GRAINS RESEARCH UPDATE 2026

GRDC
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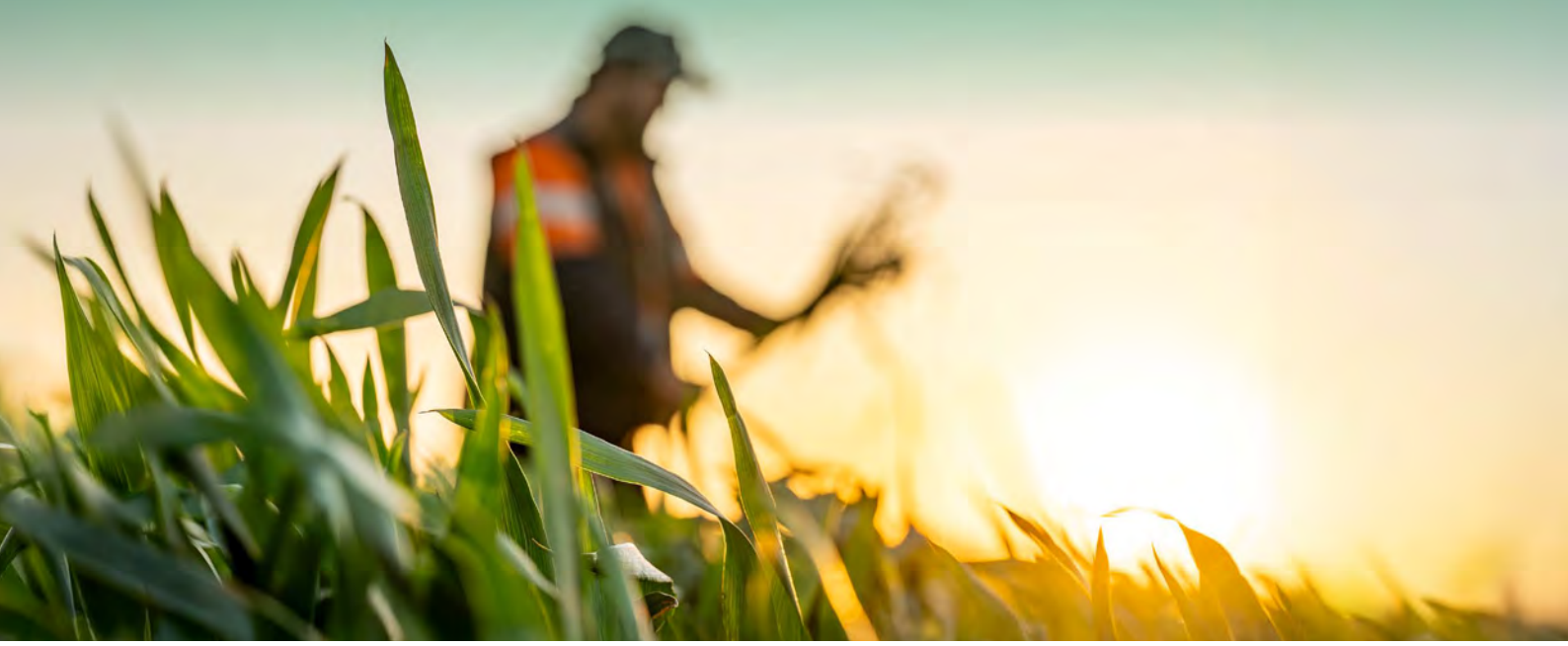
Maitland, SA
Wednesday 5 August

CELEBRATING 30 YEARS

GRAINS RESEARCH UPDATE 2026



Maitland

Wednesday 5 August

9.00am to 1.00pm

Maitland Golf Club,
2 Gardiner Terrace

#GRDCUpdates

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MAITLAND GRDC Grains Research Update
convened by ORM Pty Ltd.

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GRDC Grains Research Update MAITLAND

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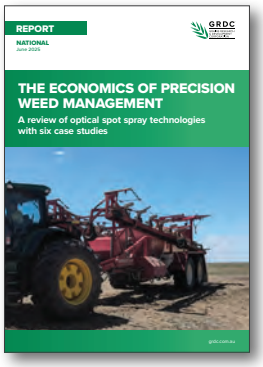

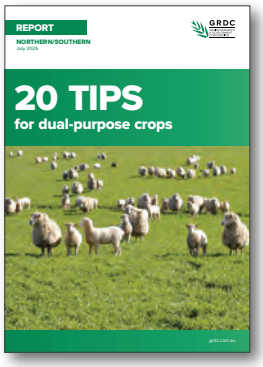

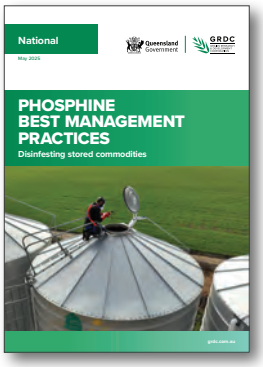

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GRAINS RESEARCH UPDATE 2026

Maitland Community Sports Club, Wednesday 5 August

PROGRAM

9.00am	Announcements and GRDC welcome	*GRDC representative*
9.15am	Good decisions with clarity under pressure	*Dr Jane Foster, Emotional Resilience Training*
9.55am	Protecting your most perishable asset – latest tips on grain storage	*Ben White, BM White*
10.35am	Morning Tea	
11.05am	Pulse root disease – what are the issues and what are our options	*Blake Gontar, SARDI*
11.45pm	Mice, reducing feed supply and improving control	*Ben White, BM White*
12.25pm	Alternative N sources	*Sean Mason, Agronomy Solutions*
1.10pm	Lunch	

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SOUTHERN PANEL

2025-27 GRDC SOUTHERN REGIONAL PANEL

ANDREW RUSSELL
PANEL CHAIR

Rutherglen, Victoria

Andrew is the director and a shareholder of Lilliput AG, and managing director of Baker Seed Co, a family owned farming and seed-cleaning business. He has served on GRDC's medium rainfall zone Regional Cropping Solutions Network and has held leadership roles with Riverine Plains Inc, Victorian Farmers Federation and the Rutherglen Group of fire brigades.

PRU COOK
DEPUTY CHAIR

Dimboola, Victoria

Raised on a mixed farm in Victoria's Wimmera region, Pru has spent her professional career working in extension for the grains industry. Starting her career at the DPI, she has worked at GRDC and the Birchip Cropping Group, managing a number of extension projects. In recent years she has managed her own business specialising in extension, project development and project management.

TIM MCCLELLAND

Birchip, Victoria

Tim farms with his wife, father and aunt on a 6500-hectare mixed property in the southern Mallee. After completing his Bachelor of Agriculture and Commerce at the University of Melbourne in 2006, he took on work at Advisor Edge, Birchip Cropping Group (BCG) and RMCG. In 2011, he moved back to Birchip to become formally involved in the family farm and continue his role with BCG.

RUTH SOMMERVILLE

Burra, South Australia

Ruth is an agroecologist who runs a consulting business. She has a Bachelor of Science in Ecology and Master of Applied Science in Wildlife Management from the University of Sydney, and has worked in sustainable agriculture research, development and extension and property management since 2002. Ruth has been the Upper North Farming Systems Group Operations Committee Member in recent years.

ANDREW WARE

Port Lincoln, South Australia

Andrew is a research agronomist who started his career with the South Australian Research and Development Institute (SARDI) and then spent time at CSIRO in Adelaide. This was followed by 10 years away from research, managing the family farm on the Lower Eyre Peninsula, before returning to SARDI. In 2019, he started his own research company, EPAG Research, delivering applied research across the Eyre Peninsula.

DR KATHY OPHEL-KELLER

Adelaide, South Australia

Kathy is a strategic science leader with a strong track record in developing and leading national research programs with industry co-investment, including GRDC. Her own research background is in plant biosecurity and molecular detection of plant pathogens and she has a strong interest in capacity building and succession planning. Kathy is a former acting executive director of SARDI and a research director at Crop Sciences, covering applied research on plant biosecurity, crop improvement, climate risk management, water use efficiency and crop agronomy.

WAYNE BURTON

Halls Gap, Victoria

Dr Wayne Burton has worked as an agricultural scientist and oilseeds breeder with over three decades of leadership across public and private sector research and development. Holding a PhD from the University of Melbourne and a Bachelor of Agricultural Sciences (Honours) from the University of Adelaide, he has played a pivotal role in the advancement of canola and mustard breeding and development in Australia.

