ONLINE DELIVERY
ELMORE & NORTH CENTRAL VICTORIA
13TH AUGUST 2020

GRAINS RESEARCH UPDATE

GRDC
GRAINS RESEARCH & DEVELOPMENT CORPORATION

grdc.com.au

Connect with us

Keep in touch with us to find out about the latest RD&E, news and events.

Newsletter subscription	Twitter @GRDC	Facebook @GRDC	Instagram thegrdc	LinkedIn GRDC

GRDC PODCAST

GET THE LATEST INFO ON THE GO

The GRDC's podcast series features some of the grain sector's most pre-eminent researchers, growers, advisers and industry stakeholders sharing everything from the latest seasonal issues, to ground-breaking research and trial results with on-farm application.

https://grdc.com.au/news-and-media/audio

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

GRDC GRAINS RESEARCH & DEVELOPMENT CORPORATION

P Level 4 | 4 National Circuit, Barton ACT 2600 | PO Box 5367, Kingston ACT 2604 **T** +61 2 6166 4500 **F** +61 2 6166 4599
E grdc@grdc.com.au @theGRDC

GRAINS RESEARCH UPDATE

GRDC
GRAINS RESEARCH & DEVELOPMENT CORPORATION

ONLINE DELIVERY

Elmore & North Central Victoria

13th August 2020

#GRDCUpdates

GRDC Grains Research & Development Corporation

GRDC Grains Research Update online
proudly convened by ORM Pty Ltd.

ORM
46 Edward Street
PO Box 189
Bendigo VIC 3552
T 03 5441 6176
E admin@orm.com.au
W orm.com.au

Contents

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

GRDC

LIVE AND ONLINE

GROUNDCOVER™

New GroundCover stories are available daily at GroundCover online.

Stories include seasonally and regionally relevant information on topics ranging from advances in plant breeding and biotechnology, new varieties and agronomic best practice, through to harvest and on-farm grain storage.

Visit www.groundcover.grdc.com.au for the latest stories.

GRDC GRAINS RESEARCH & DEVELOPMENT CORPORATION
P Level 4 | 4 National Circuit, Barton ACT 2600 | PO Box 5367, Kingston ACT 2604 T +61 2 6166 4500 F +61 2 6166 4599
E grdc@grdc.com.au @theGRDC

SOUTHERN/WESTERN REGION*

PREDICTA® B
KNOW BEFORE YOU SOW

*CENTRAL NSW, SOUTHERN NSW, VICTORIA, TASMANIA, SOUTH AUSTRALIA, WESTERN AUSTRALIA

Cereal root diseases cost grain growers in excess of $200 million annually in lost production. Much of this loss can be prevented.

Using PREDICTA® B soil tests and advice from your local accredited agronomist, these diseases can be detected and managed before losses occur. PREDICTA® B is a DNA-based soil-testing service to assist growers in identifying soil borne diseases that pose a significant risk, before sowing the crop.

Enquire with your local agronomist or visit
http://pir.sa.gov.au/research/services/molecular_diagnostics/predicta_b

Potential high-risk paddocks:

- Bare patches, uneven growth, white heads in previous crop
- Paddocks with unexplained poor yield from the previous year
- High frequency of root lesion nematode-susceptible crops, such as chickpeas
- Intolerant cereal varieties grown on stored moisture
- Newly purchased or leased land
- Cereals on cereals
- Cereal following grassy pastures
- Durum crops (crown rot)

There are PREDICTA® B tests for most of the 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

Government of South Australia
Primary Industries and Regions SA

SARDI South Australian Research and Development Institute

GRDC Grains Research & Development Corporation

CONTACT:
Russell Burns
russell.burns@sa.gov.au
0401 122 115

Dealing with the Dry

As grain growers across Queensland and New South Wales and parts of Victoria and South Australia continue to be challenged by drought conditions, the GRDC is committed to providing access to practical agronomic advice and support to assist with on-farm decision making during tough times.

Visit our ‘Dealing with the Dry’ resource page for useful information on agronomy in dry times and tips for planning and being prepared when it does rain.

www.grdc.com.au/dealingwiththedry

GRDC
GRAINS RESEARCH & DEVELOPMENT CORPORATION

P Level 4 | 4 National Circuit, Barton ACT 2600 | PO Box 5367, Kingston ACT 2604 **T** +61 2 6166 4500 **F** +61 2 6166 4599
E grdc@grdc.com.au @theGRDC

Faba bean for North Central Victoria

Jason Brand[1], Mitchell Fromm[1], Josh Fanning[1], Michael Straight[2] and Melissa Garcia[3].

[1]Agriculture Victoria; [2]Foundation for Arable Research, [3]University of Adelaide.

GRDC project code: DAV00150

Keywords

faba bean, chocolate spot, herbicide tolerance, new varieties.

Take home messages

Agronomic and varietal options are now available to profitably produce faba beans, offering growers in North Central Victoria a viable pulse option.

Choosing the best variety for your environment and farming system will maximise profitability. PBA Bendoc⍫ offers an excellent opportunity to control in-season weeds with its improved tolerance to imidazolinone herbicides and sulfonylurea residues. PBA Amberley⍫, with its significantly improved disease resistance and high yield helps reduce cost and risks of production.

Stubble retention, early sowing combined with good inoculation, nutrition and disease management can secure success for faba beans.

Background

Faba bean has proven to be a profitable and increasingly reliable crop in many farming systems throughout southern Australia, particularly within the medium and high rainfall zones. This is due to the development of adapted varieties (disease resistance and herbicide tolerance) combined with optimised agronomic practices. In 2020, it is estimated that more than 400,000t will be produced off 235,000ha (ABARE 2020), generating more than $500M, inclusive of their farming systems benefits.

There are ongoing opportunities to expand the production area of faba bean and increase its reliability with improved varieties and agronomy. In this paper we provide a short summary of the opportunities for faba bean in the North Central region of Victoria.

Key question 1 - What are some key agronomy factors growers should be focussed on when growing faba beans in North Central Victoria?

For growers in the North Central region of Victoria some of the key factors to consider before growing faba bean are:

a. Potential profitability – grain prices for faba bean have a long-term average of $450/t, but prices can be volatile depending on international and local markets. In recent years, prices have ranged from less than $400/t to $1000/t. A break-even grain yield is likely to be around 1t/ha. However, faba bean can be multi-purpose. The value of nitrogen (N) to the farming system from a faba bean crop can be substantial, with beans contributing approximately 20kg/ha of N per tonne of biomass. In addition, if sheep are part of the farming system, the sheep can show improved growth rates and profitability on faba bean stubbles compared with cereal stubbles.

b. Soil types/condition – faba bean is one of the most adaptable of the pulse crops to a range of soil types. While faba bean prefers a loam to clay soil type, it will also tolerate a sand, particularly if the nutrition of the sand has been improved. Faba bean performs best when pH is above 5.5 but will tolerate a lower pH far better than all the other pulses except lupin. Similarly, to other pulses, avoiding soil toxicities such as salt, boron and sodicity will help to minimise risks to production. Also, faba bean will struggle in compacted soils, so performance will benefit from a no-till, controlled traffic farming system, with retained cereal stubble.

c. Climate – traditionally faba bean has been the best adapted of the pulses to higher rainfall areas (e.g. > 500mm), with good relative tolerance to short term waterlogging. Conversely, faba bean is generally the first pulse to show drought stress, being poorly adapted to the dry regions (< 350mm rainfall). Faba bean also tends to be more sensitive to high temperatures during flowering compared with the other pulses, but more tolerant to cold and frost conditions.

d. Paddock history/rotation – faba bean is generally intolerant of several herbicide residues, including Group I and Group B, so it is important to have good records and know what has been applied to the paddock in the last three years as a minimum. In addition, faba bean is not particularly competitive with weeds, so planting in a paddock with a low weed burden is preferable. Maintaining adequate nutrition is essential. In particular, application of phosphorus is critical to ensure good inoculation and nitrogen fixation.

