GRAINS RESEARCH UPDATE 2026

Burra, SA
Thursday 6 August

GRDC
GRAINS RESEARCH & DEVELOPMENT CORPORATION

GRAINS RESEARCH UPDATE 2026

Burra

Thursday 6 August

9.00am to 1.00pm

Burra Town Hall
4 Market Street

#GRDCUpdates

BURRA GRDC Grains Research Update
convened by ORM Pty Ltd.

46 Edward Street
PO Box 189
Bendigo VIC 3552

T 03 5441 6176
E admin@orm.com.au
W orm.com.au

GRDC
GRAINS RESEARCH & DEVELOPMENT CORPORATION

GRDC Grains Research Update BURRA

Contents

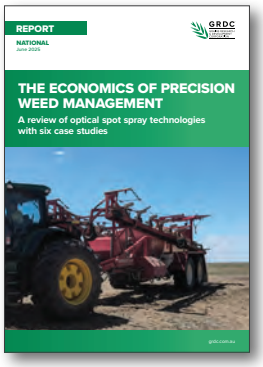
CONNECT WITH US

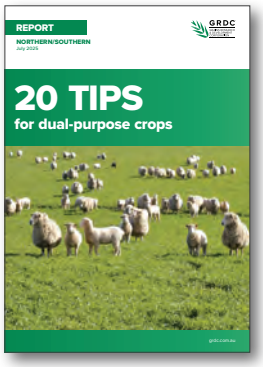
GRDC
GRAINS RESEARCH & DEVELOPMENT CORPORATION

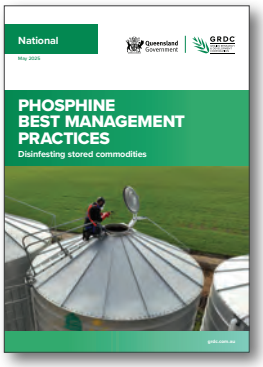
JOIN THE CONVERSATION

VISIT GRDC.COM.AU FOR GROWER RESOURCES

Including NVT Crop Sowing Guides and Harvest Reports, Fact Sheets, GoundCover™, Best Management Practice, GrowNotes, videos, podcasts and more.







FIND GRDC INVESTMENTS

GRDC investments deliver new and improved varieties, farming practices, technologies and capability to the grains industry.

SUBSCRIBE

To subscribe to our newsletters and publications and keep your details up to date visit the GRDC subscription centre: grdc.com.au/subscribe

FOLLOW US ON SOCIALS

X
@theGRDC

Facebook
theGRDC

Instagram
thegrdc

LinkedIn
thegrdc

YouTube
theGRDC

GRAINS RESEARCH UPDATE 2026

Burra Town Hall, Thursday 6 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	Cereal 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	

On X? Follow **@GRDCSouth** and use the hashtag **#GRDCUpdates** to share key messages

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.

Contact details

Website:
https://www.emotionalresiliencetraining.com.au/

Phone: 0425 718 632

Email: jane@emotionalresiliencetraining.com.au

Notes

GRDC
NATIONAL VARIETY TRIALS™

NVT tools

Trial results

Long term yield reporter

NVT disease ratings

Harvest Report

NVT Trial Notification Service

nvt.grdc.com.au

Subscribe to NVT notifications that are sent the moment results for your local NVT trials are available.

Subscribe to receive the latest NVT publications (Harvest Reports and Crop Sowing Guides), and other NVT communications.

@GRDC_NVT

KNOW BEFORE YOU SOW

PREDICTA® B and PREDICTA® rNod

Cereal root diseases and poor rhizobia inoculation decisions in grain legumes cost grain growers in excess of $300 million annually in lost production.

PREDICTA® B and PREDICTA® rNod soil testing services and your accredited agronomist can help you to identify before seeding, the soil borne disease risk in cereals, and whether an appropriate rhizobium inoculant should be applied to grain legume crops.

PREDICTA® B has tests for most soil-borne diseases of cereals and some pulse crops:

- Crown rot (cereals)
- Rhizoctonia root rot
- Take-all (including oat strain)
- Root lesion nematodes
- Cereal cyst nematode
- Stem nematode
- Blackspot (field peas)
- Yellow leaf spot
- Common root rot
- Pythium clade f
- Charcoal rot
- Ascochyta blight of chickpea
- White grain disorder
- Sclerotinia stem rot
- Eyespot.

PREDICTA® rNod has tests for rhizobia:

- Group E and F (lentil, faba bean, pea and vetch)
- Group N (chickpea)
- Groups G and S (lupin and serradella).

Enquire with your local agronomist or visit:

PREDICTA® B
http://pir.sa.gov.au/research/services/molecular_diagnostics/predicta_b

PREDICTA® rNod
https://pir.sa.gov.au/research/services/molecular_diagnostics/predicta_rnod

Government of South Australia
Primary Industries and Regions SA

SARDI
South Australian Research and Development Institute

GRDC
Grains Research & Development Corporation

Contact - Southern region

Russell Burns - 0401 122 115, russell.burns@sa.gov.au

Matthew Rowe - 0491 933 041, matthew.rowe2@sa.gov.au

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.

