Mallee Farmer

ISSUE #22 SPRING EDITION 2022

Featuring

Latest Crop Research Results.

Reducing the impact from crop diseases.

How to develop a farm biosecurity plan.

A new climate mapping tool from Agriculture Victoria.

Plains-wanderers heard in the Mallee.

And much more

Australian Government | National Landcare Program

mallee catchment management authority

Contents

3 Chair's Report.

4 Regional Agriculture Landcare Facilitators (RALF) regional roundup.

6 Vegetative frost tolerance in lentil and impact on grain yield.

10 Ag Vic delivers podcasts for your listening pleasure.

11 Mallee soils research receives a drought fund boost.

13 Mallee farmers to benefit from robust farming systems project.

14 Vegetative frost tolerance in lentil and impact on grain yield.

16 Water use options on Mallee sands to prevent the formation and recharge of Mallee seeps.

22 New mapping tool will help predict the impact of future climate variability.

23 Undertaking a risk assessment and action plan.

24 The perennial problem of frost; start planning now for the 2023 season.

26 Plains-wanderer calls recorded in annual survey.

27 Delivering infrastructure for the environment.

28 Celebrating World Conservation Day

31 Tempy Primary School makes it to the National Landcare Awards

NLP Acknowledgement
This publication is supported by the Mallee Catchment Management Authority (CMA), through funding from the Australian Government's National Landcare Program.

Australian Government | National Landcare Program

mallee catchment management authority

Publisher:
Mallee Catchment Management Authority
ISSN: 1839 - 2229

Front cover photo:
Audrey Delahunty, Senior Research Scientist (Agronomy) Agriculture Victoria, pictured at one the Mallee crop research sites near Ouyen.
Photo: Stacey Solomon, Frontier Farming Systems.

Acknowledgement of Country

The Mallee Farmer acknowledges and respects Traditional Owners, Aboriginal communities and organisations.

We recognise the diversity of their cultures and the deep connections they have with Victoria's lands and waterways.

Chair's Report.

Welcome to the latest edition of Mallee Farmer – your insight into the dryland farming research, trends and programs in the Mallee.

In this edition we have some interesting articles and updates on a range of important topics including regional roundups from our RALF Coordinators, reports on the variation for vegetative frost tolerance across lentil varieties, how to develop a farm biosecurity plan, Junior Landcare activities in the Mallee and proactive management steps to help reduce the impacts of crop diseases.

Weather has played a big part in farming this year and it is important for the farming community to continue planning for the new season. Mallee Farmer has kept that in mind and highlighted useful resources and important work being done to support our farming community to help make informed decisions on-farm.

Significant work is being undertaken across the Mallee region by our supporters and contributors including Agriculture Victoria, Landcare, Mallee Catchment Management Authority (CMA), Mallee Sustainable Farming and Junior Landcare, to name a few.

Among the highlights of this edition:

- ***Mallee Sustainable Farming outlines their Better Frost Decisions program;***
- ***Targeted research trials have paid off with the development of a new on-line tool to assist in the control of Mallee seeps;***
- ***AgVic provides important information about developing a Farm Biosecurity plan and undertaking a risk assessment and action plan on farm;***
- ***We hear from Mallee CMA about the work being undertaken in preserving the Plains-wanderer and the survey work that is continuing;***
- ***An update on the outstanding conservation work being done by students at the Tempy Primary School;***
- ***A welcome funding boost for Mallee soils research.***

It's also pleasing to get a fresh RALF Regional Roundup from Glen Sutherland and Cameron Flowers, keeping readers in touch with the latest farming news in the Mallee. In this edition, Glen and Cameron let us know about some upcoming grains research conferences and some valuable new resources available from Agriculture Victoria.
As Chair of Mallee CMA, it's pleasing to see so much progress being made on a wide range of research projects, enhancing the prospects of the local agriculture industry and the environment. Thank you to everyone who contributes to expanding our knowledge on a wide range of topics.

As always, thank you also to everyone who makes Mallee Farmer possible. The publication continues to enjoy the support of many government agencies, as well as the community.

I wish everyone across the region all the best after a difficult period of wet weather and flooding for many, and hope everyone has a trouble free and safe harvest, followed by a well deserved festive season break.

Allison McTaggart
Chair
Mallee Catchment Management Authority.

If you would like a copy of the Mallee Farmer?

Send us your contact information and we will post or email a copy to you.

Email:
reception@malleecma.com.au

Spring and **Autumn Editions** of the Mallee Farmer are produced each year. Jump online and click on the link to subscribe at

www.malleecma.com.au

Regional Agriculture Landcare Facilitators (RALF) regional roundup.

By Glen Sutherland and Cameron Flowers, Regional Agriculture Landcare Facilitators (RALFs), Mallee Catchment Management Authority.

Participants at the spring Mallee Sustainable Farming Kooloonong crop walk. Photo: Mallee CMA.

As we go to print, the annual spring round of regional production-focused crop walks, field days and workshops has all but wrapped up for this calendar year. This season has seen a return to our more traditional in-person engagement events, with participation numbers suggesting that everyone is pleased to be able to meet in-person once again. Key topics covered this season at both online and in-person events have included pressing farming issues arising from the prevailing weather conditions, such as crop disease management. This is in response to the year's much wetter than normal conditions. Don't despair if you couldn't make the events though, as some of the topics covered are also discussed in this edition of the Mallee Farmer, including the ongoing work on crop responses in the deep ripping of Mallee soils trials, and the validation work on the most successful ways to control Mallee seeps. Speaking of Mallee seeps, Mallee Sustainable Farming in partnership with Mallee CMA is well down the track of organising two seeps control workshops planned for early 2023. These workshops will focus on the early detection of at-risk sites from potential seeps. The workshops will also present the findings of research work that has identified practical control methods to manage existing seep sites.

Keep an eye out for the event details closer to the date on the Mallee Sustainable Farming Facebook page https://www.facebook.com/MSFMallee.

As mentioned in the last edition of the Mallee Farmer (Winter 2022), the RALF Regional Roundup aims to provide news and information about upcoming regional events relating to sustainable agriculture and other activities that may be of interest to farmers and farming communities.

What's coming up in 2023?
A number of Grains Research and Development Corporation (GRDC) events will be held early next year. The GRDC Grains Research Update events are for agronomists, consultants, researchers and growers to see and discuss the latest in research and to network with their peers about how to apply new and relevant information to the latest farming systems.

For further details about the events, the contact is Matt McCarthy,
Phone: 03 054416176. Email: admin@orm.com.au

Below are the event dates and locations:

- **Adelaide** - 7 & 8 February 2023, Adelaide Convention Centre.
- **Bendigo** - 21 & 22 February 2023, Ulumbarra Theatre, Bendigo.
- **Charlton** - 23 February 2023, Charlton Football Club.

Handy new resources.
A series of free online biosecurity learning modules for farmers has been released by Agriculture Victoria. These modules will help farmers to protect their animals from diseases and biosecurity threats. The training will better equip farmers, livestock producers, small landholders, industry workers and farm visitors with the knowledge and skills they need to ensure a safe and disease-free environment for livestock.

The three modules are available now through Agriculture Victoria's website: foot and mouth disease awareness, lumpy skin disease awareness and Come clean, stay clean, go clean – when visiting farms. Each module takes approximately 15 minutes to complete.

While foot-and-mouth disease (FMD) and lumpy skin disease are not currently present in Australia, there are emerging threats with outbreaks in neighbouring countries. Foot and mouth disease is considered one of Australia's greatest biosecurity risks, so it is vital that livestock owners or people working with livestock take the appropriate biosecurity actions now.

For further information about the online learning modules, please visit agriculture.vic.g ov.au/support-and-resources/elearning /biosecurity-courses.

AgriFutures Horizon Scholarship applications open
Applications for the 2023 AgriFutures Horizon Scholarship Program are now open. Students entering their final two years of an undergraduate degree who are passionate about the future of Australian rural industries are encouraged to apply. The AgriFutures Horizon Scholarship is a collaboration between many of the Research and Development Corporations (RDC's), along with the Cooperative Research Centre for Developing Northern Australia, FMC Australasia, AgriProve and Kalyx to provide eligible university students with a $10,000 bursary over two years and plenty of opportunities to develop their leadership skills and expand their networks. As part of the Program, students also attend an annual four-day professional development workshop and complete two weeks of industry work placements per year.

The Horizon Scholarship Program is open to students studying agriculture-related or STEM degrees with major studies and/or subject selections that align to agriculture. To be eligible to apply students must:

- Be an Australian citizen or permanent resident
- Be studying an undergraduate degree at an Australian university
- Be entering the final two years of their degree in 2023.

Scholarship recipients will be selected on the basis of their commitment to a career in agriculture, as well as their leadership potential and tertiary academic record to date.

Applications close Friday, 13 January 2023 at 5pm AEDT. Shortlisted applicants must be available for a telephone interview in February 2023, and scholarship winners will be announced in April 2023.
For more information and to apply visit www.agrifutures.com.au/horizon

Acknowledgement
The northern and southern RALF'S are supported by the Mallee Catchment Management Authority, through funding from the Australian Government's National Landcare Program.

Visual frost damage scored (recorded three days following frost event from 26 -27 August) in lentil varieties grown at Propodollah in 2021. Photo: AgVic

