MURRAY PLAINS FARMERS

Friday
16 Februrary 2024

# Post Harvest Meeting

## Review the season and plan for 2024


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

@MurrayPlainsFarmers @MPFarmersInc www.murrayplainsfarmers.com.au

# Notes

# Tonight's program

| | |
|---|---|
| **6.00pm** | **TEA IS SERVED** |
| **6.45pm** | **Tony Craddock,** ***Pinion Advisory*** <br> Welcome from MPF and update on the year's activities |
| **6.50pm** | **Brendan Kupke,** ***SARDI*** <br> 'Optimal flowering period for wheat and barley' trial results and the GRDC National Variety Trial results |
| **7.20pm** | **Sean Mason,** ***Agronomy Solutions*** <br> Outcomes of the phosphorus variable rate trial and what's in store for VRT in 2024 |
| **7.35pm** | **Ryan Laidlaw,** ***AgXtra*** <br> 'Improving canola establishment in dry conditions' trial results |
| **7.45pm** | **Tony Craddock,** ***Pinion Advisory*** <br> Economic analysis of canola establishment trial results |
| **7.55pm** | **DESSERT/COFFEE BREAK** |
| **8.10pm** | **Darren Ray,** ***Independent climatologist and guest weather commentator for ABC Radio*** <br> So what happened with El Nino? - 2023's crazy weather, and what it means for 2024 |
| **8.45pm** | **Tony Craddock** <br> Facilitate Q&A, discuss season ahead |
| **9.00pm** | **END OF PROCEEDINGS** |

# Contents

# Our Committee


**Adrian Bormann**
PRESIDENT


**Daniel Seidel**
VICE PRESIDENT

**Rebekah Starick**
SECRETARY

**Fiona McGorman**
TREASURER

**Will Graetz**
COMMITTEE MEMBER

**Deanna Lush**
COMMITTEE MEMBER

**Steen Paech**
COMMITTEE MEMBER

**Sharon Starick**
COMMITTEE MEMBER

## Interested to contribute to Murray Plains Farmers?

If you are interested in getting involved on the committee or hosting a trial site or have your own trial that could be incorporated in the 2024 Spring Crop Walk, reach out to your local committee member to discuss. We'd love to hear from you ... all are welcome.

# Murray Plains Farmers 2023 Trial Projects

Pinion Advisory's Tony Craddock and Jana Dixon present to grain growers at the first GRDC RiskWi$e workshop in July 2023.

## GRDC RiskWi$e

This project, formerly the National Risk Management Initiative, is a significant four-year extension initiative for the region. MPF is part of a project group with Hart Field Site, 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 first year of the project in the Murray Plains for 2023 involved introducing key concepts around risky decisions and risk management with a key focus on nitrogen application and interpreting climate and forecasts data.

A core group of 16 businesses participated in selecting a paddock for soil testing through the project and then analysed the results at a workshop in July 2023, run by Pinion Advisory. The workshop also introduced tools to improve nitrogen management and to assist with post-seeding application decisions. Some of the discussion included 'how much nitrogen do I have in my paddock', 'how much nitrogen is needed for the crop yield to be targeted', and 'what happens to nitrogen if it is not used by the crop'.

A second workshop focused on 'Climate tools and forecasting' was held in August 2023 featuring SARDI climate scientist Peter Hayman, farm consultant Barry Mudge and Bureau of Meteorology climatologists. It explored the range of tools available to farmers that would help with short and long-term decision making to best manage risk.

The final activity for year 1 of the project is to review fertiliser application in 2023 and analyse the economics of decisions made, which will be undertaken at a workshop prior to the post harvest meeting.

### Plans for 2024

The second year of the project in 2024 will include a second round of soil tests and review of approaches and tools to inform and improve N management as well as a focus on rotations and risks of crop sequencing. It will involve workshops with Tony Craddock and Pinion Advisory team in July and August and discussion during the Crop Walk in September.

## Optimal flowering period for wheat and barley

**Location:** Starkeys on Ridley Road.

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

**Funder:** SA Grain Industry Trust (SAGIT)

**Trial overview:** This was the third and final year of the Optimal Flowering Period (OFP) for wheat and barley. The

SARDI's Brendan Kupke talks through progress at the Optimal Flowering Period for wheat and barley trial during the Spring Crop Walk.

ideal flowering time for varieties with different maturity windows has been characterised for the Murray Plains region. APSIM modelling initially determined the OFP using long-term climate data and designated soil types. The model has been tested with seasonal weather data and time of sowing field trials at Palmer, Milendella and Sanderston.

## Improving canola establishment in dry conditions

**Location:** Greg and Jack Schultz's on Pine Hut Road.

**Trial manager:** Ryan Laidlaw, AgXtra

**Funder:** SA Drought Hub

**Trial overview:** This was the second and final year of the canola establishment trial, following the first year on Western Boundary Road, near Apamurra. This trial has tested establishment of canola across three sowing dates as well as suitability of a range of canola varieties for the low rainfall cropping zone, incorporating hybrid and open pollinated varieties. There has also a comparison between new seed and grower-saved seed.

An economic analysis comparing the various options has been conducted by Pinion Advisory in both years of the trial, including the cost of seed, fertiliser and oil bonuses. This compared 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.

## Demonstrating soil zone mapping for variable rate nutrition management

This project has been run in the Murray Plains in 2023 by Mallee Sustainable Farming working with precision agriculture experts Peter Treloar and Sean Mason. The project was funded by the Future Drought Fund. Growers were able to select a focus paddock in which soil zones for variable rate application of nutrients, in particular phosphorus, were created.

A field day held during the growing season looked at how crops responded to the different rates of nutrients and impacts of different soil types. The impact of the different nutrient rates on crop yield was assessed using yield maps.

### Plans for 2024

The next step for this project is looking at how variable rate technology can be applied on individual farms to improve productivity through efficient use of inputs and addressing soil constraints. Planning is progressing with a workshop to be held on Tuesday 20 February for interested growers.

# New projects in 2024

## Ley legume pastures in a changing climate

SARDI's David Peck received two years of SAGIT funding in 2022 and 2023 for a project assessing novel ways of harvesting and sowing medic pods which have the potential to reduce medic establishment costs by 60%. In 2024, he is researching how ley legume pastures can reduce input costs and risk in low rainfall areas.

Ley legume pastures provide high quality and high protein feed to livestock and increase yield of subsequent grain crops due to their nitrogen fixation and break crop effects. The recent Dryland Legume Pasture Systems project found 0.7-2.9 t/ha increase in wheat yield. Climate change projections consistently show increasing temperatures and drying in winter and spring. This project aims to mitigate the climate and drought risk to legume pastures in the short and long term.

In 2022, at Palmer and Orroroo SARDI planted over 300 legume accessions collected from locations with climate like what the climate is predicted to be in 2030-2050 in low rainfall areas of South Australia. Most accessions are annual medics, but there are also some clovers. In 2022 accessions were evaluated and allowed to set seed, in 2023 they were evaluated and sprayed out before seed set. In 2024, growers will be able to see how accessions perform after regenerating from 2022 seed set. The visit in spring will also provide an opportunity to see current cultivars and discuss using ley pastures in farming systems in low rainfall areas. By the end of the drought project, SARDI expects to identify accessions that can out perform current cultivars across a ragne of seasonal conditions.

## Derisking the seeding program

MPF is part of a project through the Ag Excellence Alliance network of farming systems groups in SA. It is funded by the Future Drought Fund through the Extension and Adoption of Drought Resilience Farming Practices Grants Program.

While the details of the trial for the 2024 year are currently being finalised, it will likely focus on lentils, time of sowing and management practices. Any feedback on these themes are welcome.

## Break crop management - canola versus lentils

While the use of break crops in the rotation offers many benefits such as weed management and nitrogen fixation, they also pose several risks including cost of inputs, establishment issues, sensitivity to drought, prone to frost, limited end use options, and fragile residual stubble/ground cover.

The Future Drought Fund, through the SA Drought Hub, is funding a project bringing together Murray Plains Farmers, Upper North Farming Systems and AIR EP to establish several paddock scale demonstration sites, tailoring each to the needs of the groups.

The project is designed to share information about break crop options and agronomics investigating crop establishment, soil testing, in-crop monitoring, yield and economic analysis, ground cover/stubble residues and benefits for the following crop.

# Characterising the optimal flowering period for the Murray Plains

***Brendan Kupke[1,2], Melissa McCallum[1], 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

## Key messages

- Modelling suggests that the optimal flowering period (OFP) for wheat at Palmer is between the 25 August and 8 September, based on climatic data from 1973-2023.
- The mid to slow spring wheat (Rockstar and Denison) more reliable option across seasons for early sowing compared to winter wheat, although new quick winter Mowhawk performed well in last two seasons.
- The range in optimal sowing dates for current elite wheat varieties varies from the 2 April to 19 May dependent on development speed and sufficient soil moisture.
- Modelling suggests that the optimal flowering period (OFP) for barley at Palmer is between the 2 and 26 August, based on climatic data from 1953-2023.
- Very quick spring barleys have an optimal sowing range of the 12 April to 23 April in the Murray Plains, significantly earlier than the same wheat phenology with sufficient soil moisture for germination.
- No yield penalty in 2021 and 2023 for barley flowering in early to mid August.

## Background

Flowering time is an important determinant of potential grain yield for cereals which can have significant yield reductions from environmental stresses that include frost, heat and drought. The optimal flowering period (OFP) is defined as the period where the combined risk of these environmental stresses is lowest, and where grain yield potential is maximised. It is important to match variety phenology, to sowing date to ensure flowering time occurs within the optimal period. This project aimed to both identify the OFP for the Murray Plains region for wheat and barley, as well as identify different phenology types that are adapted for earlier sowing in the LRZ.

