Department of
Primary Industries and
Regional Development

GOVERNMENT OF
WESTERN AUSTRALIA

Protect
Grow
Innovate

DPIRD Broadacre Systems R&D

Stakeholder Update

December 2025 Edition

Contents

Cover: DPIRD Crop Science and Grain Production Manager Dr Bob French, Senior Research Scientist Dion Nicol, Broadacre Systems Executive Director Kaara Klepper, Research Scientist Glen Riethmuller

Acknowledgment of Country

The Department of Primary Industries and Regional Development (DPIRD) acknowledges the Traditional Custodians of Country, the Aboriginal people of the many lands that we work on and their language groups throughout Western Australia (WA) and recognise their continuing connection to the land and waters. We respect their continuing culture and the contribution they make to the life of our regions, and we pay our respects to their Elders past, present and emerging.

Department of Primary Industries and Regional Development

+61 1300 374 731 | enquiries@dpird.wa.gov.au | dpird.wa.gov.au

ABN: 18 951 343 745

From Broadacre Systems Executive Director, Kaara Klepper

Dr Kaara Klepper, Broadacre Systems (DPIRD)

Welcome to the latest edition of the Broadacre Systems R&D Stakeholder Update.

Now that I've had just over six months to settle into the department, I want to thank you for the warm welcome and the open, honest conversations that have shaped my early months in the role. Your insights, challenges and big-picture thinking have made it clear just how committed Western Australia's primary industries are to staying ahead of the game. They also reflect the highly tactical nature of farming systems across the state. Operating in a Mediterranean climate with inherently lower-fertility soils than those typically found in the eastern states, decisions such as variety selection, time of sowing, fertiliser strategies and crop protection become pivotal decisions. It is a real credit to WA growers that they consistently stack the odds in their favour.

This year has been a standout. We are on track for a near-record harvest, and while the weather has certainly played its part, the real credit lies in years of steady investment in science, innovation and resources which growers rely on to make confident, evidence-based decisions. Our R&D teams have been working hard across soil management, chilling tolerance and frost mitigation, crop protection, climate adaptation and farming systems innovation, and it is rewarding to see that work delivering such tangible results in the paddock.

Of course, the production environment we operate in is not getting any easier. Rising input costs squeeze profit margins, and shifting consumer expectations and market opportunities mean growers rely on targeted research now more than ever. We need to maximise system performance while mitigating risk and adverse

impacts – a tough call when the season break, in-crop rainfall, temperature and even the geopolitical landscape are all beyond our control. Continued investment is what keeps WA competitive, resilient and ready for whatever the next season brings. Just as importantly, anticipating emerging trends and future disruptors to long term viability of the grains industry are important considerations for setting R&D priorities.

This year, we secured our new Primary Industries Research Centre in Jandakot. This modern facility will bring our displaced South Perth functions back together under one roof and give our scientists and technical teams the space to collaborate, innovate and push ideas further, faster.

Looking to 2026, Broadacre Systems will place strong emphasis on diversification, innovation, technology and productivity. Our R&D efforts will support the Premier's priorities by helping diversify WA's economy and align with industry priorities to shift and lift the production frontier in profitable and sustainable ways. This will be delivered through targeted advances in crop protection, soil and crop innovation and data driven approaches. We will work hard to align research outcomes to meet new markets, strengthen our sustainability credentials and keep WA producers firmly positioned as global leaders.

Thank you again for your support, conversations and collaboration throughout 2025. I hope you have a very Merry Christmas, a Happy New Year and a safe, restful holiday break. You've earned it.

I hope you enjoy this update, and please don't hesitate to get in touch if you have any feedback or would like more information.

Contact:

Kaara Klepper

kaara.klepper@dpird.wa.gov.au

DPIRD's new Primary Industries Research Centre, located in Jandakot.

2026 Western Australian Crop Sowing Guide launches with big updates

Tammin grain grower Brad Jones and Bush & Beyond Media founder Shannon Beattie feature on the cover of the 2026 Western Australian Crop Sowing Guide, available online now. PHOTO CREDIT: Yuhki Murayama

The 2026 Western Australian Crop Sowing Guide is now available, delivering growers a one-stop shop of the latest variety performance and agronomic insights pulled together by DPIRD's research scientists.

