PICSE UWA Science Investigation Awards at the Albany Stirling Club on Monday November 15. They presented their work to judges from the Lions Club of Albany paired with scientists from DAFWA, Agronomo, Denmark Environment Centre, Wilson Inlet Catchment Committee, Denmark Senior High School and the Science Teachers' Association of WA.

The UWA Institute of Agriculture awarded the $400 'Most Innovative in Agriculture' Prize to Julie Roberts of Mt Barker Community College for her display entitled, "Aussie, Aussie, Aussie, Pump, Pump, Pump."

The Science Investigation Awards was hosted by the Primary Industry Centre for Science Education (PICSE) at UWA. This regional event followed similar awards held in July featuring 653 students from Perth metropolitan schools.

The Science Investigation Awards aims to celebrate the science achievements of students, rewarding them for the discipline and perseverance that makes for successful scientific work.

Teachers from North Albany Senior High School, Albany Senior High School, Greater Southern Grammar School and Mount Barker Community College worked with and motivated their students to use the scientific method to explore exciting questions of their choice.

Winthrop Professor Peter Davies from the Centre of Excellence in Natural Resource Management (UWA Albany) awarded the first, second and third prizes to Henry Duddels and Brayden Bennett (Mt Barker), Daniel Blechynder (Great Southern Grammar), Lilly Backshell and Stefanie Gordon (Mt Barker) respectively. Laura Wishart (Great Southern Grammar), Jarrah Jones, Helen McDonald and Sayah Drummond (Mt Barker) all received Highly Commended awards. Rachel Lincoln-Gomm and Holly Ruscoe's display (Albany Senior High School) was voted in as the People's Choice of the event.

For more information, please contact PICSE Science Education Officer, Ms Belinda Pope on (08) 6488 1646.

UWA PhD soil science thesis acknowledged nationally

Dr Craig Scanlan, a former PhD student at UWA was recently awarded the Australian Soil Science Society CG Stephens PhD Award in Soil Science, for the best PhD thesis in soil science granted by an Australian university in 2009 at the 2010 World Congress of Soil Science in Brisbane.

WA's water limited environment has inspired Dr Scanlan to gain a better understanding of water balance and how plants affect it, should improve land use productivity. His PhD project entitled, 'Processes and effects of root-induced changes to soil hydraulic properties', focused on how plants changed the way water stored and flowed in soils and assessed how this affected growth.

His thesis was described by the judges as "an innovative thesis that makes a significant contribution to the theoretical framework of soil science and which developed a new theory that can have a wider application in managing soil structure, effluent disposal, pasture and crop management and natural resource modelling."

The key finding from Dr Scanlan's thesis was that root-induced changes to soil hydraulic properties were dynamic and depended on the combination of soil texture, connectivity of root modified pores and the ratio of root radius to pore radius.

His PhD Supervisor at UWA, Prof Christoph Hinz, said that to assess how plant roots affected soils and water balance, Dr Scanlan devised a new quantitative model to account for the effects and estimate water balance and associated changes.

This involved detailed studies of soils and reviewed and synthesised data of plant root sizes and distribution. Professor Hinz explained that when plants grew in soil with little biological activity, plant roots changed the structure and often the fabric of soils. It could result in dramatic changes to the soil's water holding capacity and its ability to transmit water. WA environments, with highly weathered ancient soils that were often sodic and prone to hard setting and crust formation, were often very vulnerable to land degradation.

Prof Hinz said Dr Scanlan's thesis can help us better understand and predict major land use involving changes in vegetation. His PhD has potentially significant ramifications for ecosystem restoration in mine-site rehabilitation, on-farm changes to cropping systems, or other environmental impacts involving changes to plant communities and plant types. Dr Scanlan completed his PhD with the support of a GRDC postgraduate scholarship and DAFWA.

Led by Prof Hinz, a research group in the UWA School of Earth and Environment and the UWA Institute of Agriculture, is improving understanding of the feedback processes between soil and vegetation and aiming to better predict hydrological processes at the landscape scale.

Dr Craig Scanlan

The UWA Tea Tree Oil Research Group

Tea tree solutions

Cancer is the second leading cause of death worldwide, accounting for 12% of all deaths and exceeded only by cardiovascular disease. Treating 434 000 Australians for one or more non-melanoma skin cancers annually costs around $264 million. More than 60% of anticancer agents currently in use are derived from natural resources, but toxic side effects and resistance to these and other synthetic drugs requires new treatment options.

