MURRAY PLAINS FARMERS

Thursday
30 March 2023

POST-HARVEST, PRE-SEEDING MEETING

Australian Government
Department of Agriculture, Fisheries and Forestry

Future Drought Fund

SA DROUGHT HUB

SOUTH AUSTRALIAN DROUGHT RESILIENCE ADOPTION AND INNOVATION HUB

This program received funding from the Australian Government's Future Drought Fund

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Tonight's program

6.30pm	**TEA IS SERVED**
7.00pm	**Adrian Bormann, President** Welcome from MPF and update on the year's activities
7.05pm	**Brendan Kupke, SARDI** 'Optimal flowering period for wheat and barley' trial results (located on Quast Rd, Punthari)
7.25pm	**Ryan Laidlaw, AgXtra** 'Pasture legume choices, establishment and persistence for the Murray Plains' trial results 'Improving canola establishment in dry conditions' trial results (both located on Western Boundary Road, Palmer)
7.45pm	**Tony Craddock, Pinion Advisory** Economic analysis of canola establishment trial results
7.55pm	**DESSERT/COFFEE BREAK**
8.10pm	**Ben White, Kondinin Group research manager** Managing your investment in machinery and on-farm grain storage • Determining your level of investment using a new benchmarking formula, the Machinery Investment Ratio. • Understanding your own machinery investment compared with your peers and industry benchmarks. • Practical examples of how other LRZ farmers are prioritising budgeted funds into machinery investment. • The latest in on-farm storage, decision-making on new investment and preserving seed quality for better quality.
8.45pm	**Tony Craddock** Facilitate Q&A, discuss season ahead
9.00pm	**End of proceedings**

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Our Committee

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Sharon Starick
COMMITTEE MEMBER

Interested to contribute to Murray Plains Farmers?

Then consider sponsorship or join the committee to help guide development of projects and applications for funding. We'd love to hear from you ... all are welcome.

Murray Plains Farmers 2022 Highlights

Crop Walk facilitator Tony Craddock, Pinion Advisory, with trial manager Richard Porter, AgXtra, and Pioneer Seeds farm services consultant Jamie Wilson talking about the performance of various varieties at the canola trial with crop walk participants in September 2022.

Research and extension trials

The Murray Plains hosted a record number of trials and research in 2022, including:

Optimal flowering period for wheat and barley

Location: Quast Road, Punthari.

Trial manager: Brendan Kupke, SA Research and Development Institute (SARDI) / University of Adelaide

Funder: SA Grain Industry Trust (SAGIT)

Trial overview: The Optimum Flowering Period (OFP) for wheat and barley varieties, with different maturity windows, is to be characterised for the Murray Plains region. APSIM modelling will initially determine the OFP using long-term climate data and designated soil types. The model is tested with seasonal weather data and a time of sowing field trial at Palmer, for two years, incorporating wheat and barley varieties with different maturity windows.

Realising cereal yield potential using crop physiology and drone technology

This trial is an addition to the optimal flowering period trial (above). It is funded by SAGIT and aims to use drone imagery to estimate both plant establishment and biomass of the field trials to help dissect key grain yield drivers independent of flowering time.

Improving canola establishment in dry conditions

Location: Steen and Deanna Paech's, corner of Randell Rd and Western Boundary Rd

Trial manager: Richard Porter, AgXtra

Funder: SA Drought Hub

Trial overview: This trial tests establishment of canola across three sowing dates and examines suitability of a range of canola varieties for the low rainfall cropping zone, incorporating hybrid and open pollinated varieties. There is also a comparison between new seed and grower-saved seed. An economic analysis comparing the various options will be conducted by Pinion Advisory, including the cost of seed, fertiliser and oil bonuses. This will compare open-pollinated varieties where there is potential to sow retained seed versus hybrids and GM varieties which have high seed costs but may have higher yields and oil contents.

Pasture legume choices, establishment and persistence for the Murray Plains

Location: Steen and Deanna Paech's, corner of Randell Rd and Western Boundary Rd (next to the canola trial)

Trial manager: Richard Porter, AgXtra

Funder: SA Grain Industry Trust (SAGIT)

Trial overview: This is the second year of the pastures trial and involves sowing wheat over the 2021 trial plots and assessing regeneration of pasture species as well as contribution of varieties to soil nitrogen and providing a soil disease break.

Pictured at the variable rate nutrition management site in September 2022 were trial host Scott Starkey, Murray Plains Farmers president Steen Paech and trial manager Sean Mason.

Demonstrating soil zone mapping for variable rate nutrition management

Location: Starkey's, corner of Sanderston Road and Schubert Road.

Project manager: Sean Mason, Agronomy Solutions

Trial manager: Mallee Sustainable Farming, SARDI

Funder: SA Drought Hub

Trial overview: The aim of this project is to demonstrate how to create soil zones in paddocks for variable rate application of nutrients. Fertiliser inputs are one of the highest input costs farmers face and, in a low rainfall environment, it is important to manage input costs to manage risk. Farmers can manage their input costs and risk by zoning their soil types, working out what inputs are required in different zones and fertilising accordingly. This is particularly relevant following dry or drought years where nutrients may be left behind and less will need to be replaced and also in years with good soil moisture and rainfall to maximise the opportunity for higher yield potential.

The trial will:

- Demonstrate the use of tools used to create zones in paddocks
- Demonstrate how to analyse soil tests and data layers for decision making
- Demonstrate how paddock strips can be used to test optimal nutrient application in different soil zones.
- Guide growers through nutrient input decision making in zones to be able to variable rate fertiliser inputs.

Harvest and use of medic pods on-farm

Location: Craig Paech's, about 10km south of Palmer on Reedy Creek Road

Trial manager: David Peck, SARDI

Funder: SA Grain Industry Trust (SAGIT)

Trial overview: This project is in its first of two years in 2022 and will research novel ways of harvesting and sowing medic pods which have the potential to reduce medic establishment costs by 60%. A cheaper method of harvesting and sowing medic pods is expected to result in increased medic dry matter production and increased benefit to subsequent grain crops.

SARDI's Sarah Day talks growers through the SARDI pulse time of sowing trial near Milendella in August 2022.

Drought resilience practices in mixed farming systems

Location: Ridley Road, south of Sedan

Project manager: Chris Preston, University of Adelaide

Trial manager: Richard Porter, AgXtra

Funder: South Australian Drought Resilience Adoption and Innovation Hub

Trial overview: This trial explored more drought tolerant rotation options in the low rainfall zone. Pasture varieties and mixes were investigated with the aim of improving soil nitrogen, controlling weeds for the next crop and enhancing the year to year stability in profitability and ground cover, while at the time increasing flexibility in the system. Due to the dry conditions in July and August, the trial was not visited as part of the MPF crop walks program but results are included in this booklet.

Pulse time of sowing trial

Location: Steen and Deanna Paech's, Randell Rd (paddock next to the canola trial)

Trial manager: Sarah Day, SARDI

Funder: SARDI

Trial overview: The site hosted SARDI Affiliate pulse trials, including lentil varieties sown across three sowing dates compared to wheat, and a vetch, field pea and lentil biomass trial looking at the potential of lentil to recover from grazing.

Crop Walks in 2022

Due to the record number of trials, the MPF Committee decided to host two crop walks during the season to ensure all sites could be visited. The Winter Crop Walk was held on Friday 19 August and the Spring Crop Walk on Tuesday 27 September. MPF was pleased to have more than 100 attendees across both events and to offer the opportunity to see the trials at various development stages with the researchers on-hand to answer questions.

Special thanks goes to Ronco Motors for supplying the barbecue lunch at the Spring Crop Walk and for Rodney Wachtel for hosting the lunch at his property.

SA Drought Hub

The South Australian Drought Resilience Adoption and Innovation Hub, or the SA Drought Hub in short, is one of eight hubs established across the nation through the Australian Government's Future Drought Fund.

The aim of the hub is to strengthen the drought resilience and preparedness of farms and regional communities in SA. Led by the University of Adelaide in partnership with the Department of Primary Industries and Regions, South Australia (PIRSA), the hub is responsible for driving extension of existing knowledge and practices to build drought resilience in primary production systems.

The hub has become an important funder of trials for the Murray Plains. On Thursday 18 August, the Future Drought Fund's Advisory Committee travelled from Canberra to visit two of our region's trials and to hear from local growers about the hub's activities and for us to provide feedback to them on how we could be better prepared for drought.

Livestock events

The PIRSA Livestock AgTech Program finished in 2022 with a presentation from Victorian livestock consultant Nathan Scott. MPF thanks PIRSA for their investment in the extension program, designed to improve uptake of technology to improve the profitability of our sheep businesses.

MPF facilitated establishment of two Lifetime Ewe Management Groups which ran during late 2021 and into 2022. These were facilitated by Colin Trengove and Deb Scammell and participation for producers subsidised by Australian Wool Innovation.

MPF Committee

MPF held its AGM on Wednesday 12 October 2022 at the Palmer Hotel. The MPF Committee was thrilled to welcome Fiona McGorman to the team. Fiona has taken on the role of Treasurer and is an asset to the committee with her broad professional experience.

At the AGM, MPF elected a new President in Adrian Bormann following the retirement of Steen Paech. Daniel Seidel was also elected Vice President following the retirement of Will Graetz. After serving five years each in their roles, Steen and Will now remain on as committee members with secretary Rebekah Starick, Deanna Lush and Sharon Starick.

MPF is always keen for more committee members. If you are interested, speak with one of the MPF team.

Sponsorship

MPF is extremely grateful to all the sponsors who have supported the group and its activities over the past 12 months. The support of sponsors means we are able to continue to host events and seek research and development for farmers in our region. See the full list on the inside front cover of this booklet.

Special thanks

Murray Plains Farmers would like to extend a special thank you to the former Frayville Agricultural Bureau. The bureau's former members recently transferred its remaining funds to the MPF group so its legacy of helping farmers to learn from each other and improve their businesses could be continued.

What's in store for 2023

Research projects

Murray Plains will again host a range of research and development trials in 2023. While there are a number of applications still in consideration with funding bodies, MPF has confirmed:

Improving the climate resilience of the Australian sheep industry

This trial is already underway through the SA Drought Resilience Adoption and Innovation Hub, running from January to June 2023. It is focused on the potential benefits to ewe productivity with application of melatonin and A, D and E drench at joining. Results will be distributed to the MPF database.

GRDC National Risk Management Initiative

This is a significant four-year project for the region in which MPF is partnering with Hart Fieldsite, Upper North Farming Systems, Northern Sustainable Soils and the Mid North High Rainfall Zone Group.

The project aims to:

1. Develop an improved understanding of the risk-reward relationships for important on-farm management practices and decisions.
2. Inform growers and their advisers of new insights into managing risks and maximising rewards.
3. Challenge grower decision-making so future management decisions are thought of in terms of probability of upside returns offset against the associated downside risks.

The group has identified two key themes to better manage risk, and hence farm business costs, in nitrogen application and climate forecasting. The project will include a trial site and paddock-scale demonstrations examining various approaches to N management that minimise risk. It will also include workshops for growers to better understand climate forecasts and the models that underpin them.

Trials extended for further years

Some of the trials run in 2022 have been extended for subsequent years, including:

- **Demonstrating soil zone mapping for variable rate nutrition management**
  This project is being run in the Murray Plains by Mallee Sustainable Farming and growers will be working with precision ag experts to zone paddocks and understand how variable rate can be practically applied.
- **Optimal flowering period for wheat and barley**
  SARDI's Brendan Kupke will be running this trial for a third year, with a suitable trial site identified at Starkeys for the 2023 season.
- **Improving canola establishment in dry conditions**
  This trial will be repeated for a second year, with a comparison to barley added to determine profitable options in dry years. MPF is seeking a trial site in the Cambrai/Sedan area.
- **Harvest and use of medic pods on-farm**
  SARDI's David Peck secured two years of SAGIT funding for this project assessing novel ways of harvesting and sowing medic pods which have the potential to reduce medic establishment costs by 60%.

Characterising the optimal flowering period for the Murray Plains

Brendan Kupke[1,2], Melissa McCallum[1], Courtney Peirce[1,2], Rhiannon K Schilling[1,2,3]
[1] South Australian Research and Development Institute, Department of Primary Industries and Regions.
[2] School of Agriculture, Food and Wine, The University of Adelaide.
[3] Flinders University

SAGIT project code: S/UA 1021 and UAD-02222-R

Keywords

- optimal flowering period, flowering time, phenology, crop development, wheat, barley

Take home messages

- Flowering on time is crucial for wheat to maximise yields whilst barley is more adaptable across flowering dates.
- Modelling suggests that the optimal flowering period (OFP) for wheat at Palmer is between the 27th August and 11th September, based on the past 50 years of climatic data.
- Across two seasons, Rockstar (slow spring) wheat had the most stable yields across germination dates and wheat varieties.
- In an above average season for rainfall, new winter barley varieties performed well in the LRZ as well the new winter wheat line Mowhawk (LPB19-14343).