It is packed with fresh data and clear advice to help growers cut through the noise and make confident sowing decisions.

The guide pulls together everything growers need to know about yield, quality and disease for wheat, barley, canola, oats and pulses — saving them from chasing information across countless reports and meetings.

It sharpens advice for lupins, field peas, faba beans, chickpeas, lentils and vetch, and includes a refreshed Agronomy and Herbicide Guide to help growers get the most out of high-value pulse crops.

This year's edition includes National Variety Trial information for 24 new varieties, giving growers a bigger set of options when weighing up yield potential, disease resistance, weed-control advantages and market fit.

It is all designed to make crop selection feel a little less like detective work and a lot more like sound business planning.

The barley section brings extra energy this year.

With the 2026-27 season expected to be a critical turning point for malting barley – thanks to low malt premiums nudging some growers toward feed varieties – the guide breaks down exactly what growers should consider before committing to a variety.

It outlines how new and emerging varieties are progressing through the Grains Australia accreditation process, including AGT-Bunyip IA, the first barley variety in the world to offer dual IMI and quizalofop-p-ethyl tolerance.

These insights help growers stay aligned with market signals, manage production risks and maintain access to high-value malting opportunities.

The publication includes updated agronomic advice, disease ratings and market information for each crop, along with variety snapshots and a clear guide to picking a pulse.

Additional sections cover the latest on Clearfield® CL Plus wheat arrangements, rising flag smut issues and practical tools to help growers reduce frost risk.

With more seasons ahead, this work is laying the foundation for more resilient and profitable cropping systems across the WA grainbelt.

The 2026 Western Australian Crop SowingGuide is available to download for free from the DPIRD website, with hard copy orders also available.

Contact:

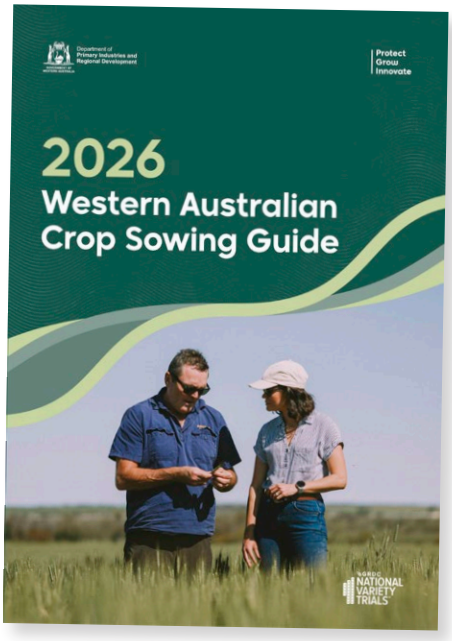
Brenda Shackley

brenda.shackley@dpird.wa.gov.au

Stacey Power

stacey.power@dpird.wa.gov.au

2026 Western Australian Crop Sowing Guide



DPIRD scientists help crack the genetic code of oats

WA's oat industry is set to benefit from a major global breakthrough, with DPIRD scientists helping decode the full genetic blueprint of oats for the first time.

This achievement opens the door to higher yields, stronger climate resilience and new breeding opportunities for WA's $120–150 million industry.

The discovery, published in Nature, reveals the genetic secrets behind oat productivity and adaptation, offering powerful tools to accelerate breeding of improved varieties.

Through the Western Crop Genetics Alliance (WCGA), a partnership between DPIRD and Murdoch University, WA scientists sequenced four oat genomes, including Australian varieties Bannister, Bilby and Williams, contributing key data to a major international research effort to crack the oat pangenome.

This advancement gives breeders unprecedented visibility of the genetic diversity underpinning oat performance and strengthens WA's processed oat industry by supporting development of more resilient, higher-yielding varieties tailored to local conditions.

By mapping how genes behave across plant tissues and growth stages, the research team produced the first–ever oat pantranscriptome, a comprehensive resource showing which genes are active and when.