Contact details

Chris Warrick
Grian Storage Extension Team

1800 WEEVIL (1800 933 845)

info@storedgrain.com.au
www.storedgrain.com.au

Notes

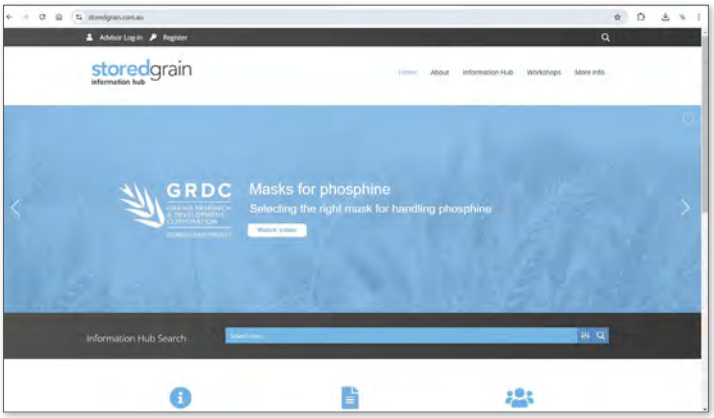
Notes

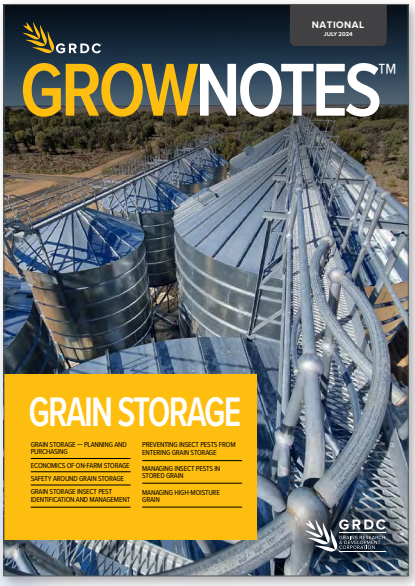
STORED GRAIN

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.

Cereal root diseases in South Australia: current risks and management options, with a focus on crown rot

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

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

GRDC project code: UOA2507-002RTX

Keywords

- barley, integrated disease management, root disease, wheat.

Take home messages

- Crown rot is now the most common soil- or stubble-borne disease on the upper Eyre Peninsula, present at damaging levels in over 70% of paddocks
- Rhizoctonia and take-all remain present at damaging levels in around 20% of paddocks
- New research is being conducted to identify the cost-benefit of management strategies, including new fungicides and approaches to cultural control.

Background

Key soilborne diseases, such as crown rot, Rhizoctonia root rot (Rhizo) 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 agronomists and some growers, and often are identified where they have a clear impact on a crop. However, management of these diseases remains challenging, with most soilborne diseases under-diagnosed or often misdiagnosed. The cost-benefit of management options once soilborne diseases are identified also remains unclear for many growers.

A new GRDC investment under the National Soilborne Disease Initiative will focus on key cereal soil and stubble-borne diseases including crown rot, Rhizoctonia root rot and root lesion nematodes. 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 cereal yields across a range of environments and seasons.

Soilborne diseases vs foliar diseases

One of the most important differences between soilborne diseases and foliar diseases is that the pathogen inoculum (the 'resting reserve' of disease in the soil or stubble) doesn't really move aerially. Unlike rusts or Septoria tritici blotch which can move around a farm, district or even across States, most soilborne diseases are caused by inoculum that was present in the soil at the start of the season. It may move within the paddock – perhaps a few centimetres to several metres – and it may work its way across paddocks over the years, but for any given season, **the risk of disease in any given paddock is most likely to come from within that paddock**. This is quite a big difference and actually represents a big advantage in managing soilborne diseases. We just need to know the disease status of the paddock in order to apply management options... simple, right?

However, 'knowing' the soilborne disease risk and applying management tactics are also points where we have some big differences between soilborne diseases and foliar diseases. Soilborne diseases are hard to identify. Firstly, they often go unnoticed in 'better' seasons. In seasons where we get a good

break, good early crop growth, then a mild spring with sufficient rainfall, there are often relatively few visual cues above ground. Unfortunately, the defining symptoms – the fungal growth, lesions, reduced root biomass – are all below or at ground level. Thus, root diseases are often **under-diagnosed**. For most growers and agronomists, while a crop may not be severely affected by, say, Septoria, they'll often still be aware if there was a little bit of disease around, and will expect to have to manage it next year. This is not true for soilborne diseases. Low-medium levels of diseased roots often go unnoticed.

Furthermore, where above ground symptoms do occur, such as reduced biomass, yellowing foliage, early maturity, whiteheads or increased screenings, these are often **misdiagnosed** as other issues – such as nutrient deficiencies, frost, mouse damage, sub-soil constraints. Compare this to a foliar disease like rust, which would never be misdiagnosed as nitrogen deficiency.

So, even though growers and agronomists have an advantage in managing soilborne diseases within a paddock because the inoculum will mostly only come from within the paddock, they are often unaware of the disease presence in that paddock until the visual symptoms above ground become obvious. This is the second point where soilborne diseases differ from foliar diseases – once visual symptoms of soilborne diseases appear in-crop, it is too late to manage. In fact, virtually all soilborne disease management takes place before seeding. Unlike foliar diseases, where we might scout the crop for early foliar symptoms or keep an ear out for news from neighbours or growers in other regions and then apply a fungicide if above threshold levels, management options for soilborne diseases must all be applied before the season starts.

Many growers and agronomists will be aware of a service called PREDICTA® B – this is SARDI's DNA-based soil testing service for soilborne diseases of cereal crops. PREDICTA B was developed specifically to address the above issues – it is based on sampling representative soil from across a paddock (or 'production zone' within a paddock), extracting DNA and simultaneously testing that DNA for all major soilborne pathogens of cereal crops using qPCR (a DNA-based molecular test). Testing is done during summer fallow, allowing growers to make decisions about crop choice, variety and fungicide, as well as informing which paddocks might be sown earlier or later in the seeding window. PREDICTA B can't tell the future… it is a prediction of risk based on pathogen inoculum only, based on 'normal' seasonal conditions. However, what drove pathogen inoculum up or down in the first place, and what will determine actual disease occurrence this year, is the interaction between pathogen, host (crop, variety) and environment (timing and amount of rainfall, temperature, soil type, other soil biology).