Background

Flowering time is an important determinant of final grain yield for cereals. For crops to maximise potential yield cereals must first establish, develop biomass and then flower at a time that coincides with optimal seasonal conditions (Fischer, 1985; Trethowan, 2014; Sadras and Dreccer, 2015). Environmental stresses that can cause significant yield reductions include, frost, heat and drought. The optimal flowering period (OFP) is defined as the period where the combined environmental stress is lowest, and where grain yield potential is generally maximised.

The Murray Plains is a cropping region in South Australia stretching from Murray Bridge in the south to Truro in the north, flanked by the Mount Lofty Ranges to the west and the River Murray to the east. Situated in the low rainfall zone (LRZ), it has variable rainfall, and a heavy rain shadow from the Mount Lofty Ranges, with rainfall decreasing rapidly further east of the range. From this variable rainfall pattern, drought stress is commonly a driving factor of yield potential, and it is paramount to take advantage of good sowing and establishment conditions in Autumn to set up the crop. This project aims to produce locally relevant information on early sowing, flowering time and the OFP to increase grower knowledge and crop production in the Murray Plains region.

Methods

In 2022 a field trial was established north-east of Punthari in the Murray Plains (-34.7875, 139.3267) on a sandy calcarosol at an elevation of 65m. The experiment consisted of ten wheat and eight barley varieties and novel breeding lines with different maturities (Table 1). All varieties were sown at four sowing dates of, 12th April, 6th May, 26th May and 14th June 2022. Due to insufficient soil moisture at sowing for the first two sowing dates, 10mm of supplementary in-furrow irrigation was applied through pressurised dripper hose to ensure plant establishment. The trial was sown with a 6-row research plot seeder with 9-inch row spacings. The trial was designed and analysed in a split-plot design with 3 replicates per variety.

Winter rainfall was low (Figure 1a), but season defining rainfall occurred in Spring which supported grain size and drove high grain yield results. The trial site experienced numerous <0°C temperatures during the growing season (Figure 1b), which caused frost induced sterility in the first sowing date (data not shown). The wide range of sowing dates and variety maturity groups resulted in a wide range of flowering dates allowing the optimal flowering date to be assessed for the region and the suitability of slower developing variety types with early sowing to be investigated. Nutrition, weeds, pests and diseases were managed using grower practice and as to not limit yield.

*Table 1 The (**a**) wheat and (**b**) barley varieties evaluated in the field trial at Punthari with their relative maturity groups.*

(a)

Variety	Maturity Group	Released
LPB17-6157 (Anvil CL Plus)	Very-Quick	2022
Vixen	Quick	2018
Calibre	Quick-Mid	2022
Scepter	Mid	2015
Rockstar	Mid-Slow	2019
Sheriff CL Plus	Mid-Slow	2018
Valiant CL Plus	Slow	2021
Denison	Slow	2020
Longsword	Quick Winter	2017
LPB19-14343 (Mowhawk)	Quick Winter	2023
Illabo	Quick-Mid Winter	2019
DS Bennett	Mid Winter	2018

(b)

Variety	Maturity Group	Released
Beast	Very Quick	2020
Commodus CL	Very Quick	2021
Cyclops	Very Quick	2022
Maximus CL	Very Quick	2020
Compass	Very Quick	2015
RGT Planet	Quick	2017
Pixel	Slow Winter	-
Newton	Slow Winter	2023

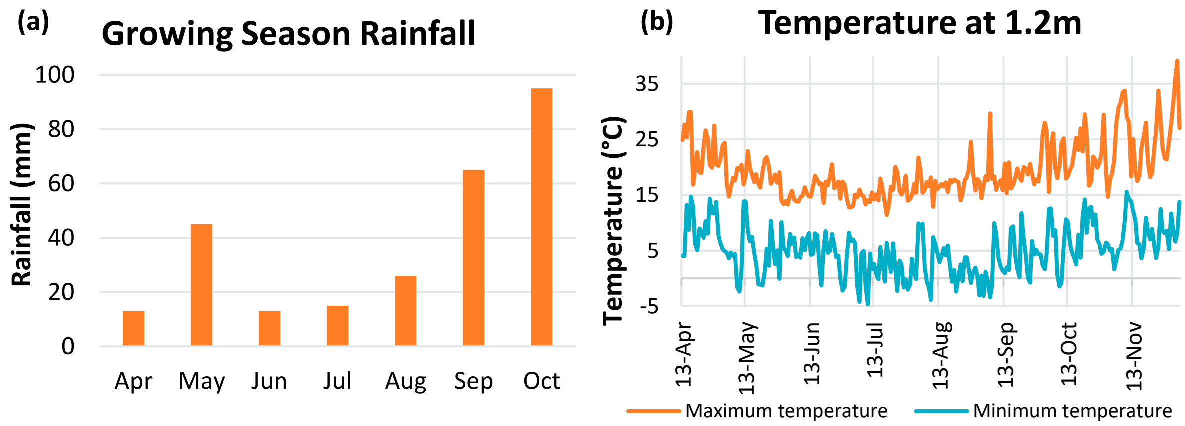

*Figure 1 The recorded growing season rainfall (April to October) from an ATMOS 41 weather station (**a**), and the maximum and minimum temperatures (**b**) from a tiny tag within a Stevenson screen at 1.2m at the field site for the 2022 growing season.*

Modelling of the OFP was completed using the crop modelling program APSIM Classic 7.10. The methodology for the creation of the OFP followed methods by Flohr et al. (2017), utilising climatic data from SILO Longpaddock patch-point (-34.85, 139.20) for up to the past 70 years. APSIM-Manager was used to sow a wheat crop of Mace (quick-mid) every 3 days between the 1st of April and the 29th July. APSIM was limited by an inability to accurately predict yield penalties due to frost and heat, therefore the impact of frost and heat on yield was estimated based on methodology described by Bell et al. (2015). The OFP was characterised by calculating a 15-day rolling average of the frost and heat limited yield, with the OFP equalling the days where yield was ≥ 95% of the maximum frost and heat limited yield.

Results and Discussion

Defining the Optimal Flowering Period

APSIM modelling for a quick-mid wheat at Palmer showed that the OFP changed depending on the number of years of climatic data used. In Figure 2, the relative grain yield curves using 30, 50 or 70 years of climatic data are shown. The modelling shows that by narrowing the number of years of data, the OFP shifted earlier and simulated yields for later flowering declined. Using the past 70 years with heat and frost rules, the OFP occurred between the 27th Aug and 13th Sept, however, this was from the 22nd Aug to 5th Sept when using the past 30 years. This demonstrates the influence that declining growing season rainfall is having on the optimal flowering time, especially in the LRZ which is often water limited. Mean yield from early flowering has not changed over this timeframe, which suggests that the frost risk has not altered.

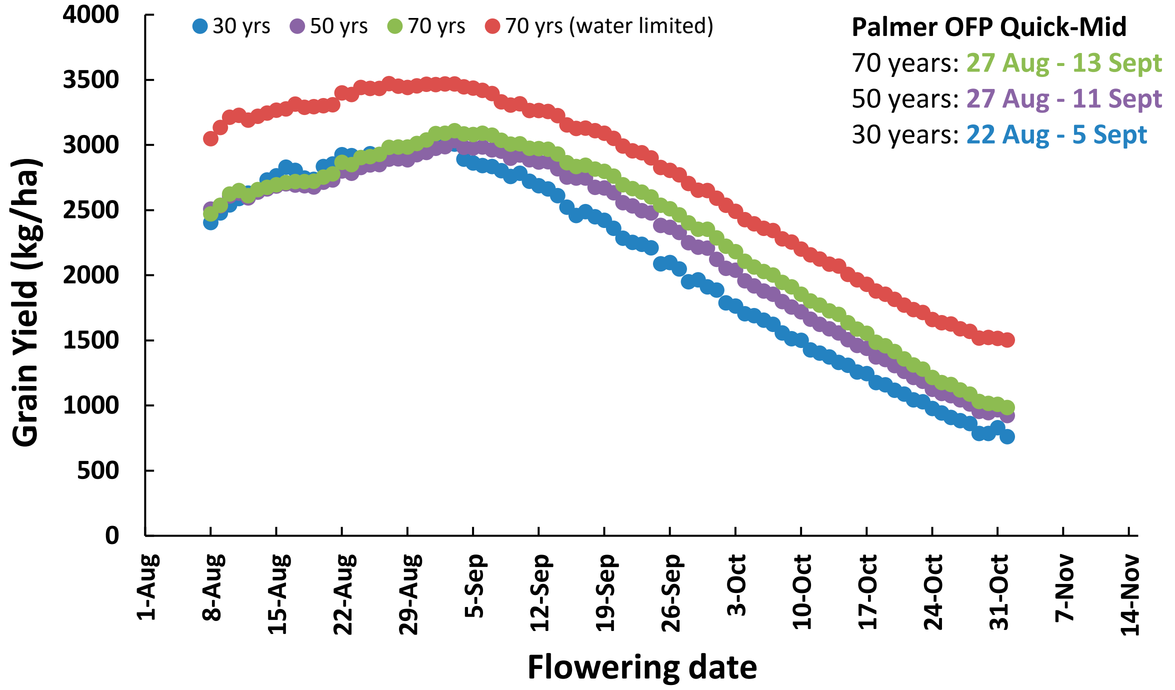

Figure 2 A simulation of the optimal flowering period (OFP) for a quick-mid wheat variety Mace at Palmer in the Murray Plains. The red dots show the water limited maximum potential yield using the past 70 years of climate data. The green, purple and blue dots represent the frost, heat and drought 15 day running mean yield over the past 70, 50 and 30 years respectively.

When comparing the simulations in Figure 2 to the actual in field flowering and grain yield data in Figure 3, it is clear that without a water limiting finish in the LRZ, the peak yield occurred much later than the APSIM models predicted. In 2021, peak yield for wheat in the middle of the simulated OFP (September 2nd), but in 2022 peak yield was a whole month later (3rd October). This demonstrates the limitations of the modelled OFP curve which is based on averaged data over a long timeframe (50 years) and does not represent the seasonal wet (or dry) anomalies, such as the 2022 season. This is due to the Murray Plains normally being water limited during the growing season, especially in spring (critical period), which final grain yields are so reliant on to fill grain. To demonstrate this, the same simulation in APSIM was run using only decile 9 and 10 rainfall years at Palmer to examine how the OFP changes in wet seasons. Evident in Figure 4, the average yield has increased as well as the duration of the OFP, which is now 21 days long. The start of the period is only 4 days later in high rainfall seasons but extends another 10 days later than the OFP. The gap between water limited vs water, heat and frost limited yield is much smaller from the start of September onwards, suggesting that these seasons also have less heat stress with later flowering. Another way of demonstrating the importance of soil moisture around flowering time for grain yield is Figure 5. Using a soil moisture probe at 10cm, a positive trend is shown when comparing grain yield to increasing critical period soil moisture (sum of soil moisture 21 days prior and 7 days post flowering). For a period of only 28 days in the growing season, optimal soil moisture during the critical period does drive grain yield. More work is needed to better understand how flowering time changes in high rainfall seasons to help growers capitalise on soil moisture in seasons where gross margins are at their highest.

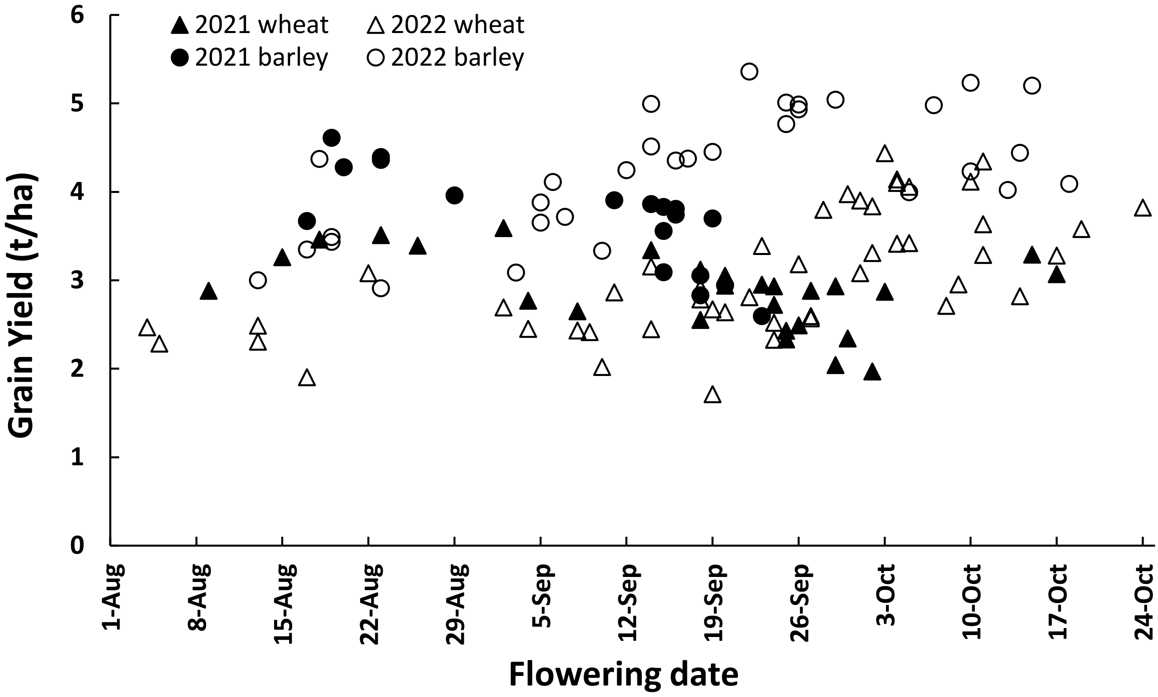

Figure 3 A comparison of the relative wheat and barley grain yield of every variety and their respective flowering dates in the field trial for 2021 and 2022.

