



Department of
Primary Industries and
Regional Development

Protect
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DPIRD Grains R&D Stakeholder Update

September 2024 Edition





**From Grains Director
Kerry Regan**

Introduction

Hello, research and industry colleagues.

It is with great pleasure that we present the latest edition of the Grains R&D Stakeholder Update.

Over the past month, the crop production estimates for the Western Australia have improved, thanks to timely August rains that reached most of the grain-growing regions. While the late start with minimal sub-soil moisture was a concern, crops across the state are now looking good with reasonable grain yield potential. The latest Grains Industry Association of Western Australia (GIWA) is now predicting total tonnage for all grains between 17 and 18 million tonnes.

These conditions have also been beneficial to our field trials. The details of more than 220 of our research experiments can now be found at Grains Research Trials map online.

We are very excited to be leading a transformational, new \$55.9 million strategic R&D collaboration aiming to lift water and nutrient use efficiency in Western Australian grain production and support the state's growers to achieve crop yield gains of more than 10 per cent.

The Soil Water and Nutrition (SWAN) collaboration is a joint five-year initiative between the Department of Primary Industries and Regional Development (DPIRD) and the Grains Research and Development Corporation (GRDC). The partnership is a key component of the Grains Directorate's ongoing research and development (R&D) initiatives and builds on the significant achievements of the past five years by our soil research team.

We are also leading the western node of the National Collaborative Research Infrastructure Strategy through the Australian Plant Phenomics Network together with UWA. As part of our commitment, we will manage two Mobile Field Phenotyping Units at Northam and UWA, and a Fixed Field Site at Merredin. The WA node will provide digital tools for measuring crop production using visible, multispectral and hyperspectral images collected with UAV or ground-based platforms.

DPIRD has engaged the Grain Industry Association of WA (GIWA) to develop the Western Australian Grains Industry Strategy for 2025–2035. This project is being led by a consortium that includes Dr Mark Sweetingham from Sweet Spot Consulting, Ian Longson from GIWA, John Roberts from Strickland Park Economics, David Hudson from SGA Solutions, and Mark Narustrang from PivotalPoint Strategic Directions. The Strategy is expected to be completed within the next 10–12 months, and we encourage our industry networks to actively participate and contribute to this important collaborative framework.

On a final note, I've had the privilege of being part of the grains R&D ecosystem for over 30 years, with the past seven and a half years spent in my current role as Director of Grains R&D. This journey has been both challenging and rewarding, and I've genuinely enjoyed working alongside a talented team of professionals, technical staff, research collaborators, investors, and industry stakeholders.

Together, we've delivered significant value to the WA grains industry through our research and development efforts. However, after much consideration, I've decided that it's time for me to move on to the next chapter.

I want to extend my thanks to all of you for your support and collaboration throughout the years. It has been an honour to work with such dedicated and skilled colleagues.

In the meantime, I will be handing over the reins to Dr Darshan Sharma, whom many of you already know. He will be taking on the role until at least February 2025.

If you have any feedback or need more information, please get in touch with me or the staff in our Grains team.

✉ darshan.sharma@dpiird.wa.gov.au

🌐 www.agric.wa.gov.au/darshan-sharma

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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



The value of grains research and development to the WA economy

- The Western Australian grains industry is worth \$14 billion per annum to the Western Australia's economy, with over 4000 mainly family owned and operated businesses producing an average 18 million tonnes per year (five-year average 2018-23).
- Responsible for over \$6 billion in exports per annum, the industry is dependent on maintaining 2% productivity growth per annum to remain internationally competitive.
- Responding to a changing climate and export market requirements calls for ongoing R&D, tailored to WA's specific constraints.
- The localised, unique R&D delivered by DPIRD (such as improved genetics, management practices and system innovations) has contributed to improved wheat yields despite declining growing season rainfall and increasing temperatures (see Figure 1). R&D outcomes have helped reduce production variability, improve the affordability of food, increase regional employment and support regional trade.
- DPIRD is the largest provider of applied grains R&D in the state and accounts for 46% of the state's capacity in grains R&D, with a regional footprint from Kununurra to Esperance.
- Every \$1 investment in agricultural R&D can generate a return to farmers of \$7.82.





\$55M SWAN collaboration aims to revolutionise soil and water productivity in WA grain production

A groundbreaking \$55.9 million strategic collaboration, known as the Soil Water and Nutrition (SWAN) initiative, has been launched with the goal of significantly enhancing water and nutrient use efficiency in WA's grain production.

This ambitious five-year project aims to empower the state's grain growers to achieve crop water use efficiency improvements exceeding 10 per cent.

The SWAN initiative is a joint effort between GRDC and DPIRD.

The collaboration will focus on providing growers with innovative machinery and soil amendment options to re-engineer soils coupled with integrated nutrient management systems as part of economically viable management strategies.