Seasonal update and disease inoculum trends

Soilborne diseases, like all diseases, are affected by seasonal conditions, including those of past seasons. Past seasons, including both the growing season and summer fallow, have a big impact on the inoculum level prior to sowing. The upper Eyre Peninsula, like much of SA, has experienced an incredibly dry period over the last couple of years. Growing season rainfall was below or very much below average in 2024 (~150mm GSR at Streaky Bay). Some crops finished well, where they were able to connect with subsoil moisture which fell over the 2023–2024 summer. However, the dry 2024 was followed by one of the driest summers on record, meaning 2025 was tough – a late break and limited subsoil moisture, together with just average GSR and below average spring rainfall made for tough cropping.

These conditions – drier than average seasons, a dry 2024–2025 summer and especially the dry spring – all had an impact on soilborne disease inoculum levels as we headed into 2026. Some of this can be seen in the results from PREDICTA B samples processed this year. SARDI's molecular diagnostic centre received 123 commercial PREDICTA B samples from South Australian agronomists in the lead up to 2026 seeding. What the trend data for SA shows is that, far and away, crown rot is the most common issue for SA growers heading into 2026, followed by take-all and Rhizo (Figure 1).

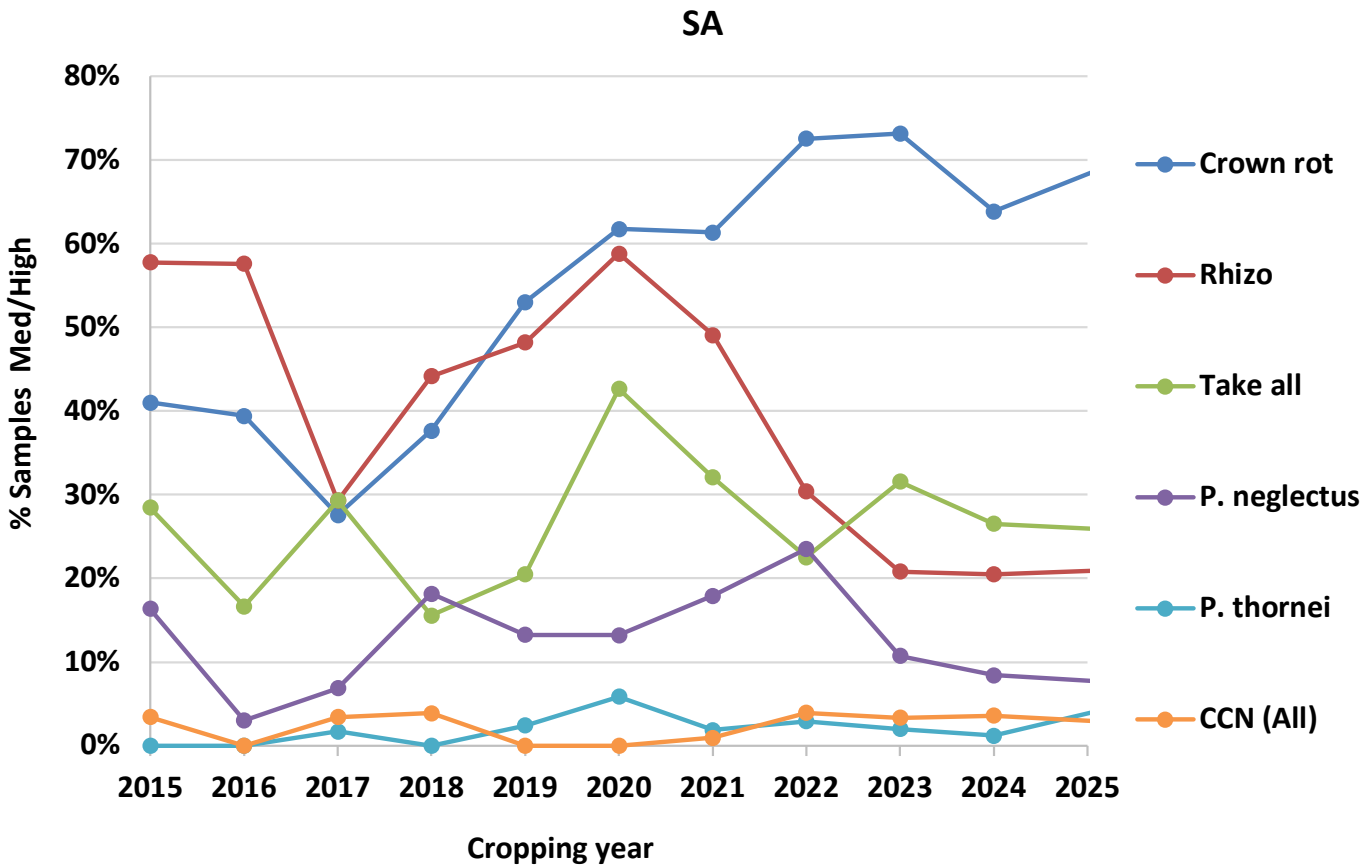


Figure 1. Trend data 2015–2026 from PREDICTA B samples submitted by SA growers/agronomists showing the proportion of all samples which had pathogen DNA levels considered to represent either 'medium' or 'high' disease risk, for key soil- and stubble-borne pathogens.

Of the 123 samples from SA, 33 samples came from the Eyre Peninsula, with 20 of these coming from the upper Eyre Peninsula (UEP). Of the 20 PREDICTA B samples from the UEP, almost half had *Rhizoctonia solani* AG8 at a level which presents a medium to high risk of yield loss. From the same 20 samples, 14 had medium to high levels of crown rot. Only two samples from the UEP and one from the Lower Eyre Peninsula (LEP) had a medium-high level of take-all.

Crown rot

Crown rot (Fusarium crown rot, FCR) has been an increasing issue nationally for the past 10–20 years, and SA is no exception. The PREDICTA B data show it has gone from being present at medium–high levels in just 30–40% of samples 10 years ago, to now being present at damaging levels in 70–80% of samples.