This breakthrough will enable breeders to pinpoint traits linked to yield, disease resistance and environmental adaptation, speeding the development of oats suited to specific regions and markets.

DPIRD Broadacre Systems Executive Director Dr Kaara Klepper said the achievement showcases the power of international collaboration and local expertise.

"This breakthrough gives WA growers access to cutting–edge science that will boost productivity, sustainability and profitability, while strengthening the State's position as a global leader in premium oats," Dr Klepper said.

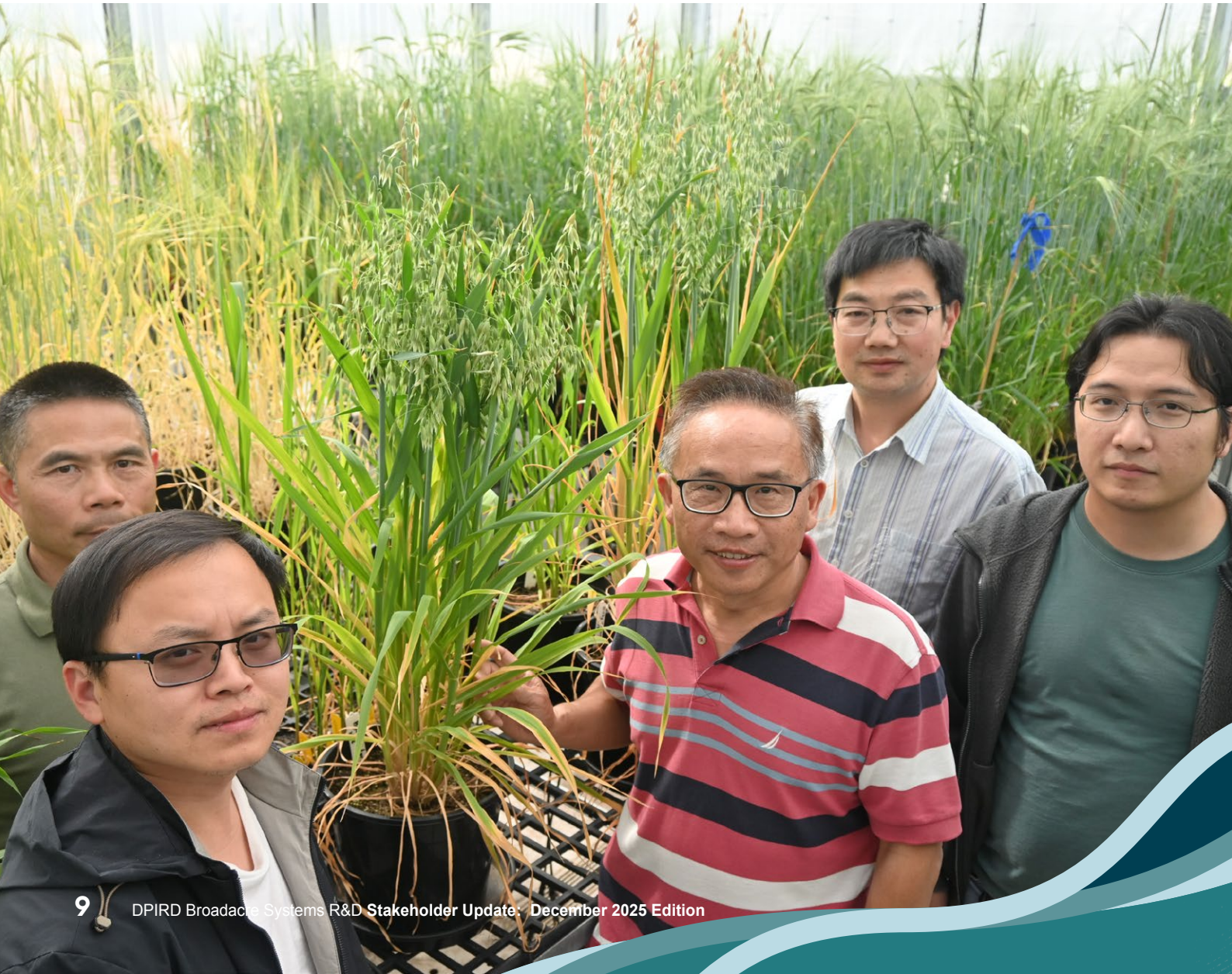
The Western Crop Genetics Alliance is supported by GRDC, the WA Oat Industry Partnership, DPIRD and Murdoch University, with computational support from the Pawsey Supercomputing Research Centre.