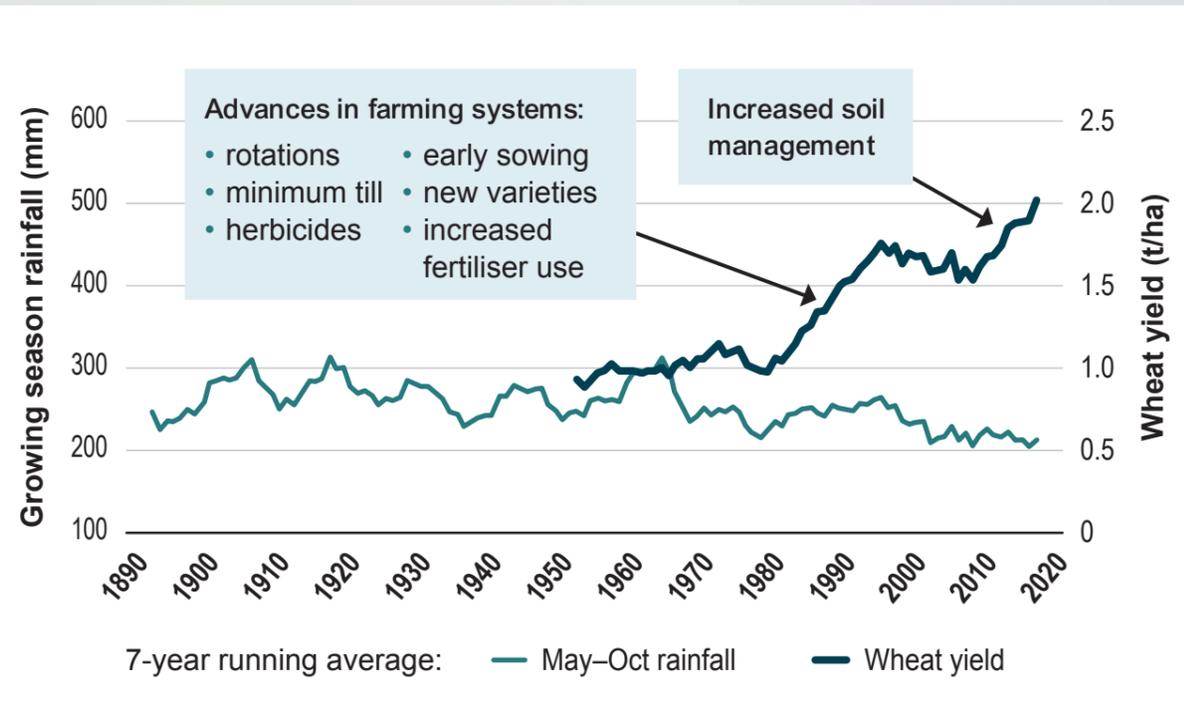


Figure 1: Long-term changes in wheat yield and rainfall in the WA grainbelt



DPIRD SWAN collaboration lead Dr Stephen Davies; GRDC sustainable cropping systems manager Rowan Maddern; GRDC Senior Regional Manager Peter Bird; DPIRD research scientist Dr Wayne Parker; GRDC Regional Panel Chair Gary Lang; DPIRD senior principal research scientist Chris Gazey.

These strategies are designed to maximise grain production per millimetre of rainfall, a critical metric in an increasingly water-constrained environment.

The SWAN collaboration is organised around three primary Programs:

- 1. Soil re-engineering expansion:** This program, led by Dr Gaus Azam, aims to extend the effectiveness and reach of soil re-engineering practices, enabling more widespread adoption across diverse soil types and conditions.
- 2. Targeted crop nutrition enhancement:** This program, led by Dr Craig Scanlan, will develop integrated nutrient management strategies to improve the long-term supply of nutrients to crops across a rotation. A special focus will be placed on optimising potassium use, a crucial nutrient for crop growth, ensuring it is efficiently utilised in various soil types.
- 3. Industry adoption readiness:** This program, led by Mr Wayne Parker, is dedicated to ensuring that research outcomes are readily accessible and applicable to real-world farming scenarios.

Dr Stephen Davies, DPIRD's SWAN collaboration manager, emphasised that the research would provide farmers with cutting-edge soil re-engineering and crop nutrition practices.

These practices are expected to lead to significant gains in crop productivity and profitability.

“By addressing soil constraints to depths of 80 centimetres or more, capturing water more effectively, and enhancing nutrient accessibility for plants, growers will be better equipped to harness the benefits of other advancements in crop management and genetics. This will allow them to fully realise the potential of their farming systems,” Dr Davies explained.

At the farm level, the SWAN initiative promises several tangible benefits:

- **Soil re-engineering:** Development of machinery and soil amendment strategies that enable deep re-engineering of soils to depths of 80 centimetres or more.
- **Productivity and financial analysis:** Tools and guidelines that quantify the productivity gains and financial returns associated with soil profile re-engineering.
- **Water management:** Improved strategies for water capture and reduced water loss in heavy-textured soils, particularly in low-rainfall areas.

- **Gypsum use optimisation:** Guidance on the application of gypsum to maximise financial returns and improve soil condition.
- **Online diagnostic hub:** A digital platform offering diagnostic tools and long-term strategies for managing cropping soils and enhancing nutrient efficiency.
- **Potassium management:** Enhanced understanding and management of potassium to reduce losses in cropping systems.
- **Deep ripping longevity:** Updated guidelines on the frequency of ripping and strategies to extend the benefits of deep ripping.