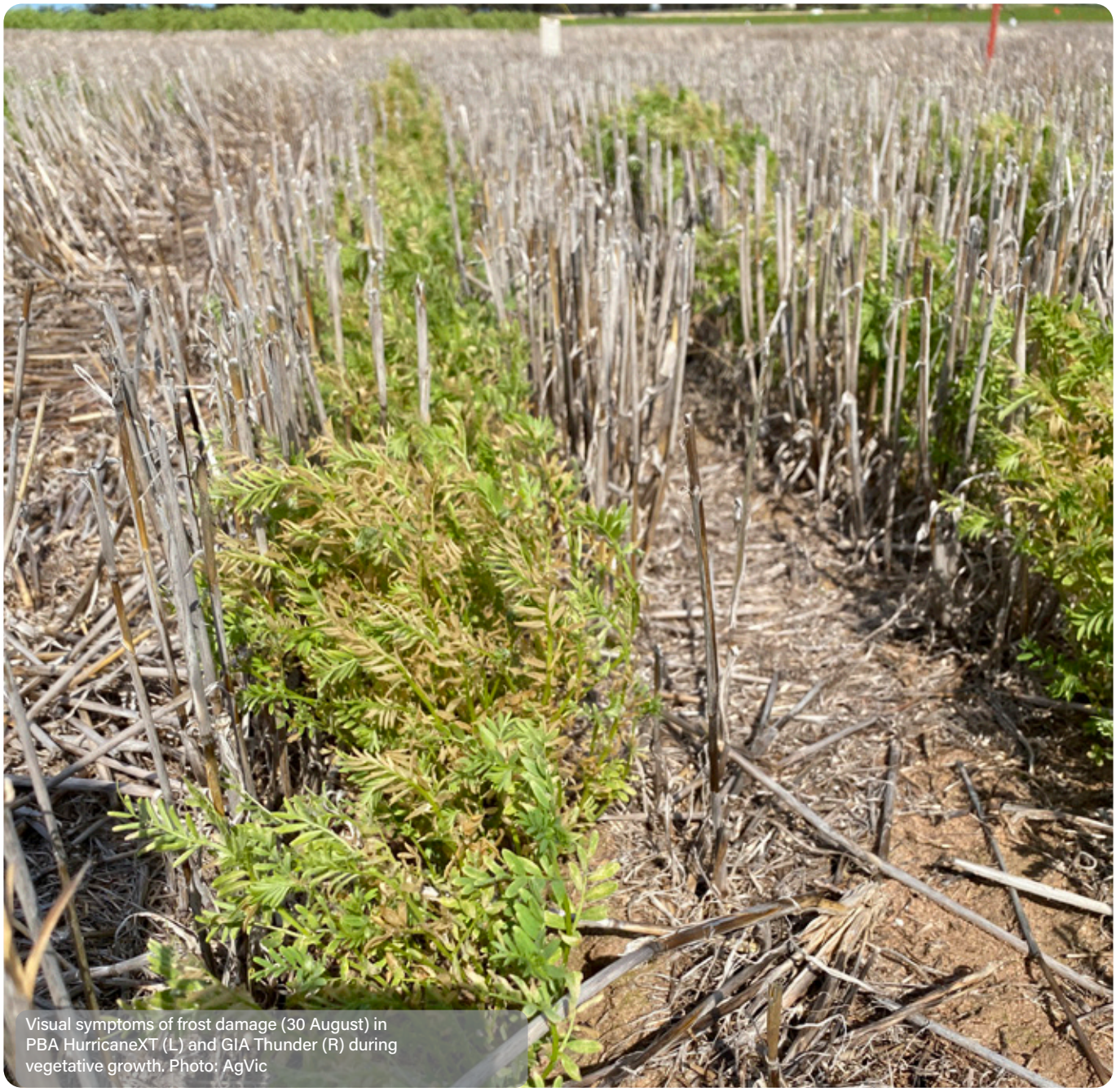
Vegetative frost tolerance in lentil and impact on grain yield.

By Jason Brand, Senior Research Agronomist – Pulses. Audrey Delahunty, Senior Research Scientist (Agronomy), Sundara Mawalagedera, Senior Research Scientist and James Nuttall, Senior Research Scientist. Agriculture Victoria.

This article reports on the variation for vegetative frost tolerance across lentil varieties, based on a visual assessment of chlorosis and the effect on yield. The impact of agronomic practices (e.g., sowing direction, row space and stubble management) and their interaction with frost damage was also determined.

Main/Key points

- ***Frost occurring during the vegetative phase in lentils can cause severe chlorosis in youngest leaves, with PBA HurricaneXT known to be highly tolerant.***
- ***Commercial varieties range in their tolerance to frost during the vegetative phase (e.g. PBA Jumbo2, PBA Ace, GIA Thunder and PBA Kelpie showed less damage compared to 12 other varieties assessed).***
- ***Standing stubble was shown to correlate with reduced frost damage compared to slashed stubble.***
- ***Vegetative frost damage was linked with a yield penalty in lentil, with high levels of visual damage being associated with yield losses of 20 per cent.***



Visual symptoms of frost damage (30 August) in PBA HurricaneXT (L) and GIA Thunder (R) during vegetative growth. Photo: AgVic

Background

Frost is a significant production constraint in lentil causing both vegetative and reproductive crop damage. Frost events that coincide with the vegetative period (pre-flowering) can cause significant chlorosis/yellowing in younger leaves, where the level of damage varies with the intensity and duration of the frost. Typically, the indeterminate nature of lentil provides some capacity to recover from damage associated with frost events during the vegetative phase, with potentially minimal effect on grain yield. Industry observations have shown PBA HurricaneXT to be high tolerance.

Results/Findings

In 2021, the pulse agronomy research site at Propodollah (17km NW of Nhill) experienced frost events on 26 and 27 August (daily minimum was -2.2OC and -2.9OC, respectively) which coincided with the vegetative phase for the lentil. These frost events caused visual damage in lentils across the site which varied between varieties and agronomic treatments. To assess tolerance to frost, a formal visual assessment of chlorosis (0 – no symptoms, 100 – youngest leaves completely chlorotic) was recorded four days after the frost event.

Varietal Response
Based on visual assessment, there was variation across the 16 varieties assessed which indicates a range in tolerance to vegetative frost (Figure 1). Overall, PBA HurricaneXT and GIA Sire showed severe chlorosis (>80). PBA HighlandXT, GIA Lightning and PBA HallmarkXT showed moderate chlorosis (40 to 50) (Figures 1 and 2), with several varieties (PBA Jumbo2, PBA Ace, GIA Thunder and PBA KelpieXT) having low levels of chlorosis (<15). All varieties recovered from the chlorosis over the next month as new growth occurred.

Effects of stubble management (rules of thumb)
One of the trials at site compared the effect on growth and yield of several agronomic treatments, row space, sowing direction, and stubble management. It was observed that row spacing of 180 and 350 mm and sowing direction (north to south or east to west) had no effect on vegetative frost damage based on visual symptoms; however, standing stubble generally showed less damage than where stubble had been slashed (Figure 3). This indicates that reduced soil cover contributes to decreasing the impact of frost by increasing the soil temperature.

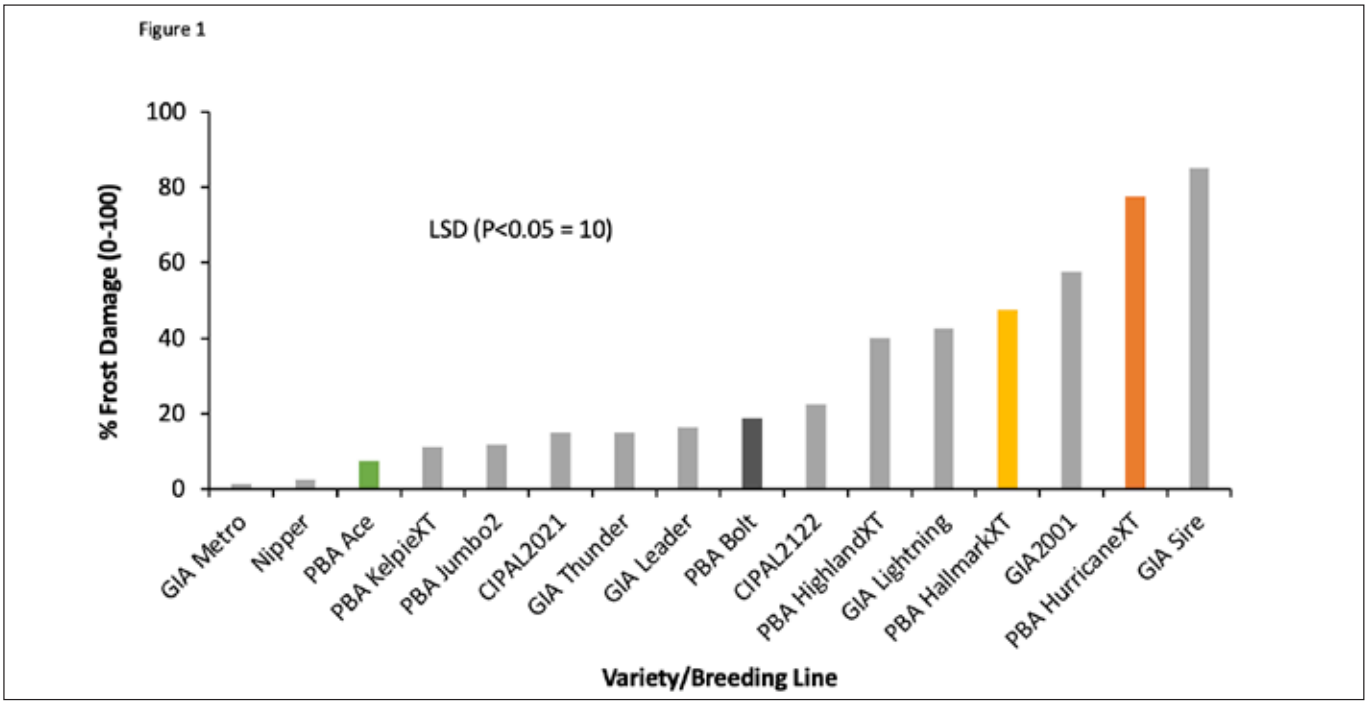


Figure 1: Visual frost damage score (recorded three days following frost event from 26 -27 August) in lentil varieties grown at Propodollah in 2021.

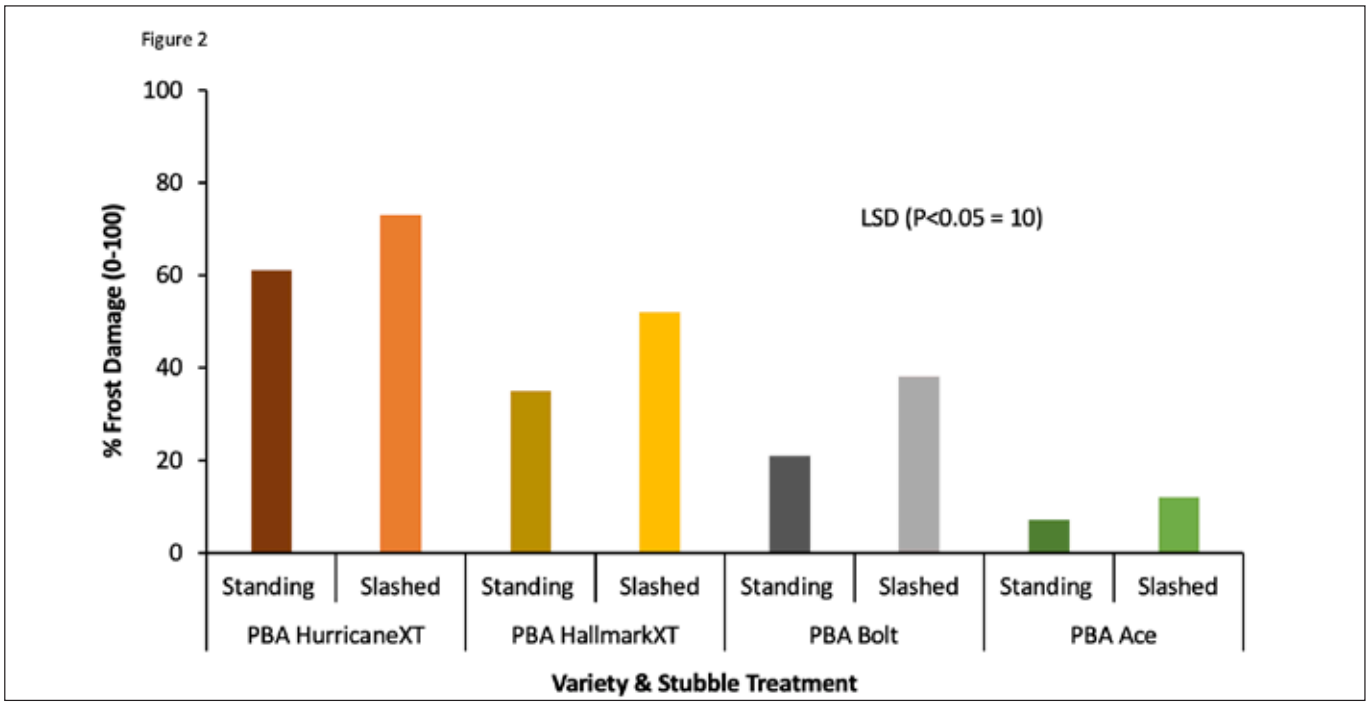


Figure 2: Effect of standing and slashed stubble on the visual frost damage score in lentils at Propodollah in 2021.