Here is a summary of crown rot features;

- Crown rot is not technically soilborne, but rather it is stubble-borne, not soilborne. The mycelium (thread-like growth) colonises the stubble and can survive >3 years.
- Because crown rot is stubble-borne, soil type doesn't directly affect disease, although there may be interactions with crop stress on some soil types.
- Two key *Fusarium* species *F. pseudograminearum* and *F. culmorum* cause crown rot. *F. culmorum* is uncommon on the upper Eyre Peninsula.
- Although *F. pseudograminearum* may produce spores, almost all infection is through the mycelium. The mycelium generally does not grow well through or across soil, so infection occurs where stubble contacts the developing stem.
- *F. pseudograminearum* does not infect canola or pulses, but is hosted by all cereals, as well as grassy weeds.
- Initial infection is favoured by wet conditions, and *Fusarium* has a broad temperature tolerance. However, once the fungus has colonised, plant stress (for example, under hot, dry conditions) favour infection development and disease expression.

- The run of dry autumns and springs has meant that stubble remains intact in paddocks, and inoculum is building up. Dry springs have also ensured inoculum builds in infected crops. The worst symptoms of crown rot, including whiteheads and severe grain loss, may have been avoided due to the mild spring temperatures.

Crown rot inoculum can be managed by growing non-hosts and reducing cereal stubble, especially in the break crop phases. Disease impact can be reduced by planting cereal varieties with better resistance or with better adaptation to avoid heat stress, by avoiding contact with stubble (inter-row sowing, especially in cereal-on-cereal rotations) and by applying seed fungicides. However, it is widely acknowledged that stubble retention is beneficial for other reasons, and that the long persistence of mycelium in that stubble means crown rot is an increasing issue.

Survey of cereal stubble for crown rot

In 2025, SARDI partnered with NSWDPI to offer growers and advisers a free stubble testing service for crown rot. The service provides growers with confirmation of crown rot incidence within individual paddocks, allowing them to make future decisions on disease management and disease risk. For SARDI and NSWDPI, the service is providing a snapshot of crown rot risk at district, State and national levels.

SARDI approached agronomists over summer 2025–2026, calling for sample submissions as part of the National Stubble Testing Service and providing the sampling protocol, as well as an offer for SARDI to provide sampling kits including reply paid envelopes. A total of 128 kits were sent out to agronomists in February 2026, for submission of one or more samples per kit.

Samples were sent by agronomists directly to NSWDPIRD and processed per existing protocols. The protocol requires that a single sample per paddock be collected, by stopping at five sample points along a W-shaped transect within the paddock. At each sample point, 12 plants are pulled up, tillers removed and the main stem retained for submission. This protocol yields a sample of 60 individual plants which are visually assessed to determine disease severity, and then cultured on media to confirm the presence of Fusarium crown rot-causing pathogens.

There was substantial disparity in sample number between regions, with over half (124) of samples coming from the Upper Eyre Peninsula (UEP), and over a quarter coming from either the Upper or Lower South-East (USE and LSE) (Figure 2). Relatively few samples were received from the Upper North (UN) and Mid-North/Lower North/Adelaide Plains (MN) regions, however it is assumed that the issue here has been well-established and growers are well aware of FCR risk. Only three samples were received from the Lower Eyre Peninsula (LEP) and six from the Mallee (MAL), which likely indicates a need for more promotion of this issue in these regions.

Of the 241 samples processed from South Australia, 55 samples (23%) had no FCR crown infection confirmed by plating, although three of these samples had a 2% incidence of FCR stem infection (Table 1). A further 114 samples (47%) had less than 20% incidence of FCR crown infection. These two numbers combined (70%) indicate that, although FCR is clearly widespread in South Australia, incidence within paddocks is typically low. Of the remaining 30% of paddocks, half had an FCR crown infection incidence of 20–40%.