## Methods

Three seasons of field trials were established east of Palmer (2021-23) which consisted of ten wheat and eight barley varieties as well as novel breeding lines with different phenology (Table 1). In 2023, there were three sowing/germination dates of 15 April, 11 May and 9 June. Due to insufficient soil moisture at sowing, the first two sowing dates had 10mm of supplementary in-furrow irrigation to ensure plant establishment. Additionally, there was a dry sown treatment that was sown on the 4 April that had multiple false breaks, with majority of plants establishing from a rain event on 26 May. The trial was sown with a 6-row research plot seeder with 22.86cm row spacings. The trial was designed and analysed in a split-plot design with 3 replicates. Growth staging and flowering time, in particular (z65), were key measures used to help determine and validate the OFP. Grain yield was also used for characterise the OFP. Grain samples were analysed for standard quality parameters and mature head samples were taken to assess grain sterility, further identifying potential environmental stress that may have influenced grain yield. Nutrition, weeds, pests and diseases were managed using local grower practice and as to not limit grain yield.

*Table 1 The (a) wheat and (b) barley varieties evaluated in the field trial at Palmer with their relative maturity groups using the National Phenology Initiative classifications (Celestina et al 2023).*

**(a)**

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

**(b)**

| Variety | Maturity Group | Released |
|---|---|---|
| Beast | Very Quick | 2020 |
| Commodus CL | Very Quick-Quick | 2021 |
| Cyclops | Very Quick-Quick | 2022 |
| Maximus CL | Very Quick-Quick | 2020 |
| Compass | Very Quick-Quick | 2015 |
| RGT Planet | Quick | 2017 |
| Pixel | Slow-Winter | Not released |
| Newton | Slow-Winter | 2023 |

Differences between treatments were identified with an analysis of variance in the statistical package GenStat 23rd Ed. at the 5% significance level. Modelling of the OFP was completed using 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.

## Results

*Grain yield of wheat and barley across different germination dates*

Consistent with previous years (2021 and 2022, data not shown), barley significantly ($p = 0.007$, LSD = 0.061) outyielded wheat. There was also a significant species by time of sowing interaction ($p = 0.004$, LSD = 0.105), with optimal (11 May) or early sowing significantly higher yielding. Scepter, Calibre and Rockstar were the most adaptable wheat varieties across different germination dates (Table 2). Scepter achieved peak yield for the wheat of 2.67 t/ha from germination on the 11 May and flowered on the 2 September in 2023. Mowhawk was the pick of the winter wheat for early sowing and later germination dates. However, Rockstar was the highest yielding variety from the 15 April germination.

For the barley, Beast was the pick across all germination dates, being the standout variety with the dry finish. Peak yield was 3.75 t/ha from the 15 April germination and flowering on the 7 August. It is clear in Table 2 that earlier sowing resulted in higher yields for barley. The longer season winter barley varieties Pixel and Newton failed to produce any significant yield across germination dates from the dry finish. However, they produced the highest yields in 2022 with the late spring rain and being a decile 9 (data not shown).

*Table 2 The mean grain yield for each variety of (a) wheat and (b) barley at four germination dates (15 April, 11 May, 9 June and a dry sown blocks germinating majority on the 26 May).*

**(a)**

| Site mean yield: **2.03 t/ha** | Yield (t/ha) across Germination Date | | | | |
|---|---|---|---|---|---|
| | 15-Apr | 11-May | 9-Jun | DRY | Mean |
| Anvil CL Plus | 1.58 | 2.06 | 2.11 | 1.75 | **1.87** |
| Vixen | 2.21 | 2.47 | 1.92 | 2.27 | **2.21** |
| Calibre | 2.23 | 2.53 | 2.01 | 2.49 | **2.31** |
| Scepter | 2.41 | 2.67 | 1.94 | 2.36 | **2.34** |
| Rockstar | 2.59 | 2.59 | 1.62 | 2.30 | **2.28** |
| Sheriff CL Plus | 2.21 | 2.26 | 1.74 | 2.06 | **2.07** |
| Denison | 2.48 | 2.60 | 1.51 | 2.19 | **2.19** |
| Valiant CL Plus | 2.39 | 2.30 | 1.47 | 1.96 | **2.03** |
| Longsword | 2.11 | 1.85 | 1.61 | 2.06 | **1.91** |
| Mowhawk | 2.42 | 2.45 | 1.93 | 2.04 | **2.21** |
| Illabo | 1.70 | 2.02 | 1.30 | 1.86 | **1.72** |
| DS Bennett | 1.21 | 1.34 | 1.00 | 1.25 | **1.20** |
| TOS Mean yield | **2.13** | **2.26** | **1.68** | **2.05** | |
| *p*-value | | 0.018 | | | |
| LSD (*p*≤0.05) | | 0.4842 | | | |

**(b)**

| Site mean yield: **2.13 t/ha** | Yield (t/ha) across Germination Date | | | | |
|---|---|---|---|---|---|
| | 15-Apr | 11-May | 9-Jun | DRY | Mean |
| Beast | 3.75 | 3.37 | 2.23 | 2.93 | **3.07** |
| Compass | 3.23 | 2.81 | 2.20 | 2.85 | **2.77** |
| Commodus CL | 3.47 | 2.89 | 2.04 | 2.51 | **2.73** |
| Cyclops | 3.08 | 3.08 | 2.42 | 2.53 | **2.78** |
| Maximus CL | 3.02 | 3.25 | 2.57 | 2.61 | **2.86** |
| RGT Planet | 3.15 | 2.69 | 1.62 | 2.69 | **2.54** |
| Pixel | 0.13 | 0.13 | 0.07 | 0.17 | **0.13** |
| Newton | 0.05 | 0.18 | 0.15 | 0.19 | **0.14** |
| TOS mean yield | **2.49** | **2.30** | **1.66** | **2.06** | |
| *p*-value | | <0.001 | | | |
| LSD (*p*≤0.05) | | 0.3762 | | | |

*Slower developing wheat varieties suited for early sowing in the Murray Plains*

There were no early sowing (April) opportunities for the duration of the project, so 10mm of supplementary in-furrow irrigation replicated an April germination. The chance of a 10mm rain event in April for the Murray Plains is low (30% chance, Australian CliMate). However, this project provides valuable comparison of long season varieties suited to early April sowing with main season varieties sown outside of the optimal period. Scepter is the benchmark wheat variety, performing well from a range of sowing dates and being a popular variety in the region. Any longer season variety needs to at least match Scepter with early sowing across different seasons to be a viable option. All longer season varieties were slower to reach flowering compared to Scepter, but few consistently matched yield, even with Scepter sown before its optimal sowing period (Table 3). Mid-spring variety Rockstar outyielded Scepter every season and had flowered date 5 to 9 days later. Denison also performed well but was lower yielding in 2022. Out of the winter wheats, the new variety Mowhawk (quick winter) matched Scepter in the two seasons it was evaluated. It also flowered 31 and 36 days later from the same sowing date. It does show significant promise in raising the yield potential of winter wheats in the LRZ as DS Bennett was the only other winter wheat to outyield Scepter.

*Table 3 The mean grain yield and flowering dates for slower wheat phenology types across early times of sowing for the 2021, 2022 and 2023 seasons in comparison to the most popular wheat variety in the region Scepter and Vixen. Z65 = flowering date, germ = germination*

| | 2021 20th April germ | | 2022 12th April germ | | 2023 15th April germ | | Mean Yield | Years out-yielding Scepter |
|---|---|---|---|---|---|---|---|---|
| | t/ha | Z65 | t/ha | Z65 | t/ha | Z65 | t/ha | No. years |
| Vixen | 2.88 | 9 Aug (-9) | 2.28 | 4 Aug (-9) | 2.17 | 21 Jul (-10) | 2.44 | 0 |
| *Scepter (control)* | *3.46* | *18 Aug* | *2.49* | *13 Aug* | *2.41* | *31 Jul* | *2.79* | - |
| Sheriff CL Plus | 3.39 | 26 Aug (+8) | 1.9 | 17 Aug (+4) | 2.21 | 10 Aug (+10) | 2.50 | 0 |
| Rockstar | 3.51 | 23 Aug (+5) | 3.08 | 22 Aug (+9) | 2.59 | 9 Aug (+9) | **3.06** | **3** |
| Denison | 3.59 | 2 Sep (+15) | 2.43 | 8 Sep (+26) | 2.48 | 23 Aug (+23) | **2.83** | 2 |
| Valiant CL Plus | 2.77 | 4 Sep (+17) | 2.02 | 10 Sep (+28) | 2.39 | 21 Aug (+21) | 2.39 | 0 |
| Longsword | 2.65 | 8 Sep (+21) | 1.71 | 19 Sep (+37) | 2.11 | 2 Sep (+32) | 2.16 | 0 |
| DS Bennett | 2.87 | 3 Oct (+46) | 2.71 | 8 Oct (+56) | 1.21 | 28 Sep (+58) | 2.26 | 1 |
| Mowhawk | - | - | 2.78 | 18 Sep (+36) | 2.42 | 1 Sep (+31) | - | **2** |
| Illabo | - | - | 2.33 | 24 Sep (+42) | 1.7 | 11 Sep (+41) | - | 0 |

*Defining the Optimal Flowering Period for wheat and barley at Palmer*

The number of climatic data years used in the APSIM runs proved important for both wheat and barley at Palmer to determine the OFP. In Figure 1, the relative grain yield curves using the last 30, 50 or 70 years of climatic data are displayed. The modelling shows that using only more recent years of data, the OFP shifted earlier and simulated yields severe yield declines from later flowering. The most significant decline was between the past 50 and 30 years data (Figure 1) where there is an increased decline in yield from late flowering. This decline is driven by decreasing growing seasons rainfall driving the OFP earlier due to lack of moisture availability and heat. The risk from early flowering on yield potential has limited differences over the time period, suggesting the frost risk has not changed for the Murray Plains.