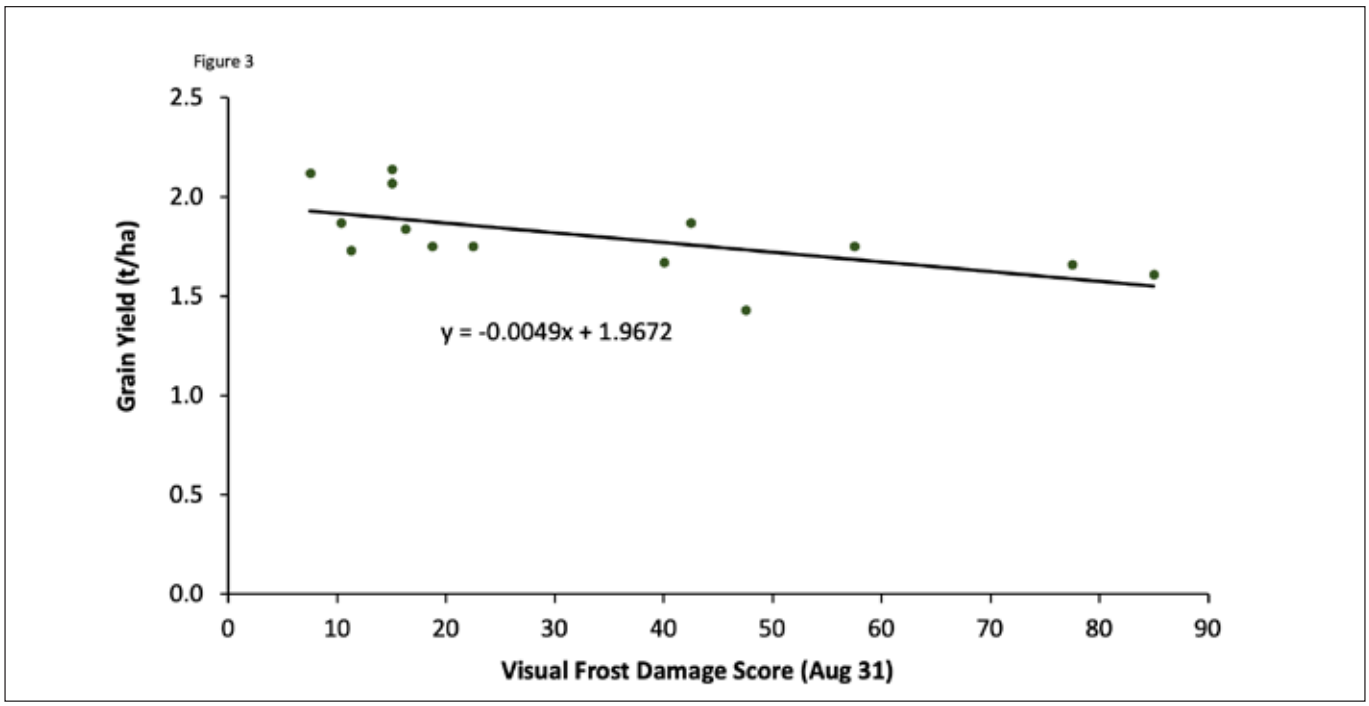


Figure 3: Relationship between vegetative frost score and grain yield for varieties in germplasm trial at Propodollah in 2021.

Grain yield impacts of vegetative frost

Growers have often asked, "Does vegetative frost damage relate to yield?"

In these trials it was found that the vegetative frost score was negatively correlated with grain yield ($r = -0.6$; $P < 0.05$), with an estimated loss of 21 per cent as the score increased from 5 to 90.

Implications of the findings

This research, has defined the range of vegetative frost tolerance in 16 lentil varieties under mild frost conditions, indicating the importance of selecting improved vegetative frost tolerance within breeding programs. In addition, standing stubble was shown to reduce the level of damage compared with slashed stubble. Based on these findings increased vegetative damage was linked with a yield penalty. Further work is required to understand the interactions between the timing, duration and intensity of a frost event and mitigating and management of its effects.

In addition, the relationship with potential genotypic variation in frost tolerance during the reproductive phase also needs to be explored.

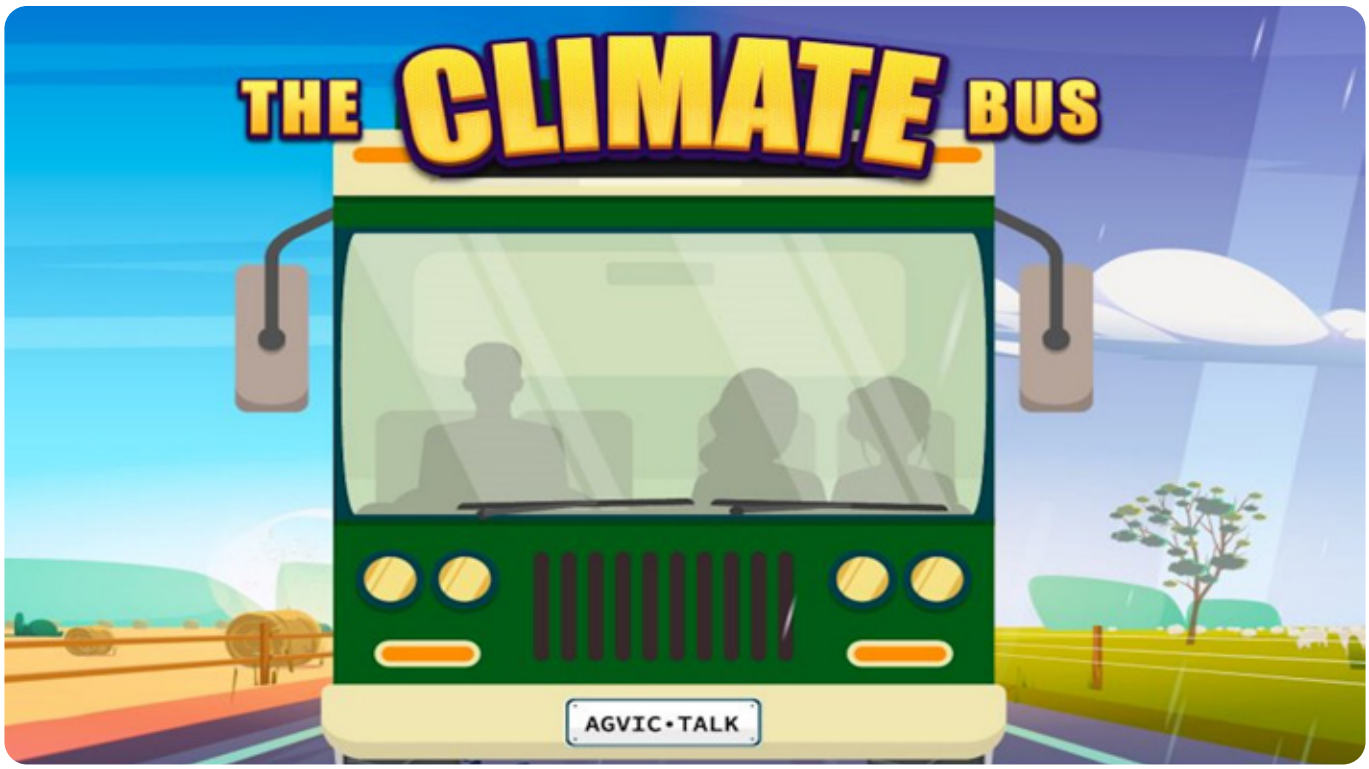
Further information and contact details

Jason Brand
Senior Research Agronomist - Pulses | Agriculture Victoria Research
Mobile: 0409 357 076
Email: Jason.brand@agriculture.vic.gov.au

Acknowledgements

These trials were conducted as part of GRDC's investment in Agriculture Victoria's Southern Pulse Agronomy program.

Frost damage in lentil pods, flowers and grain. The frost damage was caused by a frost during pod filling. Photo: Agriculture Victoria



AgVic delivers podcasts for your listening pleasure.

By Agriculture Victoria Media

Do you find yourself spending long stretches of time in the car? Well, Agriculture Victoria's podcasts are for you. To listen, simply search for AgVic Talk and My Rain Gauge is Busted wherever you get your podcasts.

Season three of the AgVic Talk podcast is particularly relevant for the Mallee, as it takes listeners on a virtual bus tour to speak with farmers and agricultural influencers about different ways to manage climate variability.

Across the 10-episode season, you will hear real examples of how farmers have managed climate change and variability across a range of locations in Victoria. Three Mallee farmers joined AgVic Talk host Drew Radford to tell us how they make decisions in a variable climate.

In episode one, climate specialist Graeme Anderson asks farmers to consider how their regions rate against a comparable climate analogue (climatechangeinaustralia.gov.au/en/projections-tools/climate-analogues/analogues-explorer/).

"There is a large range of climate zones across Australia and there are successful farm businesses that operate in all climates," Mr Anderson said.

Listening to the episodes, you will hear from livestock producers who are using stock containment areas, agricultural business resilience experts, low and high rainfall zone growers, and farmers developing new skills through online learning.

In episode four, third-generation Millewa farmer Ian Arney talks about how he has adapted to continue farming in a changing climate, making the move over the last decade from cereal and grain cropping to focus mainly on sheep. "Technology has been fantastic, and I'd suggest that it's probably the only reason why we can still grow crops in the Millewa," Mr Arney said.

"Without the technological changes that we've had, I probably wouldn't be farming."

Everyone we spoke to during season three of AgVic Talk was focused on planning and understanding their business to help them through the tough years and make the most of the good ones.