MAX YOUNG

Ardrossan, South Australia

Max Young farms at Ardrossan on the Yorke Peninsula. He has more than 40 years' experience growing predominately wheat barley and lentils. Max holds a Roseworthy Diploma in Agriculture and is a graduate of the Australian Institute of Company Directors (GAICD). He has served in leadership roles in both the South Australian No Tillage Association SANTFA and South Australian Grains Industry Trust (SAGIT) and is keenly interested in improving sustainable production through research. Max understands the importance of local grower groups as a conduit between researchers and growers.

ADAM HANCOCK

Naracoorte, South Australia

Adam Hancock is a High Rainfall Zone agronomist with Elders, based in south-east South Australia. He has 15 years of experience advising grain growers to improve productivity and profitability through evidence-based agronomy and precision agriculture. He provides agronomic advice across a wide range of farming systems and environments, supporting clients with both in-season decision-making and long-term planning.

GRETA DUFF

Inverleigh, Victoria

Greta Duff graduated from the University of Melbourne with a Bachelor of Agriculture, spending part of her studies at Dookie College. She began her career in the dairy industry before joining Southern Farming Systems (SFS) in 2020. Since then, Greta has led and contributed to a wide range of projects, particularly with GRDC, and is passionate about supporting the next generation of growers. Through her involvement with the Young Agricultural Professionals Network, she actively works to promote and retain young people in the agricultural industry.

RON OSMOND

General Manager of Strategy & Business Development

Prior to joining GRDC in 2013, after completing a PhD in Agricultural Science, Ron worked in scientific and management roles in Intellectual Property Development and Commercialisation in the private sector. Ron's interest and expertise is in the translation of Research and Development into adoptable outcomes for Australian grain growers.

Good decisions with clarity under pressure – Avoid reactive decisions, conflict and costly mistakes

Dr Jane Foster

Emotional Resilience Training

Key messages

- Learn how to enhance your emotional resilience, as it plays a crucial role in everyday life
- Use language to change perspective and create new patterns of thinking/behaviour
- Recognise the emotional state of yourself and others and understand that reasoning with someone who is not in control may not be effective.
- Manage daily stressors by recognising your triggers and knowing how to deal with them
- Learn how to navigate difficult conversations without anyone becoming defensive.

Introduction

Over the last few decades, we have created a set of cultural norms that are increasing our daily challenges and causing people to feel overwhelmed. For example, there is a common belief that to be successful, everyone is happy and life is smooth. That concept couldn't be further from the truth. Life is meant to be up and down, and it is essential to experience both rough and smooth emotions. We have been encouraged to pick everyone up off the rough roads and place them on a smooth one, thinking that we are doing the right thing. As a result, we have created generations of individuals who metaphorically can't drive on a rough road, and when left to their own devices, they crash. This related presentation will show you how to have difficult conversations with individuals you encounter who may be lazy, feel entitled or who are just argumentative. It will also teach you how to increase your own emotional resilience, giving you greater understanding and control of your home and work life.

Positive, Productive Communication Language Techniques

As farm managers and service providers, you often face the challenge of maintaining composure in adversity. Navigating the complexities of constant change can be overwhelming. Shifting national and global trends, changing weather conditions, rising labour costs, increasing fertiliser prices, and machinery maintenance can impact daily life. If that is not enough, you must also deal with managing unique challenges. ever-increasing complexity and inappropriate reactions of the people you interact with day to day.

Acknowledging that we can influence our response to these challenges is crucial. Building emotional resilience becomes essential, enabling you to cope better with difficult situations by strengthening your emotional fortitude. This fortitude then influences your employees/teams, fostering a healthier and more productive work environment.

But how do you cultivate emotional resilience in an already crowded life?

Leveraging 45 years of teaching and research, I created ER (Emotional Resilience) to help individuals navigate daily challenges. Using a driving metaphor, ER links abstract ideas (emotion management) with familiar concepts (roads and steering wheels), aiding comprehension while forming new neural connections. Embedding a language into everyday vocabulary means that even though your life is crowded, you can still practice it daily. Regular use fosters lasting brain changes, altering neural pathways and enhancing control over emotional reactions. Just like a muscle, practising emotional resilience daily continues to increase its strength, which can be a game-changer.

The following outlines the initial steps of ER, which have proven to build emotional resilience, positively influencing your life and those around you. Though the changes may appear simplistic, they are instrumental in establishing lasting transformation.

Language Change:

The first step involves a shift in language, replacing good and bad with rough and smooth. Emotions, likened to roads, can be rough or smooth. Rough emotions are often perceived as negative, prompting attempts to move individuals from bad roads to good ones. It is essential to understand that rough and smooth roads serve a purpose; rough roads build resilience and skills, while smooth roads maintain emotional health. Farmers/service providers no longer need to ensure that they and their employees/teams are always on a smooth road; instead, it's important to maintain, without judgement, a balance between the two.

Using rough and smooth enables you to have those difficult conversations without anyone becoming defensive, as there are no wrong roads. For example, rather than saying, "Your attitude is unacceptable", which may be confrontational, replace it with, "I can see that you're on a bit of a rough road at the moment. Is there anything I can do?"

This does not condone their behaviour, as there are consequences for being out of control. Instead, it opens a conversation to deal with the problem more objectively without inflaming everyone's emotions.

Understanding that you and your employees/teams won't improve driving skills by sticking to the smooth roads helps shift the definition of success away from being happy and smooth. So, facing a tough day, making difficult choices, or having an employee/team member challenge you no longer feels like a failure but part of an Advanced Driving Course. If you or your employee/team member regained and maintained control on the rough road, you have had a successful day. The day may have been rough but it was not bad.

Controlling your emotional steering wheel

Just as you are the sole driver of your car, you should be the sole controller of your emotional steering wheel. Past triggers and demanding family and work life can unconsciously take over this control, impacting emotional responses and direction. Sometimes, we may attempt to control someone else's emotional steering wheel, believing we're leading them to smoother roads. Yet, in doing so, we impede their resilience-building process. Consider the chaos if such a situation occurred while driving an actual car.

It is crucial to understand that emotional resilience cannot be built when out of control on either road. Out-of-control scenarios activate the amygdala, our brain's fight, flight, or freeze mode, disabling the prefrontal cortex, which is responsible for thinking and creativity.

It is only possible to discuss a situation once the involved parties have regained control and can access the thinking part of their brain.

Your emotional steering wheel belongs exclusively to you. By taking charge of it, you regain control over your focus, emotions, and ultimate destination, which is incredibly empowering.

Shifting judgement and blame to responsibility involves removing phrases such as "You are making me angry," which inadvertently hands your emotional steering wheel to others. Replace it with, "I am choosing to feel angry in response to this situation." This subtle alteration, substituting "making" with "choosing," helps reclaim ownership of your steering wheel rather than relinquishing control to external factors. Assigning blame to yourself or others leaves you feeling like a victim, often resorting to judgement and retaliation towards yourself and others to regain control.

Identify your daily triggers – TEPs (Triggers Extra Precaution)

The accumulation of minor daily stressors can impact our mental health more than significant events. Each TEP adds to our stress levels, gradually filling our glass of stress. When it's full, even a minor TEP can cause it to overflow, leading to mental and physical health issues.

Recognising your daily TEPs, such as the alarm clock, work-related challenges, money pressures, relationship issues, or difficult employees, can help you gain control over what silently fills your stress glass. List your TEPs.

Reduce stress with a PET (Personal Emotional Tool)

PETs vary for each person and may include exercise, drawing, deep breathing, listening to music, taking a shower or bath, reading, enjoying tea, coffee, having chocolate, or receiving a massage. Pairing your TEPs with a corresponding PET is critical. For example, traffic/podcast, challenging employees/deep breathing, feeling alone/reading, getting out of bed/song.

By being aware of your TEPs and using the appropriate PET, you can empty your stress glass daily, preventing it from overflowing and making life overwhelming. Be mindful that overindulging in any PET, such as alcohol or chocolate, can quickly turn it into a TEP. (Don't be discouraged by the terminology; just as you use Google, Twitter, or TikTok, embrace using PETs and TEPs to manage your well-being).

Understand emotional contagion

Emotional contagion occurs when one person's emotions and behaviours influence others' feelings and actions. Recognise your employees/teams' emotional atmosphere and decide whether to engage. Realising that you have the option to remain objective when someone is experiencing challenges rather than taking it personally and joining them on their rough road can be empowering. Remember, every decision to join them or remain objective is within your control.