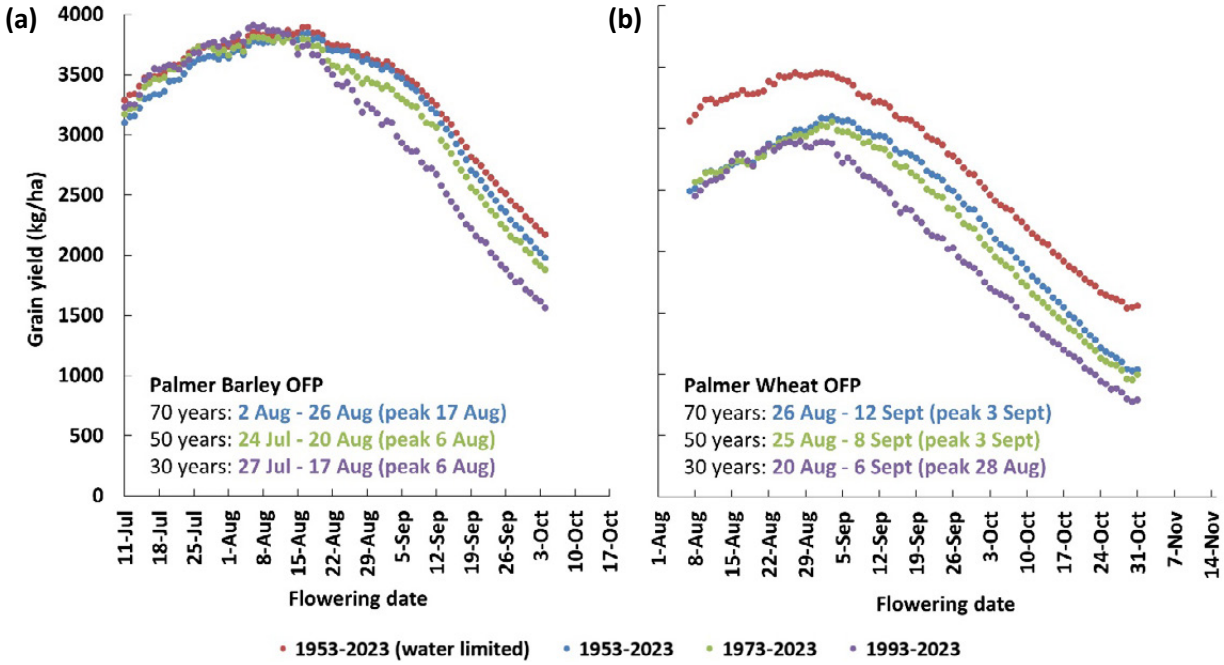



***Figure 1 A simulation of the optimal flowering period (OFP) for a very quick barley variety Compass (a) and a quick-mid wheat variety Mace (b) at Palmer in the Murray Plains. The red dots shows the water limited maximum potential yield using the past 70 years of climate data without any frost or heat reductions in yield. 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. The flowering dates for the OFP are displayed as well as the flowering date of peak grain yield for each year run.***

Flowering time for peak grain yield for wheat for the 2021 and 2023 field trial came within 2 days (1 Sept and 2 Sept) of the simulated OFP for the past 50 and 70 years (3 Sept) of climatic data (Figure 2). The one anomaly that does not fit the long term run for wheat was 2022, which was defined by a decile 9 growing season rainfall and very wet spring. Therefore, water was not a limiting factor to grain yield with late flowering. Peak yield for 2022 field results occurred a month later (3 October) than the simulated OFP as the seasonal conditions through September and October where mild and did not limit yield potential. This highlights the limitations of a simulated OFP as it is an average of all seasons and does not show the effect of extreme seasons.

For the barley, 2021 was within 2 days of the past 70 years of climatic data; while the 2023 season was 1 day off the past 30 and 50 years climatic data (Figure 2). However, consistent with the 2022 season for the wheat, peak yield for the barley came 1 month later than the simulated OFP. There was a positive trend for early flowering in the barley, with no yield decline from early flowering in both 2021 and 2023. However, flowering did not occur in July in either season, this limts the ability to validate the simulated OFP which suggests yield potential can be maximised from flowering in late July. The simulation suggestes flowering in July can occur from achieving establishment in April. It would be expected that there would be a yield decline from the increased frost risk and reduced

photoperiod/solar exposure as flowering occured earlier into July.

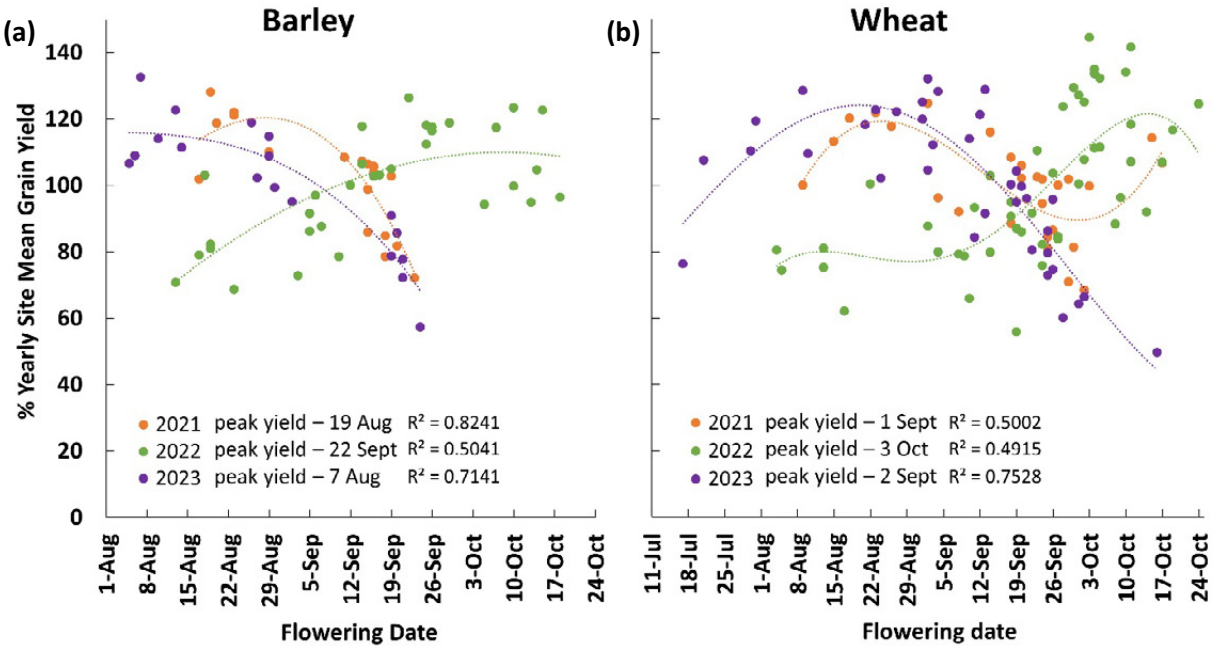



***Figure 2 A comparison of the grain yield vs flowering date across the three seasons of field trials for all barley (a) and wheat (b) varieties and times of sowing at Palmer. A percentage of the yearly site mean yield is used to represent and compare relative grain yields across each season. The site mean yield for each season for barley and wheat respectively was: 2021 – 3.6 and 2.88 t/ha, 2022 – 4.24 and 3.07 t/ha, 2023 – 2.83* and 2.03 t/ha. The flowering date of peak grain yield for each year is shown. * mean yield of barley 2023 excluding Newton and Pixel winter barley due to crop failure***

*Optimal sowing times across species and phenology type*

By using the field derived data for flowering time, optimal sowing dates were produced for different phenology types in wheat, and for a very quick spring barley. Based on previous work by Flohr et al. (2015), the past 50 years of climatic data was used as the proxy for the simulated OFP for wheat and the target date for flowering (3 Sept). When the past three seasons of flowering and sowing dates are plotted, trendlines can be developed and used to estimate the best times to be sow (into wet soil). Figure 3a-d demonstrates the variation in optimal sowing dates for the range of spring wheat phenology types. These sowing dates start from early April for the slow spring Denison through to 19 May for Anvil CL Plus (very quick-quick). Although, the OFP duration is approximately 2 weeks, targeting when peak yield on average occurs (3 Sept) will allow for buffering room for if the growing season is warmer or cooler than average, and therefore speeding up or slowing down relative development. This seasonal temperature variation is evident in the slopes of the lines, where 2022 was cool and 2023 quite warm, which resulted in varieties flowering later and earlier in these seasons respectively (Figure 3).