The Tea Tree Oil Research Group within the School of Biomedical, Biomolecular and Chemical Sciences at UWA has been researching the medicinal properties of the essential oil of *Melaleuca alternifolia* (tea tree oil) since the early 1990s. *M. alternifolia* is unique to Australia and native to Northern New South Wales. Tea tree oil contains over 100 components, mostly monoterpenes, sesquiterpenes and their alcohols. The component terpinen-4-ol is the most abundant (minimum 30%), and believed to be responsible for most of the antimicrobial activity. Levels of 14 components, including terpinen-4-ol are stipulated in the International Standard for Oil of Melaleuca, Terpinen-4-ol type (ISO 4730).

Until recently, the Tea Tree Group has investigated and characterised the antimicrobial properties of tea tree oil showing that tea tree oil has broad-spectrum in vitro antibacterial, antifungal and antiviral activity. Now a three year study funded by Rural Industries Research and Development Corporation (RIRDC) has examined the role tea tree may play in future to treat non-melanoma skin cancers.

Sold tumours were grown under the skin of mice and treated with a tea tree formulation. Results showed that it inhibited tumour growth. Within a day of treatment the tumour was smaller. The only mild side-effect, skin irritation, disappeared within days of the treatment finishing.

"If topical tea tree oil can slow down aggressive solid tumours grown under the skin in mice, it's potential to be effective against cancers that grow within the skin is enormous," principal researcher, Dr Sara Greay said.

The next step is to do clinical testing of tea tree oil formulations on people with precancerous lesions, with the aim of preventing skin cancer.

RIRDC's Tea Tree Oil program supports the continued development of a profitable and environmentally sustainable Australian tea tree oil industry. Dr Roslyn Prinsley, General Manager, New and Emerging Rural Industries, RIRDC, sees this research as a major step forward for Australia's tea tree oil industry's profile and financial viability.

Prof Tom Riley from the UWA School of Biomedical, Biomolecular and Chemical Sciences believes tea tree could also impact antibiotic resistance, and they are working towards introducing tea tree oil as a pharmaceutical.

"If we can introduce some tea tree products into the hospital environment like hand washes and antiseptics and topical microbials, I believe it will reduce the pressure on antibiotic usage. Once you reduce the pressure on antibiotic usage, even slightly, you will ultimately have an impact on antibiotic resistance which is a worldwide problem," Professor Riley said.

Professor Riley's team is about to start small clinical trials to prove tea tree oils effectiveness against ulcers in diabetics and methicillin resistant golden staph in orthopaedic surgery patients and as a hand wash for medical staff.

They have successfully used tea tree to treat patients with cold sores, looked at decolonising patients who've got golden staph up their noses and had a good outcome. "The idea now is to broaden that into a number of different areas. Do proper randomly controlled clinical trials and that really is the final arbiter as to whether a product should be introduced for general medical use," Prof Riley said.

Tea tree oil is listed under Australia's Therapeutic Goods Administration and in some countries in Europe as an antiseptic, but it has not been recognised as a pharmaceutical.

Iraqi plant breeders get hands on crossing experience at UWA.

Crop improvement for Iraq

The International Centre for Plant Breeding Education and Research (ICPBER) at UWA ran a five-week intensive training course Crop Improvement for Iraq from 22 September 2010. The course was funded by AusAID under the Iraqi Partnership Facility, Coffey International Development.

It was attended by twenty breeders from various Institutes and branches of the Iraqi Ministry of Agriculture from all parts of the country. The attendees had a diverse range of background experience in and knowledge of plant breeding.

The lectures covered topics ranging from basic genetics and plant breeding principles through to advanced new technologies currently being applied to plant breeding throughout the world. Lecturers were from the UWA, Department of Agriculture and Food WA, InterGrain Pty Ltd and Canola Breeders WA Pty Ltd. "The group took such a lively interest in the subject matter and asked so many questions that some lecturers could hardly finish their presentations," Prof Willie Erskine, Director of ICPBER said.

The Cheonggyecheon river system being aerated in central Seoul.