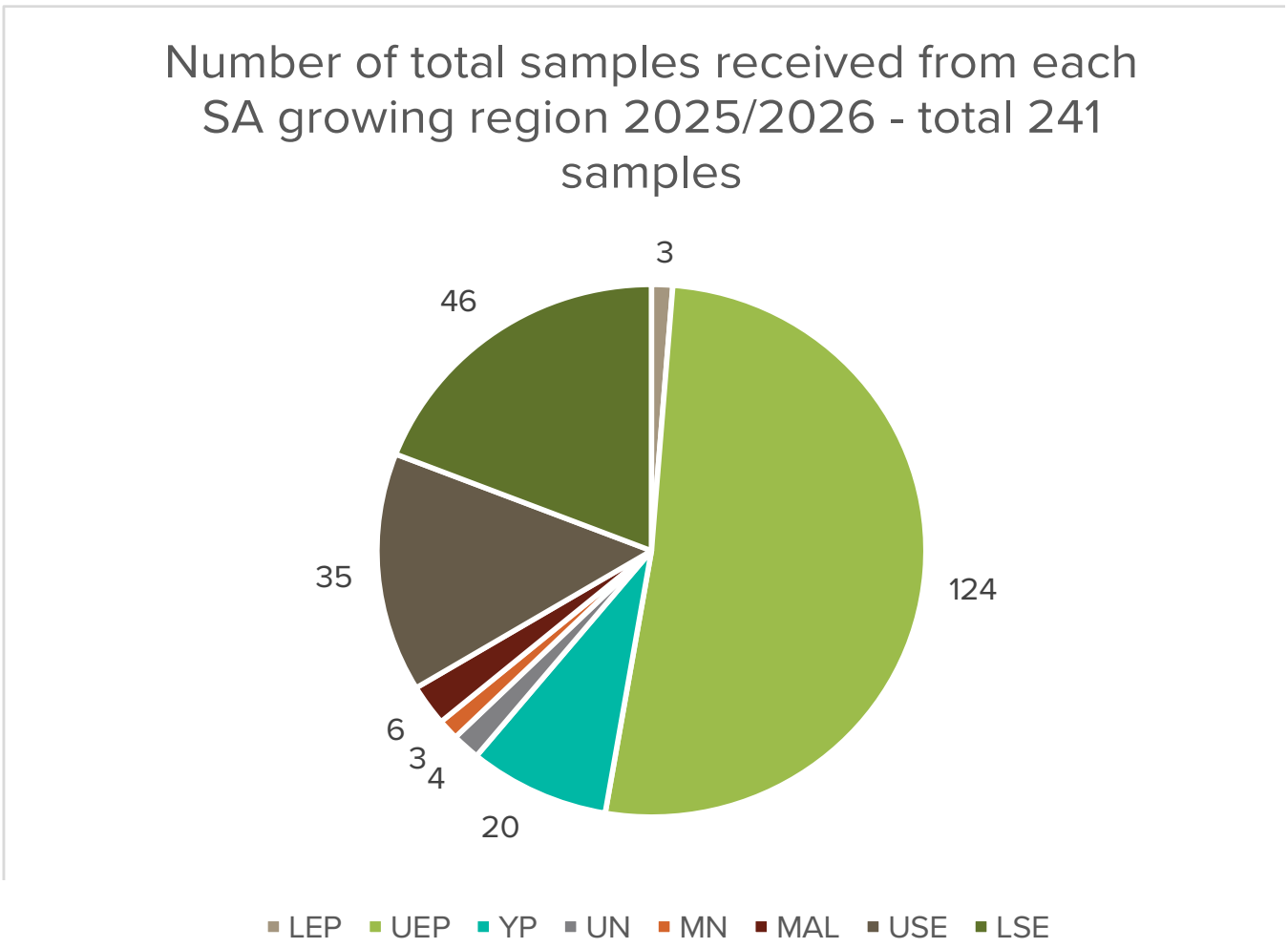


Figure 2. Number of FCR samples received from each grain cropping region within South Australia post-harvest 2025/26, where LEP = Lower Eyre Peninsula, UEP = Upper Eyre Peninsula, YP = Yorke Peninsula, UN = Upper North, MN = Mid North/Lower North/Adelaide Plains, MAL = SA Mallee, USE = Upper South East & LSE = Lower South East.

Table 1: The proportion of samples (n=241) in each category of disease level as measured by both incidence and FCR index.

Infection Level	Proportion of total samples	
	Incidence	FCR Index
0	23%	9%
0–20	47%	77%
20–40	15%	9%
40–60	7%	4%
60–80	5%	0
80–100	3%	0

FCR index, calculated from visual assessment data, was also generally low in most samples – 9% of samples had an FCR index of 0, and a further 77% of samples had an FCR index of 0–20. No samples had an FCR index of 60%. High FCR severity index samples tended to be spatially clustered, with six samples collected from paddocks of one farm on the Yorke Peninsula having an FCR index of 38–58%, and six samples from paddocks from one farm in the Mallee region having an FCR index of 17–52%. These high FCR index samples affect average FCR index considerably, yet only represent two growers.

A summary of rotational history (Figure 3) highlights that average FCR incidence and severity index was generally highest in samples with a rotation history including a cereal immediately preceding the current cereal phase.