Contact:

Professor Chengdao Li

c.li@murdoch.edu.au

BELOW: WCGA researchers Dr Tianhua He, Dr Yong Jia, Prof Chengdao Li, Dr Gaofeng Zhou and Dr Viet Dang inspect oat crosses in the GRDC Grains Precinct glasshouse at Murdoch University. Using insights from the oat pangenome accession, the researchers are transferring elite traits into Australian oat varieties.



Real-time weather intelligence giving WA growers the edge

WA grain growers are gaining a powerful advantage through DPIRD's expanding real-time weather network, which delivers precise information on local conditions to support safer spraying, more timely inputs, smoother harvest operations and better risk management.

This immediate access to accurate, localised data is helping increase and protect yields and strengthen farm profitability in a variable climate.

DPIRD maintains 191 automatic weather stations across the agricultural region and South West, with additional stations from other agencies bringing the network to more than 220 locations.

Each station records air and soil temperature, humidity, solar radiation and wind, creating practical indicators such as spray drift risk and evaporation rates.

Data is uploaded every five minutes, giving growers immediate access to up-to-date local conditions.

Above: DPIRD Research Officer Ian Foster is the technical lead for DPIRD weather stations.

Right: DPIRD weather station measuring timely and relevant weather information.

DPIRD staff inspecting the Muresk weather station as part of the 4G telemetry upgrade rollout.

The network builds on more than 30 years of DPIRD-led innovation, beginning with stations installed in the 1980s for wind erosion research.

As technology advanced, DPIRD expanded coverage, enhanced capability and strengthened reliability, supported by a small team of specialists and external providers.

A major advance is DPIRD's weather website, which brings live data, visual dashboards, forecasts and downloadable information into one accessible platform for desktop and mobile.

Growers can also access the stations through the ServiceWA app, while Bureau of Meteorology observations, radar imagery and Met Norway forecasts provide broader context and increased accuracy.

These tools help growers make timely decisions on spraying, harvesting and managing heat or frost risk using precise local information.

A refreshed mobile app will be released soon to make real-time data even easier to access on the go.

Live weather data: DPIRD Weather – Live

For more information visit:

DPIRD Weather station navigation

WA Gov – Science week

Driving low-emission grain production for a stronger WA industry

DPIRD is taking a leading role in preparing WA's grains industry for a future where emissions reporting and sustainability credentials are becoming essential for market access.

This new work is designed to give growers the tools, data and confidence they need to respond to rapidly emerging expectations from international buyers and supply chains.

Central to this effort is the Low Emission Intensity Farming Systems (LEIFS) initiative, a collaboration between GRDC, CSIRO, SARDI, NSW DPIRD and DPIRD WA which aims for 80 per cent of national grain production to be benchmarked in enterprise greenhouse gas accounts by 2030.

This will provide WA growers with clear visibility of their emissions profile and practical pathways to participate in new sustainability markets and credentialling schemes.

DPIRD's involvement ensures the program is firmly grounded in WA farming systems, with regionally relevant research and on-farm testing.

Through the Action Research Network program, DPIRD will establish four knowledge hubs and demonstration sites in Esperance, Katanning, Merredin and Geraldton.

These sites will showcase low-emission grain production in real paddocks and explore the benefits and trade-offs of incorporating emissions information into routine agronomic and business decisions.

DPIRD economists will strengthen this work through the Accessible Greenhouse Gas Monitoring program, undertaking cost–benefit and trade-off analyses to identify mitigation strategies that deliver genuine value for growers.