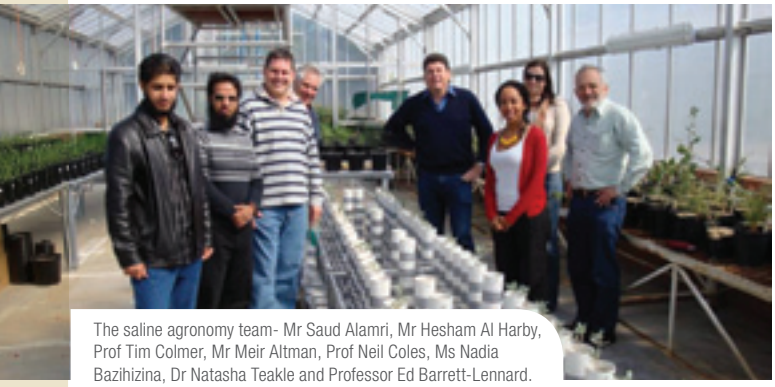
Ecohydrologists gather in Korea

The 8th International Symposium on Ecohydraulics (ISE 2010), held in Korea in September this year, was a monster fest for engineers, hydrologists, ecologists and a multitude of others with a professional interest in water science.

One of the particularly well received and attended special sessions was the Second Ecohydrology-Ecophysiology Workshop, organised and run by the UWA Centre of Excellence for Ecohydrology. The session, which was standing room only by the time it completed, was chaired by Centre Director, Prof Neil Coles. He explained that "we use a land management approach to assessing ecosystem functionality, using a variety of methods for data collection, from remote sensing to onground data collection and then pull them together to get an integrated model. The practical experience we were able to speak about and demonstrate attracted a lot of attention from attendees."

Speakers from UWA, University of Queensland, Korea University and Hohai University (Nanjing, China) presented papers related to the session subtitle: 'Understanding Wetlands, Riparian Zones & Nutrient Cycling and the Impact of Climate Variability'.

The first Ecohydrology-Ecophysiology workshop was held at UWA in September 2008 and jointly hosted by the Centre of Excellence for Ecohydrology and the School of Plant Biology.



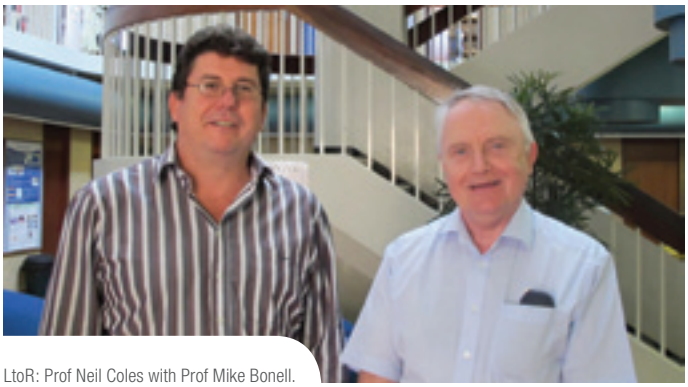
The saline agronomy team- Mr Saud Alamri, Mr Hesham Al Harby, Prof Tim Colmer, Mr Meir Altman, Prof Neil Coles, Ms Nadia Bazihizina, Dr Natasha Teakle and Professor Ed Barrett-Lennard.

Excellence in saline agronomy

The Centre of Excellence for Ecohydrology is renowned for the ground breaking research in saline pasture development and understanding plant adaptation to extreme growing conditions, with experts like Professor Tim Colmer, Dr Natasha Teakle, Professor Neil Coles, Professor Ed Barrett-Lennard and Meir Altman solving some pieces of the puzzle.

Ms Nadia Bazihizina has recently joined the Saline Agronomy team. She will continue researching the response of plants to variability in saline environments. Thus far, her PhD research showed that plants with roots in water sources of different salinity will take water from the less saline source before they take water from a highly saline source.

Two new students, Mr Saud Alamri and Mr Hesham Al Harby, both from the kingdom of Saudi Arabia, started their PhD research under the supervision of the saline agronomy team. Mr Al Harby's research on Old Man Saltbush will give the team a greater insight into how such plants survive in the long-term in saline landscapes. Mr Alamri's testing of the tolerance of several amphiploids and their parents should provide greater insight into the traits necessary to improve crop growth on saltland.



LtoR: Prof Neil Coles with Prof Mike Bonell.

Ecohydrology masterclass in Scotland

Professor Mike Bonell from the UWA Centre of Excellence for Ecohydrology was recently successful in obtaining a Professor-at-Large Nominations (PAL) funding award from the UNESCO Water Policy and Science Centre, at Dundee University, Dundee Scotland, to visit in 2011 and 2012.