The SWAN initiative will be guided by an industry advisory group comprising growers, consultants, and researchers. This group will ensure that the research is not only scientifically sound but also practical and relevant to the needs of growers. The collaboration is committed to delivering fit-for-purpose engagement approaches that will empower farmers to apply the key learnings from the initiative effectively.

“This collaboration between DPIRD and GRDC is an ambitious but logical progression and will further build on the gains from soil amelioration practices developed by soil management research over the past 10-15 years” said Chris Gazey, Manager of DPIRD's Soil Portfolio he also added that “while looking for the next step change growers must not lose sight of ensuring that the basics, such as soil pH/liming, compaction, water repellence and crop nutrition are all addressed along with pests, weeds and diseases and timeliness of all operations”.

With several projects already underway, including ongoing field experiments in the current crop season, the SWAN collaboration is poised to make significant strides in soil and water productivity. Additional experiments are scheduled to begin in the 2025 cropping season, marking the next phase of this transformative initiative.

Contact:

Dr Stephen Davies

DPIRD SWAN Collaboration Manager

 Stephen.Davies@dpird.wa.gov.au



Dr Gaus Azam (left) with Prof Stefan Patzold, discussing their long-term lime trial at the research farm of the University of Bonn, Klien-Altendorf, Germany.



Global soil solutions: Dr Gaus Azam's international study tour

In April 2024, Dr Gaus Azam, a Principal Research Scientist from DPIRD, embarked on a groundbreaking international study tour, supported by the prestigious GRDC Recognising and Rewarding Excellence Award. This journey marks a significant milestone in his ongoing mission to revolutionise soil management practices in Western Australia.

Dr Azam's tour began in Germany, where he visited the University of Bonn, a world leader in agricultural machinery development. Here, he delved into cutting-edge technologies and concepts that could potentially transform the way subsoil issues are addressed in WA.

One of the key insights he gained was the potential to develop a soil mixing implement that targets subsoil constraints while minimising disturbance to the topsoil—an essential factor for maintaining crop establishment, growth and yield.

“German scientists are thinking along similar lines when it comes to soil management,” Dr Azam noted.

“Their expertise in developing machinery that can fix subsoil problems without disrupting the topsoil is something that could greatly benefit our practices back home in WA.”

But Germany is just the first stop on this ambitious journey.

Dr Azam is continuing his tour with visits to Canada and the United States, where he will engage with leading researchers at the University of Saskatchewan in Saskatoon, the Agriculture and Agri-Food Canada Research and Development Centre in Swift Current and Indian Heads, Saskatchewan, the university of Missouri in Columbia, Missouri and the United States Department of Agriculture in Raleigh, North Carolina.

These institutions are at the forefront of soil science, specialising in areas such as soil mapping, phenotyping crop root system, and precision agriculture.

The knowledge and insights Dr Azam gathers from these global leaders will be instrumental in the development of next-generation soil reengineering technologies.

His goal is to bring these advanced practices back to WA, where they can be adapted and implemented to address local challenges in soil management.

“North America is leading the way in technologies that could revolutionise our approach to soil constraints,” Dr Azam said.

“The opportunity to learn from their successes and bring those innovations back to Australia is invaluable.”

This international study tour represents a unique opportunity for Dr Azam to expand his professional network and gain exposure to the latest advancements in soil science.

By collaborating with global experts, he aims to accelerate the development of practical solutions that can be directly applied to WA soils, ultimately improving water use efficiency and grain yield.

GRDC Western Panel Chair Darrin Lee highlighted the importance of Dr Azam’s tour, stating, “This travel scholarship is not just about recognising past achievements; it’s about investing in future innovations. Dr Azam’s work overseas will bring back critical knowledge that will help push the boundaries of what’s possible in soil reengineering.”

Contact:

Dr Gaus Azam
DPIRD Principal Soil Scientist

✉ gaus.azam@dpird.wa.gov.au



Dr Gaus Azam (right) with Dr Oliver Schmittmann (middle) and a farm technician (left) are looking at soil preparation before planting crop seeds at the research farm of the University of Bonn, Klien-Altendorf, Germany.



Dr Gaus Azam (right) with GIFS CEO Dr Steven Webb in front of GIFS Office at the University of Saskatchewan, Saskatoon, Canada.



Dr Gaus Azam in GIFS molecular lab, University of Saskatchewan, Saskatoon, Canada.



Mr Florian Frisch, a farm manager at Burg Gladbach, Germany, explaining the machinery requirements for their farm.