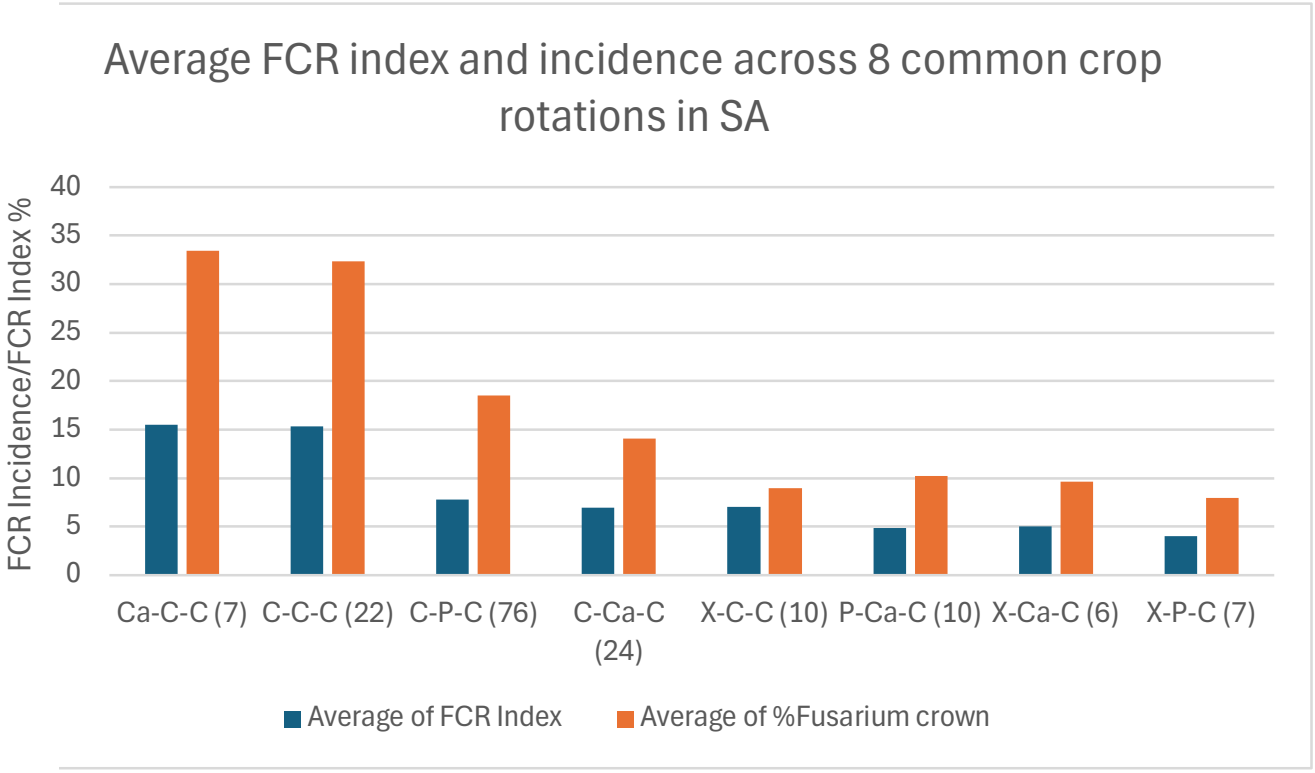


Figure 3. Average FCR Index (visual assessment) and FCR incidence (main tiller culturing) of cereal samples categorised by crop rotation. Cropping history was categorised as either cereal (C), canola (Ca) or pulse (P). 'Pulse' included pulses and forage legumes. Crop rotation is presented as from 2023-2024-2025, with the number of samples in each rotation in brackets. "X" = unknown.

Large scale demo trials

SARDI is working with SA growers and advisers to evaluate crown rot management strategies at the paddock scale. While several strategies have been identified in previous plot-scale research conducted under artificially inoculated conditions, there remains doubt over efficacy and/or cost-benefit at the paddock scale. In 2025, SARDI worked with two growers and their agronomists at Booleroo and Bordertown to establish large scale strip trials evaluating the efficacy of the seed treatment Victrato®.

Initial PREDICTA B tests were taken across several paddocks from each grower in order to identify a paddock with levels of crown rot representative of the region and the range of scenarios commonly affecting SA growers. At Booleroo, initial soil DNA was 597pg DNA/g soil, whereas at Bordertown initial soil DNA was just 44pg DNA/g soil. Once identified, research staff worked with the growers/agronomists to develop a treatment plan. Victrato seed treatment was sourced and provided by SARDI. Only the Booleroo data are further discussed here.

At Booleroo, nil and 200mL/100g seed treatments were applied to Scepter(ϕ) wheat then sown on 20 May. A study area was established in the demo paddock, with six seeder runs (three Victrato-treated, three control) of approximately 200m length sampled at Booleroo. Six sample points within each seeder run were GPS-marked and sampled throughout the year.

At each sample point, a soil + stubble sample was collected at sowing and tested for FCR using qPCR. Stubble was collected at or after harvest for assessment of FCR incidence and disease index in response to treatments and comparison to the initial inoculum level.

At Booleroo, the range of initial crown rot DNA levels (*Fusarium pseudograminearum*) was 2–20695pg DNA/g soil and averaged 4656pg DNA/g soil (Figure 4). *F. culmorum/graminearum* levels were very low (0–3pg DNA/g soil). Take-all, low levels of both *Pratylenchus neglectus* and *P. thornei*, as well as *Bipolaris sorokiniana*, were also present at this site.