Practical decision-making information will also be developed to help integrate emissions management into everyday practice.

Regional emissions benchmarks created through the project will allow growers to contextualise their own data at a farm scale and across the wider landscape.

Together, these efforts will give WA growers access to trusted, high-integrity information that supports productivity, maintains market competitiveness and aligns with WA Government priorities for climate resilience and sustainable economic development.

Demonstration activities will roll out during the 2026 season, with more information to be available once the LEIFs website goes live. We will share links to the new website in the next update.

Contact:

Kate McCormack

kate.mccormack@dpird.wa.gov.au

DPIRD leads rapid response to rising cockchafer damage

Cockchafer damage to a barley crop in Kondinin, WA.

DPIRD scientists are tackling a growing threat to grain production in WA's south-east, where cockchafers are damaging cereal and lupin crops and putting millions of dollars in yield at risk.

Cockchafers are a long-established group of beetles in WA. Although widespread, they are not usually problematic.

However, there was a notable outbreak in Harrismith, WA, in the 1990s that caused considerable crop loss due to the cockchafer species *Heteronyx obesus*.

More recently, reports from the Lake Grace and Kondinin regions have highlighted significant damage across multiple paddocks and a clear lack of control following foliar insecticide applications. Initial diagnostics indicated that cockchafer larvae from two locations could not be identified through either traditional taxonomy or molecular diagnostics.

The department's research team is spearheading a $1.5 million, three-year collaboration with GRDC to develop practical, evidence-based solutions for managing these destructive scarab beetle larvae.

Led by research scientist Dr Dusty Severtson, DPIRD scientists are working closely with growers across the Lakes district to map infestations and collect samples that will be used in further experiments.

The team is partnering with Murdoch University to use DNA sequencing to identify the exact species involved as emerging threats.

By pinpointing species differences and life cycles, DPIRD scientists aim to design effective and sustainable management strategies that protect future crops.

Field and glasshouse trials are underway to test species-specific chemical and biological control options, alongside cultural measures such as crop rotation, sowing rate and soil amelioration.

Researchers are also deploying drone imagery to assess the extent of crop loss and quantify the cost-benefit of various management tactics.

This work forms part of the National Grains Diagnostic and Surveillance initiative – a $42 million national GRDC program led in WA by DPIRD – to rapidly detect, diagnose and manage emerging pests and diseases.

The research program is also supported by GRDC's National Grower Network (NGN) funding to respond to WA grower concerns.

Contact:

Dr Dusty Severtson

dustin.severtson@dpird.wa.gov.au

Why shallow lime incorporation falls flat, but deep incorporation is rewarding in low-rainfall WA

WA grain growers are gaining powerful new direction from DPIRD's latest liming research, which is shedding new light on how to tackle soil acidity more effectively, unlocking subsoil productivity and building long-term resilience across the grainbelt.

DPIRD's long-running trials at Kalannie show that shallow incorporation of lime to 20 cm depth in low-rainfall regions simply does not deliver a yield advantage when compared to unincorporated surface liming.

Surface-applied lime barely moved in the soil beyond 10 cm over four years, while shallow incorporation lifted pH only in the top 20 cm, leaving deeper acidity untouched and restricting root growth.

Gaus Azam supervising the hand spreading of lime in a pit dug to 800 mm, before it is spaded through another 400 mm. Once spoil is returned to the pit the profile will have had lime mixed throughout to a depth of 1.2 m.

ABOVE: Georgia Keefe (Liebe Group) and Gaus Azam (DPIRD) doing a profile characterisation ahead of implementation of large re-engineering trial.
RIGHT: Use of spader to move surface applied lime through the top 400 mm of acidic Wodjil sand.

Despite the initial improvement in topsoil growing conditions, the lack of corresponding yield benefit from shallow incorporation of lime reassures growers that as there is no benefit in shallow incorporation, so they can avoid unnecessary soil disturbance and fuel use and instead focus on practices that meaningfully improve soil function. Where the research becomes transformative is when liming at depth.