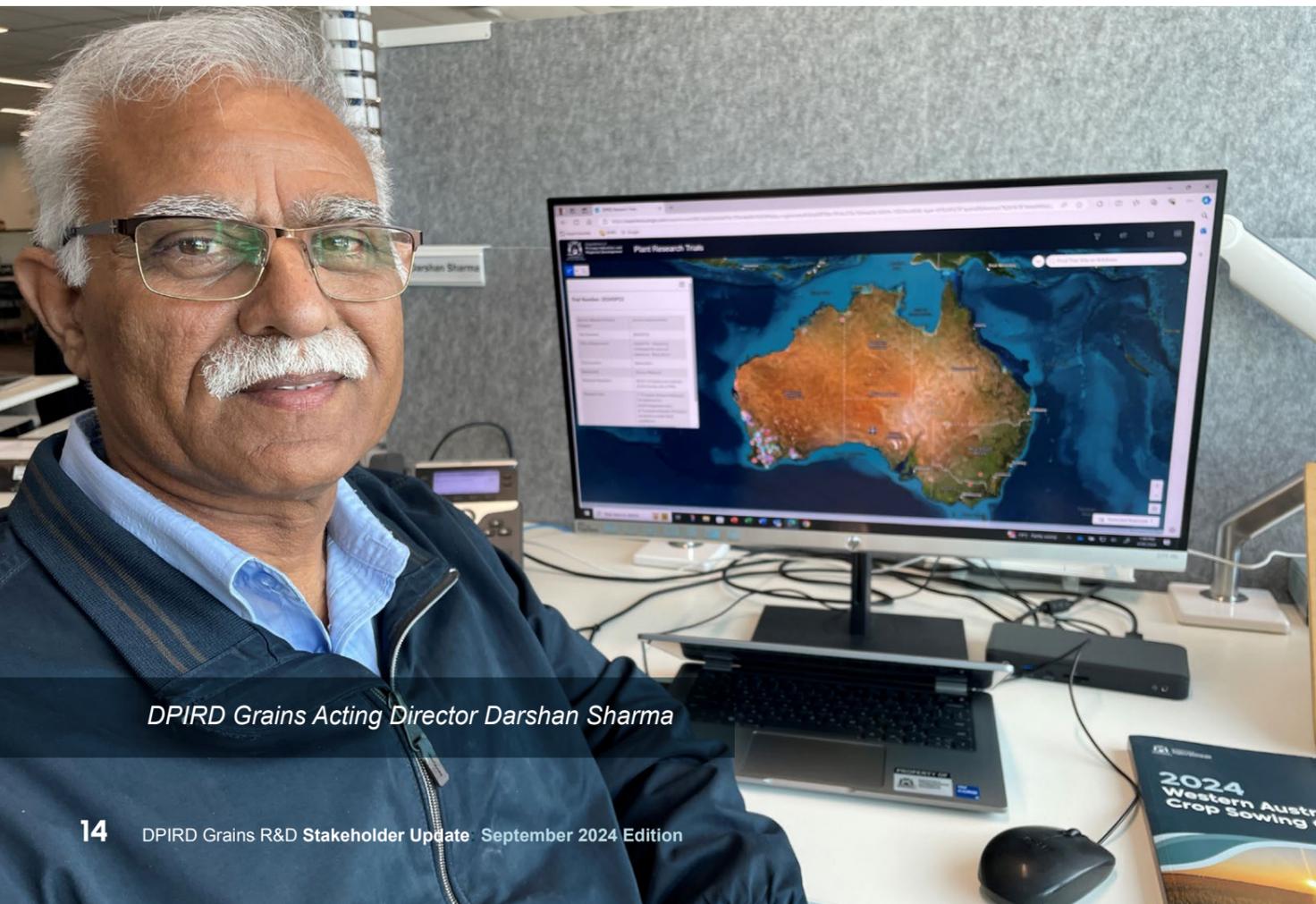


Discover 220+ grains research trials: DPIRD's interactive map unveiled

DPIRD has released its latest online map featuring more than 220 grains research experiments.

The interactive map, which is produced annually, showcases the department's grains research trials from Kununurra to Esperance.

DPIRD Grains Acting Director Darshan Sharma said the map served as a valuable resource for discovering on-the-ground efforts to enhance productivity and profitability in the industry.



DPIRD Grains Acting Director Darshan Sharma

“These trials provide crucial insights for innovation, validation of research ideas, standardisation of known technologies tailored to specific regions and soils and extension activities to boost the profitability of WA grain growers,” Dr Sharma said.

“It features trials at DPIRD’s research facilities in Northam, Merredin, Wongan Hills, Katanning, Manjimup, Carnarvon, Geraldton and Kununurra, along with many trials on growers’ properties.

“These trials have led to agronomic gains from advances in crop genetics and improvements in agronomy and the management of weeds, pests, and diseases.”

The map has been upgraded to a new platform this year, utilising DPIRD’s Geographic Information System software, a powerful tool for mapping and analysing spatial data.

DPIRD’s grains research encompasses various aspects of grain production, including soil science, crop nutrition, crop protection, crop science, genetic improvement, and farming systems innovation.

This research underpins the State’s valuable grains industry, addressing local production challenges and enhancing the sustainability and profitability of Western Australian grain businesses.

The map includes DPIRD’s collaborative research with external partners such as the Grains Research and Development Corporation, CSIRO, universities and grower groups.

Each trial is numbered and includes contact details, enabling stakeholders to connect with research scientists for more information on the ongoing work.

To view the map, visit:

[2024 research trials map](#)





National Grains Surveillance Initiative to protect Australia's agriculture from pests and diseases

The National Grains Diagnostic and Surveillance Initiative, officially launched on February 26, 2024, serves as a vital defence against the looming threat of exotic pests and diseases to Australian agriculture.

With a potential financial impact on growers estimated at \$100.4 million annually, the importance of early detection and rapid response cannot be overstated.