Professor Bonell will hold a Master Class and deliver a series of lectures in Forest Hydrology and Flooding while on Campus in 2011 – watch out for details from the International Centre for Advanced Studies. He will also assist the Centre in developing an international Forest Hydrology research program bringing together scientist from Australia, UK, US and China.

For more information on the UWA Centre of Excellence for Ecohydrology go to www.ecohydrology.uwa.edu.au

Flooding fix for salinity and waterlogging

Statistics show that ten years ago it was estimated that approximately 5.7 million hectares of Australia's agricultural and pastoral zone was affected by dryland salinity. Some say this figure might increase to approximately 17.0 million hectares by 2050.

Assoc/Prof Ole Pedersen from the Freshwater Biological Laboratory, University of Copenhagen, and Adjunct Professor at the UWA School of Plant Biology is working with Prof Tim Colmer and Dr Natasha Teakle from the UWA School of Plant Biology and the UWA Centre of Excellence for Ecohydrology to find a solution to salinity and waterlogging.

Most salt-affected land also suffer from waterlogging or intermittent flooding. Some plants might be able to grow in saline soil, but because of the lack of oxygen when the roots are flooded, they do not survive.

Dr Teakle has been researching the potential of Messina (*Melilotus siculus*) to withstand both salinity and waterlogging. Messina has been identified as the most promising salt and waterlogging tolerant annual pasture legume for areas affected by dryland salinity, because it naturally colonises saline areas.

Assoc/Prof Pedersen has previous experience in submergence tolerance of plants. He has also done research on oxygen transport in submerged plants.

He and Dr Teakle have put severe stress on Messina plants by increasing the water levels (even fully submerging the plants) at different salt levels. They have found that this plant responds to stress by "lifting" its leaves verticallytowards the air surface. Even after one week fully under water, the plants still survive, showing that Messina can also tolerate flooding.

"It is amazing to still see oxygen being transported even after the plant has been totally submerged," Assoc/Prof Pedersen said.

Assoc/Prof Ole Pedersen

Adj/Prof Mick Poole is the 2010 Farrer Memorial Medal recipient.

UWA Professorial Fellow wins Farrer Memorial Medal 2010

UWA Professorial Fellow and CSIRO Fellow, Adjunct Professor Mick Poole's outstanding contribution to agricultural research and management in Australia has been formally recognised with him announced as the 2010 Farrer Memorial Medal winner.

The Farrer Memorial Medal was established in 1911 to perpetuate the memory of William Farrer and to encourage and inspire agricultural scientists. William Farrer was a former employee of the NSW Department of Agriculture and father of Australian wheat breeding.

The Medal is awarded annually to a person who has provided distinguished service in agricultural science in the areas of research, education, extension or administration.

Industry & Investment NSW (I&I NSW) Director-General and Farrer Memorial Trust Chairman, Dr Richard Sheldrake, said that Professor Poole's award recognises his many years of national science leadership and his cutting edge research on tillage systems, salinity control, sustainable cropping, weed management, crop production and water use efficiency.

"Over the last 45 years Prof Poole has made a significant contribution to meeting the challenges of advancing crop production in a sustainable long-term manner," Dr Sheldrake said.

Prof Poole is the former Head of the CSIRO Centre for Mediterranean Agricultural Research and a Program Leader in CSIRO Plant Industry. He has also played a number of prominent roles within WA Department of Agriculture. Some of his achievements include authoring more than 85 scientific papers, technical reports and journal articles, and being a member of or chairing several influential agricultural committees, centres and working parties including chairing both the Grains Research and Development Corporation's (GRDC) board research committee, and the Australian Plant Industries Committee.

"Prof Poole has made a substantial lifetime contribution to agricultural science, in particular agricultural research, and is a very worthy recipient of the 2010 Medal," Professor Sheldrake said. Professor Poole completed his BSc in Agriculture Science in 1964 from UWA.

The medal presentation ceremony will be held in Perth on 23 February 2011 to coincide with the 2011 Crops Update. Prof Poole will deliver an Oration following the presentation.

Underwood Promenade

Walking down agriculture legend lane

UWA students will be walking down an agriculture legend's lane when they walk down newly named Underwood Promenade from the UWA Business School to the heart of campus.

"Emeritus Professor Eric John Underwood's story is that of a man whose passion for his work enabled him to accomplish extraordinary results," Winthrop Professor Alan Robson, Vice-Chancellor of UWA said in his speech at the naming ceremony on 29 October.

E/Prof Eric John Underwood (1905–1980) was a pioneering researcher in sheep nutrition and wool production from the 1930s who revolutionised primary industry.