DPIRD scientists demonstrated that loosening compacted soil to 45 cm and then incorporating lime at that depth, significantly improved soil pH, reduced aluminium toxicity and increased plant uptake of nitrogen, phosphorus and potassium.

This combination delivered the greatest improvement in root access to moisture and nutrients, helping growers overcome both compaction and acidity barriers that commonly limit returns in WA's sandy soils. Over seven years it produced an additional 10.6 tonnes of grain per ha compared to the untreated control. DPIRD is also providing new clarity on long-term maintenance liming.

Modelling shows lime requirements vary sharply between soil types, rainfall zones and nitrogen application rates, reinforcing the importance of targeted and cost-effective liming strategies.

The shift from recovery liming toward regular maintenance reflects growers' increasing confidence in managing acidity proactively rather than reactively.

Together, these findings equip growers with clearer, evidence-based guidance on when and how liming delivers the greatest advantage in the low-rainfall environments, helping WA's grains industry lift productivity while protecting the soils that underpin its future.

Contact:

Gaus Azam

gaus.azam@dpird.wa.gov.au

For more information:

Soil Quality Knowledge Base

Journal papers 2025

Genetic Improvement	Chunsheng Xiao, Gaofeng Zhou, Tianhua He, Chengdao Li (2025) Transport of secondary metabolites in plants: Mechanistic insights and transporter engineering for crop improvement. *Plant Communications* (In press)	
	Brittany Clare Thornbury, Tianhua He, Yong Jia, Chengdao Li (2025) A Comparative Bioinformatic Investigation of the Rubisco Small Subunit Gene Family in True Grasses Reveals Novel Targets for Enhanced Photosynthetic Efficiency. *International journal of molecular sciences*, 26, 15, 7424	
	Wenjuan Yang, Ming Guo, Yan Li, Qinglan Yang, Huaizhi Zhang, Chengdao Li, Juncheng Wang, Yaxiong Meng, Xiaole Ma, Baochun Li. (2025) Transcriptome Analysis and Functional Characterization of the HvLRR_8-1 Gene Involved in Barley Resistance to *Pyrenophora graminea*. Plants (Basel), 14, 15, 2350	
	Chengdao Li, Yong Jia, Darshan Sharma, Sharon Westcott, Karthika Pradeep, Lee-Anne McFawn, Jenifer Bussanich, Penghao Wang, Zibei Lin, Wendy Vance (2025) Genotype and phenotype data of 520 chickpea accessions collected from multiple trial locations across Australia from 2023 to 2025. Dataset.	
	Vanika Garg, Rutwik Barmukh, Yan Huang, Annapurna Chitikineni, Kristy Hobson, Bicheng Yang, Yong Jia, Shengnan Bi, Sukhjiwan Kaur, Muhammad Ahsan Asif, Matthew Hayden, Sally Norton, Darshan Sharma, Kadambot H. M. Siddique, Xin Liu, Chengdao Li, Rajeev K. Varshney (2025) An Australian chickpea pan-genome provides insights into genome organisation and offers opportunities for enhancing drought adaptation for crop improvement. *Plant Biotechnology Journal*, 23, 9, 3967.	

The Enhanced Efficiency Fertiliser (EEF) project at Wongan Hills Research Station, evaluating fertiliser technologies to improve nutrient use efficiency.

Where to hear about our work

16–17 February 2026	2026 GRDC Grains Research Update Optus Stadium, Perth
19–20 February 2026	EPAC 2026 Melbourne Convention and Exhibition Centre, Melbourne VIC
4 March 2026	National Canola Pathology Workshop Melbourne VIC
7–12 June 2026	23rd World Congress of Soil Science Nanjing, China
5–8 July 2026	5th International Hemipteran Plant Interactions symposium 2026 France
17–20 August 2026	Australian Barley Technical Symposium Geelong, VIC
23–27 August 2026	24th Australasian Weeds Conference Christchurch, NZ
24–28 August 2026	Australian Agronomy Conference Darwin NT
1–5 November 2026	Soils Science Conference Pan Pacific, Perth
17–22 November 2026	International Oat Conference Chili