More detailed considerations can be found in the GRDC Faba Bean Southern Region GrowNotesTM: https://grdc.com.au/resources-and-publications/grownotes/crop-agronomy/faba-bean-southern-region-grownotes

Key question 2 - How can profit be maximised while risk minimised when growing faba bean (what have we learnt from research and development)?

Some of the key factors for consideration include:

a. New varieties – faba bean now has several well adapted varieties available for growers (Table 1). Choose the best option for your situation.

b. Stubble – retaining stubble will help to maximise grain yield. Twenty per cent gains have been observed in field trials where stubble was retained compared to conventional cultivation with stubble removed.

c. Sowing time – sowing early (late April/early May) maximises biomass production and grain yield. Delaying sowing by one month can reduce grain yield by more than 20%.

d. Row spacing – due to their indeterminate growth, faba bean utilises the available row spacing and can achieve similar yields when planted from 20cm to 60cm row spacing. One benefit from a wider row spacing it the risk of disease can be reduced. Faba bean is well suited to an inter-row sowing system with retained stubble.

e. Sowing rate – research has generally shown that a sowing rate targeting a plant density of 15-25 plants/m2 is optimum; a reduced sowing rate with wider rows when sown early and an increased rate when sown late on narrower rows. Disease risks are reduced with lower sowing rates.

f. Inoculation – faba bean is very responsive to inoculation. Grain yield increases of greater than 50% have been recorded following effective inoculation.

g. Disease – considerations for the management of fungal diseases is likely to be needed every season. The specific strategy is dependent on the variety sown and needs to be planned pre-sowing to ensure required fungicides are available at the required time of application. Disease prevention is vital in any management strategy as fungicides are only effective on the parts of the plants that are present during spraying. Subsequent growth is unprotected and susceptible to infection, so an early spray (for example, tebuconazole), often applied with the grass herbicide is critical to success. Strategic sprays (for example, carbendazim) prior to canopy closure and/or rain fronts will help prevent chocolate spot, the most critical disease. Ensure thorough coverage of all foliage to achieve maximum protection.

h. Crop topping – faba bean is well suited to the practice of crop topping, to help control late maturing weeds, especially ryegrass, as faba bean can mature earlier than these weeds.

Key question 3 - What are the characteristics of the released herbicide tolerance bean variety PBA Bendoc⁽ᵈ⁾ and what can we expect in the way of further releases going forward?

PBA Bendoc⁽ᵈ⁾ was the first faba bean variety released with high tolerance to imidazolinone (Group B) herbicides when applied post emergent. It also has improved tolerance to sulfonylurea residues that can persist in the soil from application in previous crop rotations. PBA Bendoc⁽ᵈ⁾ has similar yield to other major faba bean varieties grown in southern Australia and is moderately resistant to ascochyta blight.

In the future we will continue to see a range of varieties released with similar herbicide tolerance to PBA Bendoc⁽ᵈ⁾, but with improvements in disease resistance and adaptability to a range of environments. From a herbicide tolerance perspective, future varieties with tolerance to the Group C and Group I herbicides will provide further weed management options.

There have also been a number of recently released varieties with improved disease resistance. PBA Amberley⁽ᵈ⁾, with its longer season and improved disease resistance to the common diseases affecting faba bean (Table 1) offers growers in the high rainfall zone the potential to reduce risks of increased foliar disease, and therefore, lower costs of production. In the lower rainfall zones, PBA Marne⁽ᵈ⁾ offers yield advantages compared with older varieties, with its characteristics of earlier flowering and higher grain yield in shorter seasons. From a Victorian perspective, the breeding line AF12025, has demonstrated significant grain yield advantages (20% greater than PBA Samira⁽ᵈ⁾), which is related to its earlier flowering and improved adaptability characteristics in Mallee environments compared with all currently grown varieties.

Key question 4 - In relation to the current season, which diseases are the most threatening, and therefore, what the growers should be looking out for in faba bean?

The critical diseases for faba bean production are generally cercospora, ascochyta blight and chocolate spot. Early seasonal conditions in 2020 were conducive for early infection of both cercospora and ascochtya, with both diseases observed at low/moderate levels in trials and growers' paddocks. In trials the early application of tebuconazole, provided good suppression of these diseases. Due to the drying conditions occurring in late autumn to early/mid-winter, disease infection did not progress, however the recent rain in early August has the potential to change that. Given good early growth and yield potential, it is essential that fungicides be applied pre canopy closure to ensure suppression of chocolate spot. Current varieties are of much lower risk than varieties from 10 years ago, but it is still essential to prevent the initial infection and keep the lower canopy clean of disease. As a minimum, it is likely that another fungicide application during pod fill will be required to prevent seed infection from chocolate spot.

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 and the authors would like to thank them for their continued support.

Useful resources

GRDC Faba Bean Southern Region GrowNotes™: https://grdc.com.au/resources-and-publications/grownotes/crop-agronomy/faba-bean-southern-region-grownotes

Table 1. Faba bean agronomy and disease guide.

Variety / Breeding Line	Seed Size	Flowering	Maturity	Height	Lodging Resistance	Ascochyta	Chocolate spot	Cercospora	Rust	Release Date
PBA Amberley⁽ᵈ⁾	Med-Large	Mid	Mid-late	Med	R	RMR	MR	MS	S	2019
PBA Bendoc⁽ᵈ⁾	Med	Mid	Early-Mid	Med	MS	MR	S	S	S	2018
PBA Marne⁽ᵈ⁾	Med	Early-Mid	Early-Mid	Med	MR	MRMS	S	S	MR	2018
PBA Zahra⁽ᵈ⁾	Med-Large	Mid	Mid-late	Med-Tall	MR	MRMS	MS	S	MS	2014
PBA Samira⁽ᵈ⁾	Med	Mid	Mid	Med	MR	RMR	MS	S	MS	2013
PBA Rana⁽ᵈ⁾	Med-Large	Mid	Mid	Med-Tall	MR	MRMS	MS	S	MS	2011
AF12025	Small	Early	Early	Med	MR	RMR	MRMS	S	MS	na

S=susceptible, MS=moderately susceptible, MR=moderately resistant, R=resistance.

Online Farm Trials: https://www.farmtrials.com.au/trial_data_explorer.php?action=search&query=&crop_type_name=Faba+beans&trial_type_cat_id=

Agriculture Victoria Pulse Disease guide: https://agriculture.vic.gov.au/biosecurity/plant-diseases/grain-pulses-and-cereal-diseases/pulse-disease-guide

References

ABARE, 2020 https://www.agriculture.gov.au/abares/research-topics/agricultural-outlook/data#australian-crop-report-data

Contact details

Dr Jason Brand,
Agriculture Victoria, 110 Natimuk Road,
Horsham, 3400
0409 357 076
jason.brand@agriculture.vic.gov.au
@jasonbrand

Return to contents

Notes

GRDC
GRAINS RESEARCH & DEVELOPMENT CORPORATION

Farming the Business
Sowing for your future

The GRDC's **Farming the Business** manual is for farmers and advisers to improve their farm business management skills.

It is segmented into three modules to address the following critical questions:

Module 1: What do I need to know about business to manage my farm business successfully?

Module 2: Where is my business now and where do I want it to be?

Module 3: How do I take my business to the next level?

The **Farming the Business** manual is available as:

- **Hard copy** – Freephone **1800 11 00 44** and quote Order Code: GRDC873
  There is a postage and handling charge of $10.00. Limited copies available.
- **PDF** – Downloadable from the GRDC website – **www.grdc.com.au/FarmingTheBusiness**
  or
- **eBook** – Go to **www.grdc.com.au/FarmingTheBusinesseBook** for the Apple iTunes bookstore, and download the three modules and sync the eBooks to your iPad.