A UWA graduate, E/Prof Underwood completed a PhD in pasture growth at Cambridge University before taking up appointments as UWA's Hackett Professor of Agriculture (1946), Dean of the Faculty of Agriculture and Director of the UWA Institute of Agriculture.

E/Prof Underwood attended school in Mount Barker and North Perth before studying at Perth Modern. While serving a cadetship with the Department of Agriculture, E/Prof Underwood studied at UWA. He won the Norman Albert prize and the Amy Saw scholarship, and graduated with first-class honours.

As animal nutrition officer he undertook research on 'Denmark wasting disease', a disorder that affected cattle and sheep. The cause of the disease was thought to be iron deficiency. However, with a colleague, Underwood concluded that the disease was due to a lack of cobalt.

With colleagues in the Department of Agriculture, he examined the poor pastures in the south-west and the wheatbelt, analysing the associated problems of low productivity, poor lambing percentages, pregnancy toxaemia and other symptoms of malnutrition in sheep. He also maintained his interest in trace elements, particularly cobalt, copper and manganese.

After spending two years (from 1936) at the University of Wisconsin (USA), on a Commonwealth Fund fellowship, he was invited to work at the UWA Institute of Agriculture. He began a series of experiments designed to increase the fertility of ewes. From the 1930s farmers had planted subterranean clover to improve the quality of their soil and the nutritive value of their pastures. By 1943, a severe breeding problem was evident in sheep that grazed on clover-dominated pastures. E/Prof Underwood chaired a committee which included University scientists, to co-ordinate research. The problem lay in naturally occurring oestrogens in the pastures. This sparked investigations into the chemistry and biology of phyto-oestrogens, and their potency and metabolic effects.

He received many honorary degrees and was recognised during his lifetime by many organisations for his contribution to science.

"His outstanding contribution was his ability to apply fundamental science to agricultural problems for the good of humankind," W/Prof Alan Robson said.

PHOTO COURTESY OF THE COUNTRYMAN.

Dr Doug Abrecht (DAFWA) with eight agronomist and extension specialists from Iraq and ICARDA: Mr Bassam Yehya Qasim, Mr Emad Shaker Harmaz, Mr Sami Ibrahim Mustafa, Mr Haji Muhammed Ya'kub, Muhana Jaroo Abdulrahman, Dr. Muhammed Subhhi Mustafa, Mr Atef Haddad, and Mr Shukri Ismail, visited DAFWA and UWA from 21 August until 26 September 2010 to do a one month Zero-till cropping extension study visit. This visit will enhance capacity of Iraqi research and extension programs to develop and promote improved conservation cropping technologies in Iraq.

Alumni

Dr Mike Bolland

Department of Agriculture and Food WA (DAFWA)

Dr Mike Bolland's distinguished career started as a cadet in 1966 at the Western Australian Department of Agriculture. He was awarded a BSc (Agric) with first class honours in 1970 and PhD (soil chemistry) in 1975 from UWA.

Dr Bolland has worked as Soil Conservation Advisor based at Geraldton (1969-1970) and Katanning (1970-1971); became a Research Officer in the Plant Nutrition Branch of the Plant Research Division, based at South Perth, working on phosphorus nutrition of crops and pastures (1975), and did pasture research at Esperance (1979–1984).

He returned to South Perth (1984-1994) to continue his phosphorus research. During 1995 Dr Bolland wound down his phosphorus research and started doing lime research.

In mid-1996 he started general plant nutrition crop research and plant nutrition research on dairy pastures. Dr Bolland authored 217 scientific publications, and 122 Technical publications and conference proceedings. Since 2006 he has worked full-time on dairy research, but took a voluntary redundancy from DAFWA in September 2010.

Dr Bolland who joined UWA as an Adjunct Associate Professor have made significant contributions in establishing collaboration between UWA and DAFWA on soil fertility and nutrient management research and education.

Prof Alan Tilbrook

Deputy Director, Animal Welfare Science Centre and Department of Physiology, Monash University

Prof Alan Tilbrook is an internationally renowned researcher in animal science, animal welfare and biomedical science. He did both his BSc (Agric) Hons (First Class Honours) and PhD (1985) in Animal Production at UWA. Prof Tilbrook started his career as Research Scientist at the Victorian Institute of Animal Science, Department of Agriculture.