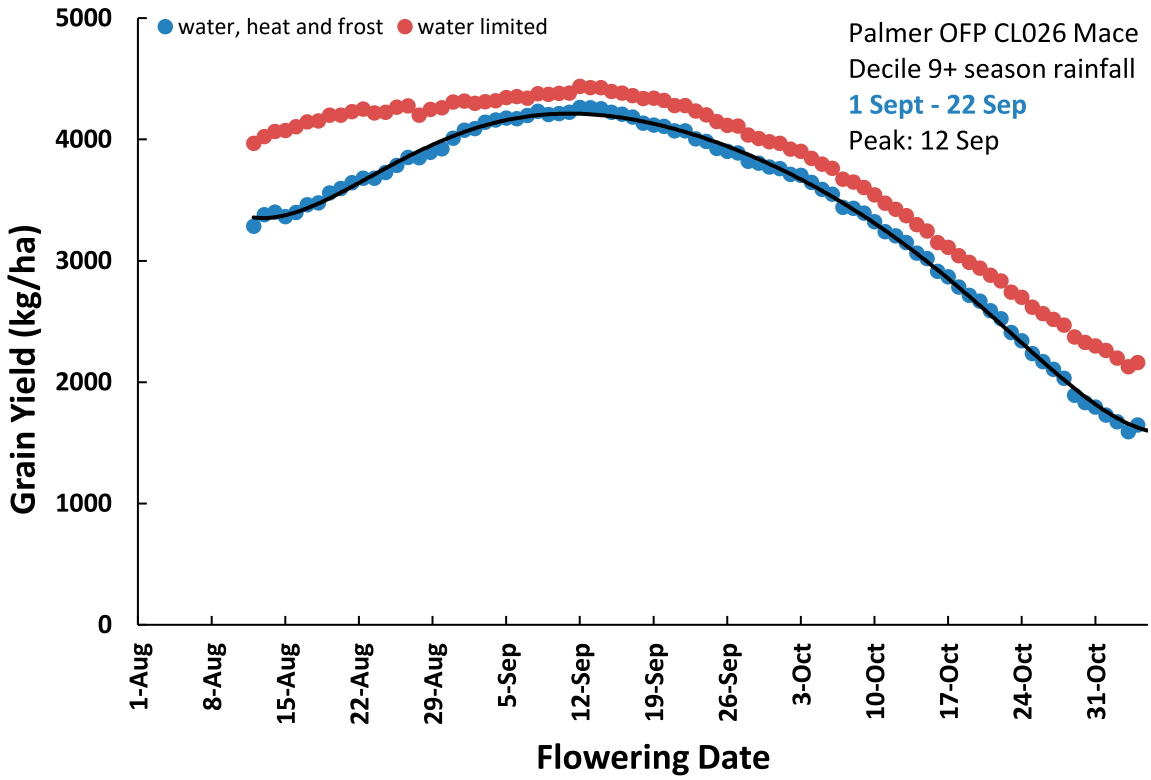

Figure 4 A simulation of the optimal flowering period (OFP) for a quick-mid wheat variety Mace at Palmer in the Murray Plains. The red dots show the water limited maximum potential yield in decile 9 and 10 rainfall seasons over the past 70 years of climate data. The blue dots represent the frost, heat and water limited yield 15 day running mean yield while the red dots represent just the water limited yield.

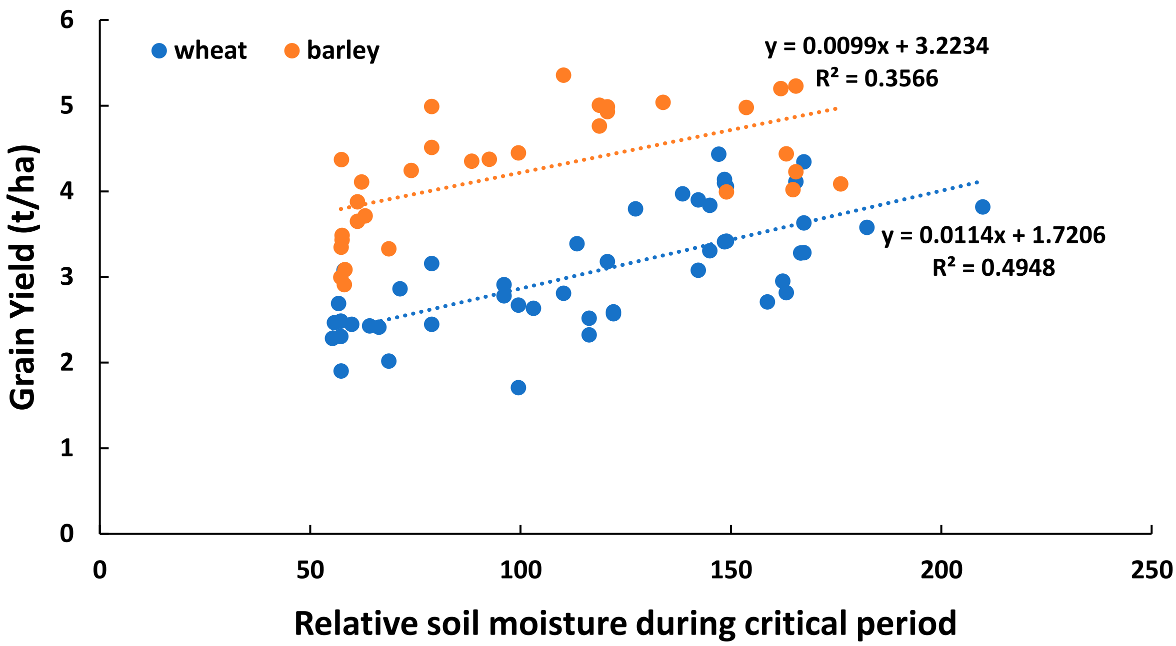

Figure 5 A comparison of grain yield for wheat and barley in 2022 to the sum of the relative soil moisture during the critical period of growth 21 days prior and 7 days post flowering. Relative soil moisture measured by using a moisture probe at 10cm to show relative changes in soil moisture through-out growing season.

The barley seasonal data also followed a similar trend across seasons, but peak yield in 2022 came earlier on the 22nd September in comparison to the wheat (3rd October). The development of an APSIM barley OFP model is still in progress but early indications are that it will be wider and slightly earlier. Both seasons of data demonstrated no real significant reductions in yield from either flowering too early or late. This demonstrates the adaptability and stability of barley sown and flowering at a range of times. Knowing this, getting the right flowering date for wheat (to lower the risk of increased yield losses from frost, heat or drought) is more important than for barley.

Influence of germination time on crop phenology

The timing of germination influenced the length of vegetative (germination to GS30) and reproductive (GS30 to GS65) phases of wheat development. Earlier germination generally increased the duration of the reproductive phase compared to later sowing dates, especially for the quicker developing spring types of wheat (Figure 6). It demonstrates how temperature dependent quick spring wheats from April germination dates develop too quickly due to the warmer temperatures in April. The 6th May germination date was optimal for these quick spring wheats, with varieties flowering in the modelled OFP. In contrast the longer season springs (Denison, Valiant CL Plus) were well suited to the 12th April germination and flowered within the simulated OFP (Figure 6). In 2022, none of the winter wheats were able to achieve flowering within the modelled OFP however in 2021, the quick winter Longsword flowered comfortably within the OFP. This is likely due to the 2022 season being cooler than 2021. A cooler season meant varieties took longer to accumulate the thermal time required to progress though their development stages. For all the slow springs and winter wheats, regardless of their sowing date, they required up to 6 weeks of colder temperatures before progressing to reproductive development. However, in this environment, the vernalisation requirements seems to be met relatively quickly for the winter wheats, with DS Bennett reaching GS30 only 10 days later than Longsword across germination dates.

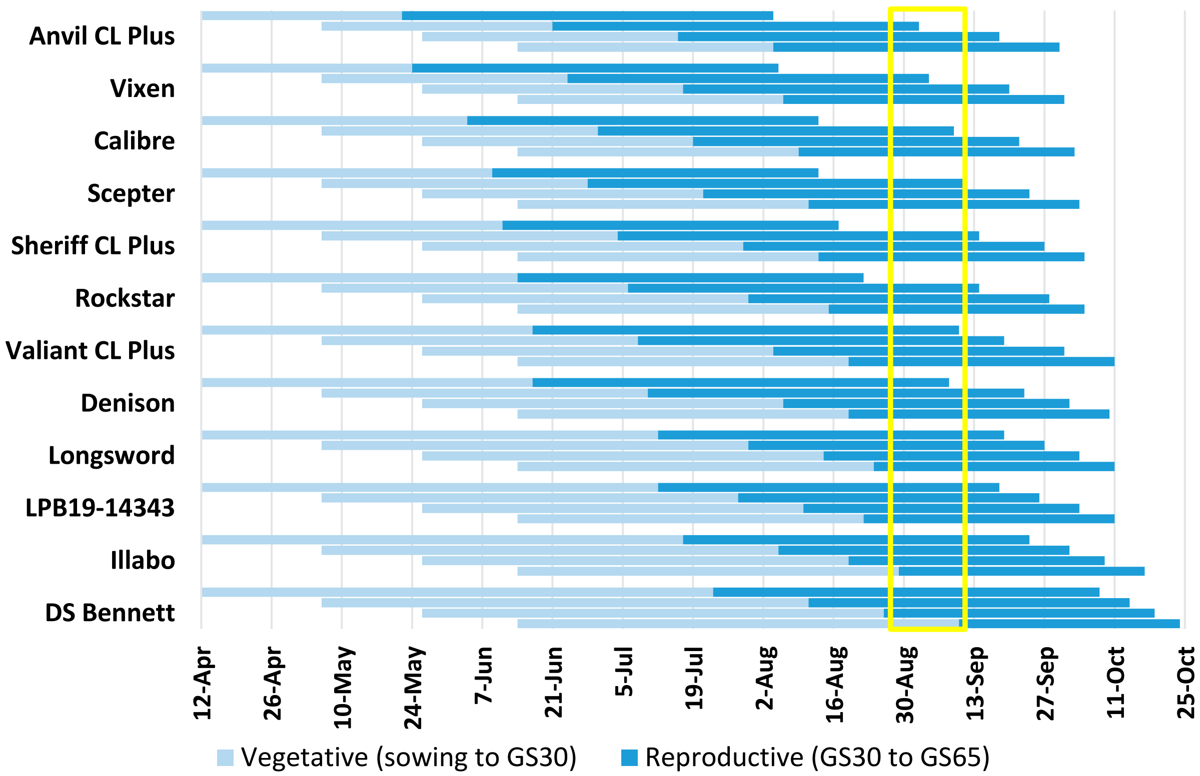

Figure 6 A schematic showing the relative duration of the vegetative (sowing to early stem elongation) and reproductive (stem elongation to flowering) growth stages of each wheat variety at the 2022 field site. Four bars are shown for each variety representing the four germination times of the 12th April, 6th May, 26th May and 14th June. The yellow box represents the simulated optimal flowering period for wheat at Palmer in the Murray Plains from 27th August to 11th September.

Early sown barley responded similarly to early sown wheat in their relative development phase transition, with an increased reproductive phase duration across varieties with earlier germination dates (Figure 7). Altering the germination dates resulted in a range of flowering dates for the spring types, however the slow winter barleys had stable flowering dates with only one week's variation from sowing between 12th April and 14th June. This might be from a combination of factors but suggests that the winter barley varieties have a larger vernalisation requirement than DS Bennett, the slowest winter wheat in the trial. It is also likely related to the relative nature of barley rushing through stem elongation as temperatures warm up in late winter/spring. When the winter barley is excluded, the variation in development between the spring types is very minimal, with RGT Planet only being roughly 1 week slower than Beast (Figure 7).