Summary/Conclusion

Managing your emotional response to people and circumstances is the key to coping with daily challenges. It is common for issues to arise with your employees or teams, so when they do, you are not failing. If you can't alter the people or circumstances involved, you always have the option to change how you respond to them.

Understanding the importance of rough emotions reduces the pressure on you and your employees/teams to always be happy and for things to run smoothly. Rough roads have a purpose: they enhance driving skills and build resilience, but only when in control. Remember, if someone's on a rough road, it's your choice whether you join them.

Knowing your daily TEPs and the corresponding PETs will allow you to regularly empty that glass of stress so it doesn't fill and become overwhelming. Regaining and maintaining control of your emotional steering wheel is in your hands.

By demonstrating this to your employees/teams, you are building your emotional resilience and teaching them how to increase theirs, fostering a healthier and more productive work environment.

More about Dr Jane Foster

Founder of Emotional Resilience, Dr Jane Foster, is a leading researcher and educator with a PhD in health and education. Jane is also trained in Traditional Chinese Medicine, Shiatsu and Yoga. Combining these skills with neuroscience and positive psychology, Jane equips people with proactive strategies to help manage their daily stresses, successfully changing perspective and creating new neural pathways.

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- Yellow leaf spot
- Common root rot
- Pythium clade f
- Charcoal rot
- Ascochyta blight of chickpea
- White grain disorder
- Sclerotinia stem rot
- Eyespot.

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Protecting your most perishable asset – latest understanding on grain storage

Chris Warrick.

Primary Business

GRDC project code: PRB2412-001SAX

Keywords

- fumigant, grain storage, phosphine, silo.

Take home messages

- A storage must be gas-tight sealed to achieve a high enough concentration of fumigant for a long enough period to kill pests at all life cycle stages.
- Pressure test silos, and when buying a new silo, buy a quality, gas-tight sealable silo fitted with aeration and check it meets the Australian Standard.
- Phosphine is a highly toxic gas, so follow all product label statements when applying and venting.
- Phosphine gas concentration needs to reach 550 parts per million (ppm) and remain above this level for 7–10 days. Exposure periods vary with temperature and storage capacity.
- Powered air recirculation systems distribute the phosphine gas to achieve lethal concentration in all areas of the storage - particularly helpful in large silos.
- Fumigation meters are an essential part of best practice use of phosphine for measuring concentration during fumigation and post-venting.

Fumigation fundamentals

Poor fumigation techniques fail to kill pests at all life cycle stages, so while some adults may die, grain will soon be reinfested again as soon as larvae and eggs develop. What's worse, every time a poor fumigation is carried out, insects with some resistance survive, making the chemical less effective in the future.

The second challenge with fumigating is venting the gas to ensure it is safe and meets the delivery site requirements, with some delivery sites using 0.3 parts per million via a spear test as a clearance limit. New lower worker exposure limits, which come into effect in December 2026, could make venting prior to delivery even more challenging.

Gas-tight

Research shows that fumigating a storage that is anything less than gas-tight sealed doesn't achieve a high enough concentration of fumigant for a long enough period to kill pests at all life cycle stages. Pressure testing a silo ensures it can hold gas concentrations sufficient to kill all insects at all life stages. Just because a silo is sold as a sealed silo does not automatically mean it's suitable for fumigation. Even if a silo is sold as 'sealed', it is not sealed until it is proven gas-tight with a pressure test.

When a pressure test is undertaken, oil levels in the pressure relief valve must take a minimum of five minutes to fall from 25mm to a 12.5mm difference if the silo is sufficiently gas-tight. When buying a new silo, buy a quality, gas-tight sealable silo fitted with aeration and check with the manufacturer that it meets the Australian Standard for sealable silos (AS2628–2010).

Safety

Phosphine is a highly toxic gas with potentially fatal consequences if handled incorrectly. As a minimum requirement, product labels direct the use of elbow-length PVC gloves and a full-face breathing respirator with combined dust and gas cartridge, suitable for inorganic gas. Be aware that cartridges have a limited lifespan as they contain activated carbon. After use, store cartridges in a sealed container and follow manufacturer directions for replacement.

Working with phosphine in an open, well-ventilated area with the wind coming from the side will help carry the gas away from the body. When opening containers, take care and point container lids away from the face and body. When opened, use the entire contents — do not reseal left-over tablets.

Safe Work Australia has announced a change to worker exposure limits for phosphine. Affective from December 2026, the peak exposure limit will be 0.15 Parts per million (ppm) and the Time Weighted Average will be 0.05ppm.

Exposure period

To control pests at all life stages and prevent insect resistance, phosphine gas concentration needs to reach 550 parts per million (ppm) and remain above this level for 7–10 days. At this concentration, an exposure period of seven days is required when grain is above 25°C or 10 days if at 15–25°C. Insect activity and development slow down in cooler grain temperatures, which means a longer exposure time to fumigants is required to deliver a lethal dose to all life stages.

In gas-tight sealed silos larger than 300t capacity that don't have powered recirculation, the exposure period is extended to 20 days regardless of grain temperature. If the silo has powered recirculation, the exposure period can be shortened to 10 days. When grain temperatures fall below 15°C, insect pests become inactive and phosphine fumigation is no longer reliably effective.

Recirculation systems

Some silos are fitted with purpose-built chambers for applying phosphine from the bottom. This method of application carries a safety advantage, as the operator doesn't have to leave the ground to apply the phosphine.

Bottom-application chambers must have a passive or powered air recirculation system to carry the phosphine gas out of the confined space as it evolves. Without air movement, phosphine can reach explosive levels if it's left to evolve in a confined space.

Silos larger than 150t will benefit from a sealed, powered recirculation system to distribute gas throughout the storage and achieve consistent gas concentration sooner. Trials have found that, without powered recirculation, phosphine travels at approximately 6m per day through grain, in any direction.

In silos larger than 300t without powered recirculation, the phosphine label stipulates an extended exposure period of 20 days, referenced as 'surface only application'. Using powered recirculation enables the fumigation period to be shortened to 10 days.

An alternative to a dedicated, powered recirculation box with a phosphine chamber is to connect a small fan between the pluming from the silo headspace to the base and place the phosphine in the headspace and/or aeration ducts at the base. This option has two main advantages – it avoids the risk of explosion if the fans stops as the phosphine can safely continue liberating in the silo, and, being lower cost, there is also the option to buy multiple fans so more than one silo can be fumigated at a time.

Venting

Following fumigation, ventilate silos to allow phosphine gas to escape into the atmosphere, so grain can be delivered free of harmful gas residues. The same PPE required for applying the phosphine is required again to open the silo and remove the phosphine residue. After the removal of tablet residue or bag chains, the labels state that a silo without aeration fans fitted must be left open to ventilate for no less than five days. Silos with aeration fans fitted must be opened to ventilate with fans operating for no less than one day. Larger flat bottom silos, cool grain or extended fumigations are likely to require additional time to vent as the grain desorbs the phosphine.

A low-level phosphine meter is the safest way to ensure the grain is vented to the delivery limit set at the receival point. Grain should be spear tested at least a few hours after fans have been switched off and prior to moving in order to sample the air gaps into which grain may have been desorbing gas. The labels state that grain treated with phosphine should not be used for human consumption or for stock food for a minimum of two days after the ventilation period has finished.

Monitoring gas concentrations

Fumigation meters are an essential part of best practice use of phosphine, especially when fumigating storages that cannot be pressure tested, such as bunkers and bags. Meters are available in high range (0 to 2000ppm) for measuring concentration during fumigation, and low range (0 to 20ppm) for measuring concentration post-venting for clearance and safety.

Acknowledgements

The research undertaken as part of this project is made possible by the significant contributions of growers through both trial cooperation and the support of the GRDC, the author would like to thank them for their continued support.

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Pulse root disease – what are the issues and what are our options

Blake Gontar[1,2] and Rebecca Tonkin[1,2].

[1]South Australian Research and Development Institute; [2]Adelaide University

GRDC project codes: UOA2206-007RTX, UOA2507-002RTX

Keywords

- integrated disease management, pulses, root disease, soilborne disease.

Take home messages

- Field experiments conducted in South Australia over three years have shown yield losses of up to 77% from Fusarium root rot, 49% from Aphanomyces root rot and 50% from Rhizoctonia root rot in lentil and faba bean, across a range of environments.
- Surveys conducted across southern Australia show multiple soilborne diseases including Aphanomyces, Rhizoctonia, Fusarium, Pythium and Phoma root rots are affecting pulses including lentil, faba bean, chickpea and lupin.
- There are partially effective management options for most soilborne diseases which can be combined into an effective integrated disease management package which complements other objectives, such as good weed control.