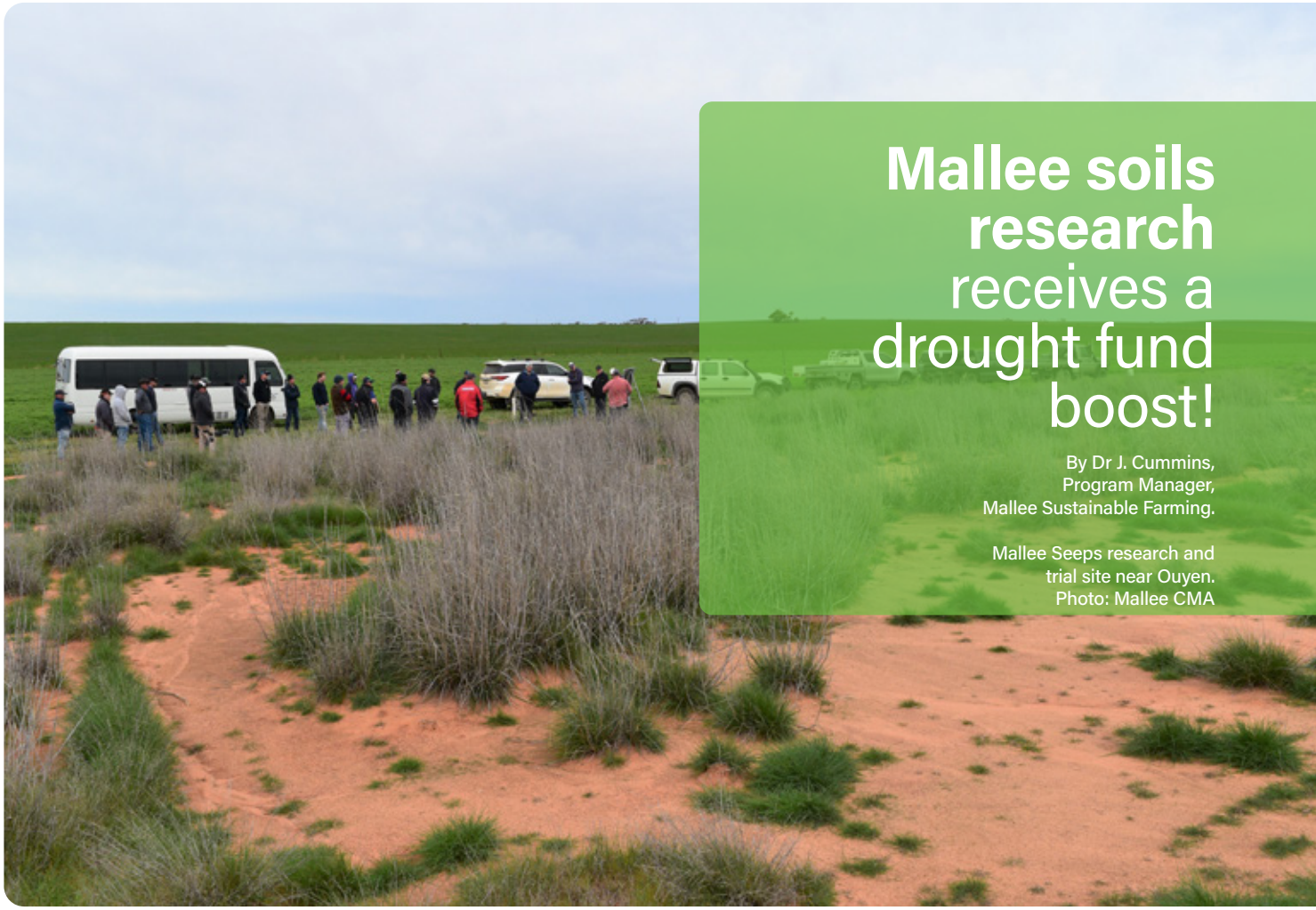
Agriculture Victoria continues to deliver trusted, relevant, and timely information to Victoria's agricultural sector and rural and regional communities, through podcasts and other mediums.

The Victorian Government is acting to reduce Victoria's emissions by 50 per cent by 2030 and reach net zero by 2050 and ensure communities, businesses and institutions are better prepared to deal with the impacts of climate change.

Additional climate resources can be found on the Agriculture Victoria website (agriculture.vic.gov.au/climate-and-weather) and the Climate Change in Australia website (climatechangeinaustralia.gov.au/en/).

You can subscribe and listen to AgVic Talk wherever you get your podcasts or listen on the Agriculture Victoria website, https://agriculture.vic.gov.au/support-and-resources/podcasts

AGRICULTURE VICTORIA



Mallee soils research receives a drought fund boost!

By Dr J. Cummins,
Program Manager,
Mallee Sustainable Farming.

Mallee Seeps research and trial site near Ouyen. Photo: Mallee CMA

Mallee Sustainable Farming was notified earlier this year of some positive news in relation to receiving project funding from the Future Drought Fund to support some on-farm research demonstration initiatives across the Mallee regions of NSW, Victoria and South Australia.

Working in partnership with Frontier Farming Systems, an extensive on-farm trial and demonstration program has been undertaken this year, with many sites being located across the Victorian Mallee. A summary of some of the new projects are provided.

Developing Robust Ground Cover
This project aims to demonstrate, evaluate, and communicate innovative farming practices that will help enable farmers to identify and adopt farming practices that maintain ground cover resilient to the pressures imposed by climate variability and management actions. Specifically, on farm research and demonstrations will help identify new and improved practices aimed at reducing soil disturbance and the degradation of stubbles during seeding, harvest and grazing. In addition to this a range of soil amelioration practices will also be assessed as a means of "drought proofing" crop establishment.

Addressing Saline Land and Mallee Seeps
A summary of some of the new projects is provided. Following the earlier success of the Mallee Seeps project undertaken by Mallee Sustainable Farming, a new project initiative has been launched under the Future Drought Fund that aims to tackle both saline land and Mallee seeps across the MSF region and further afield to include the Eyre Peninsula and northern Yorke Peninsula in SA. The valuable input from Mallee farmers through this project will be used to continue to help identify practical solutions to addressing this landscape problem.

The project will help to identify and understand the type and cause of saline land degradation, whilst helping to develop practical management strategies to help overcome the impacts from seeps and saline land. The end game will be to assist Mallee farmers to proactively adopt management practices that help to reduce saline land and seep impact, and importantly, reinstate their productive potential. Fortunately, we have already witnessed some of these positive outcomes from the previous Mallee seeps project, and will be in a position to ramp up these efforts so even more Mallee farmers can benefit.

Sandy Soils Constraints Mapping
Mallee farmers in recent years have expressed their concerns (and frustrations) about the production limitations that they regularly experience on the lighter sandy soils across the region. In response to this Mallee Sustainable Farming, together with Frontier Farming Systems, successfully accessed funding through the GRDC to undertake on-farm research work that aims to identify the underlying sub-soil constraints that are considered to limit the full productive potential of the sandy soils.

Recent Soils field day at Pinnaroo. Photo: MSF

Elements of this project will help to identify the most appropriate set of soil amelioration practices that address paddock specific constraints. Linked to this will be "paddock scale" mapping exercises that will help identify those soil types that are most likely to be responsive to soil amelioration practices. This will help to introduce cost-saving measures for farmers due to the high cost of soil amelioration and importantly, avoiding such practices on certain soil types where a response will be less likely. Farmers will also be supported through the provision of "Master Class" training relating to sandy soil constraints and approaches to mapping paddocks to help identify those responsive soil types.

Optimising Soil Amelioration Cost-Effectiveness

This project initiative provides a clear focus on providing farmers with guidance on how best to select the most cost-effective soil amelioration treatment that is likely to have a lasting impact. Further to this, on-farm demonstrations will evaluate the effectiveness of different machinery options across different soil types, through measuring and assessing soil and crop responses to a range of different soil amelioration treatments. Another important dimension to the project will be the opportunity to encourage farmers to share their experiences and knowledge through a range of on-farm field walks, field days and social media events.

Farmers and their advisers are encouraged to participate in the large number of field days and workshop events that are planned across the Mallee throughout the project.

Purpose built research deep ripper with soil ameliorant applicator. Photo: MSF

Further information can be obtained from the Mallee Sustainable Farming website or from the Program Manager

Dr Jay Cummins
Email: jay@msfp.org.au

Native shrub grazing trial site.
Photo: Mallee CMA

Mallee farmers to benefit from robust farming systems project.

By Dr Jay Cummins, Program Manager; Mallee Sustainable Farming

Farmers from across the Mallee region of northern Victoria will soon benefit from an exciting new project that is to be launched in coming weeks. The project, titled "ROBUST FARMING SYSTEMS: sustainable, innovative and profitable" will be delivered by the Mallee Sustainable Farming team.

There are two components to the project. The first component aims to assist Millewa farmers in reducing soil erosion. The project will initially provide farmers with access to crop management decision making tools and information that will help them to introduce new innovative farming practices that minimise future soil erosion risk whilst enhancing sustainable and profitable production.

The second component of the project is focused on exploring opportunities for improved livestock production through innovative and sustainable grazing opportunities that Mallee farmers can adopt, focusing on native perennial shrubs and grazing management.

The aim of each of the two project components is to develop "communities of practice" for each, whereby farmers within local communities will be invited to participate in a range of on-farm activities aimed at making better informed decisions based on what is actually happening "out in the paddock". The remainder of this article focuses on the first project component.

Opportunities for Millewa Farmers

With the launch of the Robust Farming Systems project in coming weeks, a limited number of Millewa farmers (15 in total) will be invited to participate in the project on a 'first-come, first-serve basis'. Participants will receive complimentary EM38 mapping across a 100 ha area of one of their paddocks, along with soil testing for nutrient levels and available moisture for the coming season. If farmers want the whole area of their paddocks mapped then this can be done at an additional cost price basis.

The EM38 mapping will help guide better cropping decisions, based on farming to soil type and the likely responsiveness of different soils to fertiliser inputs as well as the opportunity to fine-tune variable rate technology (VRT). Farmers will also receive one to one support in developing suitable plans from the EM38 mapping based on addressing subsoil constraints and developing whole of farm management plans that in turn will help to identify and reduce the potential for soil erosion risks.

This project initiative will complement other MSF on-farm research, including the Future Drought Fund supported project Robust Ground Cover, that explores opportunities to establish crops quickly on lighter soil types and evaluate the use of soil amelioration and deep ripping technologies.

If you are interested in being involved, please contact

MSF Program Manager
Dr Jay Cummins
Mobile: 0418 818 663
Email: jay@msfp.org.au

This project is supported by the Mallee Catchment Management Authority, through funding from the Australian Government's Future Drought Fund.

Australian Government | Mallee Sustainable Farming | mallee catchment management authority

(Left) Ascochyta blight lesion on vetch. (Middle) Stripe rust spores on boots. (Right) Spot form of net blotch of barley
Photos: Agriculture Victoria

Agriculture Victoria's Horsham field crop pathology Mallee disease update.