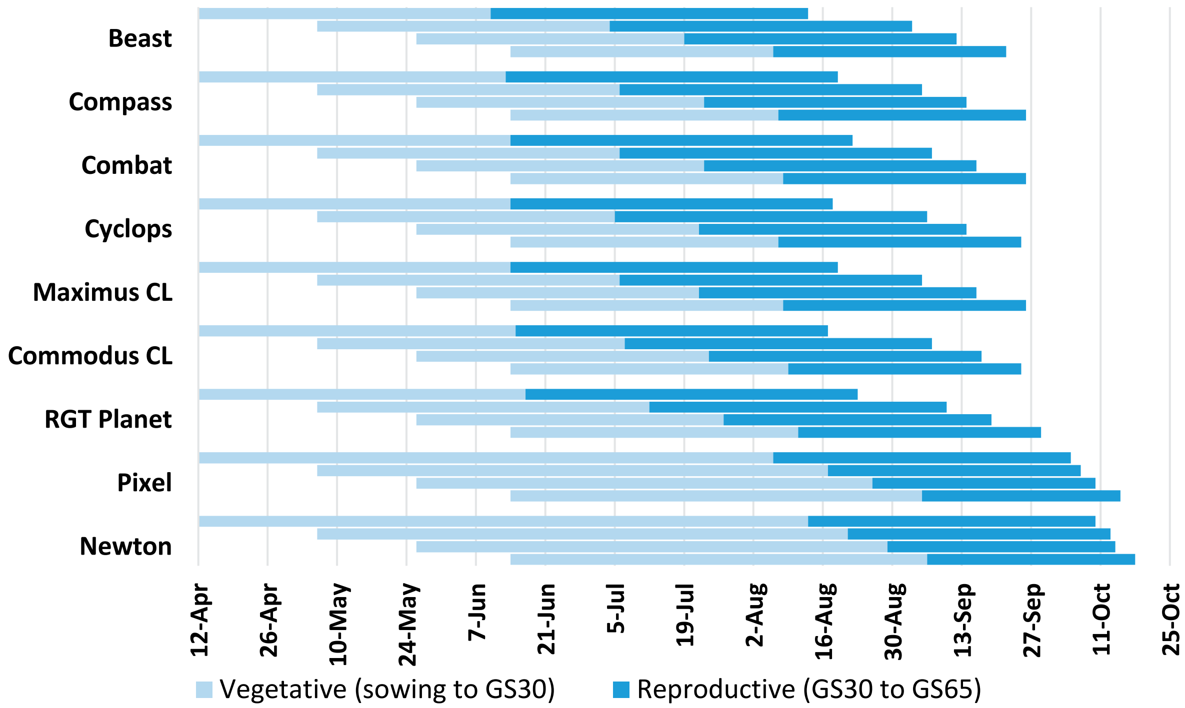

Figure 7 A schematic showing the relative duration of the vegetative (sowing to early stem elongation) and reproductive (stem elongation to flowering) growth stages of each barley variety at the 2022 field site. Four bars are shown for each variety representing four germination times of the 12th April, 6th May, 26th May and 14th June.

Grain yield across germination dates

Generally, in 2022 later germination dates were higher yielding in both the barley and wheat (Table 2). Barley (site average 4.2 t/ha) was significantly ($p < 0.001$, LSD = 0.104) higher yielding than wheat (site average 3.1 t/ha) and across all germination dates with some variation around different phenology types. Cyclops was stable across germination dates and was one of the best early sowing options for yield in the barley, even from the earliest sowing date in the presence of numerous frost events and early flowering in August. Surprisingly, the winter barley types also performed well when flowering outside the OFP and in the presence of severe drought stress in late August. The above decile 10 spring rainfall aided in their recovery and was an important reason that yields were highest from late sowing. The early sown wheat had some frost damage in the quick developing varieties that flowered early, in contrast to the barley that flowered at the same time without any significant damage (data not shown). Some of the slower developing spring and winter wheats did have a yield advantage over the quick spring types due to frost induced sterility. This demonstrates that there could be a fit for these longer season varieties in seasons with an April break. In both 2021 and 2022, Rockstar was the standout wheat across germination dates, demonstrating its yield stability and that slower spring types have a potential fit in the region. The new breeding line LPB19-14343 (Mowhawk) also shows the potential fit of a quick winter in this region with a big yield improvement over Longsword.

*Table 2 The mean grain yield for each variety of **(a)** wheat and **(b)** barley at four germination dates (12th April, 6th May, 26th May, 14th June) with green indicating above average, yellow on average and red below average.*

(a)

Site mean yield: **3.07 t/ha**	Germination Date			
	12-Apr	6-May	26-May	14-Jun
Anvil CL Plus	2.47	2.69	2.91	3.97
Vixen	2.28	2.45	2.64	3.90
Calibre	2.31	2.42	2.81	4.44
Scepter	2.49	2.86	2.52	4.10
Rockstar	3.08	3.16	3.80	4.06
Sheriff CL Plus	1.90	2.45	2.57	3.42
Denison	2.43	3.39	3.84	4.11
Valiant CL Plus	2.02	2.67	3.08	3.63
Longsword	1.71	2.59	3.41	3.29
LPB19-14343	2.78	3.18	4.14	4.34
Illabo	2.33	3.31	2.95	3.28
DS Bennett	2.71	2.82	3.58	3.82
TOS mean yield	**2.38**	**2.83**	**3.19**	**3.86**
p-value	0.013			
LSD ($p \leq 0.05$)	0.663			

(b)

Site mean yield: **4.24 t/ha**	Germination Date			
	12-Apr	6-May	26-May	14-Jun
Beast	3.00	3.09	4.24	5.36
Compass	3.44	3.65	4.51	4.99
Commodus CL	3.35	3.72	4.37	5.01
Cyclops	4.37	4.11	4.99	4.77
Maximus CL	3.49	3.88	4.35	4.93
RGT Planet	2.91	3.33	4.45	5.04
Pixel	4.00	4.98	5.23	5.20
Newton	4.23	4.02	4.44	4.09
TOS mean yield	**3.60**	**3.85**	**4.58**	**4.92**
p-value	<0.001			
LSD ($p \leq 0.05$)	0.6626			

Optimal sowing times

By using the field derived data for flowering time and development, optimal sowing dates can be determined. Using the past two seasons of data for different developing wheat varieties, trendlines can be developed and used to estimate the best times to be sowing (into wet soil). The phenology type of quick-mid spring type (Calibre) is demonstrated in Figure 8 where flowering time is plotted against the sowing date to produce a curve for both seasons. Using the curves of both the 2021 and 2022 season with the simulated OFP overlayed, sowing dates can be correlated to a specific flowering date. In the simulation, APSIM predicted peak yield to be the 3rd September which is the flowering date target. Although, the OFP is quite wide, targeting when peak yield will occur will allow for buffering room for if the season is warmer or cooler than average, and therefore speeding up or slowing down relative development. Going off the first two seasons of field data, the optimal sowing date for a quick-mid spring wheat at Palmer is between the 30th of April and 7th May. With the 2021 season being close to average and 2022 being quite cool, it could be expected that the end of the sowing window could extend out a few more days past the 7th May. More seasonal field data will aid in fine tuning this.

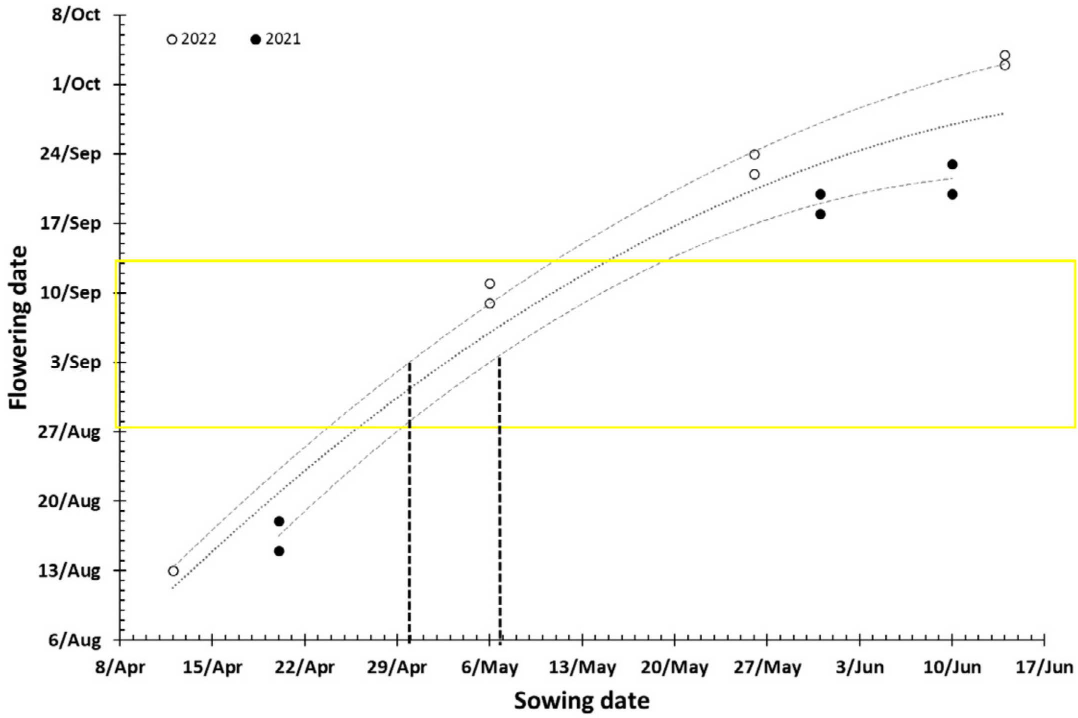

Figure 8 A plot of seasonal flowering data and sowing date (germination date) for quick-mid spring wheats in the Murray plains for the 2021 and 2022 seasons. Trendlines are fitted for each season and a combination of both seasons data. The yellow box depicts the simulated OFP with the vertical dashed lines depicting the range in sowing dates to flower at the time of peak yield (3rd September) in different seasons.

Conclusions

APSIM simulations at Palmer suggests the OFP for the Murray Plains is between the 27th August and 11th September. Although the 2021 field season matched the OFP well, maximum grain yield in the 2022 trial was much later than the simulated OFP due to the cooler and wetter season indicating caution is needed when solely using APSIM simulated OFP. The range in maturities in current elite wheat varieties is large, with new winter wheat genetics (Mowhawk) coming through that might improve the yield potential for this phenology group. However, slower spring wheats such as Rockstar and Denison are showing greater adaptability and yield stability across sowing dates. Barley yields have been relatively stable across flowering dates demonstrating that barley is more tolerant to flowering outside the OFP developed for wheat. French winter barley in its first season in the LRZ of Australia did show some promise in a high decile rainfall season but did suffer from relatively low soil water availability in August. Another season of field data in 2023 will help determine if there is a fit for these in the region and demonstrate if the winter wheat genetics are consistent across season. Additionally, further interpretation of flowering time in high decile rainfall seasons needs to be conducted to better understand how growers can maximise gross margins in seasons where generally most profit is made.

Acknowledgements

The authors thank the South Australian Grain Industry Trust (SAGIT) for funding the project as well as project support from the University of Adelaide and South Australian Research and Development Institute (SARDI). The authors would like to thank Adrian Bormann for the provision of the 2022 trial site and acknowledge the support and extension opportunities provided by the Murray Plains Farmers Group. Thanks to the SARDI Waite Agronomy team for trial technical support including support provided by Cameron Mares and Chris Bailey.

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Pasture legume choices, establishment and persistence for the Murray Plains

Take home messages

- Wheat biomass differences were recorded 128 days after sowing, but increased biomass did not result in increased yields.
- There were no significant differences in Soil Nitrate N or Ammonium N recorded.
- There were no significant differences in yield recorded, with Studenica and Volga vetchs achieving H1 quality, and all other treatments achieving H2 quality, except Biserrula which only achieved APW1.
- Of the pasture treatments, Studenica produced the highest grain protein levels, 13.4% followed by Volga vetch at 13.1%. with majority of treatments recording grain protein in the range 12 to 12.5%.
- Low yields were expressed despite the good season, as the objective was to quantify the effects of the pasture phase on the ensuing wheat crop. Higher fertiliser applications may have masked such effects. All plots received 80 kg/ha Granulock at sowing.

Background

Pasture species play a pivotal role in mixed farming operations in low rainfall zone environments, providing a disease break between cropping intervals, increasing the performance of subsequent years cereal crops by fixing nitrogen, whilst reducing economic risk of the farming enterprise. For the Murray Plains, growing quality pastures has become more attractive in recent years due to the profitability of livestock during the past few poor seasons, along with the increasing price of crop inputs including nitrogen-based fertilisers.