This initiative aims to bolster Australia's biosecurity preparedness by integrating advanced diagnostic technologies into the grain industry.

By modernising surveillance methods and accelerating diagnostic processes, the initiative seeks to protect the future of Australian grain production and ensure its continued competitiveness on the global stage.

A collaborative effort involving several state agencies, including the WA Department of Primary Industries and Regional Development (DPIRD), the South Australian Research and Development Institute (SARDI), and others, the initiative is collectively valued at \$42.7 million.

DPIRD plays a pivotal role in the project, contributing to three key areas: the adoption of modern diagnostic techniques, the development of in-field diagnostic systems, and the creation of frameworks for forecasting and risk assessment.

The project is led by Dr Monica Kehoe and supported by a dedicated team of 18 DPIRD staff members who are working across various research themes to address the challenges posed by pests and diseases.

Their work involves the development of advanced qPCR assays and high-throughput sequencing methods for more accurate virus detection in crops, as well as the implementation of rapid tests for hard-to-diagnose diseases and pests.

Additionally, the team is working on innovative approaches to predict and manage the spread of these threats, including the use of remote monitoring tools.

The National Grains Surveillance Initiative is set to continue until June 30, 2028, and represents a significant step forward in safeguarding Australia's agricultural future, ensuring that the nation's grain industry remains resilient in the face of emerging threats.

Contact:

Dr Monica Kehoe

DPIRD Plant Virologist and Molecular Plant Pathologist

 monica.kehoe@dpiird.wa.gov.au

For more information:

National Grains Diagnostic and Surveillance Initiative



Senior Research Scientist Ben Congdon testing a LAMP assay developed by DPIRD for fall armyworm. Assays and diagnostic tools are being developed by the Grains Crop Protection team for key pests and diseases as part of the National Grains Diagnostic and Surveillance Initiative.



Advancements in agricultural innovation

Accelerating chickpea breeding for acid soil tolerance: A breakthrough in agricultural research

DPIRD is at the forefront of a groundbreaking research project aimed at overcoming a significant challenge in Australian agriculture: the impact of acid soils with aluminium toxicity on chickpea production.

This issue is the second most severe limitation to chickpea productivity in Australia, just after Ascochyta blight. Chickpeas, being particularly sensitive to acid soils, face drastic restrictions in growth and yield, especially in regions where soil conditions are less favourable.



Dr Yong Jia, a leading DPIRD research scientist, transfers chickpea plants from the glasshouse

To address this, DPIRD, in collaboration with Murdoch University, Agriculture Victoria, and with significant support from GRDC, has embarked on an innovative project to develop chickpea varieties with enhanced tolerance to acid soils.

The absence of genetic variation for this trait in current Australian chickpea varieties has been a significant hurdle, limiting chickpea cultivation to regions with more neutral soils.

During the first year of the project, the research team, led by DPIRD, has achieved several important milestones:

- 1. Developed an effective hydroponics screening system for aluminium tolerance:** This system, a key development by DPIRD, has allowed for efficient and precise screening of chickpea lines for acid soil tolerance.
- 2. Screened approximately 1,200 chickpea lines and performed genome-wide association studies (GWAS):** These studies, facilitated by DPIRD's expertise, have been crucial in identifying genetic markers linked to acid soil tolerance.
- 3. Identified three quantitative trait loci (QTLs) on chromosomes 7, 6, and 1 for aluminium tolerance:** A significant breakthrough by the DPIRD-led team, with the QTL on chromosome 7 near the CaMATE2 gene being particularly notable.
- 4. Transferred germplasm with different haplotypes to breeders:** This step, guided by DPIRD, ensures that these valuable genetic traits are now available for further development into commercially viable chickpea varieties.

Looking ahead, DPIRD and its partners will focus on field trials to assess the real-world performance of these promising germplasm lines. The team will also work on crossing tolerant genotypes with existing cultivars and broadening their screening efforts to include manganese toxicity tolerance.

Under DPIRD's leadership, this research represents a major leap forward in enhancing the resilience of chickpea crops across Australia. By developing varieties that can thrive in acidic soils, DPIRD is not only helping to expand the potential cultivation areas for chickpeas but also contributing to the long-term sustainability and productivity of Australian agriculture.

Contact:

Sharon Westcott
DPIRD Research Scientist

 sharon.westcott@dpiird.wa.gov.au

Key achievements of WA's Lupin Industry Partnership: innovation and food market expansion

The Lupin Industry Partnership in WA represents a significant advance for the growth in value-added exports.

Lupins, already known for their high nutritional value, became a key player in both the food and livestock feed industries, thanks to strategic initiatives led by DPIRD.

Launched on 1 July 2022, the Value-Added Lupin Exports project of the South-West WA Drought Resilience Adoption & Innovation Hub had several key deliverables aimed at enhancing the value of lupins as a premium food product:

- 1. Formation of the Lupin Value-Adding Association:** A not-for-profit entity was established to drive the project forward, bringing together experts and stakeholders from across the lupin industry.
- 2. Development of a panel of experts:** This panel included both local and international lupin specialists who provided consulting services to WA lupin food and ingredient companies.
- 3. Launch of a promotional website:** served to raise awareness and provide resources for food technologists, health professionals, and consumers about the benefits and uses of lupins.