Background

Key soilborne diseases such as crown rot, Rhizoctonia root rot and root lesion nematode are estimated to cost Australian grain growers more than $500 million per annum in direct yield losses – an average loss of ~$38 ha over every paddock, every year – in wheat and barley alone. These diseases are quite well known by growers and agronomists and often are identified where they have a clear impact on a crop.

Pulses and canola are also impacted by soilborne diseases. But unlike cereals, these diseases are less well known by industry, and impacts may go unnoticed or be misdiagnosed. Globally, several diseases are considered major constraints to pulse production, including Aphanomyces root rot, which is considered a major issue across the northern USA, Canada, France and the UK. Increasingly, researchers in the USA and Canada are identifying several *Fusarium* species which act in complex to cause Fusarium root rot in a wide range of pulses. Yield losses of up to 84% in dry bean, and typically in the range of 10–30% are reported (Bogdan 2025).

A previous GRDC investment 'Impact of root diseases on pulse crops in Northern and Southern regions' began quantifying the losses in lentil, chickpea, faba bean and lupin in Australian pulse production, while a new investment under the National Soilborne Disease Initiative will focus on epidemiology and integrated disease management. The key aim of the collaborative team, which includes SARDI, NSWDPI, Agriculture Victoria, WA DPIRD, USQ and Queensland DAFF, is to determine economically-viable management options for the key root diseases which reduce pulse yields across a range of environments and seasons.

Causes and distribution of root diseases in lentil and faba beans

A survey of pulse root diseases was conducted nationally from 2019–2020, with additional data collected in South Australia the year prior (2018). Approximately 950 samples were processed, including ~350 from SA. About 70% of SA samples were lentil and faba bean. Briefly, the research team used two molecular methods, qPCR and Next

Generation Sequencing, to identity the potential pathogens that were present in the roots of pulses with root disease symptoms. Visual symptoms were assessed and recorded, and we attempted to isolate causal fungi and oomycetes ('water moulds' like *Pythium* and *Phytophthora* spp.) in the lab. Isolates were then studied on their own to determine if they were the original cause of disease, and what other crops they may impact. Three of the key pathogens identified in the survey and tested in lab assays are discussed below.

Aphanomyces euteiches

This pathogen has an international reputation as a major constraint in pea and lentil, causing very large yield losses. The survey found that it is particularly focused in the faba bean growing regions of SA and NSW. It was previously known to be present in northern NSW and is also known to be an issue in horticultural production of pea in Tasmania, and green bean in Victoria and NSW. Although it was only detected in 6% of SA faba bean samples during the survey, all of these came from the SE or Kangaroo Island. Subsequent surveys and monitoring in these two regions suggests it may be present in closer to 30% of paddocks in these regions.

A growth room assay showed that all isolates collected from SE faba beans and soils caused plant death in both faba bean and lentil, with little variation in virulence (Figure 1).

A) Faba bean

Isolate	Visual root disease score (0-10)	Root biomass / plant (g)
Control	0.18 a	0.44 c
SBD23/1	6.8 bc	0.17 a
SBD23/4	3.8 ab	0.37 bc
SBD23/5	8.8 c	0.24 ab
SBD23/9	9.2 c	0.12 a
SBD23/10	3.2 a	0.40 bc

B) Lentil

Isolate	Visual root disease score (0-10)	Root biomass / plant (g)
Control	0.1 a	0.05 b
SBD23/1	9.3 b	0.01 a
SBD23/4	9.3 b	0.01 a
SBD23/5	9.9 b	0.01 a
SBD23/9	9.8 b	0.01 a
SBD23/10	7.6 b	0.01 a

Figure 1. Effect of five *Aphanomyces euteiches* isolates from SA on plant growth, root health (root disease score, 0–10) and root biomass of A) faba bean, PBA Bendoc$^{\phi}$ and B) lentil, PBA Hallmark XT$^{\phi}$, tested in a controlled environment assay. Data followed by the same letter in the same column are not significantly different (p=0.05).

Fusarium spp.

Fusarium spp. were some of the most detected and isolated species from diseased survey samples. Among the most common were *Fusarium oxysporum* (actually a species group), *F. acuminatum*, *F. tricinctum*, *F. solani* (actually a species group), *F. avenaceum* and *F. redolens.* These last two were of particular interest, as they are identified in the literature as pathogens in related legume crops, or in pulse crops overseas. *F. avenaceum* was present in ~15% of samples, while *F. redolens* was detected in ~10% of samples. *F. redolens* detections were concentrated around SA and Victoria (Figure 2). Pathogenicity of five *F. avenaceum* and two *F. redolens* isolates were tested in controlled environment room (CER) assays and showed moderate to strong disease effects.

Figure 2. Distribution of *F. avenaceum* (blue dots) and *F. redolens* (red dots) detected by NGS in 2019 and 2020 national survey samples (left) and controlled environment study conducted at the Plant Research Centre, Waite in 2020 with examples of *F. avenaceum* and *F. redolens* in faba bean roots (right).

Rhizoctonia solani (AG8 and AG2.1)

Rhizoctonia solani isolates can be separated by mating type (anastomosis groups, AGs). *R. solani* AG8 is the best known and is associated with the cereal root disease Rhizoctonia root rot. It is very common, especially across drier, sandier soil types found in the SA and Victorian Mallee, YP, upper-SE and upper-EP. It is known to affect pulse crops, but pulse crops are generally considered 'break crops' for Rhizoctonia root rot, since they have been shown to reduce inoculum overall. However, the survey did highlight that pulse root health is often affected by *Rhizoctonia*. The survey found that *R. solani* AG8 was present in approximately 40% of lentil and 27% of faba bean samples. Rhizoctonia alone was occasionally observed as the key root disease in individual pulse crops (Figure 3).

Figure 3. Lentils collected near Kimba in 2020 showing characteristic Rhizoctonia patches in the paddock, and spear tips on roots. Root samples tested with qPCR had 287pg *Rhizoctonia* AG8 DNA/g of root, and no substantial level of any other pathogen.

Yield loss

Aphanomyces root rot (ARR)

Two field trials conducted in 2024 and 2025 at Kybybolite in SA demonstrate how damaging this disease can be for SA growers. The non-irrigated faba/broad beans sown into inoculum at Kybybolite in 2024 showed limited disease symptoms, likely due to the very dry season (~decile 2 rainfall). However, there was still an 8% yield loss in inoculated treatments, regardless of variety. No yield impact was observed in lentils at the same site.

More dramatic results were observed in the field experiment conducted at Kybybolite in 2025, (decile 5 rainfall), where ARR reduced faba/broad bean yield by 39% and lentil yield by 12%. There did not appear to be any yield difference between lentil varieties (Figure 4), whereas the impact of ARR was greater in PBA Bendoc$^{\phi}$ and PBA Amberley$^{\phi}$ than in PBA Samira$^{\phi}$ and particularly Aquadulce (Figure 5).

