

The UWA Institute of Agriculture



UWA's AMR Research Group, in collaboration with CRC SAAFE, is advancing sustainable solutions to combat antimicrobial resistance in agriculture.

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THE UNIVERSITY OF
**WESTERN
AUSTRALIA**

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Front cover photo:
Alex Lloyd, CEO CRC SAAFE with IOA colleagues.

From the Director

Sustained investment in agricultural R, D&E has been the backbone of Australia's global competitiveness in agriculture but with evolving funding landscapes and shifting priorities, a crucial question arises: who will bankroll agricultural R, D&E in the next 20 years?

This will be the focus of the IOA's 19th annual Industry Forum, aligning with the WA Government's newly released 10-year science strategy, offering an opportunity to explore sustainable funding models and ensure agricultural research, development and extension tackles both local and global challenges. The event will be held on 6 August at The University Club Auditorium, followed by a sundowner on the terrace.

This year started on a strong note with IOA been actively engaged in several key events including the GRDC Grains Updates (Page 6), the Mike Carroll Travelling Fellowship presentation evening (Page 4), and Ag Institute Australia WA Careers Night (Page 2). These events have been instrumental in bringing new ideas to light, sharing the latest research developments, and creating opportunities for students and professionals in agriculture to connect.

Looking ahead, I am excited to attend the 2025 Postgraduate Showcase: Frontiers in Agriculture on 28 May. The

event will highlight the cutting-edge work of our postgraduate researchers, with representatives from four UWA Schools, including the UWA Business School, School of Engineering, School of Agriculture and Environment, and School of Biological Sciences.

Later in September, the Hector and Andrew Stewart Memorial Lecture by Professor Salah Sukkarieh, FTSE, will offer a thought-provoking discussion on the intersection of technology and traditional farming practices, with his lecture Farming in Two Worlds: Integrating Physical and Digital Agriculture.

I would also like to extend a warm welcome to UWA's new Chancellor, Diane Smith-Gander, who commenced her role on 1 January. We look forward to her leadership in guiding UWA into the future.

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Agricultural careers night opens doors for future industry leaders

Students explored career opportunities in agriculture at the annual Agricultural Careers Night, held on 2 April at the Royal Agricultural Society Showgrounds in Claremont.

Organised by the Ag Institute of Australia (AIA) WA Division, the event featured a speed-networking format with 10–15 five-minute 'rounds' followed by informal discussions over pizza, offering students a chance to connect with industry experts.

Representatives from top organisations, including ANZ, CBH Group, Rabobank, CSBP were on hand to discuss various career paths and opportunities within the agricultural sector. UWA was represented by Director Hackett Professor Kadambot Siddique, Professor Megan Ryan and Dr Kelsey Pool, who spoke with students about pathways into postgraduate research and employment opportunities.



SNAGS students with Diana Fisher, Manager Native Forest Transition at South Regional TAFE, Hackett Professor Kadambot Siddique, Dr Kelsey Pool and Professor Megan Ryan.

"The AIA WA Division has proudly organised this event every year, and we are thrilled to see it continue to grow as a key opportunity for our student cohort to engage with potential employers" said Natalie Moore, secretary of the AIA WA Division.

Many students stayed after the event, keen to continue discussions on the future of agriculture, including the growing role of technology and sustainability in the sector.



Members of the Britannia Food Forest planting crew. Photo by Steve Worner.

Extending biochar permeable reactive barriers to urban environments

Land restoration concepts demonstrated at UWA Farm Ridgefield have been extended to improve soil conditions in urban settings.

The community group Transition Town Vincent (TTV) has adopted the innovation of biochar permeable reactive barriers to enhance water and nutrient management at their community food forest in Britannia Reserve, Leederville.

Led by Ian Kininmonth, the urban forest project incorporates char wells and

trenches filled with biochar, FOGO compost, and worm juice, placed near existing fruit trees to intercept runoff from water-repellent sands. This approach, first trialled in rural environments, has now been adapted for residential use in Leederville as part of TTV's My Healthy Soils Project. Members are implementing these methods in their gardens and verges to support tree and shrub growth while managing stormwater and greywater more effectively.

At the UWA Farm Ridgefield demonstration, wells approximately 40cm deep and 150-200cm wide were dug near the base of young trees planted as part of

a natural vegetation restoration program. These wells, filled with biological waste materials, provide a continuous supply of nutrients and retain water after rainfall, improving tree establishment and growth.

Funding for the demonstration site was provided by the Australian Government's National Landcare Program: Smart Farms, based on an initiative established on a farm in Brookton by Karry Fisher-Watts and Barry Watts.

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Mike Carroll Travelling Fellowship expanding global agricultural research training horizons

The 21st Mike Carroll Travelling Fellowship presentation evening brought together students, researchers, and the Carroll family to celebrate the impact of global research training experiences.

Established in memory of Dr Mike Carroll, former Director General of the WA Department of Agriculture, the Fellowship has supported 32 postgraduate students since 2003, enabling them to engage with leading researchers and institutions worldwide.

This year, PhD candidates Agyeya Pratap and Ruby Wiese shared insights from their Fellowship-supported travels. Agyeya, whose research focuses on heat tolerance in bread wheat, visited the Umeå Plant Science Centre in Sweden for a lab visit and attended the Tropentag 2024 conference in Vienna, where he presented a poster on his research. Meanwhile, Ruby travelled to the United States, attending the International Plant Phenotyping Symposium in Nebraska and meeting with pasture researchers in



Invitees to the Mike Carroll Travelling Fellowship event, PhD candidates Agyeya Pratap and Ruby Wiese, alongside members of the Carroll family.

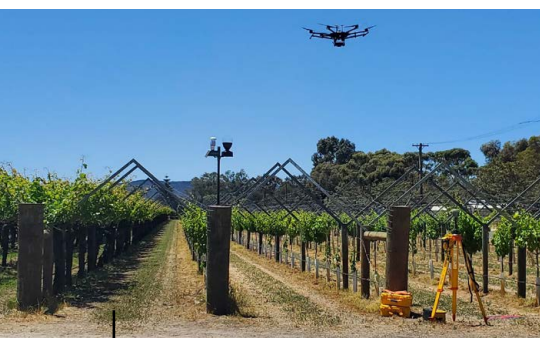
Oregon to advance her work on harvesting subterranean clover seed.