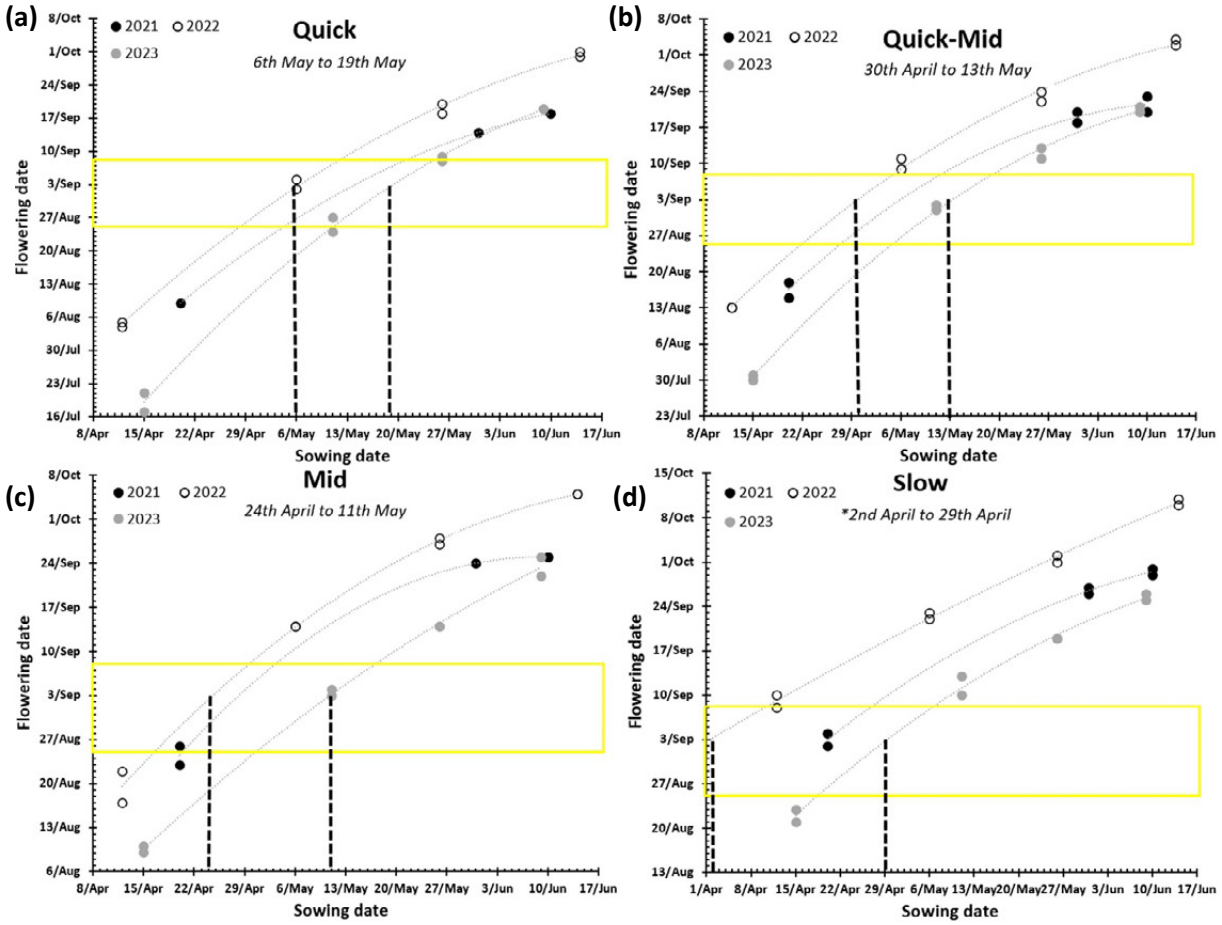



*Figure 3 The optimal sowing dates for (a) quick (Vixen/Anvil CL Plus), (b) quick-mid (Calibre/Scepter), (c) mid (Rockstar/Sheriff CL Plus) and (d) slow (Denison/Valiant CL Plus) spring wheat phenology types. Developed from field derived flowering and sowing dates from the 2021, 2022 and 2023 growing seasons in the Murray Plains. The thick dotted box depicts the OFP as simulated in APSIM, and the vertical black lines the sowing dates required to flower at the simulated peak yield on the 3 of September. The dashed line of best fit depicts the average for the 2021, 2022 and 2023 seasons. * The line of best fit is extrapolated past earliest flowering points on graph to predict optimal seasonal sowing date so interpret start of OFP date with caution.*

However, for very quick spring barley the sowing dates to flower on the 18 Aug (date of peak yield from past 70 years) become early in the season (Figure 4). The field derived data suggests that the optimal sowing range would be between the 12 and 23 April. Traditionally, this would be significantly earlier than normal for the Murray Plains, but it demonstrates that frost is not the driving factor for yield in the region rather available soil moisture is important. It would be expected that flowering on the 18 Aug would come with an increased chance of frost. However, across three seasons there has been negligible/no frost damage in the barley, even with the wheat having damage when flowering at the same time.

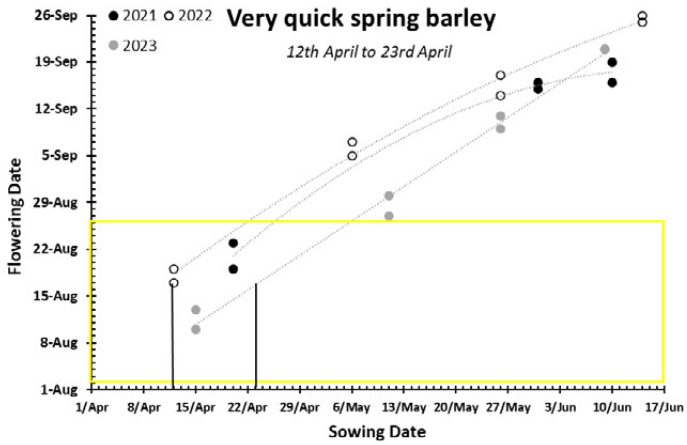



***Figure 4 The optimal sowing dates for very quick spring barley at Palmer. Developed from field derived flowering and sowing dates from the 2021, 2022 and 2023 growing seasons for Beast, Compass and Commodus CL in the Murray Plains. The yellow box depicts the OFP as simulated in APSIM, and the vertical black dotted lines the sowing dates required to flower at the simulated peak yield on the 17 of August. The dashed line of best fit depicts the average for the 2021, 2022 and 2023 seasons.***

## Conclusions

APSIM simulations of wheat at Palmer using the past 50 years of climate data, suggests the OFP for the Murray Plains is between the 25 August and 8 September. The 2021 and 2023 field seasons matched the OFP well, with maximum grain yield coming in the middle of the simulated OFP. However, maximum grain yield from the 2022 trial was much later than the simulated OFP due to the cooler and wet finish. This highlights the fact that averages are used to determine the timing and duration of the OFP, which do not account for extreme seasons, like 2022. Further research of flowering time in high decile rainfall seasons needs to be conducted to better understand how growers can optimise flowering to returns in high yielding seasons with high gross margins.

There is currently a large range in wheat phenologies in current elite varieties, with new winter wheat genetics (Mowhawk) coming through that might improve the yield potential for this phenology group and early sowing opportunities. However, currently slower spring wheats such as Rockstar and Denison are showing greater adaptability and yield stability from early sowing in multiple seasons. Scepter, a quick-mid wheat still remains a solid benchmark for grain yield from its optimal sowing range of the 30 April to 13 May.

The optimal flowering and sowing dates for spring barley in the LRZ may be earlier than what is currently practised. APSIM modelling and field derived data has shown a tendency for peak yields to coincide with a flowering date in August. The OFP using the past 70 years of climate data was from 2 to 26 August; this required a sowing date between 12 to 23 April for very quick spring barley such as Compass to flower within the OFP. The OFP starts earlier into July when using the past 30 and 50 years, however flowering dates for the trial did not get this early for barley so could not be validated. The key takeaway from the field trials was that two out of the three seasons did not see a grain yield penalty from flowering too early (peak yield in early to mid August in 2021 and 2023). Only in a decile 9 spring in 2022, that there was a penalty from flowering too early due to excessive rainfall in September and October. However, further barley time of sowing trials (with flowering dates in July) need to be done to further validate these results across seasons.

## Acknowledgements

The authors thank the South Australian Grain Industry Trust (SAGIT) for funding the project (project code: S/UA 1021 and UAD-02222-R) as well as project support from the University of Adelaide and South Australian Research and Development Institute (SARDI). The authors would like to thank Scott

and Zoe Starkey for the provision of the 2023 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 Courtney Peirce, Cameron Mares, Greg Naglis, Paul Swain, Marni Griffiths and Chris Bailey.

# 2023 Palmer Wheat and Barley National Variety Trials

Wheat Results:

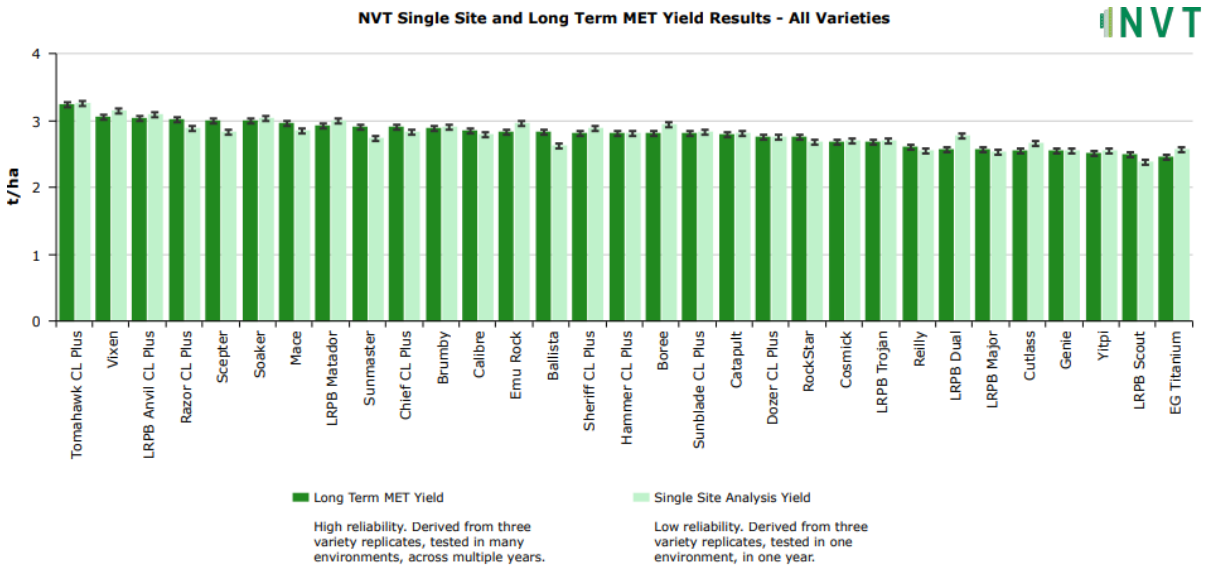



*Figure 1 The grain yield for the 2023 Palmer NVT wheat trial across all varieties with a single site analysis and long term MET data. Source: NVT Online (https://nvt.grdc.com.au/trial-results)*