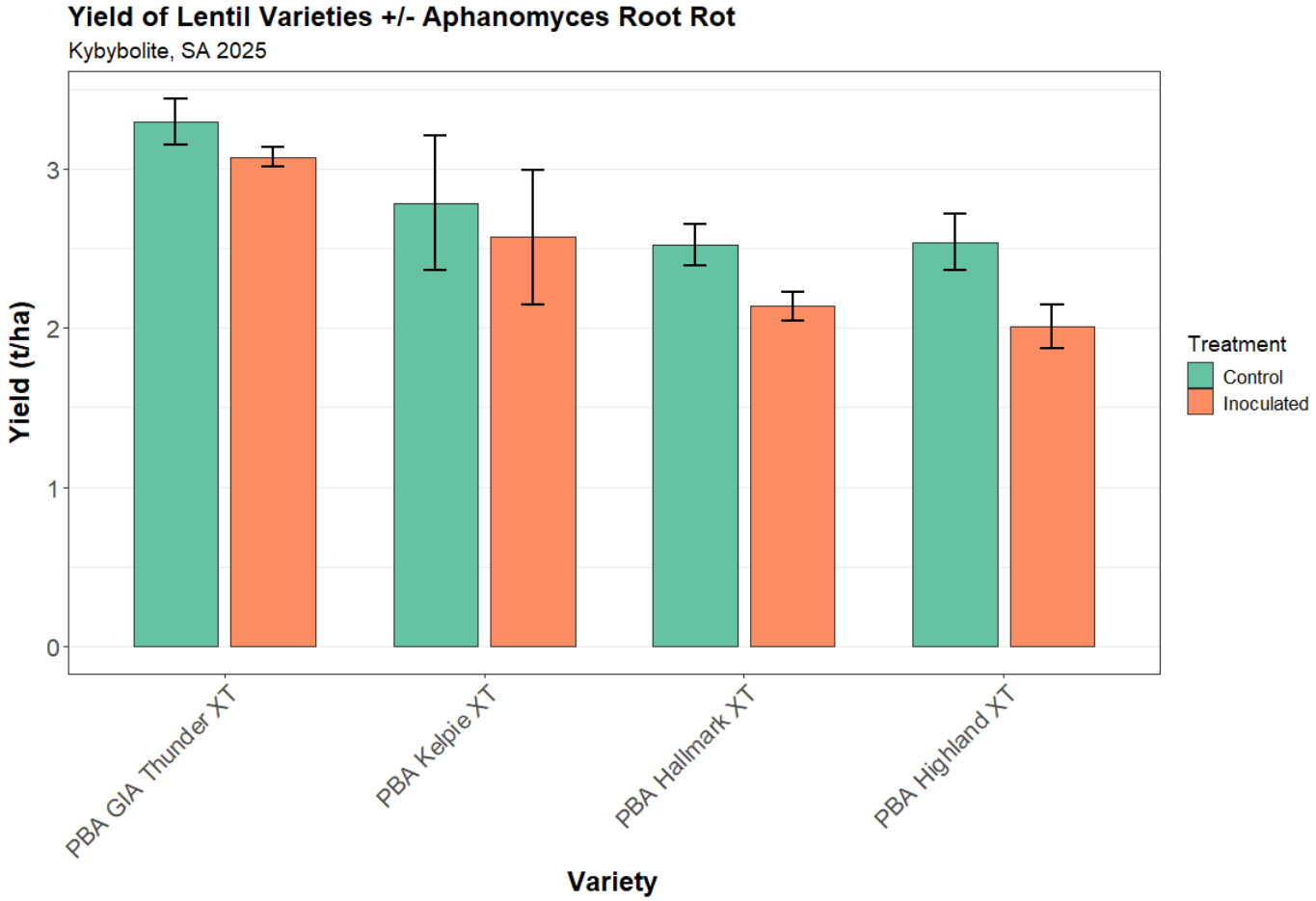

Figure 4. Yield (t/ha) of lentil varieties sown non-inoculated (Control) or sown into *A. euteiches* inoculum (Inoculated) at Kybybolite in 2025.

The results from Kybybolite in 2025 indicate that current varieties vary in their resistance to ARR, and choosing a more ARR-resistant variety is likely to be profitable in the presence of ARR. These results reflect similar work undertaken at Liverpool Plains, NSW in 2023 under irrigated conditions, where diseases symptoms were much greater, and resulted in up to 60% yield loss in the most susceptible variety, PBA Amberley(ф). PBA Samira(ф) appeared most resistant, and no significant yield loss was measured (P = 0.023).

Furthermore, the results show that *A. euteiches* isolates obtained from faba bean roots/soil in SA are capable of reducing yield in lentil varieties too.

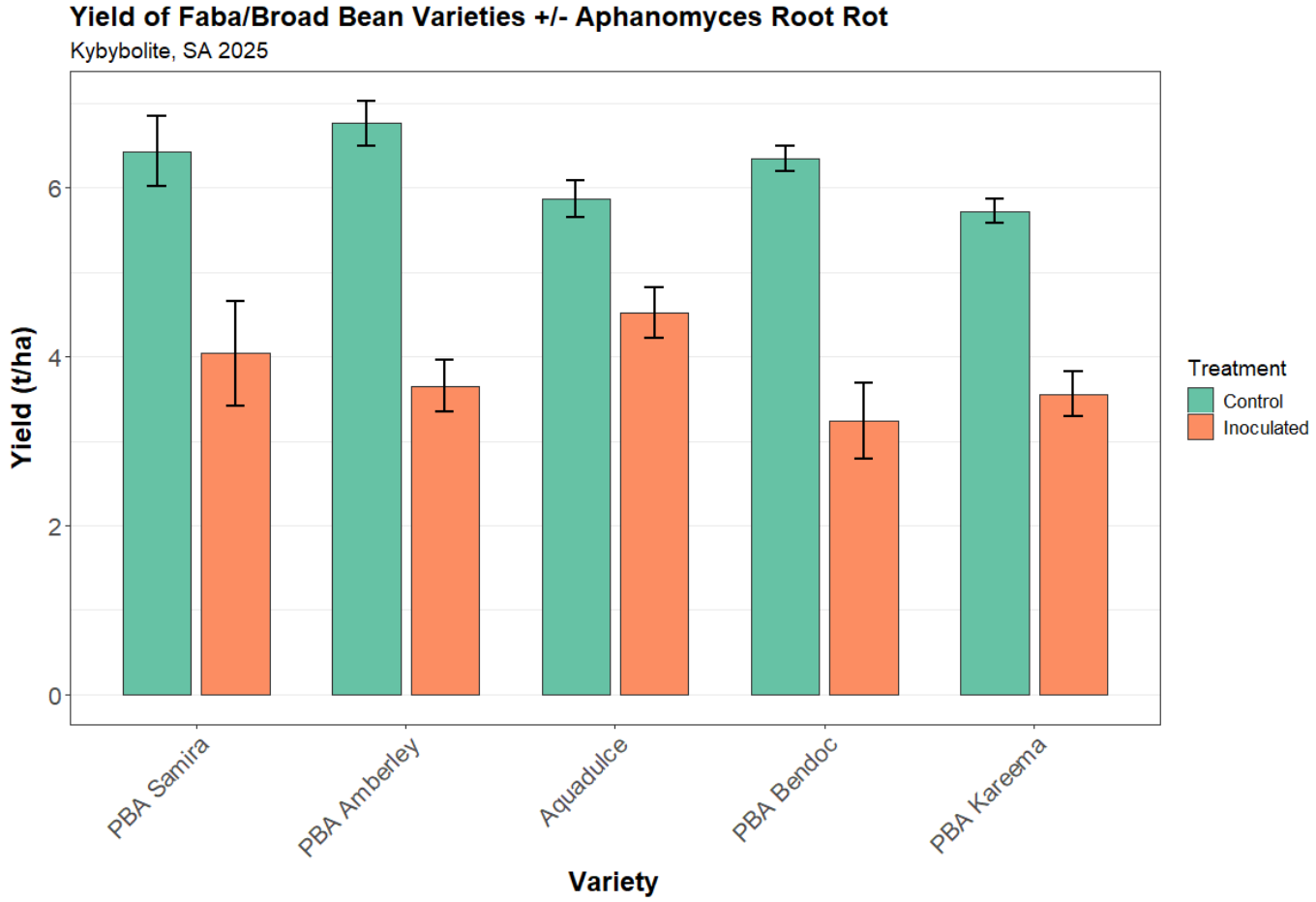

Figure 5. Yield (t/ha) of faba bean varieties sown non-inoculated (Control) or sown into *A. euteiches* inoculum (Inoculated) at Kybybolite in 2025.

Fusarium root rot

Field experiments have been conducted in SA and Victoria from 2023–24, and recorded yield loss from *F. avenaceum* up to 77% in lentil and 56% in faba bean at Roseworthy in 2023. A further experiment was conducted at Pinery in 2024, which investigated yield impacts of *F. avenaceum* at two sowing dates and at different levels of soil inoculum (Figure 6). This experiment also included an off-label seed treatment, which the research team considered may be effective on this *Fusarium*. There was a somewhat linear response to inoculum level in both lentil and faba bean, with low-rate inoculum reducing bean yield by 14% in the earlier sown treatment but no impact on yield in the later sown crop. At the higher rate of inoculum, *F. avenaceum* reduced bean yield by 43% (early sown, 'TOS1') and 32% (later sown, 'TOS2'). The seed treatment improved yield when applied with the medium rate of inoculum, although not quite to the level of non-diseased plots.