The event was attended by members of the Carroll family, including Ms Helen Carroll, her daughter Marie-Louise Carroll, and granddaughters Abbie and Coco Divola.

The IOA extends its gratitude to the donors of the Mike Carroll Travelling Fellowship bequest fund for their ongoing support. These opportunities continue to broaden students' global perspectives and enhance their research careers.

Cover crops take root in WA vineyards

South-West WA Drought Resilience Adoption and Innovation Hub (SW WA Hub) project broke new ground in vineyard management by trialling cover crops to improve soil health and water efficiency, even in dry conditions.



Vineyards monitoring with a drone. Photo by Dr Caitlin Moore.

With climate variability challenging viticulture, the project, led by Dr Caitlin Moore and Associate Professor Nik Callow from UWA's School of Agriculture and Environmental Sciences, aimed to find innovative solutions for premium grape production in WA.

Initiated by the SW WA Hub, the Grower Group Alliance and in partnership with the Department of Primary Industries and Regional Development, the project consisted in assessing whether cover crops can improve soil moisture retention and vine resilience while reducing erosion.

Researchers tested different cover crop species to determine which varieties best support vine growth with minimal water use. The trial spanned WA's key table grape and wine-growing regions, including Swan Valley, Margaret River, and the Great Southern.

This research is one of 10 innovation projects funded through grants awarded in 2022 by the SW WA Hub. The funding, made possible by a \$2.5 million investment from the Australian Government's Agricultural Innovation Hubs Program, has expanded the Hub's role in advancing agricultural innovation across the region.

Early findings showed that cover crops did not compete with vines for water, as they dried out before the peak summer heat. While initial results were promising, further research is needed to fully understand their benefits in vineyard management.

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WAARC scholarships fuelling research for resilient crops

Two UWA PhD students, Huyen Pham and Saira Azmat, are advancing research to improve crop resilience with support from the Western Australian Agricultural Research Collaboration (WAARC) top-up scholarship.

Huyen Pham, a second-year PhD student, is investigating wheat performance in acidic soils, a major challenge for 75% of WA's grainbelt. "My study seeks comprehensively to address these aspects in the WA grainbelt context, providing region-specific insights into the adaptation of wheat genotype with contrasting rhizosphere size and contributing to the development of resilient and high-yielding wheat varieties" Huyen explained.

Her 2023 glasshouse trials showed that wheat lines with larger rhizosphere sizes performed better in slightly acidic soils. She is now testing these lines in Merredin soil, with yield results expected in 2025.

Saira Azmat is exploring how phosphorus availability and root morphological traits influence barley's tolerance to salinity. Salinity and phosphorus deficiency are significant challenges for WA's cropping systems, limiting barley yields.

"This research is critical for WA, where saline soils and phosphorus-deficient landscapes impact cereal production," Saira said.

Her 2023 glasshouse experiments revealed key interactions between salinity and phosphorus in soil, identifying salt-tolerant barley varieties suited to low-phosphorus conditions. Understanding these relationships could lead to better management practices and breeding strategies.

Beyond financial support, the WAARC scholarship provides industry connections, access to state-of-the-art research facilities, and opportunities to collaborate with leading scientists.



PhD students Huyen Pham and Saira Azmat.

"The scholarship has expanded my research scope, enabling detailed experiments, high-quality lab analysis, and deeper insights," Saira said.

For Huyen, it is also a chance to strengthen Australia-Vietnam collaboration by integrating innovative agricultural solutions from both countries. She hopes to develop sustainable strategies that address soil constraints and improve crop productivity.

The scholarship has further enhanced their professional development, allowing them to present findings at conferences, refine scientific communication skills, and make industry connections.

They are among nine UWA students supported by the scholarship, all gaining valuable experience to apply their research to practical farming solutions.

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UWA and Magic Wavelength development team.

UWA technology set to transform agricultural monitoring

UWA has teamed up with Perth-based startup Magic Wavelength to commercialise a groundbreaking sensor technology that could transform crop health monitoring for farmers globally.

Developed by UWA's Microelectronics Research Group (MRG), the innovative microelectromechanical systems (MEMS) spectrometer offers a more affordable and portable alternative to traditional spectrometers, which often cost upwards of \$100,000.

"The MRG's semiconductor expertise and its close ties with the renowned UWA Institute of Agriculture make UWA the perfect setting for this type of Ag-Tech development," says Professor Laurie Faraone from School of Engineering, who leads the MRG. "This sensor dramatically

reduces the size and cost of traditional spectrometers, enabling real-time monitoring of crop health."

By analysing the infrared spectrum of a leaf, the sensor provides instant feedback on whether a plant is thriving, water-stressed, or in need of fertiliser. This technology opens up new possibilities for farmers in both developed and developing countries.

Dr Kevin Fynn, founder of Magic Wavelength and UWA PhD graduate, is excited about the potential. "What sets this technology apart is its low cost and accessibility. Our goal is to make it available

not just to large agricultural operations in developed countries, but to farmers in Southeast Asia and beyond."

The partnership will see the creation of affordable, handheld spectrometers that can be used in the field or mounted on drones for real-time monitoring of plant, grain, and soil health. The development team has already created a working prototype that matches the performance of commercial lab spectrometers.

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UWA research on show at GRDC Grains Research Update



IOA Director, Hackett Professor Kadambot Siddique, PhD student Aggyeya Pratap, Dr Asad Prodhan from DPIRD and UWA Adjunct, Dr Hayley Norman CSIRO, at IOA stall.

UWA's innovative research, automation, and collaboration take centre stage at 2025 GRDC Grains Research Update.

UWA researchers Karen Nelson and Dr Aneeta Pradhan kicked off with strong presentations in the "New Researchers" session on Monday. Their joint talk, Good Timing: Marker-assisted backcrossing rapidly moves a new flowering gene into commercial narrow-leafed lupins, captivated the audience, highlighting their latest research contributions to the grains industry.

On the second day, Associate Professor Andrew Guzzomi, Director of the Centre for Engineering Innovation: Agriculture & Ecological Restoration, and Dr Wesley Moss took part in a panel discussion on

grain automation. They explored the growing role of autonomy in agriculture and the need for developing capabilities and awareness in tertiary education.

IOA's information stall was a hub of activity, with Communications Officer Ana Mendigutxia Balil, IOA Director, Hackett Professor Kadambot Siddique, PhD student Aggyeya Pratap, and research associate Dr James O'Connor from the UWA School of Agriculture and Environment, discussed UWA's contributions to agricultural research and innovation.