By Agriculture Victoria Horsham Field Crops Pathology Group

This article gives an overview of the Field Crop Pathology Mallee diseases in the Horsham area from August 2022 and details how seasonal conditions will impact the upcoming season.

Summary:

1. Conditions have been ideal for the development of crop diseases in most areas of the Mallee
2. Copies of the 2022 cereal and pulse disease guides are available from Apple Books or the Agriculture Victoria website
3. The Field Crop Disease Victoria website is a helpful tool for grain growers.

Seasonal conditions have been ideal for the development of crop diseases in most areas of the Mallee this season. Growers are encouraged to protect crop yields as wet conditions are predicted to continue.

There are already high levels of diseases such as stripe rust in wheat, Botrytis and Ascochyta in pulse crops, and net blotches in barley. Proactive management will help to reduce their impacts.

A simple three-step approach can be applied to most crop diseases:

1. Plan – know your varietal resistance rating (consult a current disease guide), paddock history and other contributing factors
2. Monitor – check crops regularly, even resistant varieties
3. Apply management strategies if needed.

In wheat, the main concerns are rusts, including stripe and leaf rust and powdery mildew. All three are well established in susceptible varieties and could become severe, with losses up to 30 per cent if unmanaged.

A proactive approach is best for all three diseases, with foliar fungicides most effective at reducing disease impacts when applied early during disease development. Where Flutriafol has been applied to fertiliser, rusts will develop later, and potential losses will be reduced. Potential losses are much less with varieties that have resistance, so check the cereal disease guide for variety ratings. Typically, a variety rated moderately resistant to moderately susceptible (MRMS) or better is unlikely to have losses, while moderately susceptible (MS) or susceptible (S) rated varieties could lose up to 20 per cent yield.

Septoria tritici blotch is also likely to be present in most crops but will generally be at low levels and unlikely to cause losses. Fungicides applied for rust control will also reduce Septoria infection.

In barley, the main concerns are the net blotches and leaf rust– both spot and net forms of net blotch are well established in most crops. Most varieties are susceptible and have the potential to suffer grain yield and quality losses if infection continues to develop.

Previous research has indicated that losses are more likely, and fungicides are more economic to apply, where yield potential is greater than 3t/ha. The most effective strategies include foliar fungicide at mid tillering to early stem elongation (Z25-31) and flag leaf emergence (Z39). The seed treatment fluxapyroxad is highly effective for control of spot form of net blotch, so treated crops are unlikely to see much infection. However, the net form of net blotch is commonly resistant to fluxapyroxad, and a follow up application of foliar fungicides is recommended where levels are moderate (greater than 10 per cent of leaves are infected).

Barley leaf rust has been found in some crops and has the potential to cause significant losses in susceptible varieties. Check variety ratings as some have a rating of MRMS or better and are unlikely to have losses, while varieties rated MS or worse could lose up to 20 per cent yield. Barley leaf rust is more of an issue later in the season, so foliar fungicides are best applied flag to ear emergence stages.

In pulses, the main concerns for 2022 are Botrytis grey mould (BGM) in lentil and vetch, and chocolate spot in beans. Botrytis is an aggressive disease and can develop very quickly, causing significant yield losses in susceptible varieties when conditions are conducive. While the disease prefers high canopy humidity and warmth (15-25°C), BGM can still infect and develop outside of this temperature range.

A foliar fungicide at canopy closure is recommended in all varieties that are not resistant. Follow-up fungicide applications will be required given the wet seasonal outlook, with susceptible varieties likely to need between two and four fungicides this season.

Often, the fungicides applied to control BGM will also control Ascochyta blight in these crops. It is important to follow label directions on fungicides. In vetch, it is important to consider the end use of the crop for economics and to ensure maximum residue limits are not exceeded.

Sclerotinia white mould has also been observed in some pulse crops and could require fungicide control. A new national 'Sclerotinia in pulses' project, co-funded by the Grains Research and Development Corporation (GRDC) and Agriculture Victoria, is looking for growers who have affected paddocks and crops.

If Sclerotinia has been identified in your crop, Agriculture Victoria would be grateful to receive samples for the project. Contact croppathology.horsham@agriculture.vic.gov.au for more information.

FIGURE 2: (Left) Dead/white head in wheat crop caused by crown rot. (Right) Stem browning caused by crown rot. Image supplied by Agriculture Victoria.

FIGURE 3: Leaf rust symptoms. Image supplied by Agriculture Victoria.

Soil-borne diseases may become apparent in all crop types. Affected areas often show stunting or small dead patches and are often put down to 'bad patches of soil.' Dead or white heads are visible in cereals with some diseases, including crown rot and take all. However, there is a range of conditions that can cause deadheads, including frost and mouse damage.

The best way to determine what has caused the damage is to look down at the base of the stem and roots. Physical damage (i.e. chewing) will indicate mice, while discolouration (black or honey-coloured stems) or pruned roots will indicate disease. If the stem is a healthy colour with no physical damage, then the damage is likely caused by environmental stresses such as frost.

A number of resources are available to assist growers and advisers with their disease management planning. Copies of the 2022 cereal and pulse disease guides are available from Apple Books (just search 'Victorian disease guide' in the Apple Book store) or the Agriculture Victoria website (Pulse disease guide or Cereal disease guide or visit www.agriculture.vic.gov.au).

The GRDC has also released a series of apps to help with crop disease management decisions for stripe rust and yellow leaf spot of wheat, and blackleg and sclerotinia of canola. The apps are designed so that specific local information can be used (variety, likelihood of rain, when the last fungicide was applied) so that economic decisions can be made at a farm and individual paddock level. These apps include StripeRustWM, YellowSpotWM, SclerotiniaCM, and Blackleg CM.

Another useful resource is the Field Crop Disease Victoria website. It has a range of articles, videos and manuals that can help with the identification and management of field crop diseases. The website can be found at extensionaus.com.au/FCDVic

AGRICULTURE VICTORIA

Water use options on Mallee sands to prevent the formation and recharge of Mallee seeps.

By Michael Moodie, Research Agronomist, Frontier Farming Systems.

Image of Frontier Farming Systems' Chris Davies measuring soil water using a Neutron Moisture Meter (NMM)

This work was undertaken as part of the Mallee Sustainable Farming Project: A holistic approach to seep management for preventing land degradation in the landscape.

Key Points

- A lucerne phase was the most effective option to dry out the soil profile with a 30-40 per cent reduction in soil moisture down to 3 m at both sites.
- At the Turriff site the extent of drying of the soil profile following lucerne was 75 mm on the top of the sand dune, 110 mm on the mid-slope and 186 mm on the lower slope towards the discharge site.
- At the Lameroo site lucerne dried the soil profile by 118 mm on the dune top, 150 mm on the mid-slope and 190 mm on the base of the dune.
- Ameliorating the sand dune using deep ripping increased productivity by 20-50per cent.
- Despite this significant increase in production, the impact on the drying of the soil profile was minimal with up to 20 mm less water in the soil profile measured in the deep ripped treatments at the Turriff site only.

Background

Mallee sands have a low water holding capacity and in periods where there is excess rainfall, surplus water can percolate through the soil profile and move down slope, accumulating in a low-lying area of the paddock. Water logging and salination leads to the formation of "Mallee Seeps" where productivity is lost from these areas. Farming practices such as summer weed control are thought to have increased the risk of the formation of Mallee seep sites as the soil moisture levels are higher for longer periods of time and summer weeds which may have once dried out these sandy soils are no longer present. Drying the sandy soil profile will provide a buffer against periods of high rainfall which can saturate the soil profile and lead to discharge of excess water in the dune seepage sites. To evaluate which management option best achieves this, two trials were conducted at two Mallee locations from 2019-2021.

Methods

Two sites were established in 2019, with each running for three seasons. One site was in the Victorian Mallee at Turriff and one site in the South Australian Mallee near Lameroo. The trials were located on a sand dune adjacent to an existing seep, with plots running from the top of the sand dune to the lower slope, above where the seepage area breaks out (Figure 1). Therefore, the trials were evaluating water use options for the recharge areas on the sand dune and not within the seep which is the discharge site. In each trial strategies to intercept and utilize recharge on sand dunes were compared (Table 1). Within each strategy two tactics were evaluated.

Table 1. Treatments implemented at the trial sites at Turriff and Lameroo.

Treatment	Strategy	Tactics	Comments
1	Current grower practice	1.1 Current inputs 1.2 Higher inputs	Current inputs included 11 kg/ha P, 50 kg/ha N, 10 kg/ha S + Foliar Trace Elements (Cu, Mn, Zn) Higher inputs added applied a further 40 kg/ha N, 50 kg/ha K and 10 kg/ha S.
2	Soil Amelioration	2.1 Deep ripping 2.2 Deep ripping + organic matter	Deep ripping was to a depth of 50 cm. Organic matter was a compost blend (including chicken litter) applied at 5t/ha.
3	Extend the Growing Season	3.1 Long season varieties 3.2 Crop reset	Crop rest involved cutting hay and allowing regrowth to prolong water use. Winter wheat was sown early at both sites in 2020.
4	Use summer fallow moisture	4.1 Summer crops 4.2 Weedy fallow	Summer crops (millet/ sorghum) was planted each season however plant densities sporadic. Summer weed densities were low at both sites.
5	Perennial pasture	5.1 Lucerne phase 5.2 Lucerne + inter sown winter crop	Inter-sown winter crop was vetch in 2020 and oats in 2021.

Soil water was measured using a Neutron Moisture Meter (NMM) which measured at approximately eight-week intervals. The NMM device measured soil water in the top 1.4-meter soil profile. At each site soil water was measured at two locations, on the top of the dune and on the lower slope closer to the seep present at each site. At the end of the three-year trial period, further soil sampling was conducted to measure the soil water levels under each treatment down to a depth of three meters. These samples were collected from three positions: top of dune, mid-slope, and lower slope.

Figure 1: 3D Model of the Turriff trial site located on the sand dune adjacent to an existing Mallee seep site.

Deep ripped barley (left) and un-ripped barley (right) at Turriff in September 2021. Photo: MSF

Key Findings

Productivity

At the Turriff site, soil amelioration increased productivity of the sandy soil relative to the control. In 2019 productivity was increased by 54 per cent, 180 per cent in 2020 and 37 per cent in 2021. The perennial pasture strategy was highly productive with lucerne producing a cumulative total of 30 t/ha of biomass across the three seasons. The tactics of use fallow moisture and extend the growing season did not offer any advantages in productivity or soil drying relative to the current farmer practice. Summer crops failed to establish and grow on the sandy soils, summer weeds were sporadic, dry summers and autumns limited the ability to establish long season crops and resetting the crop to grow longer did not offer any productivity advantages.