The website can be found at:

Aussie Lupin Beans - The little bean that's BIG on goodness (aussielupins.org.au)



- 4. R&D Projects:** Several research and development projects were initiated to explore new value-adding opportunities for lupins, with a focus on food processing and utilisation. The project Provided input to GRDC who have funded two new large investments- one to develop very low alkaloid varieties and one to increase the protein in the product by reducing the hull thickness. There is also a Curtin University post graduate project examining sensory issues for the kernel meal.
- 5. Assisted the establishment of a new seed alkaloid testing service** to ensure that Australian lupins met the highest quality and safety requirements for international markets.

- 6. Exposure at national and international food industry events:** The partnership included presenting lupin products at key industry conferences and trade shows to increase market interest and consumer confidence.

The website has stimulated interest, particularly in the United States and the EU. It has identified some barriers to growth, particularly in the areas of lupin processing. These are being addressed by the private sector. It also underpinned the establishment of a lupin processing and export consortium, which played a key role in sharing market insights and opportunities for the distribution of lupin-based foods and ingredients.

Western Australia, as the largest global exporter of lupins, producing 65 per cent of the world's supply, primarily for stockfeed, expanded the use of lupins beyond traditional markets.

The partnership focused on their potential as a high-protein, gluten-free food ingredient.

Lupins were particularly appealing for their health benefits, which included reducing blood pressure, lowering cholesterol, and improving bowel health. These attributes made them an ideal candidate for the growing global demand for plant-based proteins.

By fostering collaboration between government, industry, and research institutions, the partnership delivered significant economic and health benefits both locally and globally.

Contact:

Greg Shea, DPIRD Senior Research Scientist  greg.shea@dpiird.wa.gov.au



South-West WA
Drought Resilience Adoption
and Innovation Hub



Revolutionising pest control: Integrated pest management secures farming's future

The Integrated Pest Management (IPM) for Grains project made significant strides in supporting Australian grain growers, ensuring sustainable pest management practices that minimise the impact of invertebrate pests on production.

Running from April 2022 to March 2024, the project's primary goal was to provide timely and accurate information on pest occurrences, enabling growers to adopt effective management strategies that maintain profitability and protect crop yields.

DPIRD's role in the project was pivotal, with a project team led by Cindy Webster (Project Manager), and supported by Alan Lord, Bec Swift, Dusty Severtson, Steve Collins, and Svetlana Micic.

A key outcome of the project was the release of 42 issues of the PestFacts WA newsletter, featuring 159 articles that alerted the WA grains industry to the latest insect pest and disease occurrences, and discussed how to identify and sustainably manage these disorders to reduce yield loss.

Innovative tools used during the project supported improved pest monitoring and reporting for growers.

The updated PestFacts WA Reporter app was released in 2022. This app allows users to report pest occurrences quickly and easily, capturing vital data that was used to alert growers and enable rapid responses to pest outbreaks. It also allows users to request a free diagnosis of insect pest and plant diseases directly from the paddock.

During this project, over 2,000 insect reports and 1,000 disease reports were gathered from WA growers and agronomists, and shared from other DPIRD surveillance projects. The PestFacts WA team also collaborated with, and sourced surveillance data from, software management companies Agworld and Back Paddock.

For more information:

Agworld

Back Paddock

PestFacts WA map

All insect and disease reports received by this service can be viewed on the PestFacts WA map.

The project's native budworm moth trapping initiative, involved volunteer farmers hosting traps across the Western Australian grainbelt each season. The moth capture data from these traps was used to alert the WA grains industry of native budworm moth movement and advise pest management strategies in a timely manner.

For more information refer to DPIRD's:

Native budworm moth trapping in Western Australia

The development of insecticide spray guides for different seasons, combined with information disseminated via the DPIRD Grains Convo podcast series, offered WA growers valuable guidance on managing pest threats.

In addition to the pest management intelligence, the project team delivered insect identification training workshops and engaged the farming community by presenting at other industry events and in multiple radio interviews.

The PestFacts WA team also helped produce an IPM checklist, which offers grain growers a structured approach to making informed decisions and promoting sustainable pest management within their crops. The IPM is a simple checklist that growers can follow all the way from pre-season to post-harvest every year.

For more information:

IPM checklist

Over the course of this project, 6 field investigations on unusual insect pests of grain crops were conducted by staff. These included following up on reports on Dongara weevil activity and unusual cockchafer damage in wheat and barley.

Led by Cesar Australia, with support from the South Australian Research and Development Institute (SARDI), New South Wales Department of Primary Industries, and Queensland Department of Agriculture and Fisheries, the IPM for Grains project has been a resounding success, ensuring the future sustainability and profitability of Australia's grain industry. This initiative was a GRDC investment and included in-kind contributions from all project partner organisations.

Contact:

Cindy Webster, DPIRD Research Agronomist [✉ cindy.webster@dpiird.wa.gov.au](mailto:cindy.webster@dpiird.wa.gov.au)



A native budworm trap in a lupin crop. Photo: Amber Balfour-Cunningham (DPIRD)



Project summaries

To learn more about our priority projects, click on the links in the table below.