Reshaping Kununurra's agricultural markets through circular practices

Ryan Willis, a graduate of UWA Bachelor of Philosophy (Honours) program, has turned his academic focus to sustainability in agriculture.

His thesis, *Shaping Circularly: Interdependent and Viable Agricultural Markets*, examines how circular and sustainable practices can transform agricultural markets.

Initially interested in sustainability through a fashion lens, Willis shifted his focus to agriculture after discovering reports on circular initiatives in WA. "I came across reports about the gin project and thought it sounded interesting", Willis explains.

His case study centres in Kununurra, a region undergoing significant transformation with the construction of a new cotton gin. Through his research, he explores how interdependencies between industries, community engagement, and innovative practices can drive sustainable growth and resilience in agricultural markets.

In this innovative approach, industries complement each other, reducing risks and ensuring long-term viability. Cotton by-products, such as seeds, serve as feed for the local cattle industry, creating a mutually beneficial relationship. "The cotton industry was actually more important for the cattle industry than the cotton industry itself. It was providing more economic opportunities because of the cattle sector's size," Willis explains.

Additionally, the localised cotton gin reduces transportation-related carbon emissions. Practices like double cropping and using gin waste as fertiliser further contribute to the region's sustainable agricultural model.

While there's a focus on establishing the economic stability of the gin, the environmental benefits are already being felt. "Most people said they wanted to see the gin get up and running, get a steady throughput, and the economics working before they focused too much on the environmental side of things. But the gin being there has already established some circular and environmental initiatives," Willis says.

Cotton Gin in Kununurra. Photo by Ryan Willis.



"My research aims to highlight the work being done in the area and show how it could drive future development."

He believes his findings help boost the region's legitimacy and viability in the broader agricultural market sector.

Willis also sees broader lessons for the agricultural industry. "It's interesting when different industries look laterally, collaborate, and innovate. Working across sectors can result in a more sustainable and economically viable future for everyone."

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Ryan Willis, author of the thesis *Shaping Circularly: Interdependent and Viable Agricultural Markets*.

A game-changer for agriculture: Behavioural Science Toolkit unlocks better outcomes

Australian grain grower groups now have a powerful ally in tackling risk and uncertainty inherent in agricultural production—the UWA behavioural science toolkit.

Developed by UWA's Centre for Agricultural Economics and Development (CAED), the toolkit is designed to build capacity on the use of behavioural science to enhance decision-making and risk management across farming operations.

The initiative builds on the foundation of the RiskWiSe program, offering a suite of resources that promote smarter, data-driven choices. The standout feature of the Toolkit is the Pannell Discussions RiskWiSe Series; 17 easy-to-read discussions, explanations and examples on risk and behavioural science written for the Australian grains industry by Professor David Pannell.

Another key feature includes a compilation of over 60 curated Decision Support Tools (DST) consolidated into a freely accessible database for Australian grain farmers for farm, business, and price risk management and decision-making.

"Each tool was evaluated based on its usability, suitability for decision-making by Australian grain farmers, availability, currency, inclusion of risk analysis, and other relevant factors" says Project Leader, Associate Professor Fay Rola-Rubzen.

The toolkit also includes results from focus group discussions that explored decision-making processes, the rules of thumb people use and the biases that may

affect farmer decision-making, and hence, farm performance.

Beyond these resources, the kit will soon feature an array of engaging materials—fact sheets, videos, guides, blogs, and podcasts—that support farmers manage complex farming decisions.

With multiple resources tailored for farmers, grain grower groups and, more broadly, the agricultural industry, the toolkit aims to support improvements to extension activities and behavioural science research efforts, enabling producers to be better supported in navigating shifting market conditions and allocating resources effectively.



Farmer on the field.

UWA-AcSIR Joint PhD program unlocking new horizons

The UWA Institute of Agriculture recently hosted a delegation from the Academy of Scientific and Innovative Research (AcSIR), India, to advance discussions on their growing joint PhD program.

The delegation—led by Director and Vice-Chancellor Professor Manoj Dhar focused on expanding academic collaboration and refining the program to offer greater opportunities for emerging research leaders.

Since its launch in 2022, the UWA-AcSIR joint PhD program has been training high-calibre researchers, with the goal of enrolling five students each year.

During their visit, the delegation met with UWA Vice-Chancellor Professor Amit Chakma and Deputy Vice-Chancellor (Research) Professor Anna Nowak, who highlighted the importance of strengthening research partnerships in the Indian Ocean region. Vice-Chancellor Professor Chakma encouraged further expansion of the program to support more students in future intakes.



Vice-Chancellor Professor Manoj Dhar and his team with UWA academics and heads of schools.

The delegation also met with key faculty members from UWA's Schools of Engineering, Biological Sciences, Molecular Sciences, and Agriculture and Environmental Sciences, along with three PhD students in the program, to discuss their experiences. They also held discussions with the Graduate Research

School team to gain insights into research training and student support.

"This program is the first of its kind between India and Australia, and it's fantastic to see it evolving to include disciplines like STEM and medicine," said IOA Director, Hackett Professor Kadambot Siddique.

Behavioural economics on a mission to accelerate technology adoption in Australian agriculture

Dr Germán Puga, a Research Fellow at the University of Western Australia's Centre for Agricultural Economics and Development (CAED), is set to make significant contributions to the future of Australia's agricultural sector.

Funded by the ARC Training Centre for Behavioural Insights for Technology Adoption (BITA), his work examines the psychological and economic factors influencing producer's decisions, aiming to develop strategies that encourage and improve the efficiency of technology uptake in Australia's agricultural industry.

"Our research relies on behavioural economics to explain the challenges of technology adoption and provide insights on how to overcome them," Dr Puga says.

Before joining UWA, Dr Puga completed his PhD and postdoctoral research at The University of Adelaide, where he worked under the mentorship of Professor Kym Anderson at the Wine Economics Research Centre.

Adopting new technologies in agriculture often proves more challenging than expected. As Dr Puga notes, "the adoption of agricultural technologies often falls short of expectations and takes longer than anticipated".

"We argue that although frequently neglected, the challenges of dis-adopting an existing technology and analysing multiple options play a huge role in driving adoption down" Dr Puga explains.