The objectives of this trial were to identify which pasture species are best suited to low rainfall zone environments, focusing on pasture establishment on soil types relevant to the Murray Plains region, measuring the amount of N fixation from these pasture species, and analysing subsequent years cereal crop results including grain quality and yield.

Methods

A total of 11 pasture species were sown at Palmer on 14 May in 2021, before wheat cv. Vixen was sown over the top of these plots on 18 May in 2022. Below average rainfall in February and March was recorded at the Palmer weather station (BOM station number 024525) approximately 3km from the trial site, before rain events in late April and early May signalled a start to the season. On the day of sowing, the site had received 10.3mm in the 7 days prior, and then received 4.8mm in the 10 days post sowing. The crop germinated well before below average rainfall in June and July resulted in slow establishment.

Site details

Location	Palmer, South Australia 5238
GPS co-ordinates	-34.867788, 139.195142
Crop and variety	Wheat cv. Vixen
Sowing rate	80 kg/ha
Previous crop	Pasture

Crop management

Sowing date	18 May 2022	
Method	Sown with a Knife point spreader boot + presswheels	
Sowing depth (cm)	2-3	
Combine make	Agrowdrill	
Combine configuration	7 tynes at 250 mm spacing	
Soil moisture	Moist	
Fertiliser	18 May 2022	80 kg/ha Granulock
Harvest date	20 Dec 2022	
Replications	4	
Plot size	2 m x 10 m	

Treatment list

No.	2021 Crop variety	Sowing rate
1	PM 250 Strand medic	5 kg/ha
2	Sultan SU medic	5 kg/ha
3	Scimitar spineless burr medic	5 kg/ha
4	Margurita - Serradella	7 kg/ha
5	Casbah - Biserrula	7 kg/ha
6	Bartolo Bladder clover*	20 kg/ha
7	Cefalu Arrowleaf clover^	4 kg/ha
8	Nitro Plus Persian clover	4 kg/ha
9	Volga vetch	30 kg/ha
10	Mawson sub clover	7 kg/ha
11	Studenica	30 kg/ha

* = Seeding rate increased due to poor germination of seed (51%)
^ = Poor establishment due to seed having 38% germination (test not available prior to seeding)

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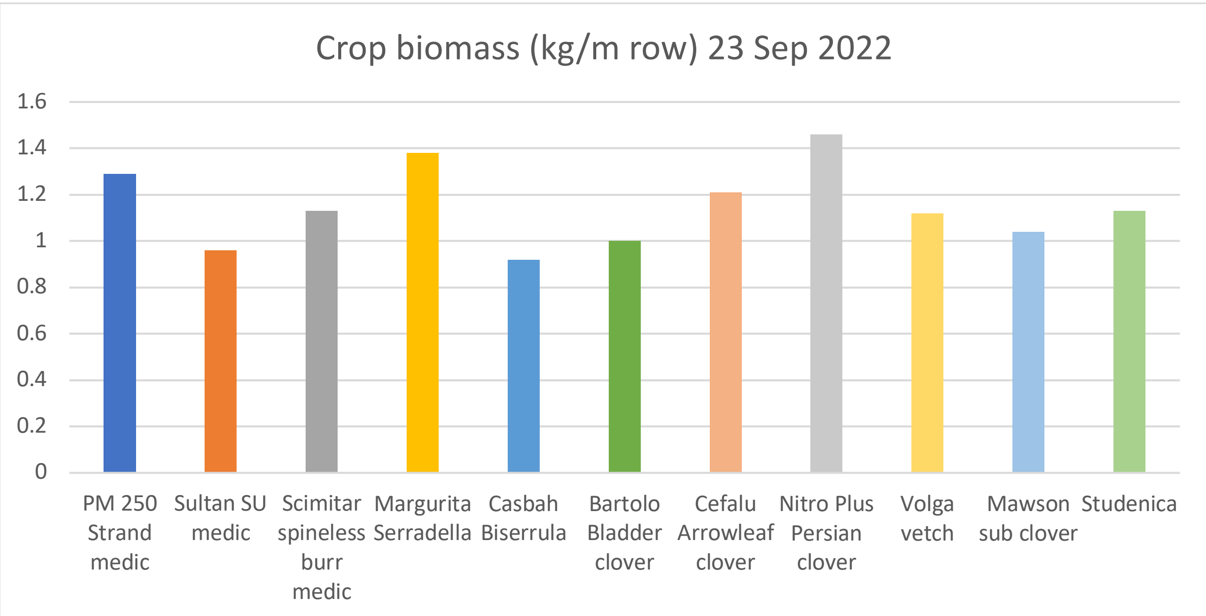
Results

Table 1. Crop emergence and biomass of wheat cv. Vixen, Palmer

No.	Treatment	Rate	Crop emergence (mean no./m row) 12 Jul 2022	Crop biomass (mean kg/m row) 23 Aug 2022	Crop biomass (mean kg/m row) 23 Sep 2022
1	PM 250 Strand medic	5 kg/ha	28.60	1.25	1.29
2	Sultan SU medic	5 kg/ha	27.50	1.04	0.96
3	Scimitar spineless burr medic	5 kg/ha	28.30	1.13	1.13
4	Margurita - Serradella	7 kg/ha	26.30	1.42	1.38
5	Casbah - Biserrula	7 kg/ha	27.40	1.29	0.92
6	Bartolo Bladder clover	20 kg/ha	25.60	1.13	1.00
7	Cefalu Arrowleaf clover	4 kg/ha	26.00	1.29	1.21
8	Nitro Plus Persian clover	4 kg/ha	27.10	1.38	1.46
9	Volga vetch	30 kg/ha	27.40	1.17	1.12
10	Mawson sub clover	7 kg/ha	25.60	1.13	1.04
11	Studenica	30 kg/ha	28.60	1.13	1.13

Figure 1. Crop biomass of wheat cv. Vixen, Palmer



Biomass cuts were undertaken on wheat cv. Vixen on 23 August and 23 September in 2022 (Table 1). There were no significant differences in weights between the treatments on 23 August, however differences were significant when comparing treatments from 23 September. Wheat grown on 2021 Nitro Plus Persian clover plots achieved a wheat biomass weight equivalent to PM 250 Strand medic and Margurita serradella, whilst achieving significantly increased biomass weights compared to all other treatments. Although there were significant differences recorded from biomass cuts taken on 23 September, this did not result in significant increases in grain yield.

Table 2. Soil analysis of wheat cv. Vixen, Palmer

No.	Treatment	Rate	Soil analysis 01 Nov 2022
			Nitrate-N (mean mg/kg)
1	PM 250 Strand medic	5 kg/ha	75.8
2	Sultan SU medic	5 kg/ha	57.5
3	Scimitar spineless burr medic	5 kg/ha	61.5
4	Margurita - Serradella	7 kg/ha	58.8
5	Casbah - Biserrula	7 kg/ha	65.5
6	Bartolo Bladder clover	20 kg/ha	67.8
7	Cefalu Arrowleaf clover	4 kg/ha	68.5
8	Nitro Plus Persian clover	4 kg/ha	71.3
9	Volga vetch	30 kg/ha	62.3
10	Mawson sub clover	7 kg/ha	72.5
11	Studenica	30 kg/ha	68.0

Figure 2. Soil analysis of wheat cv. Vixen, Palmer

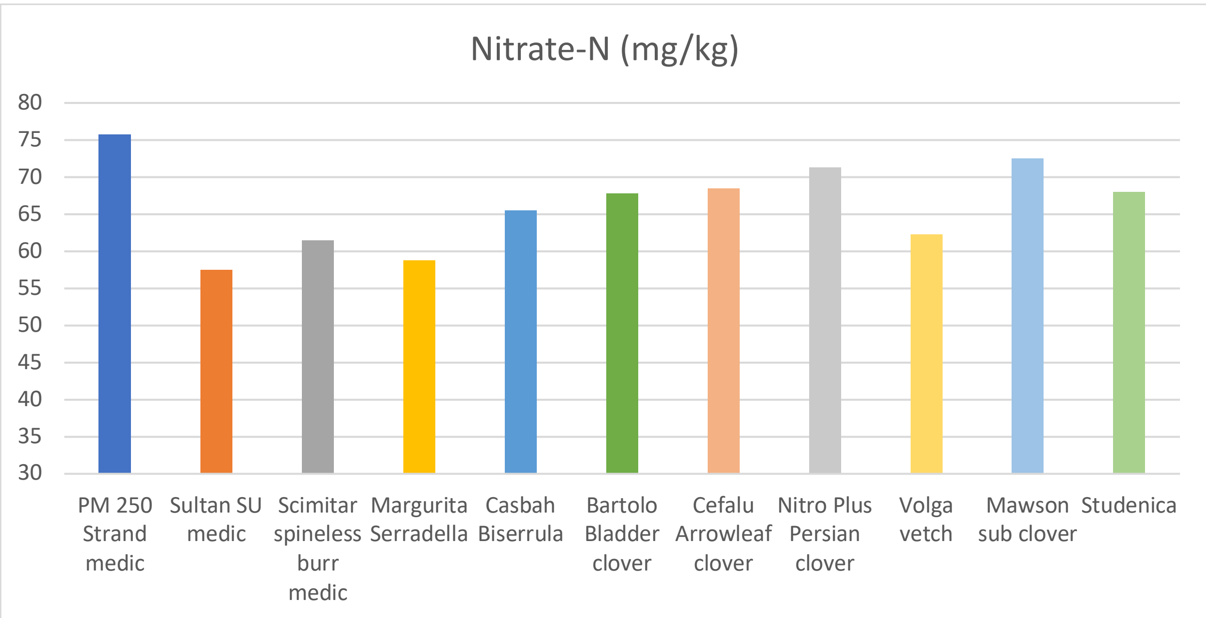


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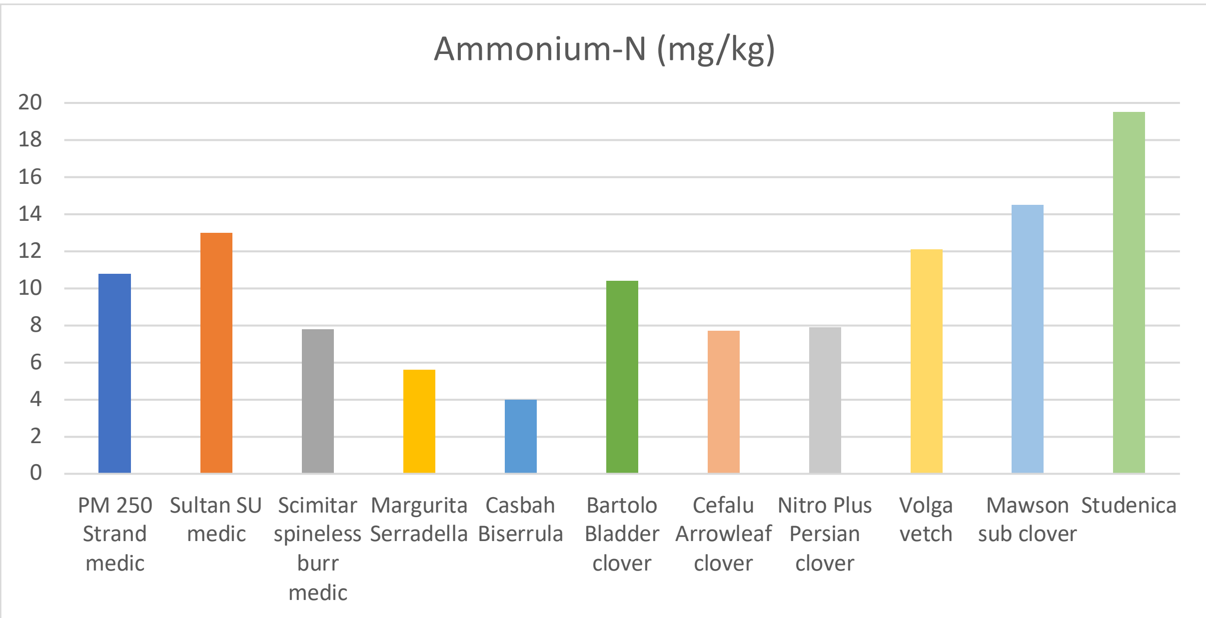
Table 2a. Soil analysis of wheat cv. Vixen, Palmer

No.	Treatment	Rate	Soil analysis 01 Nov 2022
			Ammonium-N (mean mg/kg)
1	PM 250 Strand medic	5 kg/ha	10.8
2	Sultan SU medic	5 kg/ha	13.0
3	Scimitar spineless burr medic	5 kg/ha	7.8
4	Margurita - Serradella	7 kg/ha	5.6
5	Casbah - Biserrula	7 kg/ha	4.0
6	Bartolo Bladder clover	20 kg/ha	10.4
7	Cefalu Arrowleaf clover	4 kg/ha	7.7
8	Nitro Plus Persian clover	4 kg/ha	7.9
9	Volga vetch	30 kg/ha	12.1
10	Mawson sub clover	7 kg/ha	14.5
11	Studenica	30 kg/ha	19.5

Figure 2a. Soil analysis of wheat cv. Vixen, Palmer



Soil samples were taken from the top 10 cm from each plot, before being analysed by APAL Laboratories for nitrogen content (Tables 2 & 2a). Although differences in soil Nitrate and Ammonium were detected, results were not significant, suggesting that all pasture species were able to fixate relatively similar amounts of Nitrogen through the 2021 season.