| Variety | Group | 2019 | 2020 | 2021 | 2022 | 2023 |
|---|---|---|---|---|---|---|
| | Mean Yield | 0.93 t/ha | 2.23 t/ha | 2.12 t/ha | 2.87 t/ha | 2.69 t/ha |
| | Trials | 1 | 1 | 1 | 1 | 1 |
| Calibre AH | 4 | | 118 | 114 | 114 | 106 |
| Tomahawk CL Plus | 2 | | | | 102 | 120 |
| LRPB Matador | 1 | | | | | 108 |
| Vixen AH | 5 | 104 | 103 | 111 | 111 | 113 |
| Brumby APW | 3 | | | 103 | 105 | 107 |
| Scepter AH | 5 | 113 | 110 | 104 | 101 | 111 |
| RockStar AH | 5 | 108 | 110 | 104 | 111 | 102 |
| Dozer CL Plus | 2 | | | 108 | | 102 |
| Razor CL Plus ASW | 5 | 109 | 104 | 107 | 98 | 111 |
| Sunblade CL Plus AH | 5 | 105 | 111 | 101 | 104 | 104 |
| Soaker | 1 | | | | | 111 |
| Reilly | 2 | | | | 111 | 96 |
| LRPB Anvil CL Plus AH | 3 | | | 108 | 92 | 112 |
| Catapult AH | 5 | 109 | 106 | 101 | 102 | 103 |
| LRPB Scout AH | 5 | 95 | 101 | 108 | 112 | 92 |
| LRPB Major | 1 | | | | | 95 |
| Genie | 1 | | | | | 94 |
| Mace AH | 5 | 107 | 100 | 100 | 92 | 110 |
| Hammer CL Plus AH | 5 | 107 | 100 | 101 | 93 | 104 |
| Emu Rock AH | 5 | 96 | 94 | 105 | 97 | 105 |
| LRPB Dual AH | 3 | | | 105 | 100 | 95 |
| Sheriff CL Plus APW | 5 | 100 | 95 | 98 | 98 | 104 |
| Valiant CL Plus AH | 2 | | | 94 | 99 | |
| Kord CL Plus AH | 4 | 103 | 99 | 98 | 87 | |

*Figure 2 The percentage of the site mean yield for different wheat varieties in the Palmer NVT wheat over the past 5 seasons. Source: NVT Online (https://nvt.grdc.com.au/trial-results)*

Barley Results:

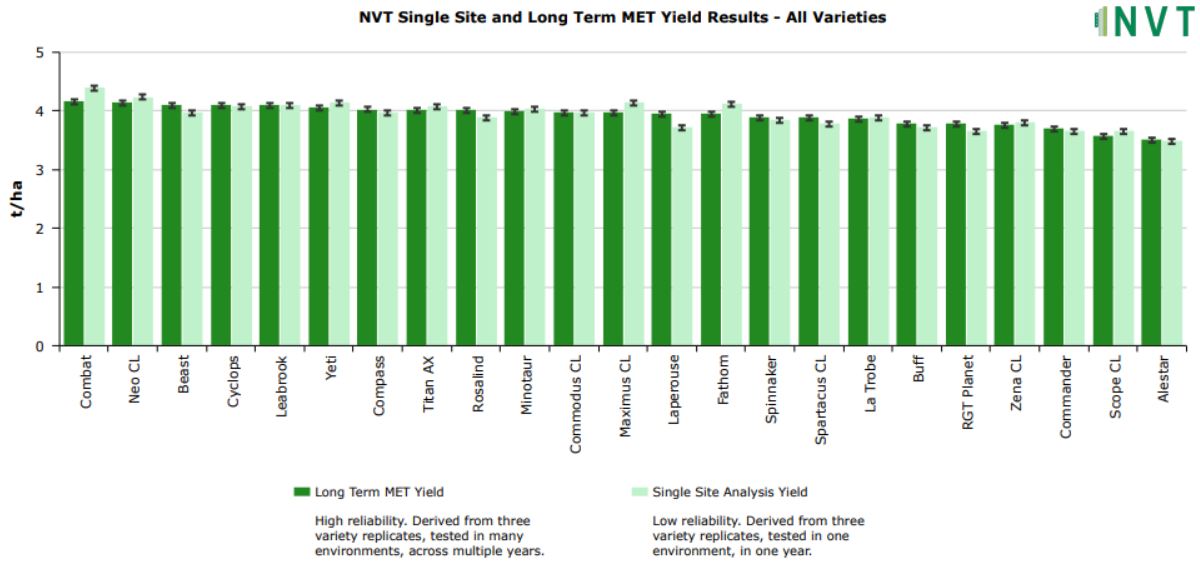



*Figure 3 The grain yield for the 2023 Palmer NVT barley trial across all varieties for a single site analysis and long term MET data. Source: NVT Online (https://nvt.grdc.com.au/trial-results)*

| | Group | 2019 | 2020 | 2021 | 2022 | 2023 |
|---|---|---|---|---|---|---|
| | Mean Yield | 0.00 t/ha | 2.13 t/ha | 2.61 t/ha | 3.94 t/ha | 3.79 t/ha |
| Variety | Trials | 0 | 1 | 1 | 1 | 1 |
| Combat | 3 | | | 124 | 108 | 110 |
| Leabrook | 4 | | 130 | 128 | 107 | 108 |
| Beast | 4 | | 134 | 126 | 101 | 108 |
| Compass | 4 | | 130 | 127 | 103 | 106 |
| Titan AX | 3 | | | 130 | 102 | 106 |
| Neo CL | 1 | | | | | 109 |
| Commodus CL | 4 | | 125 | 124 | 100 | 105 |
| Cyclops | 4 | | 123 | 119 | 97 | 108 |
| Yeti | 4 | | 121 | 115 | 97 | 107 |
| Fathom | 4 | | 122 | 115 | 98 | 104 |
| Rosalind | 4 | | 118 | 104 | 104 | 106 |
| Minotaur | 4 | | 108 | 107 | 103 | 105 |
| Laperouse | 4 | | 113 | 114 | 93 | 104 |
| Spinnaker | 2 | | | | 112 | 103 |
| Maximus CL | 4 | | 119 | 107 | 88 | 105 |
| Spartacus CL | 4 | | 116 | 103 | 87 | 103 |
| RGT Planet | 4 | | 89 | 86 | 113 | 100 |
| Commander | 4 | | 96 | 110 | 95 | 98 |
| Zena CL | 2 | | | | 111 | 99 |
| Scope CL | 4 | | 88 | 91 | 88 | 94 |

*Figure 4 The percentage of the site mean yield for different barley varieties in the Palmer NVT barley over the past 4 seasons. Source: NVT Online (https://nvt.grdc.com.au/trial-results)*

# Demonstration of time of sowing and sowing rate impacts on a diversity of canola varieties at Sedan

## Take home messages

- Maximum grain yields were recorded when canola was sown at time of sowing 2.
- Time of sowing 1 was more effected by false and staggered germinations than the other sowing windows.
- Nuseed Emu, InVigor R4022P, and 44Y94 were consistently the highest yielding varieties across the three times of sowing, whilst open pollinated varieties Stingray and Bandit TT were the two lowest yielding varieties.
- As the seeding rate increased from 1kg/ha to 2.5kg/ha, 44Y94 grain yield also increased.

## Background

Canola is an expensive crop to produce, especially with recent increases in input costs including fertilizer, 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

The trial will test three time of sowing dates and compare yield and oil quality at the end of the season, as well as economic analysis of the decision. Seeding dates were based on dry seeding, seeding at the break, and then two weeks after the break.

The trial will be replicated across hybrid and open pollinated varieties, including Stingray, Bandit TT, 43Y92, 44Y94, farmer retained 44Y94, Trident, InVigor T4510, Nuseed Emu, 44Y27RR, and InVigor R4022P. This will manage any establishment differences between both types of seed given hybrids have good early vigour and may do better in a dry sown environment.

The trial will also test four different sowing rates of 44Y94 at each time of sowing. 44Y94 will be sown at 1kg/ha, 1.5kg/ha, 2kg/ha, and 2.5kg/ha.

Below average rainfall in April was recorded at the Sedan weather station (BOM station number 024531) approximately 4km from the trial site, before the season broke in early June when 40 mm of rainfall was recorded in the first week. The site received 1.5 mm of rain in the 7 days prior to seeding, and 5 mm in the 10 days after the first time of sowing on May 2. Due to limited rain falling prior to and in the week following time of sowing (TOS) 1, canola germination was uneven and staggered across the trial site. Above average rain in June resulted in good germination of remaining seed from all 3 times of sowing, but below average rain from July through October placed the canola under stress for much of the growing season.

**Objectives;**

- Compare three times of sowing and compare yield and oil quality at the end of the season across varieties, as well as economic analysis of the individual treatments (Pinion Advisory to complete).
- Compare four sowing rates of 1kg, 1.5kg, 2kg and 2.5kg of 43Y92, depending on seed size and germination percentage of the seed supplied. Final seeding rates will be based on target plant densities.
- Compare canola with barley at the same time of sowing dates as canola and undertake an economic analysis of the decision including the opportunity costs of a missed break crop in the rotation (Pinion Advisory to complete).