These challenges are further influenced by factors such as uncertainty, social interactions, the "often-subjective views" producers have of technologies, and typical behaviours that account for the gap between the intention to adopt and actual adoption.

"Numerous biases impact producer's adoption decisions and often lead to unrealistic expectations from technology suppliers" Dr Puga says.



Dr Puga feeding young cattle during a farm visit.

Over next three years, Dr Puga will focus on a new research area within BITA, exploring the intersection of technology adoption and behavioural economics. His work will cover various industry-relevant projects, including some linked to climate change mitigation and adaptation, across various sectors including livestock and horticulture.

"Numerous biases impact producer's adoption decisions and often lead to unrealistic expectations from technology suppliers".

Working alongside Professor Marit Kragt, from UWA School of Agriculture and Environment, a team of agricultural economists and PhD students, Dr Puga aims to create actionable strategies that can help improve the rate and efficiency of adoption across different sectors of agriculture.

"Our goal is to provide recommendations for technology suppliers looking to increase the adoption of their technologies", Dr Puga says. "These recommendations include using choice architecture fairly and reducing information asymmetries between them and potential adopters".

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New forage shows potential for sheep reproduction and grazing

The relatively new legume forage, *Biserrula pelecinus*, is proving to be a valuable addition to Australian sheep farming, thriving in poor, sandy, and acidic soils.

Researchers at the UWA have conducted studies to assess its safety, particularly regarding its impact on sheep reproduction.

The concern stems from the risk of secondary compounds in new forages that could disrupt reproductive processes, similar to what occurred with sub-clover in the past, which caused infertility in sheep due to its high concentration of phytoestrogens. As UWA Emeritus Professor Graeme Martin explains, “we need to be vigilant when introducing new forages, especially given the past issues with clover disease.”

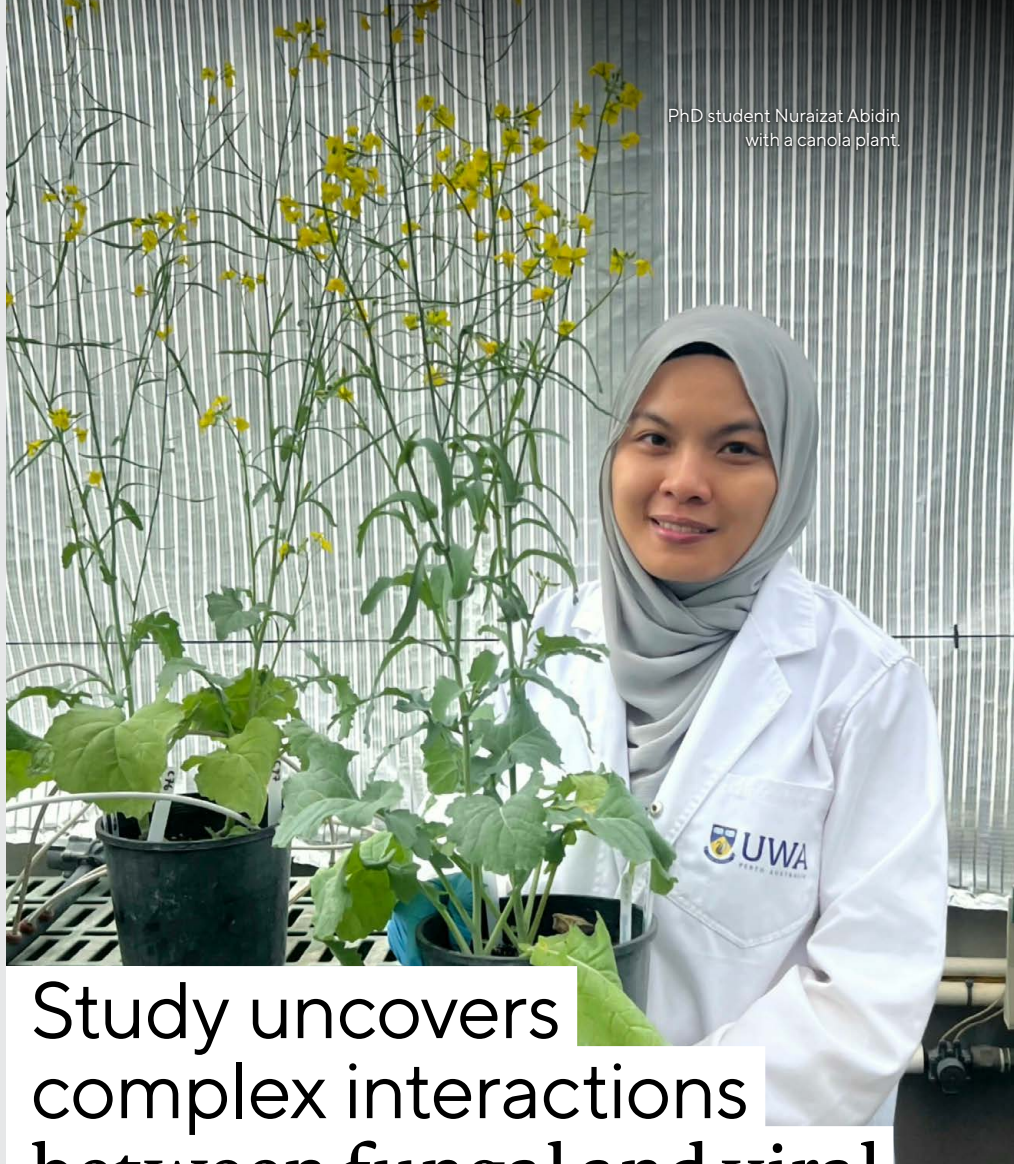
However, it is difficult to detect potential problems in reproduction using grazing sheep because very large numbers of animals would need to be studied over many years.

Therefore, for her PhD project, Anna Amir turned to in vitro embryo production (IVEP), in collaboration with Dr Jen Kelly of the South Australian Research and Development Institute. They used IVEP to rapidly screen extracts of *B. pelecinus* for any harmful effects on egg fertilization and embryo development. Initial tests showed an improvement in fertilization and embryo development, but this outcome was unexpected, so they decided to be cautious and investigate further.

That caution was warranted. A new series of studies showed that the hoped-for benefits were not repeatable. “Instead of improvement, we observed minor deleterious effects,” Professor Martin said. Moreover, the compound loliolide, identified as abundant in what was thought to be the most active extract fraction, had no impact on fertilization or embryo development.