Title	Portfolio	Commodity						
		Cereals			Oilseeds	Lupins	Pulses	Other
		Wheat	Barley	Oats	Canola	Lupins	Chickpea/ faba bean/ field pea	
Genetic Improvement (Breeding better crops)								
Increasing wheat yield and yield stability through improved heat tolerance during grain filling	GI	✓						
Increasing stable lupin productivity through enhanced disease resistances	GI					✓		
Fast tracking the delivery of improved chilling tolerance chickpea for Australian growers	GI						✓	
NVT- Disease resistance	GI	✓	✓	✓		✓	✓	
Precision gene editing for targeted trait improvement in grain crops	GI	✓	✓			✓		
Doubled haploid production	GI	✓	✓					
Crop Science and Grain Production (Agronomic advancements)								
Enhancing frost tolerance and/or avoidance in wheat barley and canola crops through in-season agronomic manipulation	CSGP	✓	✓		✓			
Matching Pulse crop designs to site and expected seasonal conditions to maximise yield and profit: a crop ecophysiology approach	CSGP					✓	✓	
Western Australian Farming Systems	CSGP	✓	✓		✓	✓	✓	✓
Reducing risks to canola establishment through an integrated understanding of genetics, management, and environment	CSGP				✓			
Crop sowing guide	CSGP	✓	✓	✓	✓	✓	✓	✓
Overcoming the root phenotyping bottleneck in cereals	CSGP	✓						✓
CP – Crop Protection; SSCN – Soil Science and Crop Nutrition; CSGP – Crop Science and Grain Production; GI – Genetic Improvement; FS – Farming Systems								



Title	Portfolio	Commodity						
		Cereals			Oilseeds	Lupins	Pulses	Other
		Wheat	Barley	Oats	Canola	Lupins	Chickpea/ faba bean/ field pea	
Soil Science and Crop Nutrition (Improving Soils)								
Predicting Nitrogen Cycling and Losses in Australian Cropping Systems – Augmenting Measurements to Enhance Modelling	SSCN							✓
Re-engineering soils to improve the access of crop root systems to water and nutrients stored in the subsoil	SSCN	✓	✓		✓			✓
Prolonging profitability and longevity following soil amelioration	SSCN							✓
Increased grower profitability on soils with sodicity and transient salinity in the eastern grainbelt of the Western Region (P03)	SSCN							
On-farm soil acidity and nutrient management (Watering WA Clean Waterways)	SSCN							✓
Crop Protection (Protecting crops)								
Effective control of brome grass in the southern and western cropping zones	CP							✓
Epidemiology and management of Rhizoctonia in low and medium rainfall zones	CP	✓	✓					
Furthering grower knowledge and understanding of the scientifically unidentified 'Dongara weevil'	CP				✓			
Investigating systems for the control of Desiantha weevil in relation to resistance and biology in WA	CP				✓			
More effective control of pest snails in Australian grain crops	CP							✓
What is the best fit for Electric Weed Control in Australia?	CP							✓
Effective virus management in grain crops	CP							✓
Disease epidemiology, modelling and delivery of management decision support tools	CP	✓	✓	✓	✓	✓	✓	
National Grains Diagnostic and Surveillance Initiative (NGDSI)	CP							✓
CP – Crop Protection; SSCN – Soil Science and Crop Nutrition; CSGP – Crop Science and Grain Production; GI – Genetic Improvement; FS – Farming Systems								



2024 project highlights

Throughout 2024, DPIRD Grains has made significant progress in its research initiatives, highlighting key advancements designed to tackle the evolving challenges and opportunities within the grains industry.

Thanks to the dedicated efforts and expertise of our teams, these advancements are set to have a lasting impact, shaping the future of agriculture with an emphasis on improving productivity and ensuring environmental sustainability.

Below are some of the stories featured in our Grains Convo e-newsletter, showcasing the progress made across various projects.

Click the links to read the stories in full.



Real time disease monitoring kicks off in WA



DPIRD team up with collaborators to unlock the long-term profitability of soil amelioration practices



Enhancing barley resilience to heat stress



New project aims to enhance insect pest and disease management in the Australian grains industry



Where to hear about our work



21–24
October 2024

The Australian Agronomy Conference



The Australian Agronomy Conference brings together professionals, researchers, and experts in the field of agronomy from around the country and will be held in Albany, Western Australia.

It is a platform for the exchange of knowledge, ideas, and experiences that contribute to the advancement of sustainable agricultural practices. This year's theme is 'Adaptive agronomy for a resilient future'.

10 December 2024

2024 DPIRD Grains Industry Day



DPIRD is pleased to announce the fifth annual Grains Industry Day. This year, the event will be hosted at Kings Park State Reception Centre.

Event Highlights:

Research presentations:

- Genetic improvements in grain crops
 - Integrated pest management strategies
 - Advancements in farming systems
 - Herbicide efficiency and resistance management
 - Dry season management techniques
- Interactive forum
- Networking opportunities
- Cutting-Edge research



Journal papers 2024



Crop Protection

Slavenko A, Babineau M, van Rooyen AR, Congdon B, Umina PA, Ward S (2024) Modelling aphid movement in Australian canola fields. *Annals of Applied Biology*.