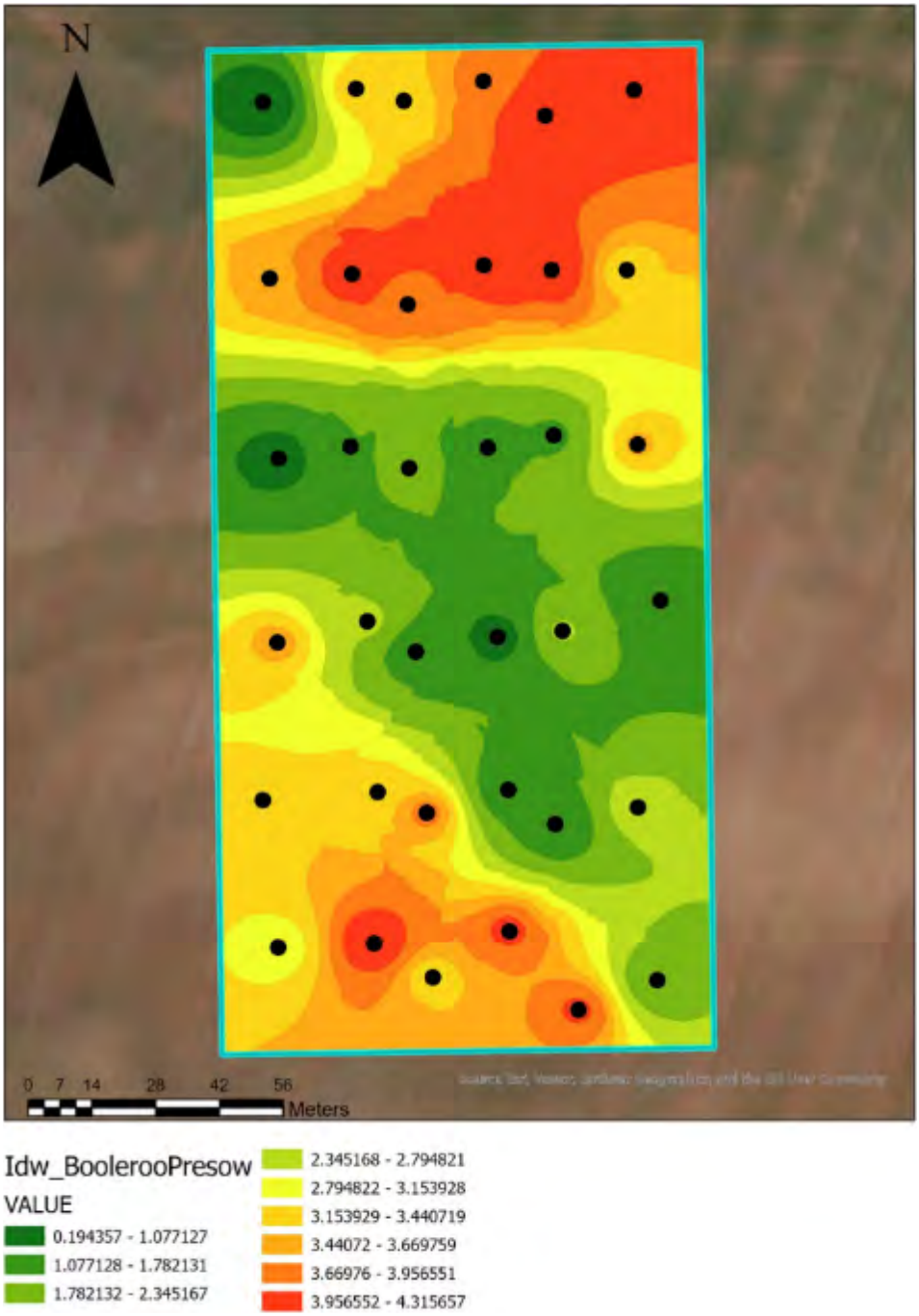


Figure 4. Map of initial crown rot DNA levels (log10 transformed) within the area of the strip trial at Booleroo in 2025.

The map (Figure 4) shows that, within the sampled area, there are distinct patterns in crown rot inoculum, and that levels can change in short distances. These could be associated with soil types or possibly management practices.

Plotting the pre-sowing inoculum levels against the in-crop disease scores shows clear differences in the disease scores from the crop in the Victrato treated area vs the untreated areas (Figure 5). Initial estimation indicates that pre-sowing inoculum levels of 2.5–4pg DNA/g (log transformed) are most likely to show responses to Victrato treatment. Lower levels of inoculum do not cause as many in-crop symptoms, and higher levels seem to overwhelm the Victrato effect. More data are needed to confirm this, and to find out whether different crops and environments have different response levels.

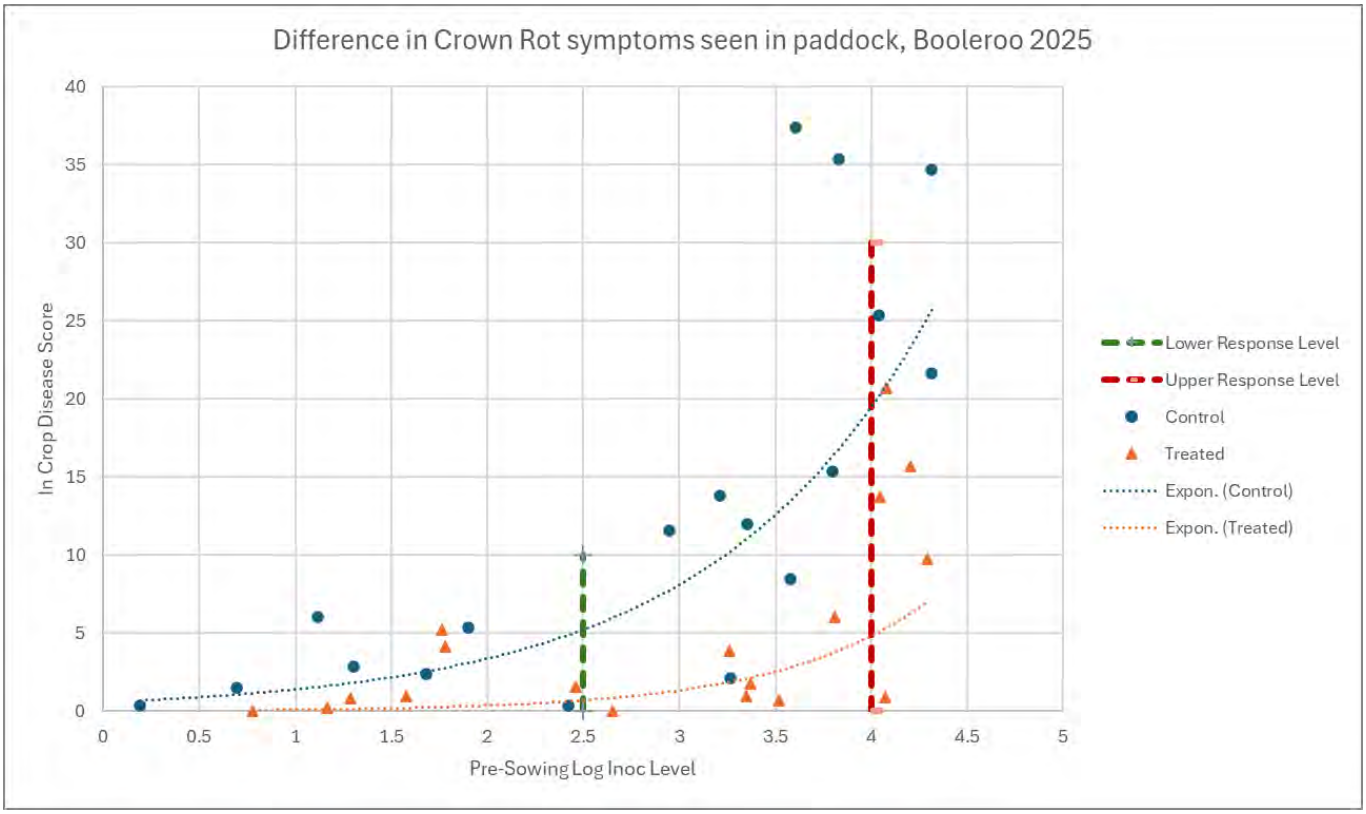


Figure 5. Scatter plot of pre-sowing soil + stubble inoculum level against post-harvest In Crop Disease Score (0-100) for both treated and untreated sample points.

These results provide encouraging preliminary observations that Victrato can provide some disease control at a paddock scale under natural inoculum conditions, but that inoculum level may influence response to Victrato. However, additional site-years and yield analysis are required before management recommendations or conclusions regarding economic benefit can be made. 2026, three large scale field trials will be established, including one at Kimba at a site identified through the survey. Growers and advisers are encouraged to take part in the free stubble testing service, which will continue in 2026–2027.