In 1992 he started lecturing at the Department of Physiology, Monash University. He was promoted to Associate Professor (1996) and later Department Head. From 2008 to 2009 he was Director of MBio Graduate School, Monash University. Last year he became a full Professor at Monash, and the Deputy Director of the Animal Welfare Science Centre.

Prof Tilbrook's research is conceptually driven with a multidisciplinary and integrative approach. He has developed cutting edge research programs involving broad collaborative initiatives nationally and with leaders in overseas laboratories.

Prof Tilbrook has published more than 100-refereed publications, 11 book chapters and 23 invited reviews. His contribution to research in stress, neuroendocrinology, neuroendocrine regulation of male reproduction, behaviour and animal welfare has been pivotal in advancing understanding in these fields.

Professor Tilbrook recently gave a public lecture 'Scientific advances in animal welfare' at UWA IOA which was well attended by industry and researches.

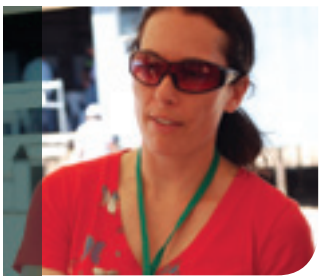
Dr Dean Revell

Principal Research Scientist CSIRO, Floreat Western Australia

Dean completed his BSc (Agric) degree at UWA in 1987 and his PhD in Animal Production in 1992. He then spent a year as at the Rowett Research Institute in Aberdeen, Scotland (where he learnt a new set of techniques for studying animal metabolism and discovered it was possible to live at temperatures resembling a refrigerator).

Dean returned to UWA to work with Dr Ian Williams as a Research Fellow for three years and, then he joined the Department of Animal Science at Massey University in New Zealand. After three years, the pull of Australia took him to Animal Science at The University of Adelaide based at the Roseworthy Campus for nearly 7 years. Since mid 2005, Dean has been with CSIRO Livestock Industries in Perth, where the research group is exploring, amongst other things, the potential of alternative forages and grazing management for sustainable livestock systems. He remembers his days at UWA fondly, especially the fellowship between the group who started in '84, and the days of studying and having fun in The Cottage.

New Staff



Ms Laura Fagan

Ms Laura Fagan recently moved to UWA from New Zealand with her husband, Professor Raphael Didham. She is a Research Associate working on the GRDC funded project 'Developing and promoting Integrated Pest Management project in Australian grains' which looks at alternative pest management practices to reduce the use of broad-spectrum insecticides. Her previous role as an Applied Entomologist at Plant and Food Research Ltd. focused on amongst others insect diversity, IPM in agricultural crops, thrips and aphid ecology in native ecosystems, and invasive species risk assessment using overseas expatriate plant communities. Previously, she managed field teams in remote areas such as Fiordland working alongside the botany team at Landcare Research and matched scientists with awarded projects via agencies such as NZAid, AusAID, Asia Development Bank and the World Bank. She invites people with an interest in entomology to visit the Entomology Laboratory anytime room 1.005 AgNorth.

Email: laura.fagan@uwa.edu.au

Assist/Prof Marit Kragt

Assistant Professor Marit Kragt joined the UWA School of Agricultural and Resource Economics (SARE) in July. Her appointment is jointly funded by SARE, the Centre for Environmental Economics and Policy (CEEP), and the Commonwealth Scientific and Industrial Research Organisation (CSIRO). After finishing a Master degree in Environmental Science at Wageningen University, the Netherlands, Assist/Prof Kragt worked for the Dutch Department of Foreign Affairs. She returned to university to complete a Masters in Economics and a PhD in Integrated Modelling and Environmental Economics at the Australian National University (ANU), Canberra.

Assist/Prof Kragt's research interests include bio-economic modelling, interdisciplinary research and non-market environmental valuation, applied to a variety of topics such as agricultural systems,

water quality issues, biodiversity conservation or marine ecosystems. An important objective in her research is developing tools for complex environmental issues that that integrate environmental, social and economic dimensions and that support more efficient natural resource management.

Email: marit.kragt@uwa.edu.au

Dr Joy Vadhanabhuti

Research Associate

Dr Joy Vadhanabhuti received her PhD in Animal Science from UWA (1998). She held a teaching and research position at the Faculty of Agricultural Technology at Rajamangala University of Technology Thanyaburi (RMUTT) in Thailand, for the past 27 years.