Table 3. Grain yield and quality of wheat cv. Vixen, Palmer

No.	Treatment	Rate	Grain yield (mean kg/ha) 20 Dec 2022	Grain test weight (mean kg/hL) 16 Feb 2023	Grain screenings (mean %) 16 Feb 2023
1	PM 250 Strand medic	5 kg/ha	1159	78.3	1.27
2	Sultan SU medic	5 kg/ha	1219	78.1	1.53
3	Scimitar spineless burr medic	5 kg/ha	915	76.9	1.96
4	Margurita - Serradella	7 kg/ha	1163	77.4	1.28
5	Casbah - Biserrula	7 kg/ha	1293	78.1	1.45
6	Bartolo Bladder clover	20 kg/ha	1330	78.2	0.69
7	Cefalu Arrowleaf clover	4 kg/ha	1293	77.5	1.40
8	Nitro Plus Persian clover	4 kg/ha	1215	77.4	1.40
9	Volga vetch	30 kg/ha	1207	78.1	1.08
10	Mawson sub clover	7 kg/ha	1085	77.5	1.12
11	Studenica	30 kg/ha	1052	77.9	0.80

Figure 3. Grain yield of wheat cv. Vixen, Palmer

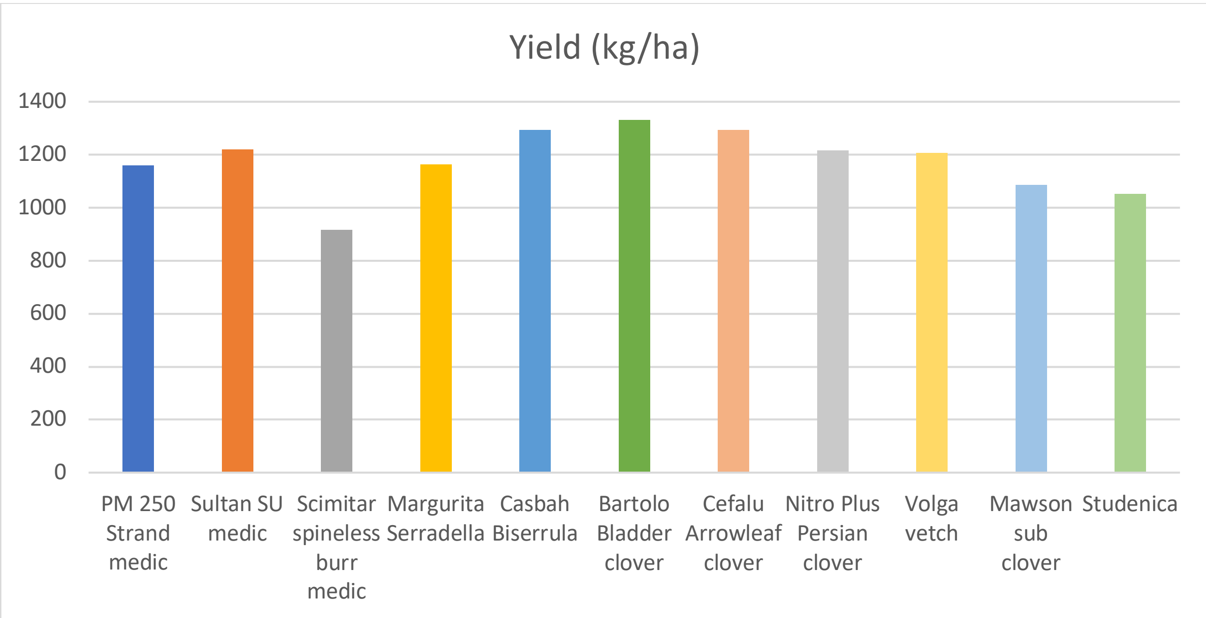


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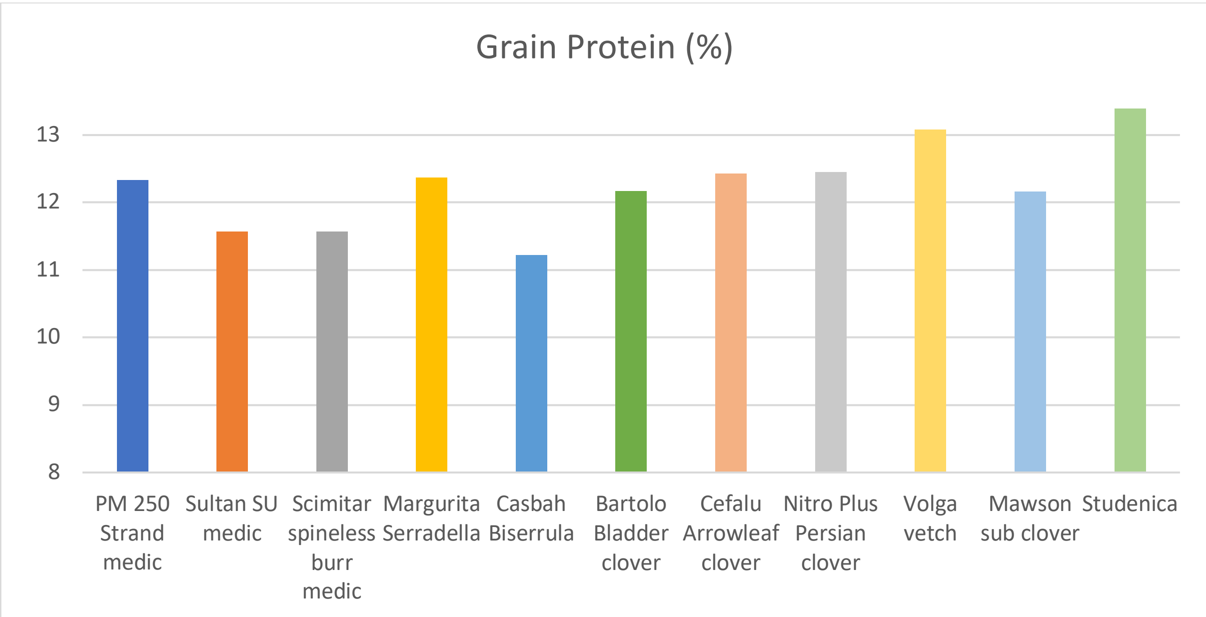
Table 4. Grain quality of wheat cv. Vixen, Palmer

No.	Treatment	Rate	Grain moisture content (mean %) 16 Feb 2023	Grain protein content (mean %) 16 Feb 2023
1	PM 250 Strand medic	5 kg/ha	9.92	12.33
2	Sultan SU medic	5 kg/ha	10.06	11.57
3	Scimitar spineless burr medic	5 kg/ha	9.98	11.57
4	Margurita - Serradella	7 kg/ha	9.97	12.37
5	Casbah - Biserrula	7 kg/ha	10.09	11.22
6	Bartolo Bladder clover	20 kg/ha	10.08	12.17
7	Cefalu Arrowleaf clover	4 kg/ha	10.01	12.43
8	Nitro Plus Persian clover	4 kg/ha	10.07	12.45
9	Volga vetch	30 kg/ha	10.05	13.08
10	Mawson sub clover	7 kg/ha	10.05	12.16
11	Studenica	30 kg/ha	9.95	13.39

Figure 4. Grain quality of wheat cv. Vixen, Palmer



Wheat cv. Vixen was harvested on 20 December 2022, and although there were no significant differences in yield recorded, there were differences in grain quality (Tables 3 & 4). Wheat grown on top of Studenica and Volga pasture plots from 2021 recorded grain protein above 13% when analysed in February 2023, achieving H1 grain quality. Wheat grown on top of Casbah pasture resulted in the lowest grain protein recorded, achieving 11.2% protein placing it at APW1 grain quality. All other treatments achieved H2 quality, recording between 12% and 12.5% grain protein.

Conclusion

From the trials conducted in Palmer in 2022, maximum biomass was recorded when wheat cv. Vixen was sown over Nitro Plus Persian clover treatments from 2021. Although significant differences in biomass were recorded, this did not result in any significant increase to grain yield. Although there were numerical differences in soil N content found, these differences were not significant, suggesting that all legume pasture species were able to produce similar amounts of N fixation through the 2021 growing season. Although there were no significant yield differences recorded, there were grain quality traits that showed significant differences. Studenica and Volga vetch recorded grain protein high enough to be classed as H1 quality, whilst all other treatments achieved grain protein level between 11.5% and 12.5%, putting them at H2 quality. Casbah grown in 2021 resulted in the lowest grain protein level, achieving 11.2% protein and placing it as APW1.

Acknowledgements

This trial was funded by the SA Grain Industry Trust (SAGIT), managed by AgXtra and hosted at Steen and Deanna Paech's.

Improving canola establishment in dry conditions

Take home messages

- 44Y94 CL achieved the highest yield at 3.5T/ha, followed closely by Invigor R4022P and 44Y27RR, with ATR stingray, Bonito, and retained Hyola Enforcer yielding significantly less at less than 3T/ha.
- Stingray yielded highest when sown late, Bonito when sown mid to late, 44Y94 when sown early, Invigor R4022P when sown early to mid, Retained Enforcer CT when sown mid.
- Invigor T4510, HyTTec Trident, New Enforcer CT, 44Y27 RR no significant difference in yield when sown early or late, under last year's seasonal conditions.
- No significant differences in oil content were recorded between varieties when averaged across the three sowing timings, however differences became significant when comparing variety and time of sowing.
- Under the conditions of this trial in 2022, sowing canola at 2 and 2.5kg/ha resulted in significantly greater seed yield compared to 1 and 1.5kg/ha. Approximately 200 – 250 kg/ha extra yield.
- Oil content significantly decreased as the seeding rate was increased, 46% down to 45%, and protein content increased as the sowing rate was increased and the oil content decreased.

Background

Canola is an expensive crop to produce, especially with recent increases in input costs including fertiliser, chemical and diesel prices. However, with canola prices ranging from $600-$1000/t there is opportunity for growers to take advantage of the associated gross margins and increase profitability. The Murray Plains is a cropping region located in South Australia, situated in the low rainfall zone (LRZ). The region extends from Murray Bridge to Truro and encompasses all the land between the Mount Lofty Ranges and the River Murray. Rainfall is variable throughout the region and decreases dramatically heading east of the Mount Lofty Ranges. A late break experienced in 2021 meant that canola was left out of the rotation for farmers due to the risk of poor establishment in dry conditions. Soil types are also variable throughout the region ranging from heavy clays to sandy rises. Therefore, there is an opportunity for farmers to gain insight about better canola establishment in dry conditions on sandy country. This project aims to provide local knowledge on dry sowing strategies to improve canola establishment including timing of sowing, sowing rate and examine the agronomic fit of LRZ varieties in the Murray Plains.