NEW BOOK FOR LOW RAINFALL GROWERS IN AUSTRALIA

IS CTF WORTHWHILE IN THE LRZ?

This new publication addresses common questions about CTF in the LRZ, such as:

- DO LRZ SOILS SELF-REPAIR OR IS AMELIORATION WORK NEEDED?
- IS CTF FEASIBLE IN LOW INTENSITY SYSTEMS WITH VERY WIDE MACHINES?
- DOES CTF REDUCE POWER AND FUEL USE IN LIGHT LRZ SOILS?
- IS CTF COMPATIBLE WITH LIVESTOCK IN THE SYSTEM?

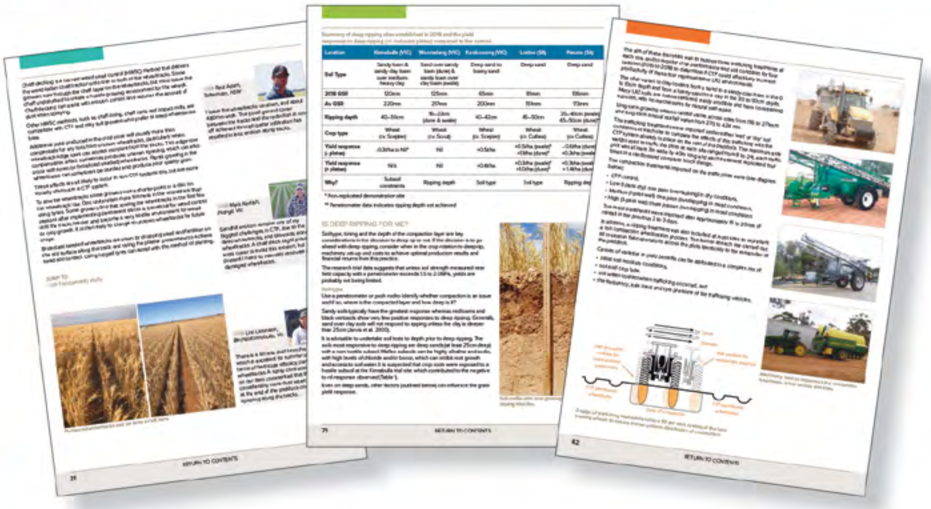
DOWNLOAD YOUR COPY OF THIS NEW RESOURCE FROM grdc.com.au or actfa.net

http://bit.ly/LRZ-CTF

YOU'LL FIND:

- Practical guides
- Grower experience
- Research findings
- Study investigations

all relevant to the implementation of Controlled Traffic Farming in Low Rainfall Zones



LOOK AROUND YOU.

1 in 5 people in rural Australia are currently experiencing mental health issues.

GRDC
GRAINS RESEARCH & DEVELOPMENT CORPORATION

The GRDC supports the mental wellbeing of Australian grain growers and their communities. Are you ok? If you or someone you know is experiencing mental health issues call *beyondblue* or Lifeline for 24/7 crisis support.

beyondblue
1300 22 46 36
www.beyondblue.org.au

Lifeline
13 11 14
www.lifeline.org.au

Looking for information on mental wellbeing? Information and support resources are available through:

www.ifarmwell.com.au An online toolkit specifically tailored to help growers cope with challenges, particularly things beyond their control (such as weather), and get the most out of every day.

www.blackdoginstitute.org.au The Black Dog Institute is a medical research institute that focuses on the identification, prevention and treatment of mental illness. Its website aims to lead you through the logical steps in seeking help for mood disorders, such as depression and bipolar disorder, and to provide you with information, resources and assessment tools.

www.crrmh.com.au The Centre for Rural & Remote Mental Health (CRRMH) provides leadership in rural and remote mental-health research, working closely with rural communities and partners to provide evidence-based service design, delivery and education.

Glove Box Guide to Mental Health

The *Glove Box Guide to Mental Health* includes stories, tips, and information about services to help connect rural communities and encourage conversations about mental health. Available online from CRRMH.

www.rrmh.com.au Rural & Remote Mental Health run workshops and training through its Rural Minds program, which is designed to raise mental health awareness and confidence, grow understanding and ensure information is embedded into agricultural and farming communities.

www.cores.org.au CORES™ (Community Response to Eliminating Suicide) is a community-based program that educates members of a local community on how to intervene when they encounter a person they believe may be suicidal.

www.headsup.org.au Heads Up is all about giving individuals and businesses tools to create more mentally healthy workplaces. Heads Up provides a wide range of resources, information and advice for individuals and organisations – designed to offer simple, practical and, importantly, achievable guidance. You can also create an action plan that is tailored for your business.

www.farmerhealth.org.au The National Centre for Farmer Health provides leadership to improve the health, wellbeing and safety of farm workers, their families and communities across Australia and serves to increase knowledge transfer between farmers, medical professionals, academics and students.

www.ruralhealth.org.au The National Rural Health Alliance produces a range of communication materials, including fact sheets and infographics, media releases and its flagship magazine *Partyline*.

ifarmwell growing farmers' wellbeing | Black Dog Institute | Centre for Rural & Remote Mental Health | CORES™
Rural & Remote Mental Health | Heads up Better mental health in the workplace | National Centre for Farmer Health | National Rural Health Alliance Ltd

P Level 4 | 4 National Circuit, Barton ACT 2600 | PO Box 5367, Kingston ACT 2604 **T** +61 2 6166 4500 **F** +61 2 6166 4599 **E** grdc@grdc.com.au

Managing nitrogen for high crop yields and sustainable farming systems

James Hunt[1].

[1]*La Trobe University.*

Keywords

nitrogen, yield, sustainable, farming systems.

Take home messages

Nitrogen (N) deficiency is the single biggest factor contributing to the Australian wheat yield gap.

You need to soil test to make any sort of rational decision about N fertiliser.

Yield Prophet®, back of the envelope calculations and 'N bank' targets are all valid ways of managing N fertiliser to achieve potential yields and avoid running down total soil N.

Don't fear over-application of N on most soils in southern Australia, unused N carries over and is available to subsequent crops and helps maintain soil organic matter.

Background

Australian wheat yields are only half what they could be for the rainfall received (Hochman et al. 2017). Nitrogen (N) deficiency is the single biggest factor contributing to this yield gap. This is also likely to be true for other non-legume crops (barley, canola and oats) which reduces farm profitability and global food security. Alleviating N deficiency would increase national wheat yields by 40 per cent (Hochman and Horan 2018), and substantially improve farm profit.

On farms with no legume pastures, most of the crop N supply must come from fertiliser. Grain legumes do not provide enough N to support yield of subsequent crops at the intensity at which they are currently grown. N fertiliser is a costly input and use of it increases cost of production and value-at-risk for growers. Growers fear that over-fertilisation will result in 'haying off', which reduces both yield and quality. There is also the concern that over applied fertiliser that is not used by crops is lost to the environment by leaching, volatilisation and denitrification. Consequently, efforts continue to be made to match N fertiliser inputs to seasonal yield potential. This is difficult in southern Australia due to the lack of accurate seasonal forecasts for rainfall.

The difficulty in matching N supply to crop demand and a tendency for growers to be conservative in their N inputs is responsible for a large proportion of the yield gap that can be explained by N deficiency. Chronic N deficiency has also caused soil organic matter to decline (Angus and Grace 2017) and has driven a rise in the proportion of low protein grain produced in Australia, which has eroded our standing as a producer of quality wheat in export markets.

'N banks' are a strategy for managing N in crop production areas with low environmental losses (leaching, denitrification, volatilisation). Most of the North Central region has soils which are free-draining and hold a reasonable amount of water and receive low to medium rainfall. Therefore, environmental losses of N are low, and N banks are an effective strategy for managing N in most of this region. Exceptions are areas prone to waterlogging or those that have very sandy soils where leaching may occur. The advantages of N banks are that they are simple to calculate, crops are rarely N deficient, and if set at an appropriate level for the environment, soil organic N is not mined. They also shift the cost of N fertiliser into years following a season of high production (when income is most likely to be high), rather than within a current season of **possible** high production.