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 who have either provided samples or supported us in locating crops to collect samples from, or hosted field experiments referred to in this paper.

Contact details

Blake Gontar

South Australian Research and Development Institute

blake.gontar@sa.gov.au

0430 597 811

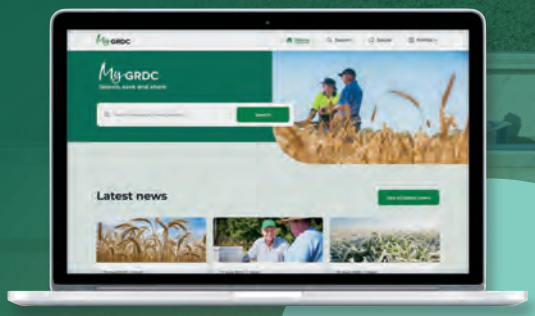
Notes

MyGRDC is here!

MyGRDC is a new way for grain growers like you to find information you can trust. Search, save and share GRDC news, events and publications through a personalised portal that you customise according to your region, crops and interests.

"I used to Google what I needed. I don't need to do that any more. MyGRDC gives me everything I am looking for."

Grain grower, GRDC Southern region



Now available on your desktop or mobile

grdc.com.au/mygrdc

Download MyGRDC now from the App store or Google Play

GRDC

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

Notes

GRDC

GROUNDCOVER

The latest grains industry research, development and extension news from GRDC.

To read GroundCover online, visit groundcover.grdc.com.au

Subscribe to receive the hard copy GroundCover magazine or other GRDC communications at grdc.com.au/subscribe

GroundCover is brought to you by Australian grain growers and the Australian Government through the publisher, the Grains Research and Development Corporation (GRDC).

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.

Contact details

Sean Mason
Unit 3/11 Ridley Street, Hindmarsh SA 5007

0422 066 635
sean@agronomysolutions.com.au

@AgSolutionsOz

Notes

Acknowledgements

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

- The local GRDC Grains Research Update planning committee that includes growers, advisers and GRDC representatives.
- Partnering organisation: Hart Field-Site Group
- Trade display supported by: Polytex

GRDC
GRAINS RESEARCH
& DEVELOPMENT
CORPORATION

Trade display
supported by

POLYTEX

Protecting Australian Produce

Polytex is a Bunker Tarp Manufacturer helping Growers Increase Profit & Reduce Logistical Challenges through On-Farm Grain Storage Solutions.

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 Burra 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. Cereal 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.

KEY CONTACTS

GRDC
GRAINS RESEARCH & DEVELOPMENT CORPORATION

SOUTHERN REGION

ADELAIDE
187 Fullarton Road
DULWICH SA 5065

08 8198 8401
southern@grdc.com.au

HORSHAM
Grains Innovation Park
110 Natimuk Road
HORSHAM VIC 3400

0428 274 018
southern@grdc.com.au

APPLIED RESEARCH, DEVELOPMENT AND EXTENSION

SENIOR REGIONAL MANAGER
Courtney Ramsey
courtney.ramsey@grdc.com.au
0428 274 018
Based in Horsham

GROWER RELATIONS MANAGER
Rebekah Starick
rebekah.starick@grdc.com.au
0458 441 278

GROWER RELATIONS MANAGER
Tim Bateman
tim.bateman@grdc.com.au
0447 526 191
Based in Melbourne

GROWER RELATIONS MANAGER
Mitchell Fromm
mitchell.fromm@grdc.com.au
0498 230 877
Based in Horsham

SENIOR MANAGER ENABLING TECH (NATIONAL)
Tom Giles
tom.giles@grdc.com.au
0417 889 860

MANAGER AGTECH (NATIONAL)
Peter Thompson
peter.thompson@grdc.com.au
0417 245 802

MANAGER SUSTAINABILITY AND PLATFORM TECH (NATIONAL)
Brooke Bruning
brooke.bruning@grdc.com.au
0417 915 477

MANAGER SUSTAINABLE CROPPING SYSTEMS
Giacomo Betti
giacomo.betti@grdc.com.au
0499 976 242

MANAGER SUSTAINABLE CROPPING SYSTEMS
Courtney Peirce
courtney.peirce@grdc.com.au
0487 423 471

CROP PROTECTION AND IMPROVEMENT

MANAGER WEEDS (NATIONAL)
Sarah Morran
sarah.morran@grdc.com.au
0447 158 908

MANAGER DISEASES (NATIONAL)
Alan Little
alan.little@grdc.com.au
0439 321 392

CROP PROTECTION MANAGER
Ruth Peek
ruth.peek@grdc.com.au
0455 534 040

MANAGER OILSEEDS (NATIONAL)
Allison Pearson
allison.pearson@grdc.com.au
0418 874 748

SENIOR MANAGER NVT (NATIONAL)
Sean Coffey
sean.coffey@grdc.com.au
0428 652 226

MANAGER NVT OPERATIONS
Sara Blake
sara.blake@grdc.com.au
0472 782 389

MANAGER NVT SOUTH
Brooke Bennett
brooke.bennett@grdc.com.au
0437 421 887
Based in Horsham

MANAGER WHEAT (DISEASE AND QUALITY)
Shiwangni Rao
shiwangni.rao@grdc.com.au
0476 304 976
Based in Horsham

MANAGER BIOSECURITY (NATIONAL)
Amy Koschella
amy.koschella@grdc.com.au
0488 106 256

COMMUNICATIONS

COMMUNICATIONS MANAGER
Sophie Clayton
sophie.clayton@grdc.com.au
0478 029 040
Based in Canberra

CONTENT MANAGER
Melanie Hunter
melanie.hunter@grdc.com.au
0427 189 827

ENQUIRIES
comms@grdc.com.au