Methods

Table 1: Sowing information for time of sowing x canola variety trial

Location	Palmer, South Australia	
Previous crop	Barley	
Sowing date	TOS1	18 May 2022
	TOS2	01 Jun 2022
	TOS3	04 Jul 2022
Method	Sown with a Knife point spreader boot + presswheels	
Sowing depth (cm)	2-3	
Fertiliser	100kg/ha Granulock	

Table 2: Canola varieties sown

No.	Crop variety	Sowing rate	Maturity
1	ATR Stingray	2.5 kg/ha	Early
2	43C80	2.5 kg/ha	
3	43Y92 CL	2.5 kg/ha	Early
4	Invigor T4510	2.5 kg/ha	Early – Mid
5	HyTTec Trident	2.5 kg/ha	Early
6	New Hyola Enforcer CT	2.5 kg/ha	Mid
7	Retained Hyola Enforcer CT	2.5 kg/ha	Mid
8	Invigor R4022P	2.5 kg/ha	Early – Mid
9	44Y27 RR	2.5 kg/ha	Mid

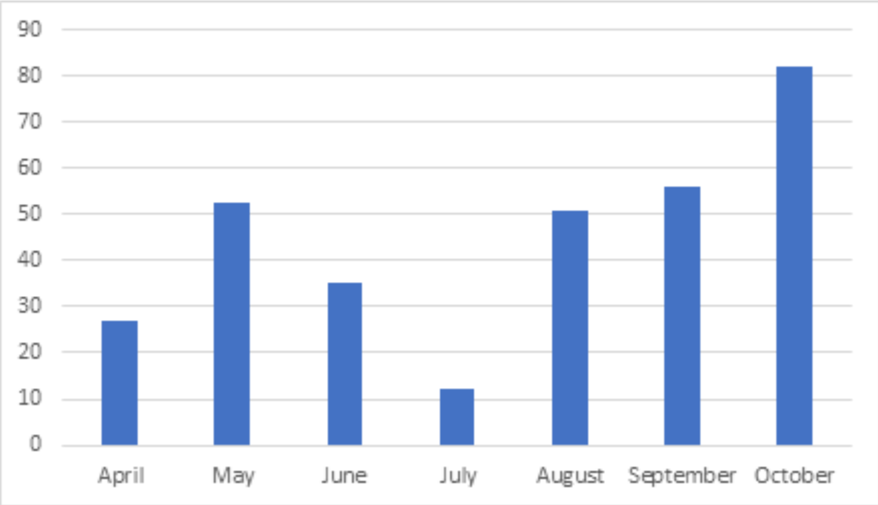
Table 3: Sowing information for canola sowing rate trial

Location	Palmer, South Australia
Previous crop	Barley
Sowing date	18 May 2022
Method	Sown with a Knife point spreader boot + presswheels
Sowing depth (cm)	0.5
Fertiliser	100 kg/ha Granulock:Gran Am 2:1

Table 4: canola variety and increasing sowing rates

No.	Crop variety	Sowing rate
1	HyTTech Trophy	1 kg/ha
2	HyTTech Trophy	1.5 kg/ha
3	HyTTech Trophy	2 kg/ha
4	HyTTech Trophy	2.5 kg/ha

Figure 1: Recorded growing season rainfall (April to October) in Palmer from BOM weather station 24545



Results and Discussion

Table 5: Canola seed yield and oil content of time of sowing x canola varieties trial

No.	Treatment	TOS	Seed yield (mean t/ha) 20 Dec 2022	Seed oil content (mean %) 15 Feb 2023
1	ATR Stingray	TOS1	2.18	46.28
		TOS2	2.94	47.89
		TOS3	3.66	46.36
2	Bonito TT	TOS1	2.6	47.13
		TOS2	3.27	47.19
		TOS3	3.06	46.89
3	44Y94 CL	TOS1	4.07	47.78
		TOS2	3.83	46.51
		TOS3	2.78	47.44
4	Invigor T4510	TOS1	3.21	45.84
		TOS2	3.41	46.81
		TOS3	3.03	46.84
5	HyTTec Trident	TOS1	3.27	46.46
		TOS2	3.05	47.65
		TOS3	3.33	47.17

6	New Hyola Enforcer CT	TOS1	3.02	47.04
		TOS2	3.29	47.18
		TOS3	3.05	46.88
7	Retained Hyola Enforcer CT	TOS1	2.72	46.13
		TOS2	3.27	47.84
		TOS3	2.85	46.83
8	Invigor R4022P	TOS1	3.56	47.60
		TOS2	3.52	47.54
		TOS3	2.99	46.61
9	44Y27 RR	TOS1	3.45	46.29
		TOS2	3.53	47.31
		TOS3	3.19	47.53

Figure 2: Canola seed yield (t/ha) of time of sowing x canola varieties, Palmer

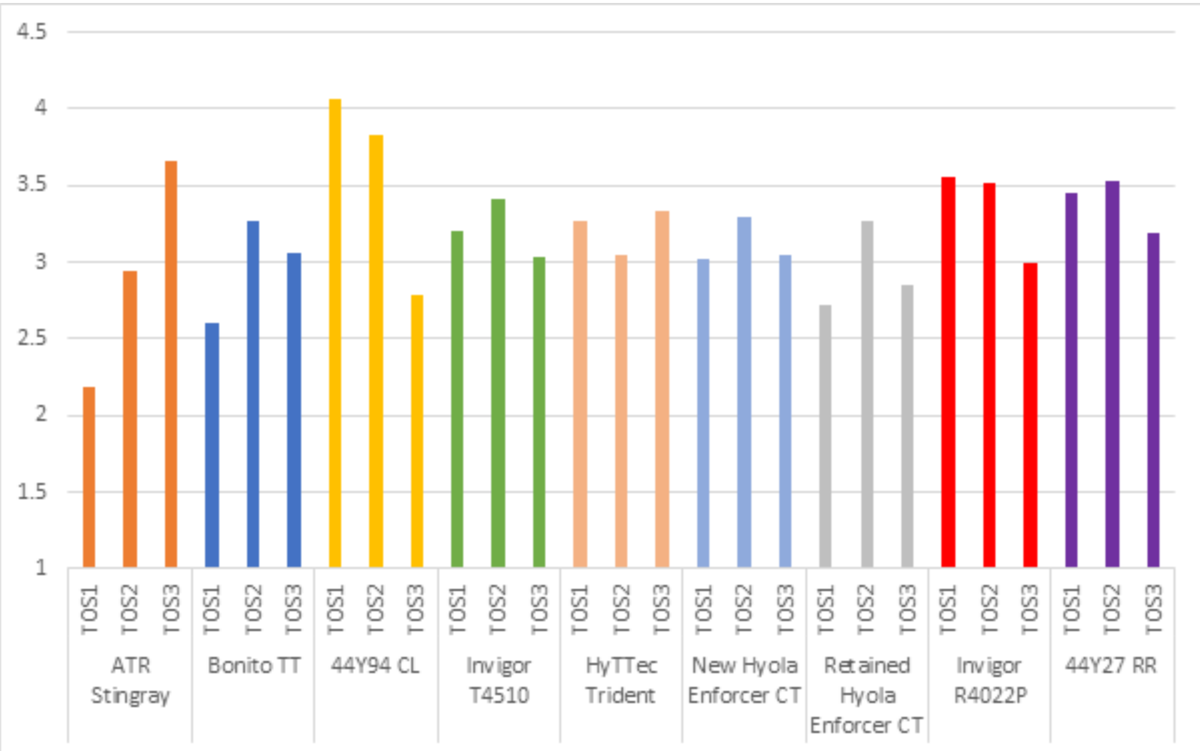


Figure 3: Canola oil content (%) of time of sowing x canola varieties, Palmer

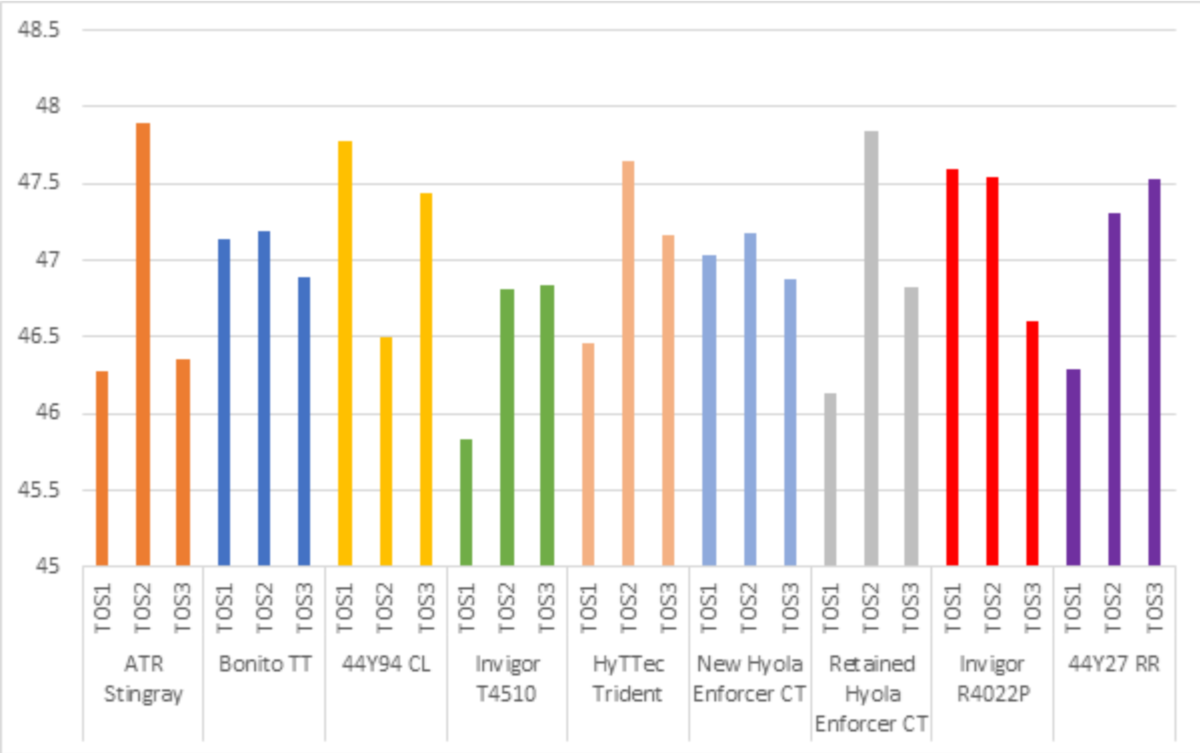


Table 6: Canola seed yield and oil and protein content of canola sowing rates trial

No.	Treatment	Seed yield (mean kg/ha) 20 Dec 2022	Moisture content (mean %)	Oil content (mean %)	Protein content (mean %)
1	Canola cv. HyTTec Trophy at 1 kg/ha	1851	5.02	46.06	18.97
2	Canola cv. HyTTec Trophy at 1.5 kg/ha	1784	5.15	45.55	19.20
3	Canola cv. HyTTec Trophy at 2 kg/ha	2023	5.11	45.37	19.64
4	Canola cv. HyTTec Trophy at 2.5 kg/ha	2051	5.00	45.16	19.70

Figure 4: HyTTec Trophy canola yield (t/ha) of sowing rates trial, Palmer

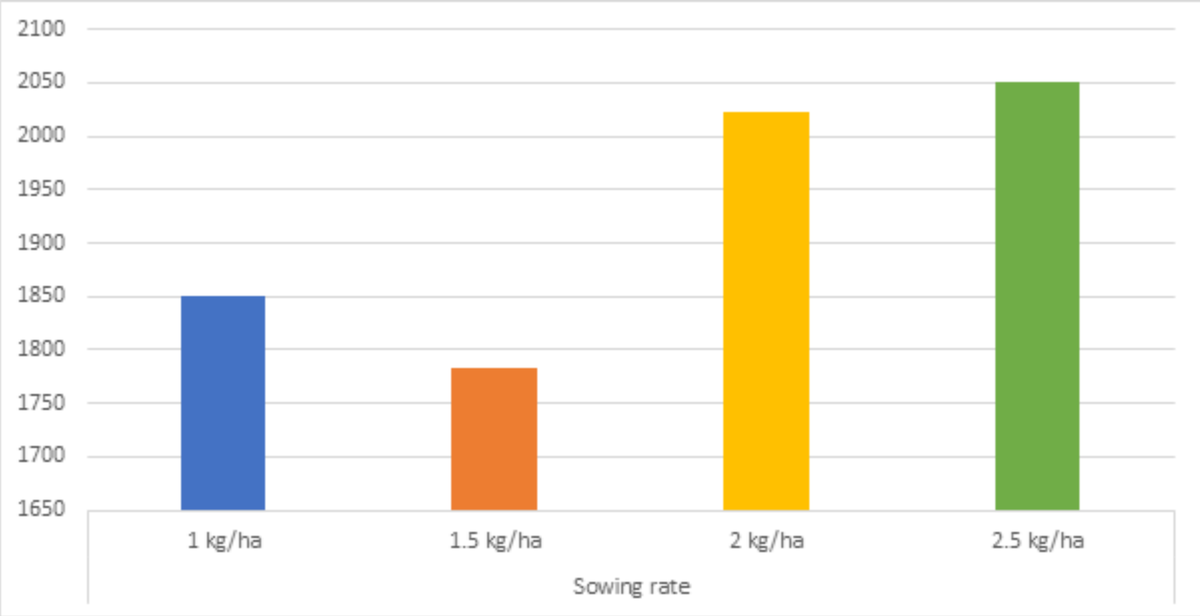
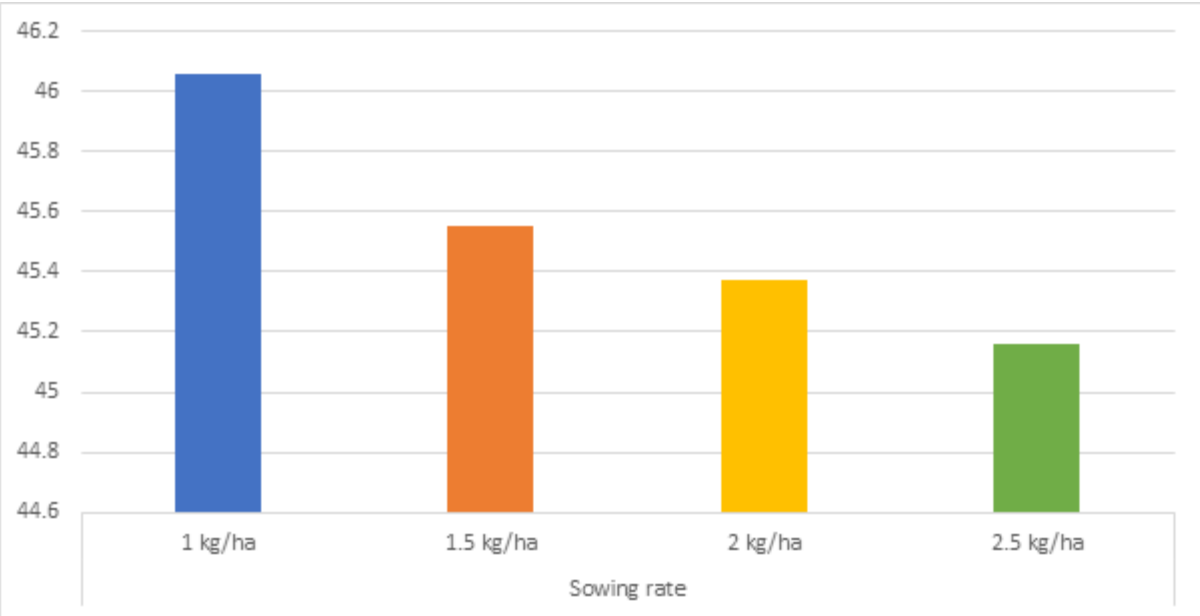