**Site details**

| | |
|---|---|
| Location | Sedan, South Australia 5353 |
| GPS co-ordinates | -34.606610, 139.299000 |
| Crop and variety | Various canola varieties |
| Soil type | Sandy loam |

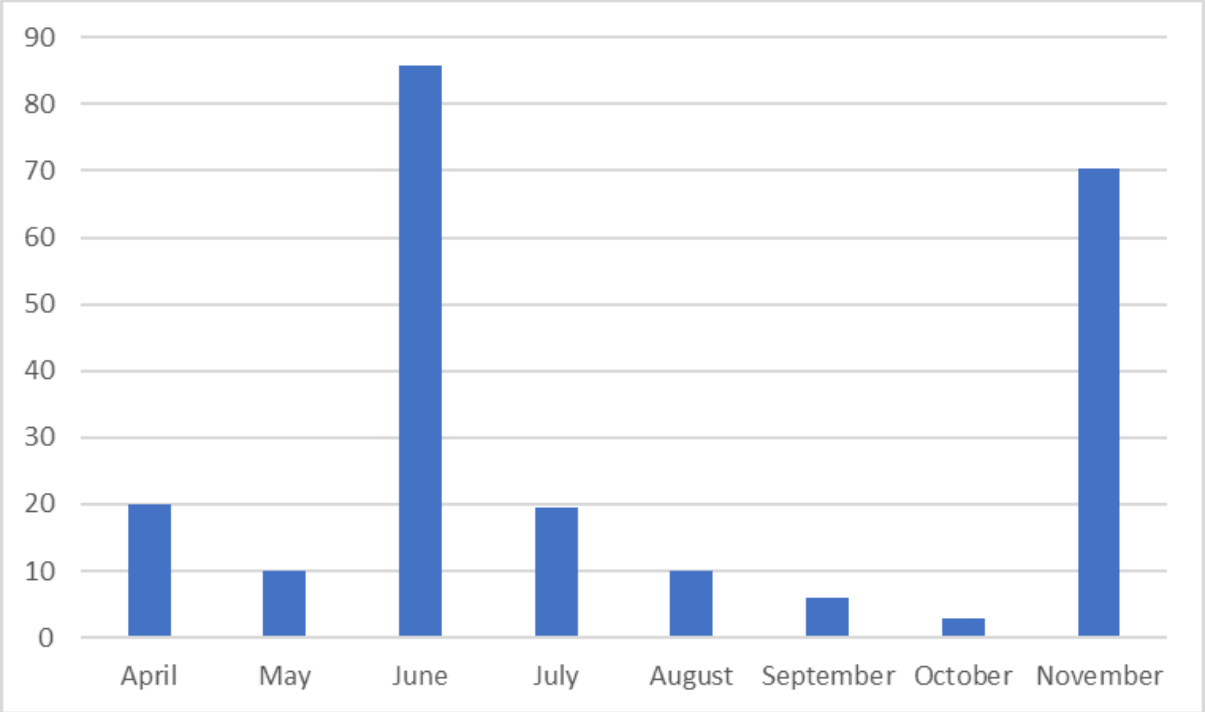
**Crop management**

| | | |
|---|---|---|
| Sowing date | TIME OF SOWING 1 | 02 May 2023 |
| | TIME OF SOWING 2 | 17 May 2023 |
| | TIME OF SOWING 3 | 29 May 2023 |
| Method | Plot Seeder: Knife points + presswheels | |
| Sowing depth (cm) | 1-2 | |
| Combine make | Agrowdrill | |
| Combine configuration | 7 tynes at 250 mm spacing | |
| Soil moisture | Moist | |
| Fertiliser | TOS1, 2 & 3 – at sowing | 95 kg/ha DAP 2:1 (canola)<br>100 kg/ha MAP 10:22 (barley) |
| Maintenance | 02 May 2023 | 2.5 L/ha Crucial<br>30 mL/ha Hammer<br>1.5 L/ha Triflur X<br>2.5 L/ha Avadex Xtra<br>1 L/ha Rustler |
| | 17 May 2023 | 2 L/ha Crucial<br>30 mL/ha Hammer<br>1.5 L/ha Triflur X<br>2.5 L/ha Avadex Xtra<br>1 L/ha Rustler |
| | 29 May 2023 | 2.5 L/ha Crucial<br>30 mL/ha Hammer<br>1.5 L/ha Triflur X<br>2.5 L/ha Avadex Xtra<br>1 L/ha Rustler |
| | 17 May 2023 | 1 L/ha Pyrinex Super |
| Harvest date | 10 Nov 2023 | |
| Replications | 4 | |
| Plot size | 2 m x 10 m | |

## Treatment list

| No. | Canola variety | Sowing rate | Time of sowing |
|---|---|---|---|
| 1 | Stingray | 2.5 kg/ha | TOS1 |
| 2 | Bandit TT | 2.5 kg/ha | TOS1 |
| 3 | 43Y92 | 2.5 kg/ha | TOS1 |
| 4 | 44Y94 | 2.5 kg/ha | TOS1 |
| 5 | Retained 44Y94 | 2.5 kg/ha | TOS1 |
| 6 | Trident | 2.5 kg/ha | TOS1 |
| 7 | InVigor T4510 | 2.5 kg/ha | TOS1 |
| 8 | Nuseed Emu | 2.5 kg/ha | TOS1 |
| 9 | 44Y27 RR | 2.5 kg/ha | TOS1 |
| 10 | InVigor R4022P | 2.5 kg/ha | TOS1 |
| 11 | 44Y94 | 1.0 kg/ha | TOS1 |
| 12 | 44Y94 | 1.5 kg/ha | TOS1 |
| 13 | 44Y94 | 2.0 kg/ha | TOS1 |
| 14 | 44Y94 | 2.5 kg/ha | TOS1 |
| 15 | Stingray | 2.5 kg/ha | TOS2 |
| 16 | Bandit TT | 2.5 kg/ha | TOS2 |
| 17 | 43Y92 | 2.5 kg/ha | TOS2 |
| 18 | 44Y94 | 2.5 kg/ha | TOS2 |
| 19 | Retained 44Y94 | 2.5 kg/ha | TOS2 |
| 20 | Trident | 2.5 kg/ha | TOS2 |
| 21 | InVigor T4510 | 2.5 kg/ha | TOS2 |
| 22 | Nuseed Emu | 2.5 kg/ha | TOS2 |
| 23 | 44Y27 RR | 2.5 kg/ha | TOS2 |
| 24 | InVigor R4022P | 2.5 kg/ha | TOS2 |
| 25 | 44Y94 | 1.0 kg/ha | TOS2 |
| 26 | 44Y94 | 1.5 kg/ha | TOS2 |
| 27 | 44Y94 | 2.0 kg/ha | TOS2 |
| 28 | 44Y94 | 2.5 kg/ha | TOS2 |
| 29 | Stingray | 2.5 kg/ha | TOS3 |
| 30 | Bandit TT | 2.5 kg/ha | TOS3 |
| 31 | 43Y92 | 2.5 kg/ha | TOS3 |
| 32 | 44Y94 | 2.5 kg/ha | TOS3 |
| 33 | Retained 44Y94 | 2.5 kg/ha | TOS3 |
| 34 | Trident | 2.5 kg/ha | TOS3 |
| 35 | InVigor T4510 | 2.5 kg/ha | TOS3 |
| 36 | Nuseed Emu | 2.5 kg/ha | TOS3 |
| 37 | 44Y27 RR | 2.5 kg/ha | TOS3 |
| 38 | InVigor R4022P | 2.5 kg/ha | TOS3 |
| 39 | 44Y94 | 1.0 kg/ha | TOS3 |
| 40 | 44Y94 | 1.5 kg/ha | TOS3 |
| 41 | 44Y94 | 2.0 kg/ha | TOS3 |
| 42 | 44Y94 | 2.5 kg/ha | TOS3 |
| 43 | Barley cv. Compass | 80 kg/ha | TOS1 |
| 44 | Barley cv. Compass | 80 kg/ha | TOS2 |
| 45 | Barley cv. Compass | 80 kg/ha | TOS3 |

**Figure 1: Recorded growing season rainfall (April to November) in Sedan from BOM weather station 024531**




## Results and Discussion

**Table 1. Crop emergence & GreenSeeker® assessment of various canola varieties at varying times of sowing, Sedan**

| Variety | TOS | Emergence | NDVI |
|---|---|---|---|
| 1kg/ha 44Y94 | TOS1 | 2.1 | 0.58 |
| | TOS2 | 3.6 | 0.65 |
| | TOS3 | 2.2 | 0.43 |
| 1.5kg/ha 44Y94 | TOS1 | 3.6 | 0.53 |
| | TOS2 | 5.2 | 0.61 |
| | TOS3 | 1.4 | 0.4 |
| 2kg/ha 44Y94 | TOS1 | 5 | 0.45 |
| | TOS2 | 6.4 | 0.62 |
| | TOS3 | 2.6 | 0.47 |
| 2.5kg/ha 44Y94 | TOS1 | 4.8 | 0.56 |
| | TOS2 | 8 | 0.69 |
| | TOS3 | 2.2 | 0.57 |
| Stingray | TOS1 | 5.7 | 0.57 |
| | TOS2 | 12.8 | 0.67 |
| | TOS3 | 2.8 | 0.52 |
| Bandit TT | TOS1 | 4.6 | 0.55 |
| | TOS2 | 10.9 | 0.61 |
| | TOS3 | 2.6 | 0.42 |

| | | | |
|---|---|---|---|
| 43Y92 | TOS1 | 4.6 | 0.34 |
| | TOS2 | 8 | 0.52 |
| | TOS3 | 2.6 | 0.41 |
| 44Y94 | TOS1 | 4.3 | 0.48 |
| | TOS2 | 7.9 | 0.56 |
| | TOS3 | 3.3 | 0.42 |
| Retained 44Y94 | TOS1 | 5.9 | 0.57 |
| | TOS2 | 12.3 | 0.65 |
| | TOS3 | 3 | 0.54 |
| Trident | TOS1 | 4.1 | 0.49 |
| | TOS2 | 8.2 | 0.68 |
| | TOS3 | 2.2 | 0.51 |
| InVigor T4510 | TOS1 | 7.8 | 0.53 |
| | TOS2 | 12 | 0.59 |
| | TOS3 | 3.4 | 0.38 |
| Nuseed Emu | TOS1 | 4.6 | 0.51 |
| | TOS2 | 9.4 | 0.59 |
| | TOS3 | 2.6 | 0.41 |
| 44Y27 RR | TOS1 | 4.3 | 0.57 |
| | TOS2 | 10 | 0.66 |
| | TOS3 | 2.8 | 0.43 |
| InVigor R4022P | TOS1 | 5.9 | 0.57 |
| | TOS2 | 6.3 | 0.64 |
| | TOS3 | 1.6 | 0.53 |
| Compass | TOS1 | 20.6 | 0.55 |
| | TOS2 | 29.1 | 0.67 |
| | TOS3 | 5.4 | 0.53 |

Crop emergence and NDVI assessments were conducted on 26 July 2023, 85 days after TOS1 (Table 1). Plants were counted along a 1 metre section of row, 4 times per plot, whilst NDVI was done along the entire length of the plot.