Soil amelioration also increased productivity of the sandy soil relative to the control at the Lameroo site. In 2019 productivity was increased by 52 per cent, 40 per cent in 2020 and 20 per cent in 2021. The establishment of the perennial pasture was poorer at the Lameroo site as a result of the topsoil having a higher degree of non-wetting sand at this site. Lucerne produced a total 15 t/ha of dry matter across the three seasons with significant growth rates not measured until the second half of the 2020 growing season. In 2020, a long season wheat variety was established at the site in February which provided 10 months growth at the site. The final grain yield of this treatment was 1.8 t/ha. As observed at the Turriff site, the other tactics did not lead to any differences in productivity relative to the control treatment at Turriff.

Table 1: Productivity of each tactic in each season at the Turriff site

Tactic	2019		2020		2021	
	Enterprise	Yield (t/ha)	Enterprise	Yield (t/ha)	Enterprise	Yield (t/ha)
Current inputs	Wheat (Grain)	1.1	Vetch (Hay)	1.1	Barley (Grain)	2.4
Higher inputs	Wheat (Grain)	1.2	Vetch (Hay)	1.1	Barley (Grain)	2.5
Deep ripping	Wheat (Grain)	1.7	Vetch (Hay)	2.6	Barley (Grain)	3.4
Deep ripping + organic matter	Wheat (Grain)	1.9	Vetch (Hay)	3.7	Barley (Grain)	3.6
Long season varieties	Wheat (Grain)	1.0	Vetch (Hay)	1.0	Barley (Grain)	2.3
Crop reset	Wheat (Hay)		Vetch (Hay)	1.3	Barley (Grain)	2.3
Summer crops	Wheat (Grain)	1.0	Vetch (Hay)	1.0	Barley (Grain)	2.3
Weedy fallow	Wheat (Grain)	1.1	Vetch (Hay)	1.1	Barley (Grain)	2.4
Lucerne phase	Lucerne (Hay)	2.1	Lucerne (Hay)	16.8	Lucerne (Hay)	13.5
Lucerne phase + winter crop	Lucerne + Wheat (Hay)	1.7	Lucerne + Vetch (Hay)	17.9	Lucerne + Oats (Hay)	11.4
LSD	Wheat (Grain)	0.4	Vetch (Hay)	0.8	Barley (Grain)	0.4

Table 2: Productivity of each tactic in each season at the Lameroo site

Tactic	2019		2020		2021	
	Enterprise	Yield (t/ha)	Enterprise	Yield (t/ha)	Enterprise	Yield (t/ha)
Current inputs	Barley (Hay)	4.5	Vetch (Hay)	2.4	Wheat (Grain)	1.2
Higher inputs	Barley (Hay)	4.6	Vetch (Hay)	2.3	Wheat (Grain)	1.3
Deep ripping	Barley (Hay)	6.6	Vetch (Hay)	3.3	Wheat (Grain)	1.5
Deep ripping + organic matter	Barley (Hay)	7.5	Vetch (Hay)	5.1	Wheat (Grain)	1.6
Long season varieties	Barley (Hay)	4.6	Wheat (Grain)	1.8	Wheat (Grain)	0.7
Crop reset	Barley (Hay)	4.4	Vetch (Hay)	2.2	Wheat (Grain)	1.2
Summer crops	Barley (Hay)	5.2	Vetch (Hay)	2.2	Wheat (Grain)	1.2
Weedy fallow	Barley (Hay)	4.8	Vetch (Hay)	2.0	Wheat (Grain)	1.1
Lucerne phase	Lucerne (Hay)	0.8	Lucerne (Hay)	6.9	Lucerne (Hay)	5.7
Lucerne phase + winter crop	Lucerne + Barley (Hay)	0.6	Lucerne + Vetch (Hay)	7.7	Lucerne + Oats (Hay)	8.1
LSD	Barley (Hay)	2.0	Vetch (Hay)	0.9	Wheat (Grain)	0.4

Lucerne growing at the Turriff site. Photo: MSF

Soil Water

Turriff

Perennial pasture was the standout treatment for intercepting and utilizing recharge on the sand dune. By February 2020 lucerne treatments had 27 mm less water than the control with most of the water extraction happening in the 60-100 cm soil layer. Soil amelioration treatments were also 12 mm drier below 60 cm than the control treatment. Similar outcomes were observed further down the slope towards the discharge site, however the effect of soil amelioration on soil water was observed closer to the soil surface. Similar results were observed at the end of the 2020 season with lucerne plots 26 mm drier on the sand dune and 58 mm drier down the slope in the top 1.4 m soil profile. Soil amelioration treatments also had 16 mm less soil water than the control in December 2020.

Drier soil profiles were again observed at the end of the 2021 season for the soil amelioration and perennial pasture treatments. The differences between these treatments and the controls were of a similar magnitude as measured in December 2020.

In February 2022 soil samples were collected from the top 3m of soil profile. As expected, perennial pastures had the most significant impact on soil water levels with 77 mm less soil water than the control on the tops of the sand dune, 110 mm less soil water on the mid-slope and 186 mm less soil water on the lower slope. Soil amelioration led to a drier profile than the current practice treatment, however the magnitude difference in soil water was similar to that measured in the top 1.4 m of soil.

Lameroo

Perennial pasture was also the standout treatment at Lameroo, although the poor emergence and delayed production was reflected in the soil moisture monitoring. There was little difference in soil water between the lucerne and control treatments in February 2020, however by the end of that season (December 2020), lucerne treatments had dried the soil profile by 40mm. Lucerne maintained a 20-40 mm drier soil profile in the top 1.4 m for the remainder of the trial, however deep soil sampling at the end of the three-year trial showed much greater water use by the lucerne pasture. On the top of the sand hill approximately 120 mm more soil water had been used down to a depth of 3 m in the lucerne treatments compared to current farmer practice. This difference increased to 190 mm on the lower slope which was closer to the seep site.

As observed at the Turriff site, other strategies and tactics were unsuccessful in increasing the water use on sand. Despite benefits to productivity observed following soil amelioration at Lameroo, there was no significant impact of this strategy on drying the soil profile. In 2020 the long season wheat variety established at the site in February provided 10 months growth at the site, however there was no measurable impact of this treatment on the amount of soil water stored in the profile.

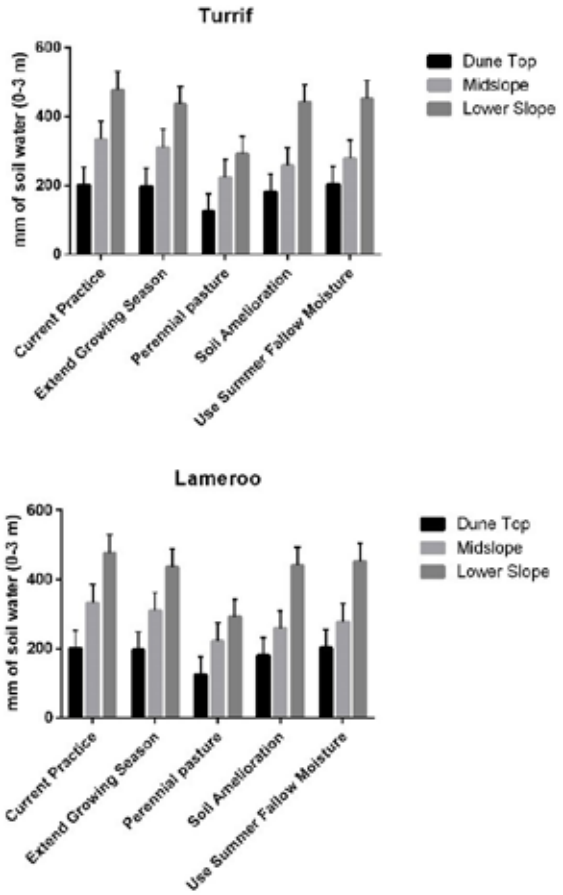


Figure 2. Total soil water (mm) to a depth of 3 metres under each treatment at the conclusion of each trial (February 2022).

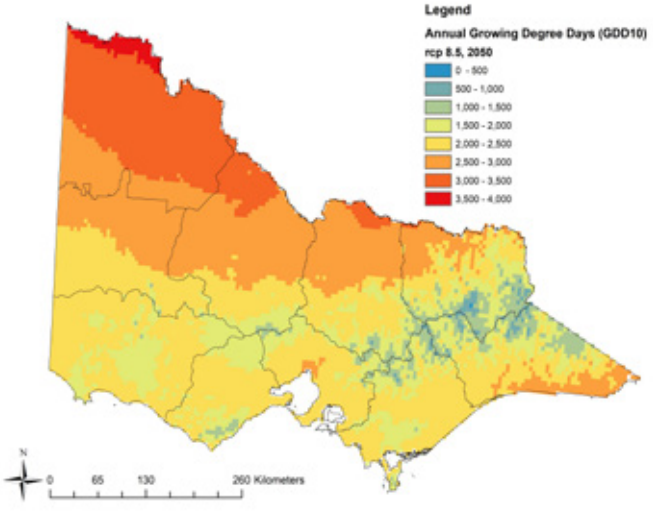
Implications for commercial practice

These trials have provided clarity about the options to enhance water use on Mallee sands. Prior to these trials opportunities such as summer crops were viewed as a potential option to dry out these soil profiles, but these trials have narrowed the options down to two main management techniques. The most effective way to utilize excess moisture is a period of perennial pasture which over the three years dried the top 3m of the soil profile by 75-200 mm, depending on position on the sand dune. The second option was to ameliorate the soil with deep ripping. While this management action had less impact on drying the soil profile, there were large productivity gains with a yield benefit of 20-50 per cent commonly observed at both sites across the life of project.

While lucerne was the most effective option for drying down the soil profile, how farmers would implement that in commercial practice is challenging. One approach that has been trialled is plant interception strips above potential seep zones, which would allow for excess moisture to be removed while grain production can still occur on the bulk of the paddock.


Seeps Field Day. Photo: MSF

The Mallee Seeps project is supported by Mallee Sustainable Farming through funding from the Australian Government's National Landcare Program and the Grains Research and Development Corporation.



Annual Growing Degree Days - annual sum of daily average temperature above 10oC in 2050 under RCP 8.5 (high emission scenario).

New mapping tool will help predict the impact of future climate variability.

By Agriculture Victoria Media

Agriculture Victoria scientists are working with farmers, industry experts, other government agencies, and partners to develop a predictive tool that will help farmers and industry advisers make informed decisions about potential climate change impacts in their region.

The Agriculture Climate Spatial Tool (ACST) will use advanced biophysical models to integrate land use information, industry information, and climate change projections for the years 2030, 2050, 2070, and 2090. Projections will be provided for the two greenhouse gas Representative Concentration Pathways (RCPs) of 4.5 (moderate emission scenario) and 8.5 (high emission scenario).

The tool, which will be invaluable to farmers, industry advisers, and agriculture students will generate high-resolution information, maps and analytics on climate thresholds (for example days above 40 degrees).