Importantly for industry, “*B. pelecinus* does not appear to pose a significant risk, at least with respect to early reproductive events in sheep,” Martin stated. However, the researchers caution that further monitoring is needed, as other potential effects may not have been detected by the study.

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PhD student Nuraizat Abidin with a canola plant.

Study uncovers complex interactions between fungal and viral coinfections in canola

UWA study reveals complex fungal-virus interactions in canola.

Recent UWA research has revealed important new understanding concerning the complex intra- and inter-pathogen interactions likely to arise when fungal and viral pathogens coinfect crop cultivars that belong to the same plant species but possess different types of host pathogen resistances.

PhD student Nuraizat Abidin research focused on two major canola pathogens: *Leptosphaeria maculans*, the fungus causing blackleg disease, and turnip mosaic virus (TuMV). Nuraizat's study used both resistance-breaking and non-resistance-breaking pathogen strains, along with canola cultivars with different pathogen resistances, to explore the effects of mixed infections.

The study found that when a mixture of both resistance-breaking and non-resistance-breaking fungal strains infected a canola cultivar with single gene resistance to *L. maculans*, the disease severity was greatly reduced. In contrast, this effect was weaker in cultivars with

polygenic resistance.

Interestingly, TuMV resistance breaking strain presence was shown to suppress *L. maculans* disease severity in cultivars with polygenic resistance or those lacking single gene resistance.

Additionally, when TuMV was introduced first and either *L. maculans* strain second, both its symptoms and viral concentration were suppressed in different cultivars, regardless of their fungal resistance. However, in a cultivar with combined polygenic resistance to *L. maculans* and TuMV's temperature-sensitive resistance, its symptom severity and virus concentration both increased.

These findings provide essential information for advancing crop protection strategies, contributing to the development of more resilient agricultural systems in the face of multiple concurrent infections.

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Harnessing plant potential to tackle climate challenges

Dr Fazeli, a researcher from Ilam University in Iran, is expanding his expertise internationally as a Visiting Research Fellow at UWA's School of Molecular Sciences.

Dr Fazeli's previous research in Iran focused on abiotic stresses as well as biotic stresses from fungal diseases in wheat and barley. "Wheat is the most crucial crop grown in numerous regions worldwide, yet drought stress remains a major barrier to productivity," he explained. "In Iran, where over 90 percent of agricultural land faces arid or semi-arid conditions, drought has led to a 17 percent reduction in productivity."

Using genomics and transcriptomics, he studied plant responses at a genetic level, enhancing his understanding of gene diversity and expression. However, since each gene can produce multiple enzymes or peptides, he recognised that metabolomics offers a more direct and comprehensive way to assess stress tolerance and identify key resilience markers.

Building on this foundation, he is now turning his focus to wheat at UWA, using metabolomics to identify metabolic markers linked to drought resistance. "With access to suitable research facilities and conditions, I aim to identify a relevant metabolic marker associated with drought stress in wheat, which will enable me to effectively identify and select stress-tolerant and compatible varieties," he added.



Picture of Dr Arash Fazeli.

"Metabolomics gives us deeper insights into the biological and genetic traits associated with stress resistance."

Dr Fazeli sees international collaboration as vital in tackling global agricultural challenges. "The agricultural issues of today cross national and regional lines, demanding a coordinated global response,"

he said. "As these challenges are intricate and universal, only through collaborative efforts, resource sharing, and the creation of innovative strategies can we hope to resolve them on a global scale".

By developing crops that are tougher and more resilient, Dr Fazeli hopes to contribute to a future where agriculture thrives despite climate challenges.

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CRC SAAFE Representatives with members of the IOA.

CRC SAAFE-backed research advances antimicrobial resistance solutions for sustainable agriculture

Antimicrobials are drugs widely used to treat infections in humans, animals and plants. Antimicrobial resistance (AMR) occurs when microbes such as bacteria, viruses and fungi evolve to develop resistance to the drugs. Besides the human health impact, AMR is a serious global threat to food safety, food security, agricultural productivity, and water quality.

UWA is a partner of the Cooperative Research in Australia (CRC) for Solving Antimicrobial Resistance in Agribusiness, Food and Environments (SAAFE). The CRC uses a One Health approach recognising the interconnection between people, animals, plants and their shared environments. Collaborations with CRC SAAFE, industrial entities, and academic researchers enhance the practical implications of the group's findings, ensuring the research translates effectively into real-world applications. The overarching aim is to inform better antibiotic stewardship practices and identify sustainable agricultural strategies for mitigating AMR.

With a strong focus on collaboration and innovation, the Antimicrobial Resistance (AMR) Research Group at UWA is driving solutions to minimise resistance risks and enhance sustainable farming practices.

Led by Associate Professor Zakaria Solaiman from the UWA School of Agriculture and Environment, the research group is dedicated to investigating the origins, spread, and mitigation strategies of antimicrobial resistance in diverse

farming systems. The multidisciplinary team comprises a postdoctoral researcher and four PhD students, each exploring different yet interconnected aspects of AMR.

Associate Professor Zakaria Solaiman spearheads a major project under the SAAFE Foundation, focusing on sustainable agricultural practices to tackle AMR. His research aims to enhance soil health and productivity through microbial inoculations, biochar, compost amendments, and Troforté regenerative farming. He provides strategic direction for AMR research and promotes collaboration.

The four PhD students are tackling diverse aspects of AMR, spanning molecular microbial ecology, environmental AMR, the One Health approach, and data science and bioinformatics. Each candidate brings a unique perspective to AMR research. Mostarak Munshi who received a top-up scholarship from the CRC is comparing AMR prevalence in conventional and biological farming systems, focusing on resistance genes in regenerative agriculture. Gokhan Karadeli is evaluating manure management

practices in horticulture, particularly composting techniques to reduce AMR. Kamrun Sheuly is investigating AMR in bulb and tuber crops, exploring biochar and compost as sustainable soil health solutions. Wafa Alsaïdi is examining how manure-derived composting affects microbial diversity and AMR prevalence in vegetable production.

Dr Sajeevee Sarathchandra, an early career researcher, is pioneering the development of microbial consortia to reduce AMR across different farming systems.

Discussions are underway with other disciplines at UWA such as Engineering, Medicine, Agricultural Economics and Animal Science to contribute to the holistic approach to tackling a global problem.