Dr Vadhanabhuti will be working with Prof Phillip Vercoe on the 'Demonstration project for on-farm practical methane management strategies: UWA, Ridgefield' as part of the Reducing Emissions from Livestock Research Program (RELRP). The project aims to develop a demonstration site at Ridgefield 'UWA Future Farm' to help the transition of the outcomes of RELRP to the farming community. In conjuction with other programs within the Australia's Farming Future Climate Change Research Program, the demonstration site will promote commercial applications and enhance farmer acceptance and adoption.

Email: joy.vadhanabhuti@uwa.edu.au

Ms Nadia Bazihizina

Research Associate

Ms Nadia Bazihizina's has joined the UWA School of Plant Biology and Centre of Ecohydrology recently. She has submitted her PhD in Plant Physiology (responses of saltbush to non-uniform salinities in the root-zone) at UWA a recently. Ms Bazihizina is currently working with A/Prof Ed Barrett-Lennard, Dr Natasha Teakle and Prof Tim Colmer looking at improving saltland capability assessment for productive and sustainable use of saline lands. This entails a survey throughout Australia to assess saltland vegetation and relate this to soil and groundwater conditions. This data set will then enable the development of a matrix that can be readily used by farmers to guide them in choosing the best species for their saline lands to increase their productivity. Ms Bazihizina will do further physiological work to try and understand the mechanism behind the tolerance of *Puccinellia* ciliate.

Email: nadia.bazihizina@uwa.edu.au

Research and Industry Recognition

NAME	AWARD
Assist/Prof Graeme Doole	Australia's best young agronomist
Dr Craig Scanlan	Soil Science Society CG Stephens PhD Award in Soil Science: The best PhD thesis in soil science granted by an Australian university in 2009
Prof Mick Poole	2010 Farrer Memorial Medal
W/Prof Zed Rengel	Honorary doctorate from the University of Zagreb
Mr Blair Humphry	Winner of Royal Agricultural Society prize

New PhD Students

NAME	TOPIC	SCHOOL	SUPERVISOR(S)	FUNDING BODY
Md.Mahmudur Rahman	Studies on Genotype x Environment interaction on Selenium uptake in Lentils	Plant Biology	W/Prof Kadambot Siddique and Prof Willie Erskine	UWA SIRF, UWA IOA and CLIMA
Mr Saud Alamri	The adaptation of amphiploids of wheat and sea barleygrass to salinity and waterlogging	Plant Biology	Professor Tim Colmer and Professor Ed Barrett-Lennard	Centre of Excellence for Ecohydrology
Mr Hesham Al Harby	The accumulation of salt in the root-zone of the halophyte *Atriplex nummularia* (Old Man Saltbush)	Plant Biology	Professor Tim Colmer, Dr Natasha Teakle, Professor Ed Barrett-Lennard	Centre of Excellence for Ecohydrology

New Research Projects

TITLE	FUNDING PERIOD	FUNDING BODY	SUPERVISOR(S)
Impact assessment for genetically modified canola in cropping systems	2010-13	University of Melbourne Ex GRDC	W/Prof Steve Powles
Management of nutrients and water for high quality and quantity of mallee biomass supply	2010-11	Future Farm Industries CRC	W/Prof Keith Smettem, Assoc/Prof Mark Tibbett
A national soil quality monitoring framework	2010-14	Grains Research and Development Corporation (GRDC)	Associate Professor Daniel Murphy
Commercial seed technology for *bituminaria bituminosa var albomarginata*	2010-11	Department of Agriculture and Food WA (DAFWA) ex Rural Industries Research and Development Corporation (RIRDC)	Assoc/Prof Megan Ryan, Dr Clinton Revell and Mr Richard Snowball