Crop Science and Grain Production

Lake L, Hayes J, Ortega Martinez R, Weller J, Javid M, Butler J, James L, Gimenez R, Dreccer M, French R, Sadras V (2024) Genetics of phenological development and implications for seed yield in lentil. *Journal of Experimental Botany*.



Genetic Improvement

Golzar H, Shankar M, Sznajder B, Fox R, Reeves R, Mather DE (2024) Genetic mapping of loci affecting seedling and adult-plant resistance to powdery mildew derived from two CIMMYT wheat lines. *Planta*, 260:13



Jellen EN, Wight CP, Spannagl M, Blake VC, Chong J, Herrmann MH, Howarth CJ, Huang Y-F, Juqing J, Katsiotis A, Langdon T, Li C, Park R, Tinker NA, Sen TZ (2024) A uniform gene and chromosome nomenclature system for oat (*Avena* spp.). *Crop & Pasture Science* 75, CP23247



Zhou G, McFawn L-A, Zhang Xiao-qi, Angessa TT, Westcott S, Li C (2024). Genome-wide association study on seed dormancy in barley. *Seed Science Research* 1–7



Soil Science and Crop Nutrition

Azam G, Rahman S (2024) Incorporation of residual lime can ameliorate subsoil acidity promptly and improve crop performance on sandy soils of the semi-arid regions of Western Australia. *Plant and Soil*, Preprint



Barrett-Lennard EG, George N, D'Antuono M, Holmes KW, Ward PR (2024) Rain and potential evapotranspiration are the main drivers of yield for wheat and barley in southern Australia: insights from 12 years of National Variety Trials. *Crop and Pasture Science*, 75(6)



We support AEGIC and GIWA

AEGIC

The WA government invests in the Australian Export Grains Innovation Centre (AEGIC) with Grains Australia. AEGIC exists to increase value in the Australian grains industry by ensuring Australian grain meets the needs of customers and end-users. The work that AEGIC does is outlined in the AEGIC Corporate Video 2024

AEGIC produces virtual crop inspection videos during the Australian winter crop growing season, offering our international customers a unique insight into Australian grain growers and the development of our crops from emergence to harvest. The first update for 2024 was released 31 July.

[AEGIC Corporate Video 2024](#)

[AEGIC virtual crop inspection videos](#)

GIWA

The Grain Industry Association of Western Australia (GIWA) is a not-for-profit, incorporated, whole of value chain member industry association. Its' purpose is to support an effective and efficient Western Australian grain industry. GIWA facilitates communication, information exchange, capacity building and grain supply chain solutions for Western Australia.

One of the popular products are the GIWA Crop Reports. These are a monthly forecasting service, released by the end of the second week each month (excluding January and March), which estimates grain production and yield in Western Australia for the forthcoming harvest season. The latest August report shows that WA grain production estimates are continuing to climb.

This will provide researchers the ability to collect data on crop traits that had previously been too difficult or laborious to measure in the field. This will advance our understanding of how crops perform under real-world conditions as well as facilitating more rapid breeding progress when coupled with modern genetic technologies.

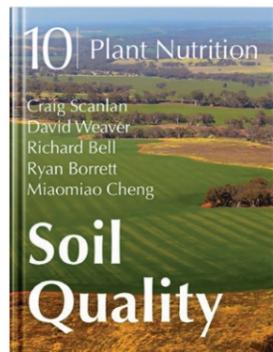
The network of controlled environment phenotyping facilities, mobile phenotyping units and field sites is strategically spread across Australia's diverse climate zones and involves plant research organisations nationwide.

[GIWA Crop Report - August 2024](#)

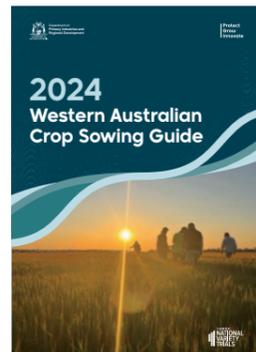


Products for industry

The DPIRD Grains team is supporting industry to stay on the front foot with the latest innovations, pest and disease management, best practice, and farm planning. The following tools have been developed to assist growers in their day-to-day operations.



Soil Quality ebooks



Crop Sowing Guide ebook



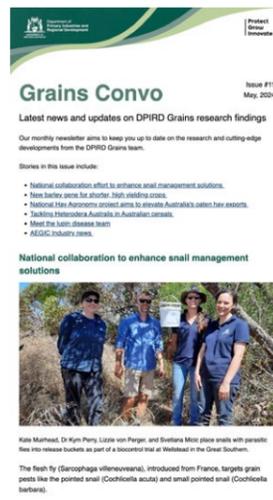
Grains Convo podcast



Pestfacts newsletter



Protecting WA crops newsletter



Grains Convo newsletter



Reach out to the Grains team



Grains Research and Industry Development

Acting Director: Dr Darshan Sharma



Crop Protection

Manager: Dr Helen Spafford



Soil Science and Crop Nutrition

Manager: Chris Gazey



Crop Science and Grain Production

Manager: Dr Bob French



Genetic Improvement

Manager: Dr Yong Han



Industry Development

Manager: Alex Edward



Field Research Operations

Manager: Dr Gavin Sarre