Microcredentials drive the future of smart farming

UWA is gearing up to revolutionise agricultural education with cutting-edge microcredential opportunities.

Co-led by Associate Professor Andrew Guzzomi and Dr Wesley Moss, the Centre for Engineering Innovation: Agriculture & Ecological Restoration, in collaboration with the School of Engineering and the UWA School of Agriculture and Environment, has developed these short, targeted courses to equip the next generation of professionals with the skills needed to thrive in a high-tech agricultural industry.

Launching in July 2025, the “Agricultural Technology” microcredential will cover key areas across software and electronics, hardware and mechanical systems, and systems integration in agricultural applications.

By offering free enrolment for domestic learners through Federal Government funding, the initiative aims to make this training accessible and address

skills shortages. Aimed at learners with engineering or agriculture backgrounds, the program provides an introduction to agricultural technology and begins to develop the foundational skills needed to drive forward new advances in agriculture.

These microcredentials will also serve as a foundation for the Grain Automate project, a GRDC-supported initiative focused on automation in the grain industry. A dedicated Grain Automate microcredential is already in development, with a pilot program slated for 2026.

As technology transforms the agricultural sector, these courses offer a unique opportunity for both newcomers and industry professionals to stay ahead of the curve.

By integrating smart farming techniques and automation expertise, UWA is paving the way for a more efficient, innovative, and sustainable future in agriculture.

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UWA natural capital project gains spotlight at AARES agricultural economics conference

Associate Professor Ram Pandit from the UWA School of Agriculture and Environment presented key findings from his natural capital research at the Australasian Agricultural and Resource Economics Society (AARES) 69th Annual Conference in Brisbane.

Held from 11 to 14 February 2025, the conference attracted over 450 experts to discuss advancements in managing agricultural and environmental resources. Pandit’s presentation, “*Investing in Natural Capital Production Landscapes: An Exploratory Analysis of Investors’ and Landowners’ Perspectives*,” explored the economic opportunities and challenges of incorporating natural capital into farming practices.

Pandit’s research generated strong interest, particularly regarding how investors and landowners view natural capital as part of their business models. “Natural capital holds great potential for agriculture, but we need more evidence-based insights to make it accessible and scalable,” Pandit said.

The project is part of the South-West WA Drought Resilience Adoption and Innovation Hub and is funded by the Australian Government’s Future Drought Fund. It aims to provide valuable data to help integrate environmental value into agricultural economics, an area seen as critical for future sustainability and resilience in farming.

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Dr Catie Gressier with lamb.

Saving heritage breeds: a love story

Drive through the countryside, and you’ll see a familiar pattern—paddocks filled with Merino sheep, black-and-white dairy cows, and backyard chooks that are usually ISA Browns.

You probably can’t even remember the last time you saw a pig, because they’re all hidden away in sheds.

This shift heralds efficiency and profitability; but it’s also led to a quiet extinction crisis. For more than 30 years, a unique livestock breed has disappeared globally every month. In *Saving Heritage Breeds: A Love Story*, Dr Catie Gressier Adjunct Research Fellow from UWA’s School of Agriculture and Environment shares the stories of Australian farmers fighting to keep heritage cattle, sheep, pigs, and poultry from vanishing.

Through vivid storytelling, Dr Gressier reveals that for these farmers, preserving rare breeds isn’t just about biodiversity or sustainability—it’s about love. Love for the animals, for the history they carry, and for the future of farming.

Both urgent and hopeful, *Saving Heritage Breeds* is a tribute to the people ensuring these animals don’t disappear forever. [Now available through UWA Publishing.](#)

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Revitalising lentil farming in Ethiopia through cutting-edge virology lab



Dr Brettell and Prof Barbetti making comparisons on infected and non-infected plants during the projects' mid-term review. Photo by Ms May Muthuri, Australian Centre for International Agricultural Research.

Ethiopia's highlands, once known for their ideal lentil-growing conditions, have faced declining yields in recent years. A combination of pests, diseases, and limited access to healthy seed has led to a reduction in lentil-growing areas, from over 119,000 hectares to under 70,000 hectares in 2021-22. This has threatened farmers' livelihoods and prompted Ethiopia to import lentils to stabilise the market.

To address this, a new virology lab has been established in Ethiopia as part of a \$2.14 million project funded by the Australian Centre for International Agricultural Research and led by UWA. The project also includes specialized help and training from the International Center for Agricultural Research in Dry Areas.

For the first time, the lab equips local researchers with the tools and resources needed to diagnose a wide range of viral diseases affecting crop legumes and to differentiate them from other issues such as fungal diseases or insect damage.

Previously, farmers had to rely on expensive and time-consuming foreign diagnostic services. With the introduction and training for on-site testing methods like the Tissue Blot Immunoassay, farmers now benefit from more efficient, cost-effective virus identification. This reduces the need for pesticides, saves money on chemical sprays, and has a positive environmental impact.

The lab's influence extends beyond diagnostics. Ethiopian farmers are also trained to recognise virus symptoms, understand virus vectors, and use virus-free seeds. The lab's research also focuses on breeding virus-resistant lentil varieties, producing clean seeds, and deploying sustainable pest management techniques. These strategies are enhancing lentil production and improving food security for Ethiopian farmers.

Professor Martin Barbetti from the UWA School of Agriculture and Environmental Sciences and IOA emphasises the global significance of this work: "The advances made by Ethiopian virologists not only benefit Ethiopia but also have the potential to help with protecting lentil crops in regions like South Asia, North Africa, and Australia, where similar viral threats exist."

This initiative aligns with the Ethiopian government's commitment to modernising agricultural practices and boosting lentil production through research. By training local virology experts and strengthening agricultural resilience, Ethiopia is taking important steps towards reducing imports and ensuring sustainable agriculture.

Through projects like this, IOA continues to support sustainable agricultural development and enhance food security across the globe.

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BeefLinks at the core of improving cattle management practices

As the BeefLinks program nears its conclusion at the end of June, its work in improving cattle management practices continues to provide valuable insights for producers across WA.

Over the last four years, BeefLinks has brought together researchers, farmers, businesses, and state agencies to boost productivity, sustainability, and quality of beef cattle moving from the Northern Rangelands of WA into the southern supply chain. This has been achieved through several projects, such as the Feedlot Project, by focusing on specific areas of management and innovation across the supply chain.