Completing the smoke effect picture systems development to reduce the negative effects of smoke on grapes and wine	2010-12	Department of Agriculture and Food WA (DAFWA)	Assist/Prof Michael Renton
Deep biosphere geomicrobiology a new frontier for UWA	2010	UWA Research Collaboration Awards	Assist/Prof Deirdre Gleeson, Ms Jennifer Carson, and Dr John Moreau
Plant breeding by example contextual examples linking theory with practice in plant breeding education	2010	University of Adelaide ex Australian Learning and Teaching Council Ltd	Prof Wallace Cowling, Prof Willie Erskine
'Jarrah Forest Fertiliser Trial 2004 Final Assessment'	2010	BHP Billiton Worsley Alumina	Assoc/Prof Mark Tibbett
Grower Group Alliance	2010-12	Mingenew Irwin Group Inc Ex GRDC	W/Prof Kadambot Siddique and Ms Susan Hall
Wheatbelt natural resource management annual community survey	2010-11	Wheatbelt Natural Resource Management Incorporated	Assist/Prof Colin MacGregor
Global change and food web structure: synergistic effects of multiple drivers of global change on species interaction networks	2011-13	ARC Discovery Projects	Prof Raphael Didham
Improving heat and drought tolerance in canola through genomic selection in *brassica rapa*	2011-13	ARC Linkage Projects	Prof Wallace Cowling, W/Prof Neil Turner, W/Prof Kadambot Siddique, Assist/Prof Matthew Nelson, Dr Robert Furbank
Physiological and molecular characterisation of salinity tolerance in chickpea	2010	Council of Grain Grower Organisations LTD (COGGO) Pea Foundation (NPZ)	Prof Tim Colmer
Introduction of Short Duration Pulses into Rice Based Cropping Systems in Western Bangladesh	2011-15	Department of Foreign Affairs and Trade (ACIAR)	Prof Willie Erskine and Dr Ken Flower
Centerless Governance for the Management of a Global R and D Process Public Private Partnerships and Pulse Breeding in Australia and Canada	2010	Academy of The Social Sciences In Australia Ex DIISR: ASSA International Science Linkages	W/Prof Kadambot Siddique and Dr Cami Ryan (University of Saskatchewan, Canada)
Cause, epidemiology and management of kikuyu grass poisoning in Western Australia	2011	Cattle Industry Compensation Act (WA)	Prof Martin Barbetti, Adj/Prof Michael Ewing, and Dr Gavin Flematti
Building national capacity in education and research in applied entomology	2011-15	Grains Research and Development Corporation (GRDC)	W/Prof Kadambot Siddique, W/Prof Graeme Martin and W/Prof Tony O'Donnell

Publications (2010)
(August – December)

Refereed journals

Abdelhamid MT, Palta JA, Veneklaas EJ, Atkins C, Turner NC and Siddique KHM (2010). Drying the surface soil reduces the nitrogen content of faba bean (*Vicia faba L.*) through a reduction in nitrogen fixation. Plant Soil DOI 10.1007/s11104-010-0586-9

Anderson JP, Lichtenzveig J, Gleason C, Oliver RP, and Singh KB (2010). The B-3 Ethylene Response Factor MtERF1-1 Mediates Resistance to a Subset of Root Pathogens in *Medicago truncatula* without Adversely Affecting Symbiosis with Rhizobia1. Plant Physiology**154**: 861–873.

Balázs E and Cowling WA (2010). Exploiting genome-wide association in oilseed Brassica species. Genome **53**: 853–855.

Beeck CP, Cowling WA, Smith AB and Cullis BR (2010). Analysis of yield and oil from a series of canola breeding trials. Part I. Fitting factor analytic mixed models with pedigree information. Genome **53**: 992–1001.

Bell LW, Bennett RG, Ryan MH, and Clarke H (2010). The potential of herbaceous native Australian legumes as grain crops: a review. Renewable Agriculture and Food Systems doi:10.1017/S1742170510000347

Bell LW, Wade LJ and Ewing MA (2010). Perennial wheat: a review of environmental and agronomic prospects for development in Australia. Crop and Pasture Science **61**(9): 679–690.

Busi R, Vila-Aiub MM and Powles SB (2010). Genetic control of a cytochrome P450 metabolismbased herbicide resistance mechanism in *Lolium rigidum*. Heredity doi:10.1038/hdy.2010.124

Cowling WA and Balázs E (2010). Prospects and challenges for genome-wide association and genomic selection in oilseed Brassica species. Genome **53**: 1024–1028.

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UPCOMING MEETINGS AND EVENTS

The UWA Institute of Agriculture Events

Food and Agriculture Lecture Series

How do plants take up water in a drying climate?

E/Prof Ulrich Zimmermann,
Molecular and Chemical Sciences
Lecture Theatre, G33, UWA
February 15, 2011
www.ioa.edu.au

Hector and Andrew Stewart Memorial Lecture

March 8, 2011
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AARES Conference – Australian Agricultural Resource Economics Society

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CONTACT DETAILS

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Editor: Erika von Kaschke
Erika.vonKaschke@uwa.edu.au
The UWA Institute of Agriculture
Tel: +61 8 6488 4717
Web: www.ioa.uwa.edu.au

UWA, M082, 35 Stirling Highway
Crawley, WA 6009

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