N banks require growers to set a locally relevant target for crop N supply (soil mineral N plus fertiliser N) that is enough to maximise yield in most seasons. Soil mineral N is then measured early in the growing season, and if less than the target N bank, is topped up to the target value with fertiliser N. A more detailed description of N banks and a long term experiment investigating their effectiveness can be found here: http://www.ausgrain.com.au/Back%20 Issues/301mjgrn20/Grower%20group%20focus.pdf

Key Question 1 - How do we assess the N bank after a big season in the previous year?

The 'N bank' management system relies on growers knowing how much mineral N (nitrate and ammonium) they have available to a crop early in the growing season. It doesn't include in-season mineralisation in the calculations, because mineralisation is cancelled out by immobilisation in systems where soil organic matter is being maintained (i.e. stubble retained systems with neutral to positive N balance). Consequently, for any rational decision to be made on N management, it is critical that paddocks are soil tested to measure mineral N at the start of the season. Assessment of the soil N bank is achieved by testing for nitrate and ammonium. This can be done any time from March through to June, but if done following sowing it is essential that samples are taken from the inter-row to avoid sampling any fertiliser N applied at sowing. Soil cores should be taken to at least 0.6m (ideally >1.0m) and segmented into different depths (e.g. 0-0.1 m, 0.1-0.3 m, 0.3-0.6 m). At least six cores need to be taken per paddock or production zone within a paddock, and bulked samples carefully mixed. Samples should be kept cool and ideally air dried before being sent to an accredited laboratory for analysis. A good soil sampling contractor will do all these things for you!

Key Question 2 - With a big production year in mind, what are the key messages for growers to consider when developing a nitrogen strategy?

The yield gap due to N deficiency is always bigger in high production years. Growers either need to make a realistic assessment of current economic yield and associated crop N demand or choose an N bank target (see calculations in following section). They then need to calculate how much mineral N was available to crops early in the season from soil samples (refer to preceding section), and therefore, how much fertiliser N needs to be applied to achieve economic yield or the N bank target.

The bulk of this fertiliser should be applied in July-early August, and when cereal crops are sown on time, this is at Z30-31 and canola hasn't started elongating. Applying N at this time minimises volatilisation losses (i.e. cold and often wet soil with rain fronts coming through fairly regularly) and maximises chances of crop uptake. If you are applying N during this period, you do not need to do it right in front of a substantial rain, and you can apply it by a certain date of the calendar. Crops can be 'topped up' later in the season (e.g. Z37), but the risk of volatilisation losses are higher and substantial rain is needed to make sure the N becomes available to crops, especially if the topsoil is dry. If top-dressing later than mid-August you should do it in front of a substantial (>15 mm) forecast rain. Later N applications tend to boost protein content rather than grain yield.

Growers in North Central Victoria shouldn't fear over-application of N (supplying more N than the crop needs) on paddocks that aren't sandy or don't reliably get waterlogged. In these cases, leaching and denitrification losses are very low and N that is not used by the crop this year will be available for next year's crop. Crop simulations and the BCG-La Trobe long-term N field experiment at Curyo is showing that occasional over-application is more profitable in the long-term than under-application (Figure 1). Apart from the risk of 'haying off' (discussed later in this section), the only other reason not to overapply N is if your cash flow is tight and you can't afford not to get a return on investment in fertiliser N in the year of application.

Many growers continue to be concerned about 'haying off', that is excessive vegetative growth early in the season followed by a dry spring with a negative yield and quality response to applied fertiliser N). Chances of this happening are low in modern farming systems. This is due to;

1. The shift to continuous cropping and decline in pasture area has reduced both soil mineral N prior to sowing, and the amount that mineralises in-season.
2. Stubble retention further reduces in-crop mineralisation by increasing immobilisation.
3. Soil testing prevents N from being applied to paddocks with very high levels of soil mineral N.

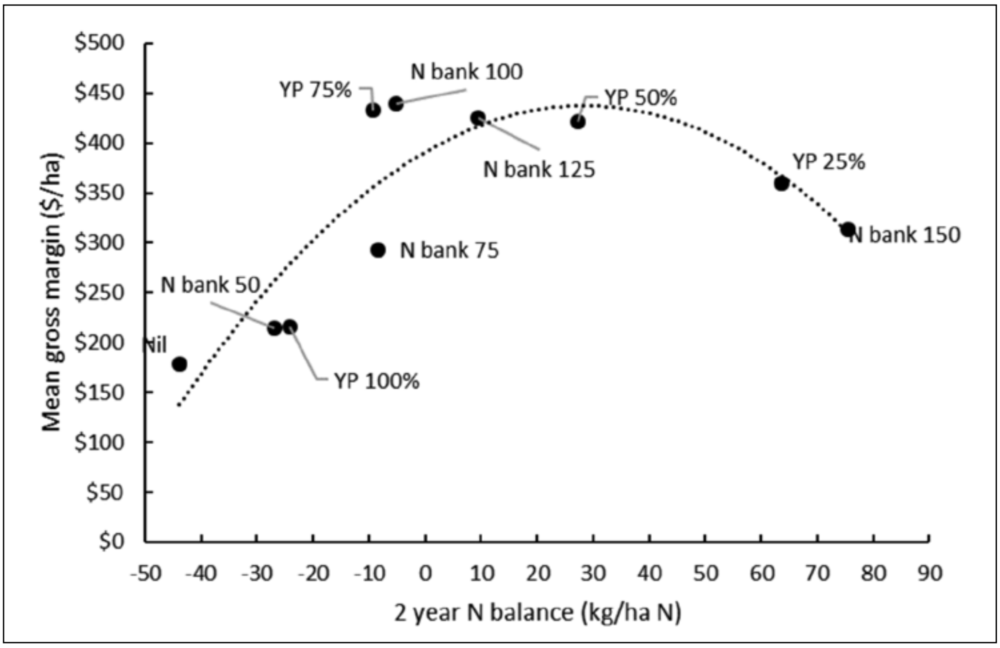


Figure 1. The BCG-La Trobe University long-term N management experiment at Curyo is showing that N management strategies that over-apply (i.e. have a neutral to positive N balance) are more profitable. These strategies will also avoid mining soil mineral N and thus running down soil organic matter. For details of the experiment see: http://www.ausgrain.com.au/Back%20Issues/301mjgrn20/Grower%20group%20focus.pdf The number following 'N bank' treatments is the N bank target in kg/ha. YP=Yield Prophet treatments at different levels of probability (YP100% targets yield assuming the worst seasonal finish on record, YP50% targets yield assuming a median finish, etc.).

4. Modern crops are less susceptible to haying off. Canola and high harvest index cultivars of barley, such as Spartacus⁽ᵈ⁾ are virtually immune. Modern wheat cultivars that have been heavily selected for grain size (e.g. Scepter⁽ᵈ⁾) carry a very low risk.

Key question 3 - What tools are available for growers and consultants to help with making decisions regarding nitrogen application?

Yield Prophet® is still an effective tool for attempting to match N supply to seasonal demand. The downside of Yield Prophet® is that it is data-hungry and requires experience to get it right. This simple spreadsheet tool (available here; https://www.bcg.org.au/understanding-crop-potential-and-calculating-nitrogen-to-improve-crop-biomass-workshop-recording/) requires less data but doesn't give probabilistic output or include seasonal forecasts. It uses the old 'back of the envelope' N budget calculation as follows;

Crop water supply (mm) = 0.25*(Nov-Mar rain) + growing season rain to-date + your guess at rain for the rest of the season

Water limited potential yield (t/ha) = 0.022*(crop water supply – 60)

Economic yield = 0.8*(water limited potential yield)

Crop N demand (kg/ha N) = 40*(economic yield)

Fertiliser N requirement (kg/ha N) = crop N demand – (soil mineral N + previous fertiliser application)

If you allow for in-crop mineralisation when calculating fertiliser requirement, you will run down soil organic N, and thus, soil organic matter. We can work this through with an example for a wheat crop in the North Central region using rainfall from Echuca Aerodrome with a conservative estimate of rainfall for the remainder of the season (120 mm). We'll also assume there was 75kg/ha mineral N measured in soil cores prior to sowing.