Through station visits and fieldwork, the BeefLinks Feedlot Project team has recorded many management practices aimed at improving cattle handling, stress reduction and herd genetics in the Northern Rangelands.

UWA Research Officer working on the feedlot project, Montana Walsh Baddeley from the UWA School of Agriculture and Environment, acknowledges the diversity in management practices observed during fieldwork: “Each business approaches management differently, but the general trend is that most operations are using some form of low-stress management, which has been incredibly beneficial for production and animal welfare”.

These methods, including pressure-release techniques, are becoming more widespread, and when applied across all aspects of management—such as helicopter mustering—they help producers handle cattle in a way that enhances both



UWA Research Officer working on the feedlot project, Montana Walsh Baddeley.

welfare and productivity.

Many producers are turning to Estimated Breeding Values to improve herd genetics, though adoption varies. To help bridge the gap to adoption, BeefLinks has been running workshops with experts from University of New England to show producers how to use these tools to enhance their herds' genetic potential and improve herd profitability.

The latest update with industry partners took place at the Gascoyne Catchments Group annual Forum, held in Coral Bay, where key project outcomes were shared. The presentation also featured insights and personal anecdotes on best management from Craig Forsyth, a cattle backender and member of the BeefLinks stakeholder group, which sparked lively discussions on best practices and future directions for beef production from the Northern Rangelands.

Data collection across the beef supply chain remains a significant challenge. As Montana notes, “there’s been a big push for producers to gather more and better data on their herds, but the logistics, cost

and value proposition make it difficult.”

Key gaps, such as animal age and weaning weight, have slowed efforts to optimise breeding and management practices. To address this, BeefLinks, in collaboration with producers, focuses on identifying where these data gaps are, their importance in predicting growth and carcass quality and how data can be used to inform management and marketing decisions.

As the project nears its conclusion, the lessons learned will inform future initiatives aimed at creating a more efficient and sustainable beef production system across WA. “The project has sparked a shift towards a more open, collaborative approach in data sharing,” says Montana.

Montana Walsh Baddeley

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Consumer choices shaping the future of climate-impacted produce



Variety of carrots.

New research from UWA has found consumers tend to prioritise the quality of produce, such as size, firmness, and aesthetics, over their empathy for farmers impacted by extreme weather events.

Lead author Dr Liudmila Tarabashkina, from UWA's Business School, collaborated with Dr Kenneth Kaysan Khayr Ho, from Edith Cowan University, and Dr Rajesh Rajaguru, from the University of Tasmania, on the study published in Food Quality and Preference.

Researchers investigated how consumers make purchasing decisions when faced with climate affected produce. Unlike "ugly" food — defined by visual imperfections — climate-affected produce undergoes broader changes, such as smaller size, altered texture, and enhanced sweetness.

The study used drought as an example of adverse climate conditions driving these changes and whether marketing strategies could increase demand for the produce.

Findings showed attributes, such as firmness, size and visual appeal, had a stronger influence on purchasing decisions even when empathy was present, and climate-affected produce was only chosen when it was discounted.

"This insight helps us understand the complexities of consumer choices in the context of climate change, which is different from decisions made when consumers consider 'ugly' food," Dr Tarabashkina said.

Marketing strategies that emphasised the resilience of climate-affected produce, particularly its ability to withstand harsh

conditions, were effective in increasing consumer acceptance, especially among those with lower empathy for farmers.

"Framing climate-affected produce as resilient and highlighting unexpected benefits, such as enhanced flavour in some fruits, can be an avenue to explore to shift consumer perceptions," Dr Tarabashkina said. "A key takeaway for retailers and farmers is that well-crafted marketing messages can make a difference."

The findings offer practical solutions for reducing food waste and financial losses for farmers while adapting to the increasing challenges posed by climate change.

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Microplastics in soil: a hidden threat to ecosystem health

While plastic pollution in oceans has dominated environmental concerns, microplastics (MPs) are silently invading agricultural soils, posing a severe risk to ecosystem health.



Various sources and routes of microplastics in the soil environment.

These tiny particles are entering the ground through various channels, such as recycled water, biosolid and compost applications, and the degradation of plastic mulch used in farming. As MPs continue to infiltrate agricultural lands, the implications for food security and ecosystem stability grow dire.

A recent review paper, *Microplastics Pollution Modulating Soil Biological Health – A Review*, provides valuable insight into the interaction of MPs with soil biota and their impact on soil health.

The research was a collaboration between prestigious institutions, including Amity

University and Shoolini University in India, Auburn University in USA and the University of Western Australia. Key contributors from UWA included Professor Nanthi Bolan, Dr Shiv Bolan, and Professor Kadambot Siddique, alongside Mala Hettiarachchi from the Environmental Resources Group (USA).

This is part of the Australian Department of Agriculture, Fisheries and Forestry's National Soil Strategy, Soil Science Challenge Project: "Soil biological mechanisms underpinning the effects of biological amendments on soil health, productivity and resilience".

MPs carry harmful chemical additives that, as the plastics degrade, leach into the soil. These additives, along with the plastic particles, are ingested by soil organisms, disrupting microbial activity and function. Some microbes even use MPs as a carbon source, amplifying the spread of contamination. Additionally, MPs alter the soil's physical and chemical properties, degrading habitats for essential microorganisms.

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IOA Director, Hackett Professor Kadambot Siddique with partners at Kerala Agricultural University.



Insights from IOA Director's visits to Kerala, India

At the start of the year, IOA Director Hackett Professor Kadambot Siddique concluded a series of significant visits to India, focused on strengthening academic and research collaborations between India and Western Australia.

Professor Siddique's journey commenced at the *Teresian Centenary International Multidisciplinary Conclave-2024* in Kerala, where he delivered a compelling keynote address on environmental sustainability. During his visit to St. Teresa's (Autonomous) College, he explored potential collaborations, setting the stage for future partnerships.

His itinerary also included a visit to the University of Horticultural Sciences in Bangalore, where he engaged in discussions on joint research initiatives in horticulture and plant species conservation. At Carmal College in Kerala, Professor Siddique engaged students and faculty with a keynote speech, sparking conversations about potential collaborations with IOA.

A key highlight of his trip was his participation in the *Sustainable Agriculture & Food Processing Growth Summit & Expo 2025* at Kerala Agricultural University (KAU). Professor Siddique emphasised the role of farmer groups in sustainable food production and highlighted Kerala's KERA project, a US\$285 million initiative supported by the World Bank, aimed at promoting climate-smart agriculture and value addition.