It will also detail the potential impacts on agricultural productivity including changes in yield, phenology, irrigated water demand, and water availability. Growers and industry experts will have a strong involvement in developing the farming scenarios and testing the products.

Users will be able to examine maps and charts of approximately 25 grazing, cropping, horticulture, and forestry commodities at a range of scales, from individual farms to statewide. The tool will also provide analysis for local government areas, Catchment Management Authorities, and industry regions.

The models will provide information to help farmers understand, adapt, and make informed decisions about planting, water needs, and future climate risks to production.

Mallee farmers and their advisers will be able to investigate potential future climate change impacts on key Mallee commodities by examining the predicted frequency and changes in the climate thresholds relevant to their commodity, and through the modelled impact on productivity. Modelled productivity impacts for crops (wheat, canola) include yield, growing season duration, growing season rainfall, and soil water at planting; and modelled impacts for horticulture (citrus, table and wine grapes, nuts, olives, and avocados) include yield and timing of phenological stages.

Users will also be able to see predicted impacts on the water balance including runoff, recharge, evapotranspiration (ET), top and subsoil moisture, and irrigation water requirements.

Prototype testing will commence in late 2022, and the tool will be available through an interactive online spatial viewer in 2023.

Mallee farmers may also be interested in the Past, Present and Future Climate eBook for the Victorian Mallee. This book collates some of the key tools and resources that look at the historical rainfall and temperature data, climate trends, and projections for the Victorian Mallee.

Agriculture Victoria is also helping the agriculture sector respond to climate change and reduce emissions through its Agriculture Sector Pledge program. The program includes research trials to test methane inhibiting feed additives, an innovative pilot of a free on-farm emissions assessment for 250 farm businesses and delivering the tools and services to help farmers reduce emissions while maintaining productivity and profitability.

The Victorian Government is acting to reduce Victoria's emissions by 50 per cent by 2030 and reach net zero by 2050 and ensure communities, businesses and institutions are better prepared to deal with the impacts of climate change.

For more information about the ACST please contact Dr Dugal Wallace, Research Leader, Landscape and Water Sciences, Agriculture Victoria.
Email: dugal.wallace@agriculture.vic.gov.au

AGRICULTURE VICTORIA

Well-placed farm signage letting visitors know what they need to do. Photo: Mallee CMA

Undertaking a risk assessment and action plan.

By Richard Smith, Dairy Industry Development Officer, Agriculture Victoria

Biosecurity is about managing risks. Each property is different and faces different challenges, so it is critical to assess the biosecurity risks that are most likely to impact your property.

Biosecurity risks can be broken down into the following broad categories: livestock, vehicles, equipment, people, and supplies. The risk impact will change for livestock when they move onto, around, or off your property. As part of developing a biosecurity management plan, an important step is to conduct a risk assessment and develop an action plan.

A risk assessment is simply the process of identifying a hazard, the consequences of this hazard, and the probability this hazard will happen.

When undertaking the risk assessment, try to determine:
- How severe the risk is
- Whether any existing control measures are effective
- What action you can take to control the risk
- How urgently action needs to be taken.

This allows you to target and apply your resources to areas which are likely to achieve the best result. The next step is an action plan. This converts the risks identified in the risk assessment and outlines the actions you intend to implement on-farm to prevent or reduce impacts to your property.

The actions you enact on your property need to be specific and set out how you are going to manage the risk. They need to be practical and achievable with your resources and budget. They also need to be relevant to what you produce and how you manage your property.

For example, during your risk assessment you might determine that visitors could introduce a new disease, pest or weed via their footwear. To manage this risk the action plan may include setting up a boot washing station and purchasing plastic tubs, scrubbing brushes, and some recommended disinfectant. Alternatively, your action might be to purchase boots or gumboots in common sizes for visitors to use around the farm. Both are effective measures to reduce the risk of pests or disease being transferred via mud or dung on footwear from property to property.

Stay tuned for the next article discussing biosecurity management planning as part of our series on biosecurity practices to come out over the following weeks.

More information about Victoria's biosecurity can be found on Agriculture Victoria website.

Information on risk assessments and property biosecurity management planning can be found on the farm biosecurity website. Visit the Farm Biosecurity website to download a risk assessment factsheet.

For information about upcoming farm biosecurity planning workshops as well as resources about foot-and-mouth disease, visit the Agriculture Victoria website.

AGRICULTURE VICTORIA

Typical Frost Damaged Wheat. Photo: WA Department of Primary Industries and Regional Development

The perennial problem of frost; start planning now for the 2023 season.

By Dr Jay Cummins, Program Manager; Mallee Sustainable Farming

By the time you have read this article hopefully the threat of frost has passed. Whilst as farmers you have no control over frosts occurring in the first place there are a number of management practices that can be put in place that can help to reduce the severity of frost. Mallee Sustainable Farming are currently leading a national GRDC Project titled 'Better Frost Decisions.'

Now is the time to start thinking about some of the options that can be put in place for the 2023 season. Managing frost risk is based on developing a plan that involves taking action pre-season or in-crop during the growing season.

Pre-season risk management

Pre-season actions involve risk assessment through a simple four-step process.

Step 1: Consider your personal approach to risk in your business, everyone will have a different approach. The risk of frost can often drive conservative farming practices, which should be carefully and regularly reviewed in light of the latest research.

Step 2: Assess frost risk of property; carefully consider the risk of your property incurring frosts due to the location. Use historic seasonal records and forecasts. Spatial variability (topography and soil type) across the landscape should also be considered as cold air will flow into lower regions. Temperature monitoring equipment, including low-cost weather stations, can determine temperature variability across the landscape.

Step 3: Manage risk through farm enterprise diversity; a range of enterprise options should be considered as part of a farm management plan to spread financial risk in the event of frost damage. Intensive cropping systems especially focused only on canola and spring wheat, expose the business to greater frost risk losses since both crops are highly susceptible to frost damage.

Step 4: Zone property/paddock; paddocks or areas within paddocks prone to frost, can be identified through past experience, the use of precision tools such as topographic, EM38 and yield maps (as well as temperature monitors to identify susceptible zones). This can help determine the appropriate management practices to reduce the incidence of frost.

In-crop frost zone management tactics

In-crop strategies are centred around the concept of frost-zone management tactics and involves six key steps.

Step 1: Consider enterprise within a zone; the use of identified frost zones should be carefully considered, for example using them for grazing, hay or oat production and avoiding large scale exposure to frost of highly susceptible crops like peas or expensive crops like canola. It may be prudent to sow annual or perennial pastures on areas that frost regularly in order to avoid the high costs of crop production.

Step 2: Review nutrient management; targeting fertiliser (nitrogen, phosphorus, potassium) on high-risk paddocks and seed rates to achieve realistic yield targets should minimise financial exposure, reduce frost damage and increase whole paddock profitability over time. These nutrients could be reallocated to lower risk areas of the farm. While high nitrogen (N) increases yield potential it will also promote vegetative biomass production and increase the susceptibility of the crop to frost. Using conservative N rates at seeding and avoiding late top-ups results in less crop damage.

It is best if crops are not deficient in potassium or copper, as this may increase susceptibility to frost events. Soils that are deficient in potassium could benefit from

increasing potassium levels at the start of the growing season. However, it is unlikely that there will be a benefit of extra potassium applied to plants that are not potassium-deficient. Frost tolerance cannot be bought by applying extra potassium or copper to a crop that is not deficient. There is no evidence that applying other micronutrients has any impact to reduce frost damage.

Step 3: Modify soil heat bank; the soil heat bank is important for reducing the risk of frost. Farming practices that manipulate the storage and release of heat from the soil heat bank into the crop canopy at night are important to consider to reduce the impact of a frost event. Agronomic practices that may assist with storing heat in the soil heat bank include practices that alleviate non-wetting sands, such as clay delving or spading, have multiple effects; rolling sandy soil and loamy clay soil after seeding, reducing seeding (helps to create a thinner canopy and more tillers resulting in a spread of flowering time), and cross-sowing/seeding (where crops sown twice with half the seed sown in each direction have a more even plant density resulting in heat being released from the soil heat bank more slowly to warm the crop canopy at head height in early morning when frosts are more severe).

Step 4: Select appropriate crops; crop selection is an important factor to consider for frost-prone paddocks. Crops grown for hay are harvested for biomass and avoid grain loss from frost. Pasture rotations are a lower risk enterprise and oats are the most frost tolerant crop during the reproductive stage. Barley is more tolerant than wheat at flowering, but it is not known if barley and wheat have different frost tolerance during grain fill. Canola is an expensive crop to risk on frost-prone paddocks due to high input costs. Yield Prophet is a useful tool to match the flowering time of varieties to your own farm conditions.

Step 5: Manipulate flowering times; when wheat is sown in frost risk areas, a good tactic is to ensure the flowering window of the cropping program is spread widely. This can be done by using more than one variety, manipulating sowing date and varieties with different phenology drivers so crops flower over a wide window throughout the season. It should be noted that flowering later than the frost may result in lower yields in seasons with hot, dry finishes due to heat and moisture stress.

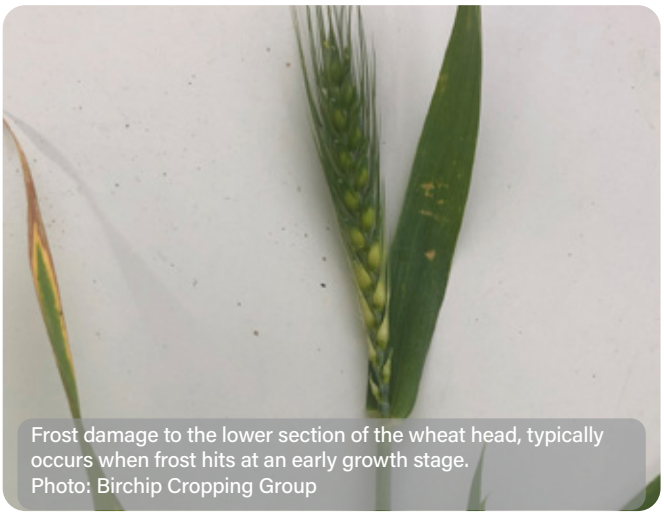
Staging sowing dates over a three to six week period is recommended. If sowing just one variety, this would provide a wide flowering window. If sowing more than one variety sow winter wheat first, then a long season spring wheat or a daylength sensitive wheat, then an early maturing wheat last. The whole wheat program is set to flower over a two week period, potentially exposing it to more frost risk but maximising the yield potential in the absence of frost. Even with this strategy in place it is possible to have more than one frost event that causes damage. Flowering over a wide window will probably mean that some crop will be frosted but the aim is to reduce extensive loss.

Sowing at the start of a variety's preferred window will achieve higher yields at the same cost as sowing late. Sowing time remains a major driver of yield in all crops with the primary objective to achieve a balance between crops flowering after the risk of frost has passed but before the onset of heat stress. The loss of yield from sowing late to avoid frost risk is often outweighed by the gains from sowing on time to reduce heat and moisture stress in spring.