**Table 2. Grain yield and quality of various canola varieties at varying times of sowing, Sedan**

| Variety | TOS | Yield | Test weight | Oil | Protein |
|---|---|---|---|---|---|
| 1kg/ha 44Y94 | TOS1 | 0.67 | 65.3 | 42 | 23.02 |
| | TOS2 | 1.34 | 65.53 | 43.3 | 21.94 |
| | TOS3 | 1.47 | 65.7 | 43.8 | 22.29 |
| 1.5kg/ha 44Y94 | TOS1 | 0.83 | 66.1 | 41.2 | 23.8 |
| | TOS2 | 1.38 | 65.96 | 43.3 | 22.03 |
| | TOS3 | 1.51 | 65.64 | 43.6 | 22.21 |
| 2kg/ha 44Y94 | TOS1 | 1.18 | 65.35 | 41 | 23.76 |
| | TOS2 | 1.55 | 65.71 | 43.3 | 21.97 |
| | TOS3 | 1.6 | 65.64 | 43.4 | 22.51 |
| 2.5kg/ha 44Y94 | TOS1 | 1.3 | 65.85 | 42.5 | 22.49 |
| | TOS2 | 1.69 | 65.51 | 43.4 | 21.92 |
| | TOS3 | 1.87 | 65.58 | 43.8 | 21.75 |
| Stingray | TOS1 | 1.19 | 68.13 | 42.1 | 23.81 |
| | TOS2 | 1.27 | 67.89 | 43.6 | 22.59 |
| | TOS3 | 0.46 | 67.35 | 43 | 23.42 |
| Bandit TT | TOS1 | 1.28 | 68 | 40.3 | 23.61 |
| | TOS2 | 1.27 | 68.35 | 40.1 | 23.84 |
| | TOS3 | 1 | 67.47 | 41.8 | 22.88 |
| 43Y92 | TOS1 | 1.33 | 67.98 | 42.4 | 22.96 |
| | TOS2 | 1.45 | 67.89 | 42.8 | 22.81 |
| | TOS3 | 0.99 | 67.3 | 43.1 | 23.08 |
| 44Y94 | TOS1 | 1.7 | 66.66 | 42 | 23.28 |
| | TOS2 | 2 | 65.85 | 43.7 | 21.68 |
| | TOS3 | 0.92 | 64.97 | 43.1 | 22.62 |
| Retained 44Y94 | TOS1 | 1.55 | 66.82 | 42 | 22.93 |
| | TOS2 | 1.47 | 66.32 | 43.5 | 21.66 |
| | TOS3 | 0.43 | 65.78 | 42.9 | 23.15 |
| Trident | TOS1 | 1.45 | 67.97 | 40.6 | 22.52 |
| | TOS2 | 1.37 | 67.97 | 32.1 | 22.22 |
| | TOS3 | 0.81 | 66.94 | 41.5 | 22.52 |
| InVigor T4510 | TOS1 | 1.64 | 68.74 | 40.4 | 23.36 |
| | TOS2 | 1.67 | 67.91 | 41.9 | 22.31 |
| | TOS3 | 0.74 | 67.32 | 42.6 | 22.74 |
| Nuseed Emu | TOS1 | 1.79 | 67.95 | 42.3 | 22.53 |
| | TOS2 | 2.32 | 67.82 | 42.8 | 22.04 |
| | TOS3 | 1.29 | 67.26 | 42.7 | 23.14 |
| 44Y27 RR | TOS1 | 1.56 | 68.43 | 42.5 | 22.55 |
| | TOS2 | 1.97 | 67.81 | 43.8 | 21.54 |
| | TOS3 | 1.24 | 66.98 | 43.9 | 21.96 |
| InVigor R4022P | TOS1 | 1.68 | 68.15 | 44 | 22.58 |
| | TOS2 | 2.32 | 67.83 | 44.8 | 21.63 |
| | TOS3 | 0.94 | 67.25 | 44.3 | 22.29 |