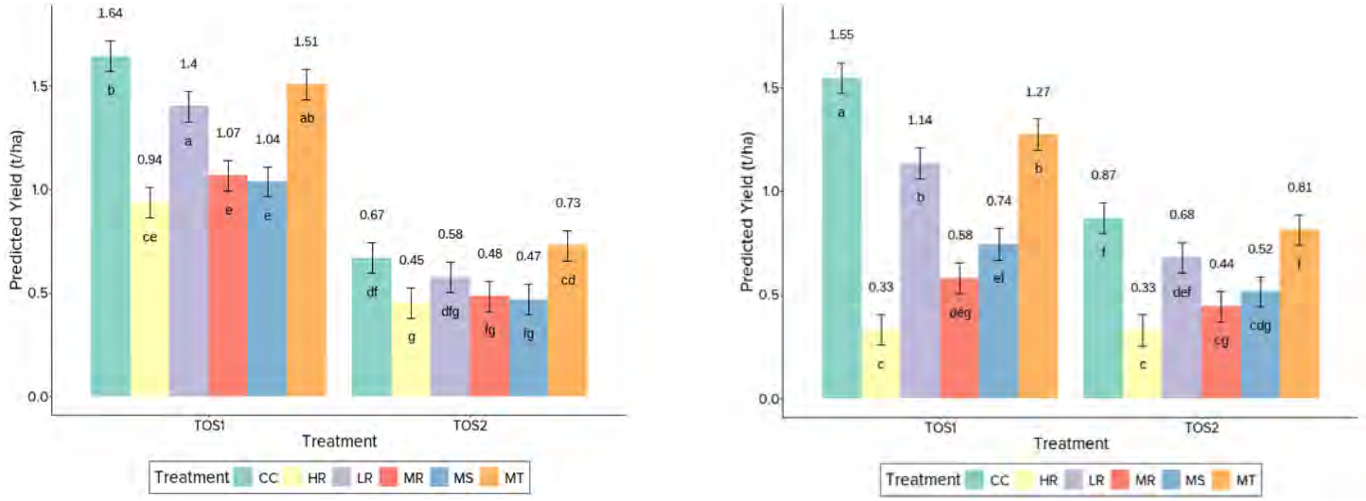

Figure 6. Yield of faba bean (left) and lentil (right) sown non-inoculated (control: CC) or sown into *F. avenaceum* inoculum (LR = low rate, MR = medium rate, HR = high rate, MS = medium rate + seed spore suspension), or sown into a medium rate of inoculum but with a seed treatment (MT) at Pinery in 2024.

Rhizoctonia root rot

A single field experiment conducted at Loxton in 2023 found that Rhizoctonia root rot caused yield loss at high rates of inoculum of 50% ($P < 0.001$), however no significant yield loss was recorded at lower rates of inoculum.

Developing control options

The yield-loss studies presented above generally evaluated a couple of management strategies. Firstly, the Fusarium, Aphanomyces, Phoma and Rhizoctonia experiments all demonstrated that soilborne inoculum level impacts disease development and yield loss. This is an important implication because it tells us that if inoculum levels are kept low, mainly through rotations with non-hosts, then yield loss will be reduced. All of these pathogens can be tested for using qPCR to confirm their presence in the paddock to estimate inoculum levels.

Furthermore, seed treatments were shown to have impact for disease control of Fusarium root rot and Phoma root rot. A seed treatment applied in the Rhizoctonia trial also looked effective at establishment and is currently being considered for registration. These experiments show there are active ingredients which could be registered in pulses to improve yield.

Finally, ongoing research into Aphanomyces root rot in faba bean indicates that variety resistance already exists in Australian faba bean varieties. Where the pathogen is identified, growing a resistant faba bean will improve yield. Further work is being conducted to confirm varietal impacts, including in lentil.

If you observe root disease in pulses or are unsure what is causing poor growth in a pulse crop, contact Blake Gontar on 0430 597 811 to discuss sampling and diagnostic options.

Acknowledgements

The research undertaken as part of this project is made possible by the significant contributions of growers through both trial cooperation and the support of the GRDC, the authors would like to thank them for their continued support. We would like to acknowledge the contribution of many staff from DPIRD (WA), NSWDPI, UQ, QDAF, Agriculture Victoria and SARDI in supporting previous research including surveys referred to in this paper. We would also like to acknowledge the many agronomists and growers have either provided samples or supported us in locating crops to collect samples from, or hosted field experiments referred to in this paper.

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Notes

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Mouse baiting for grain growers

Ben White, *BM White*

GRDC project code: BVW2302-001SAX

Keywords

- Mice, baiting, harvest losses, integrated pest management

Take home messages

- Minimise grain losses at harvest to reduce feed availability and lower risk of mouse population explosions.
- Monitor mouse activity and act early – baiting is most effective when mice have limited alternative food sources and before significant crop damage occurs.
- Invest in equipment that delivers accurate, even bait coverage, because successful mouse control depends as much on bait placement as bait choice.

Notes

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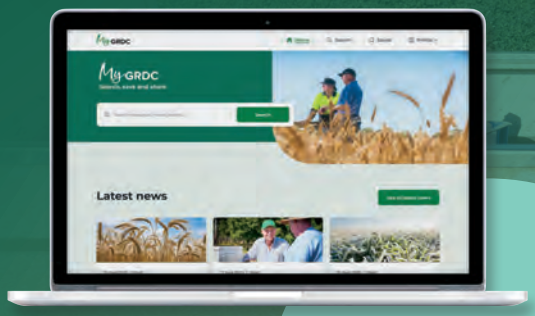

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Alternative sources of nitrogen and phosphorus – how do they perform

Sean Mason[1], Sam Trengove[2], Stuart Sherriff[2], Jordan Bruce[2] and Sarah Noack[2].

[1]Agronomy Solutions; [2]Trengove Consulting.

Keywords

- biosolids, chicken litter, MAP, urea.

Take home messages

- Current input prices have generated increased interest in alternative nutrient sources, but we need updated information on how they perform relative to synthetic forms of nitrogen (N) and phosphorus (P) across various soil types.
- After two trial seasons, the greatest benefit of organic amendments has been the application of chicken litter on P deficient soil types defined by high pH, high P fixing, Calcarosols (surface).
- Biosolids produced a small residual benefit in comparison to chicken litter. This difference in P effectiveness between chicken litter vs biosolids can be explained by the composition of both products. Care should be taken with use of biosolids for this reason.
- Organic amendments alone can be a small source of N but over two seasons this N supply did not match the performance of N applied as urea/MAP. When combined with district practice in the second season, organic amendments started to be competitive with fertiliser N additions made in season 1.
- Alternative sources of nutrients can be useful to supplement synthetic fertiliser programs but should not be used as a complete replacement program and should be targeted to certain soil types.

Background

Organic amendments, such as manures and biosolids, are used in farming systems as alternatives to inorganic fertiliser, to improve poor performing soils and to ameliorate subsoil constraints. Where positive crop responses to organic amendments have been reported, they are often attributed to the presence of nutrients in more bioavailable forms, nutrient release patterns better matched to seasonal conditions, increase in organic matter and microbial activity, or providing nutrients not supplied by the current fertiliser strategy. However, the exact mechanisms behind the yield improvement from organic amendment applications are still unclear. Due to high synthetic input costs creating a high demand and limited supply of chicken litter and biosolids, there is a need to provide information to growers regarding which locations/soil types will derive the greatest benefit from the application of organic amendments.

This SAGIT-funded project aims to improve grower understanding of the impact of chicken litter and biosolids on soil and crop properties in the short-term (three years initially). Outcomes from this research will be used to inform best management practice for the use of these products for maximum benefit on cropping systems and soil types. The following reports on the first two seasons of results, with a third currently running in 2026.

Method

Three trials were conducted in different soil type x production zones within a single paddock at Barunga Gap, SA. The three locations are referred to as:

- Phosphorus responsive – high pH, PBI, low Colwell P/DGT P (Table 1)
- Non-responsive – moderate organic carbon (OC), moderate profile N, high P, low PBI
- Nitrogen responsive – sandy texture, low OC, low profile N, moderate P, low PBI.

Table 1: Main soil characteristics of the three field sites established in one paddock located at Barunga Gap, 2024. The shaded values present levels which may reduced root growth.