To minimise frost risk there needs to be a mix of sowing dates, crop types and maturity types to be able to incorporate frost avoidance strategies into the cropping system. In years of severe frost, regardless of which strategy is adopted, it may be difficult to prevent damage. Trials have found that blending a short season variety with a long season variety is an effective strategy. However, the same effect can be achieved by sowing one paddock with one variety and the other with another variety to spread risks.

Step 6: Fine tune cultivar selection; no wheat or barley varieties are tolerant to frost. Consider using wheat and barley varieties that have lower susceptibility to frost during flowering to manage frost risk of the cropping program while maximising yield potential. There is no point selecting less susceptible varieties for the whole cropping program if there is an opportunity cost of lower yield without frost.

Preliminary ranking information for current wheat and barley varieties for susceptibility to reproductive frost is available from the National Variety Trial website (www.nvtonline.com.au). A new variety should be managed based on how known varieties of similar ranking are currently managed. (adapted from the GRDC publication 'Managing Frost Risk, northern, southern and western regions.' Feb 2016).



Frost damage to the lower section of the wheat head, typically occurs when frost hits at an early growth stage.
Photo: Birchip Cropping Group

For further information simply Google **'better frost decisions'** for access to on-line podcasts, newsletters and farmer case studies, or access the pod cast resources through the MSF website www.msfp.org.au

Mallee Sustainable Farming

Male (right) and female Plains-wanderer.
Photo: Dr. David Baker-Gabb

Plains-wanderer calls recorded in annual survey!

By Jennifer McCamley

Trust for Nature (TFN) and the Birchip Landcare Group (BLG) were thrilled to hear that the distinctive calls of a Plains-wanderer *(Pedionomus torquatus)* had been captured on a song meter in their last annual survey.

The Mallee CMA has been working on a five-year project (2018 – 2023) with TFN and BLG to survey for the presence of this critically endangered species in the Birchip-Nullawil region, an area with historical records of the species' presence. This was the fourth annual survey and the species had been recorded only once before in early 2020.

Between late January and early April this year, 104 calls from a female Plains-wanderer were captured on one of the five song meters deployed for the annual survey. All calls were nocturnal. TFN think that patterns in the calling indicate that breeding was being attempted by the female Plains-wanderer.

Females will only call when habitat conditions are favorable for mating, and the recorded calls indicate that the habitat around this song meter is suitable for Plains-wanderer. This is great news because the Plains-wanderer has very particular habitat requirements. While it relies on native grasslands for its habitat, these grasslands need to be sparse, with patches of open ground and a range of herbs, forbs and grasses.

Part of the Plains-wanderer project has been to raise awareness of the species and its habitat requirements among local landholders in the Birchip-Nullawil area. As most Plains-wanderer habitat has been cleared in this area, those landholders with native grassland remnants on their properties have a crucial role to play in conserving the Plains-wanderer in our region. The grazing regime is the key here. While overgrazing decreases the habitat value of the grasslands for the Plains-wanderer, heavy swathes of grass are also unsuitable for the species. An appropriately designed grazing regime can maintain the openness of these grasslands to the level preferred by the birds and TFN have been discussing this with interested landholders.

The song meters went out again this October. This will be the final Plains-wanderer survey and will run from October to May. Everyone involved in this project is hoping to hear, once again, the distinctive sounds of this critically endangered species.

This project is supported by the Mallee CMA, through funding from the Australian Government's National Landcare Program.

Bitterang channel.
Photo: Mallee CMA

Delivering infrastructure for the environment.

By Leesa Merrett, Mallee CMA

The Hattah-Kulkyne National Park is a Ramsar listed wetland, home to many important flora and fauna. The delivery of environmental water to the lakes has been vital to its ongoing survival. The Hattah Lakes infrastructure project was one of the largest of its kind in Australia.

Hattah-Kulkyne National Park lies in Mallee country 60 kilometres drive from Mildura, in far north-west Victoria. With its beautiful native woodlands, freshwater lakes and vast open spaces, it is a place deeply loved by many. The 13,000ha Ramsar-listed lakes provide vitally important drought refuge for birds, animals and vegetation, while the significant cultural and social values of the landscape continue to connect Traditional Owners and community members with this amazing part of the country.

The Hattah Lakes were once regularly connected to the river and received flows prior to river regulation. Due to reduced flooding and water availability, to provide the floodplains and lakes with the vital water needed to ensure its survival, infrastructure was required.

The installation of the pumps, regulators and levees at the Hattah Lakes in 2013 was an iconic moment for the National Park. The infrastructure was one of Australia's largest environmental projects, 10 years in the planning. Since the installation, the park has received environmental flows six times, natural flooding on two occasions, with drawdowns and drying occurring between inundation, reflecting the natural cycle for floodplain lakes. As part of the project three major regulators were installed at crucial points within the landscape, block banks and levees were created, along with a pumping station and suctions with capacity to pump up to 1000ML per day.

The Hattah-Kulkyne Lakes are the largest series of floodplain lakes along the Murray River and support significant populations of Endangered and Threatened flora and fauna.

The Hattah Lakes is a sought-after recreation destination, with camping, walking, bike riding and canoeing very popular activities, providing great opportunities for the community to connect with nature and learn about the importance of the floodplain. The Hattah Lakes are a vital part of our floodplain health and play a significant role in supporting our natural ecosystem.

"The Hattah Lakes is an area of significance for the region and provides vital habitat for native flora and fauna. The installation of the pumps, levees and other important infrastructure has been crucial to the long-term survival of the area."

Chair Allison McTaggart

Celebrating **World Conservation Day**

By Marissa Shean

Tempy Primary School students Kingsley Howieson and Riah Rampling planting a native tree at the old Patchewollock Race Course Community Reserve as part of the World Conservation Day event. Photo: Natalie Mitchell

Students and community members busy planting trees and shrubs at the event site.
Photo: Parks Victoria

World Conservation Day was celebrated in style this year with a powerhouse Mallee school (Tempy Primary School) and members of the Patchewollock community alongside some of our incredible Parks Victoria Rangers from the Northern & Southern Mallee.

The theme of World Nature Conservation Day 2022 was 'Living Sustainably in Harmony with Nature.' The day acknowledges that a healthy environment is the foundation for a stable and healthy society.

On Thursday 28 July, Tempy Primary School supported the World Conservation Day ideal by cleaning up the huge, degraded old Patchewollock Racecourse community reserve. The students and local community members pitched in together to remove rubbish and plant and guard 500 native trees and shrubs. One of the aims of the event was to give students a hands-on grounding in the importance of wildlife corridors that connect some of our National Parks, reserves and State Forest. With a key focus on how important they are to one of our threatened species, the Malleefowl.

The day's activities will directly benefit the local environment through revegetating an area that was degraded and it will help preserve a significant wildlife corridor into the Deering Reserve, which connects to the Patchewollock State Forest.

We were privileged to have Barengi Gadjin Land Council (BGLC) representative Traditional Owner, Uncle Ron Marks, a proud Wotjobaluk man, who performed a heart-warming Welcome to Country, smoking ceremony and shared his incredible Indigenous knowledge and heritage with the Tempy Primary School children prior to the tree planting activity.

Tempy Primary School students, community members and Parks Victoria staff take part in the event's smoking ceremony to commence the day's activities. Photo: Parks Victoria.

Students engaged with traditional owner, Wotjobaluk man, Uncle Ron Marks.
Photo: Natalie Mitchell, Principal of Tempy Primary School.

The event was a massive joint effort by a wide range of organisations and thanks is certainly due to Natasha Anderson from Mallee First Aid who was on stand-by, as were the traffic management controllers from Yarriambiack Shire. A special thanks also to the Tempy Primary School and the school community plus Explore the Mallee, a local eco-tourism business run by Louise Nicholas and Michael Gooch. Also, a thank you to EnviroEdu who provided hands-on environmental education programs dedicated to promoting environmental, conservation and sustainability awareness.

The day was meticulously organised by Kelly Mott, Parks Victoria Community Engagement Ranger, Northern/Southern Mallee Region.

"There is definitely so many reasons why outside classroom educational days are so vitally important," Kelly said.

"Just being out in nature is therapeutic. Our native bush is a giant, open-ended learning space. Children are innate scientists, that love to experience the sights, scents, sounds, and textures of the outdoors.

"Nature provides countless opportunities for discovery, creativity, problem-solving, and help with positive mental and physical well-being," Kelly said.

The project was funded by the Mallee Catchment Management Authority through the Victorian Landcare Grants Program, and was auspiced through the Mallee Landcare Group Inc.

Memphis and Alexa Shean at the National Landcare Awards.
Photo: Cheryl Torpey

Tempy Primary School makes it to the National Landcare Awards

By Cheryl Torpey, Principal Tempy Primary School

Memphis and Alexa Shean represented Tempy Primary School at the National Landcare Awards held at Sydney International Convention Centre on August 24th 2022.

They won the award after undertaking a significant project aimed at protecting the endangered Malleefowl, and were supported by an amazing team of local, national and global experts, including Dr Joe Benshemesh, the Victorian Malleefowl Recovery Group; Marissa Shean, Local Landcare Facilitator; Bev and Tony Bingley; Kelly Mott, Parks Victoria; Mallee Catchment Management Authority and a team of locals - too many to name!

Through the project we now have a fleet of remote sensing cameras focused on Malleefowl nests to monitor and protect nests while collecting scientific data. Students worked with Ant Crowley, who is a multi-award-winning playwright, composer, director, designer, dramaturge and educator, to create a documentary, 'Waiting for the Rain' as part of the project. Students also made connections with First Nations people through learning about Neilloan, the ancestral Malleefowl seen in the night sky and also other constellations. They discovered through mimicking the birds' use of solar and microorganisms (composting) how eggs are incubated. Students have been planting trees in Malleefowl habitat to reduce fragmentation, and have lobbied for more feral animal control, better road signage and lots more other activities.

Memphis and Alexa with awards host Costa Georgiadis.
Photo: Cheryl Torpey.

Tempy Primary unfortunately didn't come home with the top trophy, this time; and congratulations must go to Ivanhoe Central School, NSW for taking out the title. Woolworths sponsor the Junior Award, but there are a number of past and present politicians (Bob Hawke, Linda Burney), many workers and volunteers who continue to invest in young learners and schools - building a strong future!

Costa Georgiadis hosted the awards ceremony and reminded us to be mindful of our 'footprints' on the planet.

MalleeFarmer

NLP Acknowledgement
This publication is supported by the Mallee Catchment Management Authority (CMA), through funding from the Australian Government's National Landcare Program.

Publisher:
Mallee Catchment Management Authority
ISSN: 1839 - 2229

Design & Artwork by Haynes Design Pty Ltd - Mildura