Figure 5: HyTTec Trophy canola oil content (%) of time of sowing rates trial, Palmer



Grain yield and oil content across time of sowing x variety and sowing rate

Rainfall conditions at the site were favourable except for a dry July and in particular a very wet October. This provided above average canola yields across the trial. Sowing 44Y94 CL on 18 May (TOS1) recorded the highest yield with 4.07 t/ha (figure 2). 44Y94 CL was the outstanding variety on average across the three times of sowing compared to the other varieties. Invigor R4022P and 44Y27 RR also recorded significantly ($p < 0.001$, LSD = 0.31) greater yields compared to Stingray and Bonito across the three times of sowing. Stingray benefitted from the 4 July sowing date with a significant ($p < 0.001$, LSD = 0.54) increase in yield compared to the earlier sowing times. Sowing on 1 June significantly increased Bonito and retained Hyola Enforcer CT yield compared to the 18 May and 4 July. Across all varieties, sowing on 1 June significantly increased canola yield at the site. However, this was only for this particular year and the soft finish that was received in 2022 is likely to have been a major factor in this result.

Differences were also observed for oil content between the different time of sowing and canola variety. Stingray sown on 1 June recorded significantly ($p < 0.001$, LSD = 0.122) greater oil content compared to the other times of sowing (figure 3). Sowing 44Y94 on 18 May also significantly increased oil content compared to 1 June. Furthermore, sowing Roundup Ready canola variety 44Y27 RR on 4 July significantly improved oil content compared to the 18 May sowing date.

A trend was observed in the canola sowing rates trial. The 2 and 2.5 kg/ha of HyTTec Trophy sowing rates significantly increased canola yield compared to the 1 and 1.5 kg/ha. As mentioned previously, favourable rainfall conditions for majority of the growing season and in particular the soft finish allowed for optimal growth conditions. Therefore, there was no competition between plants for moisture. However, the 1 kg/ha sowing rate significantly ($p < 0.001$, LSD = 0.3) increased the oil content compared to the other seeding rates. As seeding rate decreased, oil content increased.

Conclusion

From the trials conducted in Palmer in 2022, maximum grain yields were recorded when canola was sown on 1 June. However, this is not likely to occur every year due to favourable rainfall events received in October providing a soft finish. 44Y94 CL was the standout variety and when sown on 18 May recorded the highest yield compared to all other varieties and times of sowing. 44Y94 CL was followed by Invigor R4022P and 44Y27 RR for grain yield. Open pollinated varieties Stingray and Bonito recorded lower yields across the three times of sowing compared to the other varieties. Stingray recorded the highest yield when sown late, Bonito when sown mid-late, Invigor R4022P when sown early-mid and 44Y94 when sown early. No differences were observed for Invigor T4510, HyTTec Trident, New Enforcer CT and 44Y27 RR when sown early or late. However, the seasonal conditions of 2022 must be considered. Sowing canola cv. HyTTec Trophy at 2-2.5 kg/ha increased grain yield compared to the 1-1.5 kg/ha rates. The favourable conditions experienced during the season allowed for there to be minimal competition for moisture. It was found that as seeding rate decreased, oil content increased.

Acknowledgements

This trial was funded by the SA Drought Hub, managed by AgXtra and hosted at Steen and Deanna Paech's.

Canola Variety Trial Economic Analysis 2022-23 by Pinion Advisory

Variety	Type	Grain yield (t/ha)	Oil (%)	Price ($/t)	Income ($/ha)	Freight ($/ha)	EPR	Seed Cost ($/kg)	Seed Cost ($/ha)	Chemicals ($/ha)	Fertiliser ($/ha)	Spraying ($/ha)	Seeding ($/ha)	Harvest ($/ha)	Total Costs ($/ha)	Gross Margin ($/ha)
ATR Stingray	**OP TT**	**2.93**	47	752.50	**2202**	44		10	25	73	220	25	30	50	**467**	**1735**
ATR Bonito	**OP TT**	**2.98**	47	752.50	**2240**	45	15	18	45	73	220	25	30	50	**503**	**1737**
44Y94 CL	**Hybrid CF**	**3.56**	47	752.50	**2679**	53		34	85	70	220	25	30	50	**534**	**2145**
Invigor T4510	**Hybrid TT**	**3.22**	46	752.50	**2421**	48		34	85	73	220	25	30	50	**531**	**1889**
HyTTec Trident	**Hybrid TT**	**3.22**	47	752.50	**2421**	48	16	18	45	73	220	25	30	50	**508**	**1913**
New Hyola Enforcer CT	**Hybrid TT + CF**	**3.12**	47	752.50	**2348**	47		34	85	73	220	25	30	50	**530**	**1818**
Retained Hyola Enforcer CT	**Hybrid TT + CF**	**2.95**	47	752.50	**2217**	44		10	25	73	220	25	30	50	**467**	**1750**
Invigor R4022P	**GM Truflex**	**3.36**	47	700.00	**2350**	37		44	109	70	220	25	30	50	**541**	**1809**
44Y27 RR	**GM RR**	**3.39**	47	700.00	**2373**	37		44	109	70	220	25	30	50	**541**	**1832**

Assumptions

The non-GM canola price reflects delivery in late January 2023 to the Viterra, Tailem Bend delivery site (base price of $700/t and include oil bonuses of $52.50/t)

The GM canola price is based on delivery to Inghams,Murray Bridge and assumes a $700 per tonne flat price with no oil bonus, and no base pricing discount for GM product.

Retained seed costs are based on commercial canola grain prices in 2021, plus and estimate of seed grading and include the cost of Ilevo and Poncho Plus seed dressings

Freight costs reflect transport costs assuming use of a grower's own truck from Palmer to Tailem Bend (non-GM canola) and to Murray Bridge (GM canola)

Observations

Yield and oil content of all varieties were exceptional and were well above average for the district due to canola benefiting from above-average late season rainfall.

Very profitable gross margins were achieved driven by high yields and high (Decile 9) prices.

The Clearfield hybrid variety 44Y94 produced the highest performance of the varieties in the trial (yield and gross margin).

The next most profitable varieties were the TT Hybrid varieties, HyTTec Trident and Invigor T4510.

Open-pollinated TT varieties, ATR Stingray and ATR Bonito, achieved the lowest gross margins, but were still very profitable varieties.

Plots grown from retained (second generation) CT Hybrid seed (Hyola Enforcer CT) were 6% lower yielding than first generation hybrid seed.

There were no differences in oil content in canola grown from first or second generation seed.

Drought resilience practices in mixed farming systems – pasture demonstration at Sedan

Background

Pasture species play a pivotal role in mixed farming operations in low rainfall zone environments, providing a disease break between cropping intervals, increasing the performance of subsequent years cereal crops by fixing nitrogen, whilst reducing economic risk of the farming enterprise. For the Murray Plains, growing quality pastures has become more attractive in recent years due to the profitability of livestock during the past few poor seasons.

The objectives of this trial were to identify which pasture species are best suited to low rainfall zone environments, focusing on pasture establishment on soil types relevant to the Murray Plains region, helping maximise pasture uptake throughout the region.

Methods

A total of 9 pasture species were selected, sown in a combination of 12 different treatments at Sedan on 30 June, South Australia in 2022.

Below average rainfall in April was recorded at the Sedan weather station (BOM station number 024531) approximately 6km from the trial site, before the season broke on 30 May when 30 mm of rainfall was recorded. The site received 1.6 mm of rain in the 7 days prior to seeding, and 1.9 mm in the 10 days after. Although the trial was sown into moisture, the pasture species were slow to germinate, whilst below average rainfall in June through to end of August resulted in reduced establishment.

Site details

Location	Sedan, South Australia 5238
GPS co-ordinates	-34.619022, 139.281381
Crop and variety	Various pastures

Crop management

Sowing date	30 Jun 2022	
Method	Sown with a Knife point spreader boot + presswheels	
Sowing depth (cm)	2-3	
Combine make	Agrowdrill	
Combine configuration	7 tynes at 250 mm spacing	
Soil moisture	Moist	
Fertiliser	30 Jun 2022	100 kg/ha Granulock
Harvest date	20 Dec 2022	
Replications	4	
Plot size	2 m x 10 m	

Treatment list

No.	Crop variety	Sowing rate
1	PM 250 Strand medic	5 kg/ha
2	Sultan SU medic	5 kg/ha
3	Scimitar spineless burr medic	5 kg/ha
4	Studenica vetch Sultan SU medic	15 kg/ha 2.5 kg/ha
5	Studenica vetch Cefalu Arrowleaf clover	15 kg/ha 2 kg/ha
6	Bartolo Bladder clover	10 kg/ha
7	Cefalu Arrowleaf clover	4 kg/ha
8	Nitro Plus Persian clover	4 kg/ha
9	Studenica vetch	30 kg/ha
10	Mawson sub clover	7 kg/ha
11	Nitro Plus Persian clover Bartolo Bladder clover Sultan SU medic	2 kg/ha 5 kg/ha 2.5 kg/ha
12	Studenica vetch Commodus barley	15 kg/ha 50 kg/ha

Results

Table 1. Crop emergence and biomass of various pasture varieties, Sedan

No.	Treatment	Rate	Crop emergence (mean no./m row) 12 Sep 2022	Crop biomass (mean kg/ha) 01 Oct 2022
1	PM 250 Strand medic	5 kg/ha	5.5	3660
2	Sultan SU medic	5 kg/ha	2.3	4290
3	Scimitar spineless burr medic	5 kg/ha	3.3	3200
4	Studenica vetch Sultan SU medic	15 kg/ha 2.5 kg/ha	7.3	3720
5	Studenica vetch Cefalu Arrowleaf clover	15 kg/ha 2 kg/ha	7.3	3460
6	Bartolo Bladder clover	10 kg/ha	3	2970
7	Cefalu Arrowleaf clover	4 kg/ha	2	3280
8	Nitro Plus Persian clover	4 kg/ha	1.5	3640
9	Studenica vetch	30 kg/ha	8	4310
10	Mawson sub clover	7 kg/ha	3	3330
11	Nitro Plus Persian clover Bartolo Bladder clover Sultan SU medic	2 kg/ha 5 kg/ha 2.5 kg/ha	2.3	3910
12	Studenica vetch Commodus barley	15 kg/ha 50 kg/ha	8.5	6820

Crop emergence was conducted on 12 September 2022, 74 days after sowing (Table 1). Plants were counted along a 1 metre section of row, 4 times per plot. Emergence counts were done late in the season due to sowing occurring in late June, outside of the ideal sowing time for these pasture species, resulting in slow emergence and low density of plant establishment.

Crop biomass cuts were taken on 1 October 2022, 93 days after sowing (Table 1). Plants were cut along a 50cm section of row, 4 times per plot, and weights were converted to kg/ha. Studenica vetch sown with Commodus barley recorded the highest biomass availability at this time. There appeared equivalence across all other pasture options at this time, with all treatments being statistically equivalent, demonstrating a degree of variability across the site.

Acknowledgements

This trial was funded by the SA Drought Resilience Adoption and Innovation Hub, managed by AgXtra and hosted at Rodney Seidel’s.

MURRAY PLAINS FARMERS 2022-23 SUPPORTERS

A special thank you to the following organisations for their support this year …

RESEARCH AND EXTENSION PARTNERS

GRDC Grains Research & Development Corporation

SAGIT

Australian Government Department of Agriculture, Fisheries and Forestry

Future Drought Fund

SA Drought Hub

Australian Government National Landcare Program

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