Site	Sample Depth	pH $CaCl_2$	Organic Carbon	Nitrate - N	Ammonium - N	Profile N	Colwell P	PBI	DGT-P	Colwell K	EC 1:5	ECe	Boron
			%	mg/kg	mg/kg	kg/ha	mg/kg		µg/L	mg/kg	dS/m	dS/m	mg/kg
P Responsive	0-10	7.56	1.52	18	3.3	72	28	91	43	570	0.16	1.4	2.5
	10-30	7.8		6	<1.0						0.14	0.83	2.1
	30-60	7.7		2.6	<1.0						0.17	1.5	2.7
	60-110	7.93		2.2	<1.0						0.4	3.4	11
Non-Responsive	0-10	6.08	1.73	25	6.9	74	69	45	147	650	0.17	1.6	1.2
	10-30	7.56		5.5	1.1						0.19	1.6	2.4
	30-60	7.93		2.8	<1.0						0.23	1.3	5.9
	60-110	8.02		<1.0	<1.0						0.36	2.1	10
N Responsive	0-10	6.84	0.59	14	3.4	47	26	18	83	200	0.12	2.8	0.38
	10-30	6.76		2.3	<1.0						0.056	1.3	0.27
	30-60	7.63		1.3	<1.0						0.12	1.6	0.47
	60-110	7.79		1.5	<1.0						0.12	1.6	0.81

At each of the three sites, combinations of N and P were supplied through MAP, urea, chicken litter or biosolids (Table 2) in the initial phase (2024). These were formulated to try and capture a range of grower options when alternative sources of nutrients are applied. All chicken litter and biosolid treatments were broadcast just prior to sowing, Urea applications were spread at time of sowing and MAP inputs were banded below the seed with separation (2-3cm). In season two, effectively half of the treatments were left as pure residual effects (no 2025 inputs), and the rest had a low district practice treatment of 10kg P/ha and 30kg N/ha applied which was banded below the seed at sowing.

The partial gross margin (PGM) for all treatments/sites were calculated using the following pricing: chicken litter ($42/t) and biosolids ($10/t), both include freight costs. Tractor ($15/ha) and spreader ($12.60/ha) costs were also included. Inputs were priced at MAP $1200/t, urea $800/t, and returns of wheat at $350/t (2024), barley at $300/t (2025). We acknowledge input and commodity prices have been highly volatile across these two seasons. As a fair representation, the large fertiliser inputs have been allocated spreader costs as per chicken litter and biosolid applications.

Results and discussion

Nitrogen responsive site

Large and significant ($p<0.001$) grain yield responses were obtained for various sources of applied N in the initial year of application (2024, wheat) and the residual phase (2025, barley) (Table 2). Synthetic sources (urea + MAP) of N were more effective in the year of application and were more effective at banking nitrogen in the soil as measured by soil sampling to a depth of 60cm (data not shown). Chicken litter was more effective at supplying nitrogen in both phases compared to biosolids. Cumulative grain yields from 2024 and 2025 were highest for the high rate of synthetic N to match chicken litter input of 7.5t/ha, followed by initial application of chicken litter (6.3t/ha) with starter P (10kg P/ha) and follow-up low district practice rate. Treatment two targeted as district practice and moderate rate of chicken litter (3.8t/ha) combined with starter P and low district practice were next best performers.

Phosphorus responsive site

Highly significant ($p<0.001$) grain yield responses were obtained for both seasons to various inputs of phosphorus. As a summary, phosphorus supplied as MAP was more effective at increasing wheat yields

in 2024 on a unit of P applied basis. Wheat was able to respond to sources of P applied as chicken litter but was not as effective as MAP, potentially due to differences in placement for both sources, banded (MAP) vs broadcast (chicken litter). Biosolids were very poor at delivering P via broadcasting to the wheat crop, with no significant (p>0.05) benefits over the control (0kg P/ha). Second season residual assessments through barley outlined that chicken litter sources significantly (p<0.05) improved barley growth compared to MAP sources, which was also supported by pre-season soil sampling (data not shown). Small residual value was obtained through P supplied via biosolids but was not competitive with chicken litter. Overall, two season grain yields effectively has shown that fertiliser applied through MAP to match chicken littler P application at 7.5t/ha and chicken litter applied at 7.5t/ha led to the best yield results (5.7t/ha vs 5.84t/ha, respectively), an increase of 1.190–1.33t/ha over the control.

Non-responsive site

As anticipated, there were no significant (p>0.05) treatment effects by applying extra nitrogen or phosphorus through MAP, urea, chicken litter or biosolids at this site with good reserves of N and P (data not shown). Effectively, initial soil test results highlight that inputs could have been directed elsewhere in the paddock.

Table 2: Treatment list for each of the three replicated field trials and resulting wheat (2024) and barley (2025) grain yields. Total applied P and N is the combination of 2024 and 2025 treatments. Shaded cells with DP represent low district practice applications in 2025. Poorest performing treatments defined by red shade through to best performing treatments in green shade.

					Site: N Responsive			Site: P Responsive			Site: Non Responsive		
Treatment No.	Description Yr1	Description Yr2	Total P (kg/ha)	Total N (kg/ha)	24 GY	25 GY	Total	24 GY	25 GY	Total	24 GY	25 GY	Total
1	Untreated, no fert	No Fert	0	0	1.48	2.62	4.11	1.62	2.89	4.51	2.05	2.94	4.99
2	Fertiliser, 10kg P + 50 kg N	DP, 10P/30N	20	85	2.98	4.35	7.33	2.02	3.46	5.48	1.91	2.71	4.61
3	Fertiliser 10kg P + 50 kg N + Incorporation	DP, 10P/30N	20	85	2.97	3.93	6.90	1.67	3.12	4.79	2.02	2.97	4.99
4	Fert matched to 2.5t CL	No fert	21	86	3.04	3.21	6.25	2.12	3.24	5.36	2.08	2.85	4.93
5	Fert matched to 7.5t CL	No fert	64	257	3.45	4.76	8.21	2.32	3.39	5.70	2.04	2.59	4.63
6	2.5t CL	No fert	21	86	1.83	2.93	4.76	1.78	3.32	5.10	2.01	2.97	4.98
7	5t CL	No fert	43	172	2.46	3.37	5.83	1.95	3.57	5.52	2.02	3.04	5.05
8	7.5t CL	No fert	64	257	3.01	4.03	7.04	2.05	3.79	5.84	2.07	2.99	5.05
9	4.2t Biosoilds (5t CL equivalent)	No fert	43	37	1.63	2.84	4.47	1.61	3.20	4.81	1.95	3.07	5.03
10	1.3t CL + 10kg P	DP, 10P/30N	31	84	2.45	4.29	6.74	2.02	3.63	5.65	1.94	2.99	4.93
11	3.8t CL + 10kg P	DP, 10P/30N	52	170	2.73	4.60	7.33	2.06	3.51	5.57	2.13	3.06	5.19
12	6.3t CL + 10kg P	DP, 10P/30N	74	256	2.98	4.85	7.82	2.09	3.65	5.73	2.08	2.85	4.92
13	1.1t Biosoilds + 10kg P	DP, 10P/30N	31	49	2.21	4.14	6.34	1.91	3.41	5.32	2.14	3.11	5.25
14	3.2t Biosoilds + 10kg P	DP, 10P/30N	52	68	2.27	4.26	6.53	1.90	3.50	5.40	2.13	3.12	5.25
15	5.3t Biosolids + 10kg P	DP, 10P/30N	74	86	1.93	4.25	6.19	1.92	3.60	5.52	1.98	2.91	4.89
16	1.3t CL + 10kg P + Incorporation	DP, 10P/30N	31	84	2.24	3.87	6.10	1.72	3.28	5.00	2.02	2.99	5.01
17	6.3t CL + 10 kg + Incorporation	DP, 10P/30N	74	256	2.77	4.32	7.09	2.05	3.44	5.49	1.92	2.72	4.64
18	3.2t Biosolids + 10kg P + Urea matching 5t CL	DP, 10P/30N	52	206	2.15	4.78	6.92	1.86	3.54	5.41	2.07	2.82	4.89
19	1.3 CL + 10kg P	1.3 CL + 10kg P	42	100	2.27	4.36	6.63	1.91	3.53	5.44	2.15	3.00	5.15
20	CL @ 2.5t/ha - Repeated	2.5t CL	43	172	2.03	4.01	6.04	1.81	3.60	5.41	1.96	3.01	4.98
				P value	0.001	<0.001		<0.001	<0.001		0.103	0.241	
				LSD	0.848	0.594		0.1843	0.304		NS	NS	

Note Chicken litter (CL) and biosolids also contain potassium and zinc. These nutrients were balanced with fertiliser but are not presented as they had minimal influence on yield at all sites.*

Economics

Partial gross margins from the first two seasons for each site are presented in Table 3. Fresh applications of nitrogen as urea to match yield N demand in 2024 and 2025 returned the highest PGM in a nitrogen responsive soil type. High initial application of chicken litter with or without starter P and with or without follow up DP inputs were competitive. In a phosphorus deficient scenario, low rate (1.3 t/ha) of chicken litter with starter P in both seasons resulted in the highest return. Chicken litter sources alone were competitive with P starter rates of MAP mainly attributed to second year supply from chicken litter. The non-responsive part of the paddock saw decreases in returns for any input, with no associated extra returns in grain yield from these inputs.