Furthermore, Professor Siddique revisited the College of Climate Change and Environmental Science at KAU, an institution late Professor Alan Robson visited when it was launched in 2009. Discussions included potential joint master's programs in selected areas between UWA and KAU.

These visits underscore the immense potential for IOA to expand its global footprint, share knowledge, and develop innovative solutions through collaboration with Indian research and higher education institutions.

Awards and industry recognition

Name	Award
H/Prof Kadambot Siddique	Adjunct Professor in Plant Physiology – ICAR-Indian Agricultural Research Institute

Visitors to IOA

Name of visitor	Visitor's organisation and country	Host details	Dates of visit
Director and Vice-Chancellor, Professor Manoj Dhar Prof. Ajay Dhar, Associate Director (Academic) Ms. Aarti Katoch, Manager, International Academic Partnerships	Academy of Scientific & Innovative Research's (AcSIR), India	IOA, Prof Kadambot Siddique	10 March
Mr Alex Lloyd, CEO Dr Mary Carr, Head of Collaborations, Research & Impact	CRC SAAFE	IOA, Prof Kadambot Siddique	24 March

New postgraduate research students (PhD)

Student	Topic	School	Supervisor(s)	Funding body
Ms Sanjida Akter	Unravelling the impact of manure management practices on antibiotic resistance and soil health in horticultural farming systems	SMS	Prof Kadambot Siddique Dr Mia Sultan	UWA and RTP scholarship
Mr Jai Nagarajan (Masters)	Agronomic and Soil Health Benefits of Food Organic Garden Organic (FOGO) Compost as a Soil Amendment in Wheat	SAgE	Prof Kadambot Siddique Prof Nanthi Bolan Dr Zakaria Solaiman	Self-funded

Research grants

Title	Funding period	Funding body	Investigators
Ripple Effect: A national, grower-led collaboration to increase biodiversity and reduce emissions via the demonstration and accelerated adoption of best-practice water management, strengthening farm water security, productivity and sustainability	2025 - 2028	Dept of Agriculture, Fisheries & Forestry (DAFF)	Assoc/Prof Nik Callow, Bonnie Stutsel, Prof Matt Hipsey, Assoc/Prof Sally Thompson
Weed Management Initiative	2025 - 2030	GRDC	Prof Ken Flower, Dr Michael Ashworth, Dr Danica Goggin, Dr Heping Han, A/Prof Michael Renton
Understanding the evolution of blackleg disease resistance genes in canola	2025	UWA	Dr William Thomas, Prof Jacqueline Batley, Mathieu Rousseau-Gueutin, Angela Van De Wouw
UWA MERIL3-2	2024 - 2027	Department of Industry, Science and Resources	Stephanie Payne, Auyog Subedi, Dr Joy Vadhanabhuti, Dr Zoey Durmic
GGA Student Bursary	2024 - 2026	Grower Group Alliance	Prof Kadambot Siddique, Huyen Pham
Food hypersensitivity in Australia and NZ	2024 - 2025	Food Standards Australia and New Zealand	A/Prof Michael Burton, Adj/Prof Dan Rigby
Pasture diversification to promote climate resilience	2024 - 2028	Department of Agriculture, Fisheries and Forestry	Dr Sasha Jenkins, Prof Kadambot Siddique, Dr Bede Mickan, E/Prof Lyn Abbott, Prof Nanthi Bolan, A/Prof Zakaria Solaiman, Tammie Harold, Prof Matthias Leopold.
Grain Automate Program 1: Developing capability, awareness, and preparedness for autonomy in the tertiary education sector	2024 - 2027	GRDC	Dr Andrew Guzzomi, Dr Wesley Moss, Prof Marit Kragt, A/Prof James Fogarty, Prof Gustavo Alckmin, E/Prof Graeme Martin, Karen Eyles, Alysia Kepert
Australian Plant Phenomics Network (APPN) - Strategic Initiative Fund	2024 - 2025	Department of Education	Dr Nic Taylor
Exploring Antimicrobial Resistance in Conventional and Biological Farming Systems	2024 - 2028	SAAFE CRC	Mostarak Munshi, A/Prof Zakaria Solaiman, Prof Kadambot Siddique, Prof Zed Rengel, Paul Storer
CRC Zero Net Emissions in Agriculture	2024 - 2033	Department of Industry, Science and Resources	Prof Phil Vercoe, Prof Marit Kragt, Dr Heather Bray, A/Prof James Fogarty, Dr Caitlin Moore
Building resilient organic weed management systems with precision smart sprayer technologies	2024 - 2026	Department of Agriculture (US)	Dr Wesley Moss, Dr Andrew Guzzomi
Herbicide resistance status of grain and cotton cropping regions - strategic insights for RDE	2024 - 2028	GRDC	Dr Mechelle Owens
ARC Training Centre in Predictive Breeding for Agricultural Futures	2024 - 2029	ARC	Prof Dave Edwards, Dr Michael Considine, Dr Nic Taylor, Prof Harvey Millar, Prof Jacqueline Batley

Memorandum of Understanding

Name	Date
UWA and The Kerala Agricultural University	January 2025

UWA IOA

2025 April

Publications

Peer Reviewed Journals

Previously unreported

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UPCOMING EVENT

IOA Postgraduate Showcase

Wednesday, 28 May 2025
Bayliss Lecture Theatre, UWA

Industry Forum

Wednesday, 6 August 2025
The University Club of UWA

Hector and Andrew Memorial

Wednesday, 25 September 2025
Bayliss Lecture Theatre, UWA

Australian Plant Breeding Conference

Wednesday to Friday, 4-6 June 2025
Esplanade Hotel Fremantle, Perth

Food and Legume Research Conference

Monday to Friday,
15-19 September 2025
Pan Pacific Perth, Perth

Symposium for the Use of Organic Soil Amendments

Tuesday to Thursday,
16-18 September 2025
Twin Towns Conference and
Function Centre Coolangatta, QLD



Register to attend our events on Eventbrite

IOA MISSION

To develop and communicate innovative evidence-based solutions for ethical food production, environmental sustainability and agribusiness advancement.



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The UWA Institute of Agriculture acknowledges the contribution of The FA Hadley Bequest and The WE Rischbieth Bequest for support towards communications activities.