Crop water supply (mm) = 0.25*(149mm) + 176mm + 80mm = 293mm

Water limited potential yield (t/ha) = 0.022*(293 – 60) = 5.1t/ha

Economic yield = 0.8*(5.1) = 4.1t/ha

Crop N demand (kg/ha N) = 40*(4.1) = 164kg/ha N

Fertiliser N requirement (kg/ha N) = 164kg/ha N – (75kg/ha N + 7kg/ha N) = 82kg/ha N

This crop needs 82kg/ha fertiliser N (178kg/ha urea) to achieve the economic yield of 4.1 t/ha, assuming there is 80mm of rain between now (6 August) and the end of October.

The problem with Yield Prophet® and the 'back of the envelope' strategy is they require a forecast of the future (i.e. how much rain is going to fall between now and the end of the season). With the N bank management strategy that is currently being developed, we don't even attempt to match crop N supply to seasonal demand, we just make sure that the crop has enough N supply (soil mineral N measured early in the season + fertiliser) to achieve water limited potential yield in the majority of seasons. We do this by selecting an N bank target appropriate for the environment. A target of 125kg/ha N is proving most profitable in the southern Mallee, but it is likely to be more like ~200kg/ha N at Elmore. We then use soil mineral N measurements from soil cores to work out how much mineral N the crop has available and top up the balance with fertiliser. For example;

Soil mineral N measured in soil cores = 75kg/ha N

N bank target = 200kg/ha N

Fertiliser required to meet N bank target = 200 – 75 = 125kg/ha N (271kg/ha urea)

This system relies on having well drained loams or clay soils with low risks of leaching or denitrification losses associated with waterlogging, so that any surplus N applied carries over to the next season. You need to apply less N following a low yielding year when a lot of mineral N is not used by the crop, and consequently, is carried over, and more N following a high yielding year when lots of N is taken up by the crop and removed in grain.

Two years of results from the experiment at Curyo indicate that the N bank strategy and Yield Prophet® use similar amounts of N and are equally profitable (Figure 2), and this is confirmed by simulation studies over many seasons (Meier *et al*. CSIRO unpublished).

Conclusion

Nitrogen deficiency is the single biggest cause of the Australian wheat yield gap. Growers can easily reduce this yield gap, increase profitability and stop mining soil organic matter and N by better managing fertiliser N inputs. Soil testing is essential to do this. N banks, Yield Prophet® or 'back of the envelope' calculations are all equally effective at reducing N limitation and increasing profit. N banks are much simpler to calculate but run a higher risk of losses and have not been validated in the field over the long-term.

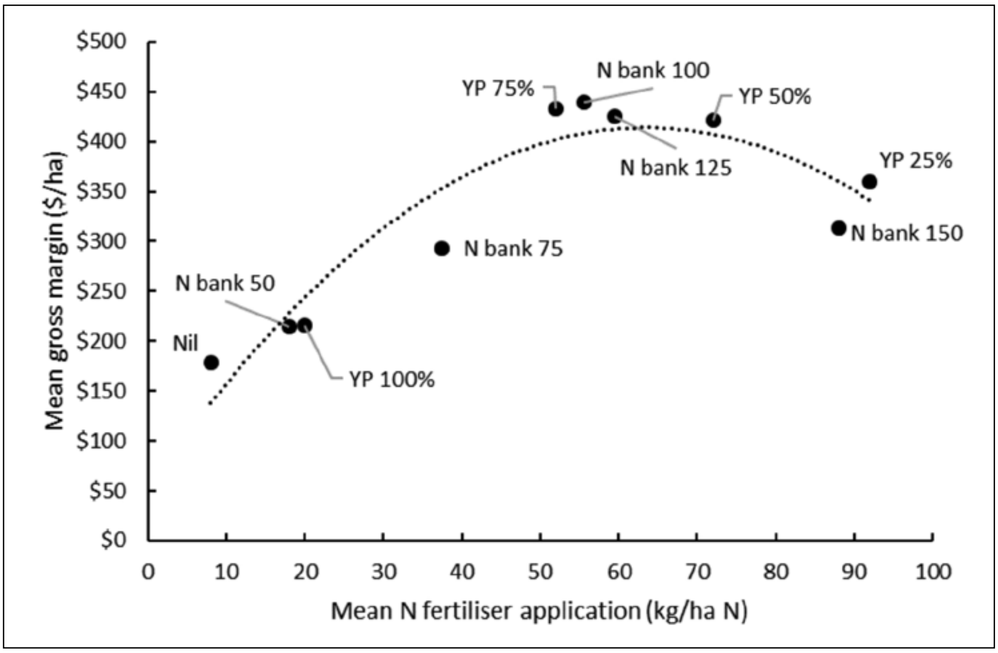


Figure 2. Mean fertiliser application and mean gross margin (2018-2019) for the BCG-La Trobe University long-term N management experiment at Curyo. For details of the experiment see http://www.ausgrain.com.au/Back%20Issues/301mjgrn20/Grower%20group%20focus.pdf the number following 'N bank' treatments is the N bank target in kg/ha. YP=Yield Prophet treatments at different levels of probability (YP100% targets yield assuming the worst season finish on record, YP50% targets yield assuming a median finish etc.).

Acknowledgements

This project is funded by La Trobe University through the Securing Food, Water and the Environment Research Focus Area and the Mallee Catchment Management Authority, through funding from the Australian Government's National Landcare Program.

Useful resources

http://www.ausgrain.com.au/Back%20Issues/301mjgrn20/Grower%20group%20focus.pdf

https://www.bcg.org.au/managing-n-fertiliser-to-profitably-close-yield-gaps/

https://grdc.com.au/resources-and-publications/all-publications/publications/2020/a-nitrogen-reference-manual-for-the-southern-cropping-region

References

Angus, JF, Grace, PR (2017) Nitrogen balance in Australia and nitrogen use efficiency on Australian farms. *Soil Research* **55**, 435-450.

Hochman, Z, Gobbett, DL, Horan, H (2017) Climate trends account for stalled wheat yields in Australia since 1990. *Global Change Biology* **23**, 2071–2081.

Hochman, Z, Horan, H (2018) Causes of wheat yield gaps and opportunities to advance the water-limited yield frontier in Australia. *Field Crops Research* **228**, 20-30.

Contact details

Associate Professor James Hunt
Department of Animal, Plant and Soil Sciences,
La Trobe University
0428 636 391
j.hunt@latrobe.edu.au
@agronomeiste

Return to contents

Notes

Notes

Managing red leather leaf disease and preventing weather damage in oats

Mark McLean and Hari Dadu.

Agriculture Victoria, Horsham.

GRDC project codes: DJP1097-001RTX, DJP1907-004RTX

Keywords

disease resistance, integrated disease management, fungicides.

Take home messages

Red leather leaf (RLL) is a common foliar disease that causes yield losses in milling and hay oats in the medium and high rainfall zones of Victoria.

Avoiding planting of very susceptible rated varieties significantly reduces losses.

Foliar fungicide applied at mid tillering (Z25) and early stem elongation (Z31) provided the best suppression of RLL.

Foliar fungicide application also provided suppression of fungal saprophytes and reduced hay discolouration post hay cutting.