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

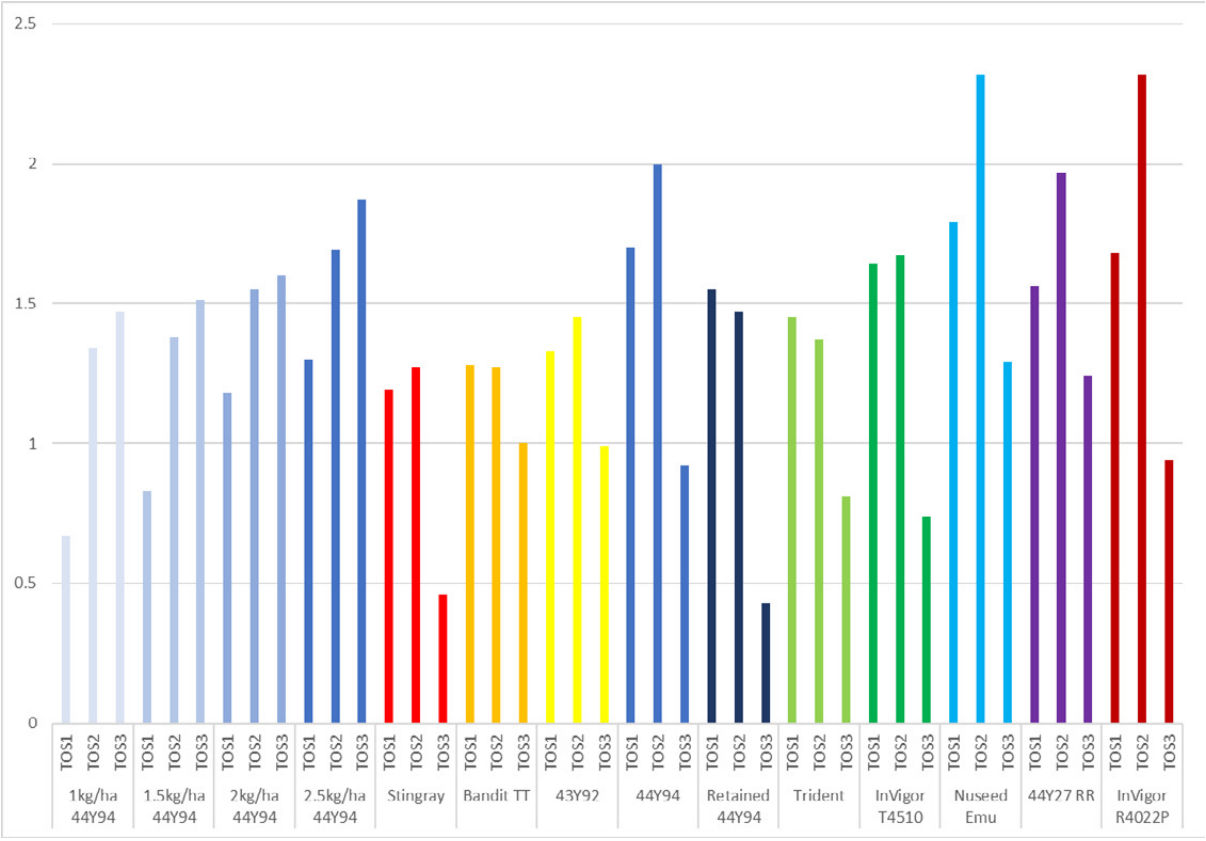



**Figure 3: Canola oil content (%) of time of sowing x canola varieties, Sedan**

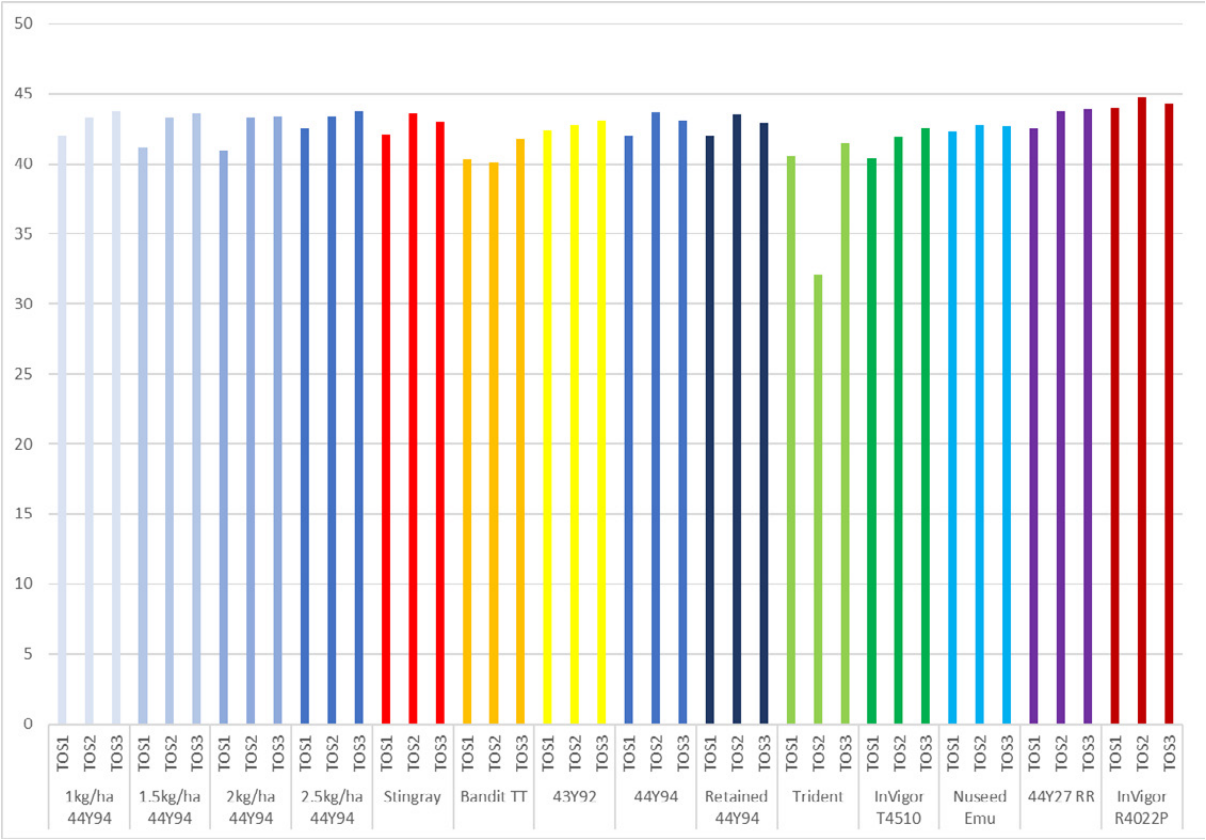


**Table 3. Grain quality of barley cv. Compass at varying times of sowing, Sedan**

| No. | Canola variety | Sowing rate | Time of sowing | Grain quality 15 Jan 2023 | | |
|---|---|---|---|---|---|---|
| | | | | Screenings (mean %) | Retention (mean %) | Protein (mean %) |
| 43 | Barley cv. Compass | 80 kg/ha | TOS1 | 3.67 | 82.63 | 14.25 |
| 44 | Barley cv. Compass | 80 kg/ha | TOS2 | 3.45 | 80.46 | 14.65 |
| 45 | Barley cv. Compass | 80 kg/ha | TOS3 | 4.03 | 79.67 | 15.7 |

Dry seasonal conditions throughout the growing season of 2023 resulted in significantly lower yields than those achieved in 2022. Nuseed Emu recorded the highest yield amongst varieties at TOS1 (02 May), recording 1.79 tonne per hectare (t/ha), followed by 44Y94 at 1.7 t/ha (Table 2). And although recording statistically equivalent yields to Nuseed Emu and 44Y94, Stingray and Bandit TT recorded the lowest yield at less than 1.3 t/ha.

Nuseed Emu and InVigor R4022P yielded highest amongst TOS2 (17 May), both recording 2.32 t/ha. 44Y94 and 44Y27 RR followed closely behind at 2 and 1.97 t/ha respectively, all four varieties recording significantly higher yields than Bandit TT and Stingray which both recorded 1.27 t/ha at TOS2.

Yields significantly reduced when sown at TOS3 (29 May), where 44Y94 sown between 2.5kg/ha and 1kg/ha recorded greater yields than all other varieties, recording between 1.87t/ha and 1.41 t/ha. Canola sown at TOS3 however did show greater variability and results showed limited statistical significance between the varieties. TOS3 was impacted the greatest from the dry conditions of July through October.

A trend was observed in the canola sowing rates trial. Although there were no statistically significant differences in the results, as sowing rate increased, so did grain yield. Although minor, grain oil content also increased as sowing rate increased, trends similar to what were found during 2022.

Barley yields were significantly impacted due to kangaroo grazing during the season. At the time of germination, there was limited feed in surrounding paddocks and as the barley was quick to establish it became a camping ground for kangaroos throughout the year. As a result, yield was heavily impacted. There were no significant differences in Barley yield recorded, which yielded between 1.4 t/ha and 1.5 t/ha at each TOS.

## Conclusion

From the trials conducted at Sedan in 2023, maximum grain yields were recorded when canola was sown at time of sowing 2 (17 May). With less than 5mm of rainfall recorded either side of TOS1, many varieties were affected by false and staggered germinations, resulting in TOS1 being most effected by the dry conditions recorded until the end of May and start of June. Nuseed Emu, InVigor R4022P, and 44Y94 were consistently the highest yielding varieties across the three times of sowing, whilst open pollinated varieties Stingray and Bandit TT were the two lowest yielding varieties. Bandit TT, Retained 44Y94, and Trident recorded their highest yield when sown early. Stingray, 43Y92, 44Y94, InVigor T4510, Nuseed Emu, 44Y27 RR, and InVigor R4022P all recorded their highest yield when sown mid. All canola varieties yielded lowest when sown at the late time of sowing window. As the seeding rate increased from 1kg/ha to 2.5kg/ha, 44Y94 grain yield also increased. Grain oil content also increased as seeding rate increased, and Protein was least effected by seeding rate.

## Acknowledgments

This trial was funded by the SA Drought Hub, managed by AgXtra and hosted by Jack Schultz.

## Murray Plains Farmers - Canola Variety Trial Economic Analysis 2023-24

| Variety | Type | Grain yield (t/ha) | Oil (%) | Price ($/t) | Oil Bonus/Discount ($/t) | Income ($/ha) | Freight ($/ha) | EPR | Seed Cost ($/kg) | Seed Cost ($/ha) | Chemicals ($/ha) | Fertiliser ($/ha) | Spraying ($/ha) | Seeding ($/ha) | Harvest ($/ha) | On Farm Storage ($/ha) | Total Costs ($/ha) | Gross Margin ($/ha) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **ATR Stingray** | **OP TT** | **1.27** | 42 | 644.45 | 0.00 | **818** | 19 | | 10 | 25 | 97 | 155 | 35 | 30 | 50 | 0 | **411** | **407** |
| **Bandit TT** | **OP TT** | **1.27** | 40 | 644.45 | 19.33 | **794** | 19 | 13 | 0 | 0 | 97 | 155 | 35 | 30 | 50 | 0 | **399** | **395** |
| **43Y92 CL** | **Hybrid CF** | **1.45** | 43 | 644.45 | 9.67 | **948** | 22 | | 34 | 85 | 94 | 155 | 35 | 30 | 50 | 0 | **471** | **478** |
| **44Y94 CL** | **Hybrid CF** | **2.00** | 44 | 644.45 | 19.33 | **1328** | 30 | | 34 | 85 | 94 | 155 | 35 | 30 | 50 | 0 | **479** | **849** |
| **Retained 44Y94 CL** | **Hybrid CF** | **1.47** | 44 | 644.45 | 19.33 | **976** | 22 | | 10 | 25 | 94 | 155 | 35 | 30 | 50 | 0 | **411** | **565** |
| **Invigor T4510** | **Hybrid TT** | **1.67** | 42 | 644.45 | 0.00 | **1076** | 25 | | 48 | 120 | 97 | 155 | 35 | 30 | 50 | 0 | **512** | **564** |
| **HyTTec Trident** | **Hybrid TT** | **1.37** | 40 | 644.45 | 19.33 | **856** | 21 | 7 | 18 | 45 | 97 | 155 | 35 | 30 | 50 | 0 | **439** | **417** |
| **Nuseed Emu TF** | **GM TruFlex** | **2.32** | 43 | 670.00 | 0.00 | **1554** | 49 | | 44 | 110 | 97 | 155 | 35 | 30 | 50 | 58 | **584** | **971** |
| **Invigor R4022P** | **GM TruFlex** | **2.32** | 45 | 670.00 | 0.00 | **1554** | 49 | | 44 | 109 | 94 | 155 | 35 | 30 | 50 | 58 | **579** | **975** |
| **44Y27 RR** | **GM RR** | **1.97** | 44 | 670.00 | 0.00 | **1320** | 41 | | 44 | 109 | 94 | 155 | 35 | 30 | 50 | 49 | **563** | **757** |
| **Compass** | **Barley** | **1.5** | | 300.00 | | **450** | 17 | | 0.35 | 28 | 63 | 155 | 20 | 30 | 50 | | **363** | **88** |

**Assumptions**

The non-GM canola price reflects delivery in late November 2023 to the Viterra, Tailem Bend delivery site (base price of $670/t minus $19.05 freight from TB to Adel, and any applicable oil bonuses/discounts)

The GM canola price is based on delivery to Inghams,Murray Bridge and assumes a $670 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 2022, 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 from the paddock to on-farm storage, and then from farm to Murray Bridge (GM canola)

The cost of on-farmstorage has been factored in for GM canola varieties assuming "*at buyer's call*" contracts apply

**Observations**

Yield and oil content of all varieties were reasonable considering the exceptionally dry finish to the season

All canola varieties in the trial achieved positive gross margins

The GM TruFlex Canola varieties Emu TF and Invigor R4022P produced the highest performances of the varieties in the trial (yield and gross margin)

The next most profitable variety was the hybrid Clearfield variety 44Y94CL

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

Plots grown from retained (second generation) Clearfield Hybrid seed (44Y94CL) were 36% lower yielding than first generation hybrid seed.

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

The Compass barley plots were heavily grazed by kangaroos and are unlikely to provide a valid comparitive performace between barley and canola.

# MURRAY PLAINS FARMERS 2023-24 SUPPORTERS

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

## TRIAL FUNDERS

Australian Government
Grains Research and Development Corporation

GRDC
GRAINS RESEARCH & DEVELOPMENT CORPORATION

SAGIT

Australian Government
Department of Agriculture, Fisheries and Forestry

Future Drought Fund

SA DROUGHT HUB

## GOLD

Coopers Farm Supplies

## SILVER

RONCO MOTORS
Servicing Farmers Since 1960

## TRIAL PARTNER

Elders

## BRONZE

MAD SEED SERVICES

Colrae Seeds
your local Seednet Partner

Crop Smart
better crop protection