Importantly, for long-term economic assessment, the third season is being sown to lentils, which will highlight phosphorus dynamics. Pre-season soil assessments in 2026 suggest a high residual benefit of chicken litter > MAP > biosolids for P.

Table 3: Combined partial gross margins from wheat (2024) and barley (2025) for all treatments including returns from grain yield increases and input costs including spreader requirements and delivery pricing of alternative sources. The large fertiliser treatment PGM without spreading costs (trt 5) was $2019, $1210, $874 for each of N, P and non-responsive sites, respectively. Bold, underlined, shaded cells represent the treatments that returned the highest PGM for each site.

Combined 2024/2025 Partial Gross Margins ($/ha)			Nitrogen	Phosphorus	Non
Trt No.	Description Yr1	Description Yr2	Responsive	Responsive	Responsive
1	Untreated, no fert	No Fert	1306	1434	**1600**
2	Fertiliser, 10kg P + 50 kg N	DP, 10P/30N	**2090**	1509	1243
3	Fertiliser 10kg P + 50 kg N + Incorporation	DP, 10P/30N	1959	1283	1360
4	Fert matched to 2.5t CL	No fert	1692	1379	1248
5	Fert matched to 7.5t CL	No fert	1631	822	486
6	2.5t CL	No fert	1387	1486	1462
7	5t CL	No fert	1635	1515	1379
8	7.5t CL	No fert	1920	1511	1277
9	4.2t Biosoilds (5t CL equivalent)	No fert	1354	1455	1536
10	1.3t CL + 10kg P	DP, 10P/30N	1927	**1603**	1383
11	3.8t CL + 10kg P	DP, 10P/30N	1986	1450	1337
12	6.3t CL + 10kg P	DP, 10P/30N	2044	1396	1151
13	1.1t Biosoilds + 10kg P	DP, 10P/30N	1836	1537	1526
14	3.2t Biosoilds + 10kg P	DP, 10P/30N	1862	1529	1493
15	5.3t Biosolids + 10kg P	DP, 10P/30N	1715	1537	1350
16	1.3t CL + 10kg P + Incorporation	DP, 10P/30N	1726	1390	1409
17	6.3t CL + 10 kg P + Incorporation	DP, 10P/30N	1815	1320	1059
18	3.2t Biosolids + 10kg P + Urea matching 5t CL	DP, 10P/30N	1748	1301	1155
19	1.3 CL + 10kg P	1.3 CL + 10kg P	1886	1521	1444
20	CL @ 2.5t/ha - Repeated	2.5t CL	1648	1448	1325

Conclusion

The greatest benefit of using alternative nutrient sources for either nitrogen or phosphorus appears to be from applying chicken litter at targeted P responsive sites which is driven by soil types with high P fixation potential. Synthetic sources of P are still required in the first season but potentially could be scaled back in season two. Synthetic sources of nitrogen are most beneficial initially at meeting crop N demand and building soil N banks. This is potentially due to the straw nature of chicken litter and the requirement for this to be broken down initially (drawing an N source) before the N is then made available. Comparatively, biosolids are a poor source of nitrogen and phosphorus due to other co-components which include high levels of aluminium, calcium and iron. Aluminium can become toxic in low pH conditions, and all three elements have a high affinity for P which reduces availability of the P contained.

Acknowledgements

We acknowledge funding from SAGIT through project 'ASO 05624 - Unravelling crop yield response to application of organic amendments on different soil types'. This project also received co-funding from the Australian Government's Future Drought Fund through the Long-term Trials of Drought Resilient Farming Practices Grants.

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Notes

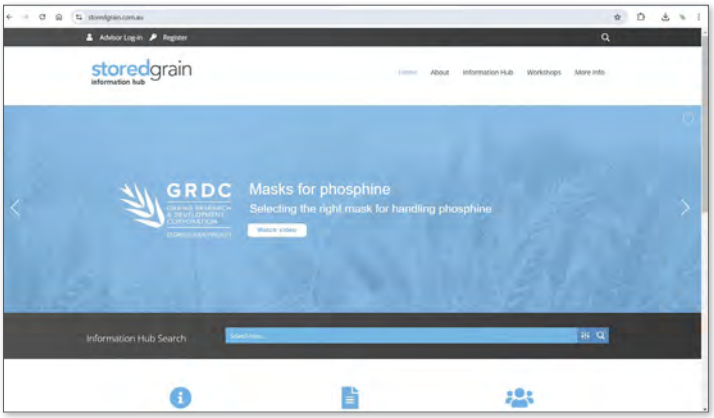
Notes

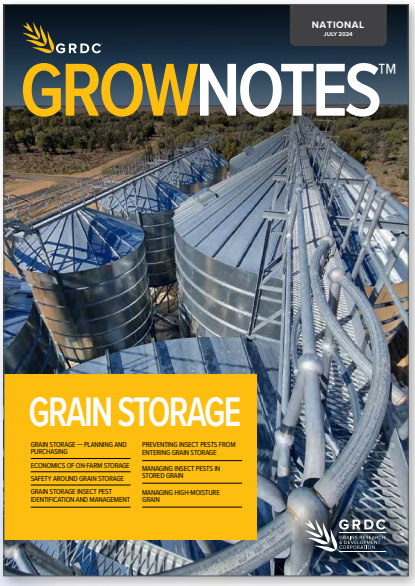
STORED GRAIN

Call the National Grain Storage Information Hotline **1800 WEEVIL (1800 933 845)** to speak to your local grain storage specialist for advice or to arrange a workshop.

Find the latest stored grain information online at

storedgrain.com.au





The complete manual for on-farm grain storage:

GRDC GrowNotes - Grain Storage

July 2024

storedgrain.com.au

The Stored Grain Information Hub is a GRDC investment.

Acknowledgements

We would like to thank those who have contributed to the successful staging of the Maitland GRDC Grains Research Update:

- The local GRDC Grains Research Update planning committee that includes growers, advisers and GRDC representatives.

- Trade display supported by: Polytex

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Prefer to leave your feedback online? Scan the QR with your phone camera.

OR use the form on the next page – tear it out and drop at the registration desk as you leave. Thank you!

2026 Maitland GRDC Grains Research Update Feedback

1. How would you describe your <u>main</u> role? *(choose one only)*

- ❑ Grower
- ❑ Agronomic adviser
- ❑ Farm business adviser
- ❑ Financial adviser
- ❑ Communications/extension
- ❑ Grain marketing
- ❑ Farm input/service provider
- ❑ Banking
- ❑ Accountant
- ❑ Researcher
- ❑ Student
- ❑ Other* (please specify)

Your feedback on the presentations

For each presentation you attended, please rate the content relevance and presentation quality on a scale of 0 to 10 by placing a number in the box (**10 = totally satisfactory, 0 = totally unsatisfactory**).

2. Good decisions with clarity under pressure
Dr Jane Foster, Emotional Resilience Training

Content relevance ☐ /10 Presentation quality ☐ /10

Have you got any comments on the content or quality of the presentation?

3. Protecting your most perishable asset - latest tips on grain storage
Ben White, BM White

Content relevance ☐ /10 Presentation quality ☐ /10

Have you got any comments on the content or quality of the presentation?

4. Pulse root disease - what are the issues and what are our options
Blake Gontar, SARDI

Content relevance ☐ /10 Presentation quality ☐ /10

Have you got any comments on the content or quality of the presentation?

5. Mice, reducing feed supply and improving control
Ben White, BM White

Content relevance ☐ /10 Presentation quality ☐ /10

Have you got any comments on the content or quality of the presentation?

6. Alternative N sources
Sean Mason, Agronomy Solutions

Content relevance ☐ /10 Presentation quality ☐ /10

Have you got any comments on the content or quality of the presentation?

Your next steps

7. Please describe at least one new strategy you will undertake as a result of attending this Update event

8. What are the first steps you will take?
e.g. seek further information from a presenter, consider a new resource, talk to my network, start a trial in my business

Your feedback on the Update

9. This Update has increased my awareness and knowledge of the latest in grains research

Strongly agree	Agree	Neither agree nor Disagree	Disagree	Strongly disagree
❑	❑	❑	❑	❑

10. Do you have any comments or suggestions to improve the GRDC Update events?

Thank you for your feedback.