Introduction

Red leather leaf (RLL) is a common seed and stubble-borne foliar disease of oats in south-eastern Australia. It is favoured by cool, wet conditions. Growers should avoid sowing oats into paddocks with oat stubble from previous years as this is the main source of infection. RLL can also be seed-borne, so it is important to monitor all crops and use seed from clean sources. The majority of varieties are susceptible to RLL, especially the commonly grown varieties such as Yallara⦶, Mitika⦶ and Wintaroo⦶. Some varieties such as Bannister⦶, Kowari⦶ and Forester⦶ have better resistance, and therefore, their use reduces the risk of yield loss from disease.

Surveys (funded by AgriFutures Australia) during 2018 and 2019 determined that RLL was present in approximately 90% of oat crops in the medium and high rainfall zones of Victoria. Severity was greater with higher winter rainfall. Red leather leaf was less common and had low severity in the low rainfall Mallee environment and was unlikely to have caused a yield loss.

No fungicides are registered for control of RLL in oats, however products are registered for other diseases in oats and can provide suppression of RLL. Some of these products can also provide prolonged green leaf retention and suppression of saprophytic fungi that colonise hay post cutting. It is important to always follow the label instructions for the other diseases including the relevant withholding periods for harvest and cutting for stock food.

Experiments were conducted to determine the grain and hay yield losses due to RLL in different varieties and different environments; to determine the best timing for foliar fungicides for the suppression of RLL and suppression of saprophytic fungi post hay cutting.

Grain yield loss

Experiments conducted at Horsham, Victoria in 2019 demonstrated that RLL caused up to 13% (0.5t/ha) grain yield loss in susceptible varieties (Table 1). Yallara⦶ was the worst affected, while Mitika⦶ and Williams⦶ also recorded reductions in grain yield. Growers should grow moderately susceptible (MS) or better rated varieties to reduce losses from RLL. Most of the RLL infection occurred on the flag minus two leaves and lower in the canopy. Greater losses are possible during wet weather conditions that favour greater infection on the top two leaves.

Hay yield loss

At Horsham, RLL severity varied significantly between varieties (Table 2). The worst affected were the susceptible rated varieties Mulgara(b), Yallara(b) and Wintaroo(b). Stem thickness and plant height were also significantly reduced. There was no significant effect on hay yield (data not shown), this was most likely due to the dry spring conditions limiting infection later in the season.

At Inverleigh, RLL infection was more severe compared to Horsham (Table 3) due to wetter seasonal conditions during winter and spring (Table 3). This resulted in significant hay yield loss of 0.5 – 1.0 t/ha in the susceptible rated varieties. Moderately susceptible or better rated varieties did not record significant reductions in hay yield. These findings demonstrate the benefits of avoiding growing oat varieties which are rated susceptible to RLL that to reduce risk of loss.

Fungicides

There are no fungicides registered for control of RLL, however there are products registered for other diseases in oats. We found that fungicides suppress RLL but do not provide complete control. Foliar fungicide applications at Z25 and Z31 were most effective as they coincide with early disease development, while application at Z39 can provide benefits during seasons with wet springs.

Table 1. Red leather leaf severity and grain yield of six milling oat varieties in response to disease and fungicide treatments near Horsham during 2019.

		Red leather leaf (RLL) severity (% leaf area affected) 16/8 Z32		Grain yield (t/ha)		
Variety	Rating#	Maximum Disease	Minimum Disease	Maximum Disease	Minimum Disease	Loss (%)
Kowari(b)	MS	14	7	4.2	4.2^{ns}	0
Bilby(b)	MS	14	8	3.7	3.9^{ns}	5
Bannister(b)	MSS	16	8	3.9	4.1^{ns}	5
Williams(b)	MS	15	7	3.8	4.2*	9
Mitika(b)	S	16	10	4.0	4.4*	9
Yallara(b)	SVS	20	11	3.3	3.8*	13
P=		<0.001	0.034	-	-	-
LSD (0.05)=		2.1	2.6	-	-	-

General analysis of variance for a completely randomised design was used for analysis.

*= statistically significant at P < 0.05; ns= not statistically significant

Maximum Disease - Spread 1kg infected stubble, no fungicides; Minimum Disease = no stubble infection, propiconazole at Z25, Z31 and Z39.

#rating = moderately resistant (MR), moderately susceptible (MS), moderately resistant – moderately susceptible (MRMS), moderately susceptible – susceptible (MSS), susceptible (S), susceptible – very susceptible (SVS), very susceptible (VS), taken from the Victorian Cereal Disease Guide.

Table 2. Impact of Red leather leaf on hay characteristics of six hay oat varieties in response to disease and fungicide treatments at Horsham during 2019.

Variety	Rating	Red leather leaf severity % (Z32)		Stem thickness (mm)		Plant height (cm)	
		Maximum Disease	Minimum Disease	Maximum Disease	Minimum Disease	Maximum Disease	Minimum Disease
Forester(b)	MRMS	2	1*	3.7	4.0**	83	81^{ns}
Brusher(b)	MS	12	7**	3.8	3.8^{ns}	84	85^{ns}
Williams(b)	MS	16	7**	4.3	4.7**	72	79**
Mulgara(b)	S	18	11**	4.1	4.3**	94	99**
Yallara(b)	S	19	12**	3.8	4.1**	80	84**
Wintaroo(b)	S	20	11**	4.1	4.2*	85	88**

General analysis of variance for a completely randomised design was used for analysis.

** = statistically significant at P < 0.001;

*= statistically significant at P < 0.05; ns= not statistically significant

Maximum Disease – Spread 1kg infected stubble, no fungicides; Minimum Disease = no stubble infection, propiconazole at Z25, Z31 and Z39.

Table 3. Red leather leaf severity and hay yield of six hay varieties in response to disease and fungicide treatments at Inverleigh.

Variety	Rating	Red leather leaf severity (%) GS 31		Hay yield (t/ha)		Loss %
		Maximum Dis-ease	Minimum Dis-ease	Maximum Dis-ease	Minimum Dis-ease	
Forester(b)	MRMS	4	2**	8	8[ns]	0
Brusher(b)	MS	13	5**	8.5	8.5[ns]	0
Williams(b)	MS	15	6**	7.5	7.5[ns]	0
Mulgara(b)	S	35	20**	7	8**	13
Yallara(b)	S	27	13**	7	7.5*	7
Winteroo(b)	S	31	17**	7.5	8.5**	12

General analysis of variance for a completely randomised design was used for analysis.

** = statistically significant at $P < 0.001$;

*= statistically significant at $P < 0.05$; ns= not statistically significant

Maximum Disease – Spread 1kg infected stubble, no fungicides; Minimum Disease = no stubble infection, pro-piconazole at Z25, Z31 and Z39.

Table 4. Visual estimate of percentage colonisation by saprophytes and mould colony units on oaten hay 40 days after cutting.

Treatment	Percent of Saprophytic growth		Mean mould units /g
	Sub surface layer	Top surface layer	
Propiconazole Z25, Z31 and Z55	1[a]	29[a]	63,667[a]
Propiconazole Z25, Z31 and pyraclostrobin + epoxiconazole Z55	2[a]	26[a]	93,667[a]
No Fungicide	10[b]	58[b]	1,810,667[b]
P =	<0.001	<0.001	0.002
LSD (0.05) =	1.9	5.1	57856

General analysis of variance for a completely randomised design was used for analysis. Fisher's protected LSD was used for pairwise comparison of Treatment. Means with one letter in common are not significant.

Hay discoloration

One experiment was conducted near Horsham to investigate the efficacy of repeat applications of propiconazole compared to propiconazole followed by (fb.) pyraclostrobin plus epoxiconazole on the suppression of saprophytic colonisation and mould growth on cut hay. Seasonal conditions were dry and the first observation of saprophyte growth was 40 days after hay cutting. Application of propiconazole and propiconazole fb. pyraclostrobin plus epoxiconazole significantly reduced saprophytic fungal growth and mould colonies (Table 4).

To avoid problems with maximum residue limits, growers are requested to adhere recommended withholding periods following application of respective fungicides.

Useful resources

Cereal disease guide: https://agriculture.vic.gov.au/biosecurity/plant-diseases/grain-pulses-and-cereal-diseases/cereal-disease-guide

Field Crop Diseases Victoria website: https://extensionaus.com.au/FieldCropDiseasesVic/

National Variety Trial (NVT) website https://www.nvtonline.com.au/

Victorian crop sowing guide https://grdc.com.au/2020-victorian-crop-sowing-guide

Acknowledgements

This research was made possible with investment from the Grains Research and Development Corporation (GRDC), the Victorian Government and AgriFutures Australia. Thanks to Agriculture Victoria's field crop pathology team. Thanks to the Foundation for Arable Research for field trials at Inverleigh.

Contact details
Mark McLean
Agriculture Victoria
Private Bag 260, Horsham VIC 3401
03 4344 3111
mark.s.mclean@agriculture.vic.gov.au
@msmclean777

Hari Dadu
Agriculture Victoria
Private Bag 260, Horsham VIC 3401
03 4344 3111
Hari.dadu@ecodev.vic.gov.au
@lmharidadu

Return to contents

Notes

GRDC
GROWNOTES

SPRAY APPLICATION GROWNOTES™ MANUAL

SPRAY APPLICATION MANUAL FOR GRAIN GROWERS

The Spray Application GrowNotes™ Manual is a comprehensive digital publication containing all the information a spray operator needs to know when it comes to using spray application technology.

It explains how various spraying systems and components work, along with those factors that the operator should consider to ensure the sprayer is operating to its full potential.

This new manual focuses on issues that will assist in maintaining the accuracy of the sprayer output while improving the efficiency and safety of spraying operations. It contains many useful tips for growers and spray operators and includes practical information – backed by science – on sprayer set-up, including self-propelled sprayers, new tools for determining sprayer outputs, advice for assessing spray coverage in the field, improving droplet capture by the target, drift-reducing equipment and techniques, the effects of adjuvant and nozzle type on drift potential, and surface temperature inversion research.

It comprises 23 modules accompanied by a series of videos which deliver 'how-to' advice to growers and spray operators in a visual easy-to-digest manner. Lead author and editor is Bill Gordon and other contributors include key industry players from Australia and overseas.

Spray Application GrowNotes™ Manual – go to: https://grdc.com.au/Resources/GrowNotes-technical
Also go to https://grdc.com.au/Resources/GrowNotes and check out the latest versions of the Regional Agronomy Crop GrowNotes™ titles.

GRDC™
GRAINS RESEARCH & DEVELOPMENT CORPORATION

TOP 10 TIPS

FOR REDUCING SPRAY DRIFT

GRDC
GRAINS RESEARCH & DEVELOPMENT CORPORATION

01 **Choose all products in the tank mix carefully**, which includes the choice of active ingredient, the formulation type and the adjuvant used.

02 **Understand** how product uptake and translocation may impact on coverage requirements for the target. Read the label and technical literature for guidance on spray quality, buffer (no-spray) zones and wind speed requirements.

03 **Select the coarsest** spray quality that will provide an acceptable level of control. Be prepared to increase application volumes when coarser spray qualities are used, or when the delta T value approaches 10 to 12. Use water-sensitive paper and the Snapcard app to assess the impact of coarser spray qualities on coverage at the target.

04 **Always expect** that surface temperature inversions will form later in the day, as sunset approaches, and that they are likely to persist overnight and beyond sunrise on many occasions. If the spray operator cannot determine that an inversion is not present, spraying should NOT occur.

05 **Use weather forecasting** information to plan the application. BoM meteograms and forecasting websites can provide information on likely wind speed and direction for 5 to 7 days in advance of the intended day of spraying. Indications of the likely presence of a hazardous surface inversion include: variation between maximum and minimum daily temperatures are greater than 5°C, delta T values are below 2 and low overnight wind speeds (less than 11km/h).

06 **Only start spraying** after the sun has risen more than 20 degrees above the horizon and the wind speed has been above 4 to 5km/h for more than 20 to 30 minutes, with a clear direction that is away from adjacent sensitive areas.

07 **Higher booms increase drift**. Set the boom height to achieve double overlap of the spray pattern, with a 110-degree nozzle using a 50cm nozzle spacing (this is 50cm above the top of the stubble or crop canopy). Boom height and stability are critical. Use height control systems for wider booms or reduce the spraying speed to maintain boom height. An increase in boom height from 50 to 70cm above the target can increase drift fourfold.

08 **Avoid high spraying speeds**, particularly when ground cover is minimal. Spraying speeds more than 16 to 18km/h with trailing rigs and more than 20 to 22km/h with self-propelled sprayers greatly increase losses due to effects at the nozzle and the aerodynamics of the machine.

09 **Be prepared** to leave unsprayed buffers when the label requires, or when the wind direction is towards sensitive areas. Always refer to the spray drift restraints on the product label.

10 **Continually monitor** the conditions at the site of application. Where wind direction is a concern move operations to another paddock. Always stop spraying if the weather conditions become unfavourable.
Always record the date, start and finish times, wind direction and speed, temperature and relative humidity, product(s) and rate(s), nozzle details and spray system pressure for every tank load. Plus any additional record keeping requirements according to the label.

THE 2017-2020 GRDC SOUTHERN REGIONAL PANEL

JANUARY 2020

GRDC GRAINS RESEARCH & DEVELOPMENT CORPORATION

CHAIR - JOHN BENNETT

Based at Lawloit, between Nhill and Kaniva in Victoria's West Wimmera, John, his wife Allison and family run a mixed farming operation across diverse soil types. The farming system is 70 to 80 percent cropping, with cereals, oilseeds, legumes and hay grown. John believes in the science-based research, new technologies and opportunities that the GRDC delivers to graingrowers. He wants to see RD&E investments promote resilient and sustainable farming systems that deliver more profit to growers and ultimately make agriculture an exciting career path for young people.

M 0429 919 223 **E** john.bennett5@bigpond.com

DEPUTY CHAIR - MIKE MCLAUGHLIN

Mike is a researcher with the University of Adelaide, based at the Waite campus in South Australia. He specialises in soil fertility and crop nutrition, contaminants in fertilisers, wastes, soils and crops. Mike manages the Fertiliser Technology Research Centre at the University of Adelaide and has a wide network of contacts and collaborators nationally and internationally in the fertiliser industry and in soil fertility research.

M 0434 765 574
E michael.mclaughlin@adelaide.edu.au

PETER KUHLMANN

Peter is a farmer at Mudamuckla near Ceduna on South Australia's Western Eyre Peninsula. He uses liquid fertiliser, no-till and variable rate technology to assist in the challenge of dealing with low rainfall and subsoil constraints. Peter has been a board member of and chaired the Eyre Peninsula Agricultural Research Foundation and the South Australian Grain Industry Trust.

M 0428 258 032 **E** mudabie@bigpond.com

JON MIDWOOD

Jon has worked in agriculture for the past three decades, both in the UK and in Australia. In 2004 he moved to Geelong, Victoria, and managed Grainsearch, a grower-funded company evaluating European wheat and barley varieties for the high rainfall zone. In 2007, his consultancy managed the commercial contract trials for Southern Farming Systems (SFS). In 2010 he became Chief Executive of SFS, which has five branches covering southern Victoria and Tasmania. In 2012, Jon became a member of the GRDC's HRZ Regional Cropping Solutions Network.

M 0400 666 434 **E** jmidwood@sfs.org.au

FIONA MARSHALL

Fiona has been farming with her husband Craig for 21 years at Mulwala in the Southern Riverina. They are broadacre, dryland grain producers and also operate a sheep enterprise. Fiona has a background in applied science and education and is currently serving as a committee member of Riverine Plains Inc, an independent farming systems group. She is passionate about improving the profile and profitability of Australian grain growers.

M 0427 324 123 **E** redbank615@bigpond.com

LOUISE FLOHR

Lou is a farmer based at Lameroo in the Southern Mallee of South Australia. Along with her parents and partner, she runs a mixed farming enterprise including export oaten hay, wheat, barley a variety of legumes and a self-replacing Merino flock. After graduating Lou spent 3 years as a sales agronomist where she gained valuable on-farm experience about the retail industry and then returned to her home town of Lameroo. She started her own consultancy business three years ago and is passionate about upskilling women working on farms.

M 0429 083 927 **E** flohrlouise@gmail.com

RICHARD MURDOCH

Richard along with wife Lee-Anne, son Will and staff, grow wheat, canola, lentils and faba beans on some challenging soil types at Warooka on South Australia's Yorke Peninsula. They also operate a self-replacing Murray Grey cattle herd and Merino sheep flock. Sharing knowledge and strategies with the next generation is important to Richard whose passion for agriculture has extended beyond the farm to include involvement in the Agricultural Bureau of SA, Advisory Board of Agriculture SA, Agribusiness Council of Australia SA, the YP Alkaline Soils Group and grain marketing groups.

M 0419 842 419 **E** tuckokcowie@internode.on.net

MICHAEL CHILVERS

Michael runs a collaborative family farming enterprise at Nile in the Northern Midlands of Tasmania (with property also in northern NSW) having transitioned the business from a dryland grazing enterprise to an intensive mixed farming enterprise. He has a broad range of experience from resource management, strategic planning and risk profiling to human resource management and operational logistics, and has served as a member of the the High Rainfall Zone Regional Cropping Solutions Network for the past seven years.

M 0409 974 556 **E** fchilvers@bigpond.com

KATE WILSON

Kate is a partner in a large grain producing operation in Victoria's Southern Mallee region. Kate and husband Grant are fourth generation farmers producing wheat, canola, lentils, lupins and field peas. Kate has been an agronomic consultant for more than 20 years, servicing clients throughout the Mallee and northern Wimmera. Having witnessed and implemented much change in farming practices over the past two decades, Kate is passionate about RD&E to bring about positive practice change to growers.

M 0427 571 360 **E** kate.wilson@agrivision.net.au

ANDREW RUSSELL

Andrew is a forth generation grain grower and is currently the Managing Director and Shareholder of Lilliput AG and a Director and Shareholder of the affiliated Baker Seed Co - a family owned farming and seed cleaning business. He manages the family farm in the Rutherglen area, a 2,500 ha mixed cropping enterprise and also runs 2000 cross bred ewes. Lilliput AG consists of wheat, canola, lupin, faba bean, triticale and oats and clover for seed, along with hay cropping operations. Andrew has been a member of GRDC's Medium Rainfall Zone Regional Cropping Solutions Network and has a passion for rural communities, sustainable and profitable agriculture and small business resilience.

M 0417 401 004 **E** arussell@lilliput-ag.com.au

DR NICOLE JENSEN

Nicole Jensen is GRDC General Manager for the newly created Genetics and Enabling Technologies business group. Nicole brings a wealth of experience in plant breeding and related activities arising from several roles she has held in Australia and internationally in the seed industry including positions as Supply Innovation Lead with the Climate Corporation - Monsanto's digital agricultural flagship, Global Trait Integration Breeding Lead for Monsanto.

T 02 6166 4500 **E** Nicole.Jensen@grdc.com.au

T +61 8 8198 8407
P Grains Research and Development Corporation (GRDC) | Level 1 | 187 Fullarton Road, Dulwich 5065, South Australia

KEY CONTACTS

SOUTHERN REGION

ADELAIDE
Level 1
187 Fullarton Road
DULWICH SA 5065

P: +61 8 8198 8400
southern@grdc.com.au

OPERATIONS GROUP

SENIOR REGIONAL MANAGER
Craig Ruchs
Craig.Ruchs@grdc.com.au
M: +61 4 7771 0813

BUSINESS SUPPORT TEAM LEADER
Amanda Kendall
Amanda.Kendall@grdc.com.au
P: +61 8 8198 8402

CONTRACT AND TEAM ADMINISTRATOR
Claire West
Claire.West@grdc.com.au
P: +61 8 8198 8401

CONTRACT ADMINISTRATOR
Mark Waterhouse
Mark.Waterhouse@grdc.com.au
P: +61 8 8198 8406

APPLIED RESEARCH AND DEVELOPMENT GROUP

MANAGER AGRONOMY, SOILS, NUTRITION AND FARMING SYSTEMS
Stephen Loss
Stephen.Loss@grdc.com.au
M: +61 4 0841 2453

MANAGER AGRONOMY, SOILS, NUTRITION AND FARMING SYSTEMS
Allison Pearson
Allison.Pearson@grdc.com.au
M: +61 4 1887 4748

MANAGER WEEDS (NATIONAL)
Jason Emms
Jason.Emms@grdc.com.au
M: +61 4 3954 9950

CROP PROTECTION MANAGER SOUTH
Ruth Peek
Ruth.Peek@grdc.com.au
M: +61 4 5553 4040

GENETICS AND ENABLING TECHNOLOGIES GROUP

SENIOR MANAGER ENABLING TECHNOLOGIES
Tom Giles
Tom.Giles@grdc.com.au
M: +61 4 1788 9860

SENIOR MANAGER NATIONAL VARIETY TRIALS
Sean Coffey
Sean.Coffey@grdc.com.au
M: +61 4 2865 2226

MANAGER NATIONAL VARIETY TRIALS SOUTH
Rob Wheeler
Rob.Wheeler@grdc.com.au
M: +61 4 0114 8935

MANAGER NATIONAL VARIETY TRIALS SYSTEMS
Neale Sutton
Neale.Sutton@grdc.com.au
M: +61 4 3857 9992

MANAGER RESEARCH PLATFORMS
Trevor Garnett
Trevor.Garnett@grdc.com.au
M: +61 4 5790 6770

NATIONAL VARIETY TRIALS OFFICER
Ben O'Connor
Ben.O'Connor@grdc.com.au
M: +61 4 9988 7749

CONTRACT ADMINISTRATOR
Cindy Hall
Cindy.Hall@grdc.com.au
P: +61 8 8198 8407

GROWER EXTENSION AND COMMUNICATIONS GROUP

GROWER RELATIONS MANAGER
Courtney Ramsey
Courtney.Ramsey@grdc.com.au
M: +61 4 2827 4018

GROWER RELATIONS MANAGER
Randall Wilksch
Randall.Wilksch@grdc.com.au
M: +61 4 3776 9098

GROWER RELATIONS MANAGER
Tom Blake
Tom.Blake@grdc.com.au
M: +61 4 1889 3186

COMMUNICATIONS MANAGER
Sharon Watt
Sharon.Watt@grdc.com.au
M: +61 4 0967 5100

BUSINESS AND COMMERCIAL GROUP

ACTING GM – BUSINESS DEVELOPMENT AND ECONOMICS GROUP
Ron Osmond
Ron.Osmond@grdc.com.au
M: +61 4 000 2640

MANAGER COMMERCIALISATION
Fernando Felquer
Fernando.Felquer@grdc.com.au
M: +61 4 1351 1412

GET THE LATEST STORED GRAIN INFORMATION ONLINE

GRDC
GRAINS RESEARCH & DEVELOPMENT CORPORATION
STORED GRAIN PROJECT

storedgrain.com.au

Booklets and fact sheets on all things grain storage

Workshops in all regions covering topics such as:

- Economics of on-farm storage
- Grain storage hygiene
- Aeration cooling or drying
- Managing high moisture
- Fumigation
- Insect pest management
- Managing different storages
- Storage facility design
- Storing pulses and oilseeds

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

Download the new storedgrain app to get the latest information and storage recording tool on your iPhone or iPad

GRDC
GRAINS RESEARCH & DEVELOPMENT CORPORATION
STORED GRAIN PROJECT

www.grdc.com.au | www.storedgrain.com.au | 02 6166 4500