SA CROP TECHNOLOGY CENTRE

FAR AUSTRALIA

GRDC GRAINS RESEARCH & DEVELOPMENT CORPORATION

FIELD DAY

INCREASING PRODUCTIVITY IN THE HRZ OF SA

Thursday 20th October 2022

Thanks to the following event sponsor:

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MFMG, SE Farmers, FAR Australia, Riverine Plains, SFS, Department of Primary Industries and Regional Development, CSIRO, CeRDI, Federation University Australia, BRILLAG, TechCrop

Regional Pulse Agronomy Research Partners:

MFMG, SARDI

SA CTC trial sites courtesy of:
James & Chris Gilbertson (canola)
Brett & Mel Gilbertson (pulses & cereals)

SOWING THE SEED FOR A BRIGHTER FUTURE

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- Wash your hands regularly for 20 to 30 seconds. If soap and water is not available, use an alcohol-based hand sanitiser. Hand sanitiser does not replace washing your hands after using the bathroom.
- Avoid touching your eyes, nose and mouth.
- Cover your mouth and nose when coughing and sneezing with a tissue or cough into your elbow.
- Dispose used tissues into a bin immediately and wash your hands afterwards.
- Practice social distancing:
  - Keep a distance of 1.5 metres between you and other people.
  - Avoid crowds and large public gatherings.
  - Avoid shaking hands or any other physical contact.

Thank you for your cooperation.

INCREASING PRODUCTIVITY IN THE SA HRZ

FEATURING THE GRDC'S HYPER YIELDING CROPS AND PULSE AGRONOMY PROJECTS

On behalf of our investor, the **Grains Research & Development Corporation** along with the associated project teams, I am delighted to welcome you to our 2022 SA Crop Technology Centre Field Day featuring Hyper Yielding Crops (HYC) and Pulse Agronomy projects.

To make the programme as diverse as possible, I would like to thank all our speakers who have helped to put today's programme together; in particular our keynote speaker Mr Dave Grant who has made the trip from the Canterbury Plains of New Zealand to join us today.

Finally I would like to thank the GRDC for investing in these research programmes. Also a big thanks to James and Chris Gilbertson and Brett and Mel Gilbertson, our host farmers for their tremendous practical support given to the team and to today's Keynote speaker sponsor SeedForce and our lunch sponsor Sebastopol Machinery Service – please support them in supporting us.

Should you require any assistance today, please don't hesitate to contact a FAR Australia staff member. We hope you find the day informative, and as a result, take away new ideas which can be implemented in your own farming business.

Nick Poole
Managing Director
FAR Australia

Hyper Yielding Crops

Hyper Yielding Crops (HYC) builds on the success of the GRDC's four-year Hyper Yielding Cereals Project in Tasmania which attracted a great deal of interest from mainland HRZ regions. The project demonstrated that increases in productivity could be achieved through sowing the right cultivars, at the right time and with effective implementation of appropriately tailored management strategies. The popularity of this project highlighted the need to advance a similar initiative nationally which would strive to push crop yield boundaries in high yield potential grain growing environments.

With input from national and international cereal breeders, growers, advisers and the wider industry, this project is working towards setting record yield targets as aspirational goals for growers of wheat, barley and canola.

In addition to the research centres, the project also includes a series of focus farms and innovative grower networks, which are geared to road-test the findings of experimental plot trials in paddock-scale trials. This is where in the extension phase of the project we are hoping to get you, the grower and adviser involved.

HYC project officers in each state (Jen Lillecrapp of MFMG here in SA) are working with innovative grower networks to set up paddock strip trials on growers' properties with assistance from the national extension lead Jon Midwood.

Another component of the research project is the HYC awards program. The awards aim to benchmark the yield performance of growers' wheat paddocks and, ultimately, identify the agronomic management practices that help achieve high yields in variable on-farm conditions across the country. This season, HYC project officers are seeking nominations for 50 wheat paddocks nationwide (about 10 paddocks per state) as part of the awards program.

For more details on the project contact:

Rachel Hamilton – HYC Communications and Events, FAR Australia
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Nick Poole – HYC Project Lead and HYC wheat research lead, FAR Australia
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Dr Kenton Porker – HYC barley research lead, FAR Australia
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Rohan Brill – HYC canola research lead, Brill Ag
Email: rohan@brillag.com.au

Jon Midwood - HYC extension coordinator, TechCrop
Email: techcrop@bigpond.com

Jen Lillecrapp – HYC Project Officer, Mackillop Farm Management Group
Email: jen@brackenlea.com

Pulse Agronomy

A Grains Research & Development Corporation (GRDC) Investment across eastern Australia aims to close the economic gap in grain legume production. South Australia is led by SARDI (Penny Roberts), Agriculture Victoria (Jason Brand) in Victoria, and Brill Ag (Rohan Brill) in NSW along with other regional partners including FAR Australia across all states at spoke sites focusing on Faba Beans.

Faba bean is the most dominant pulse in this region. The key point about Faba Beans is that they are not limited in yield potential. For example, if every flower on every faba bean plant produced a pod, and every pod produced between 2 – 3 seeds their yield potential would far exceed that of the 10t/ha of wheat and barley. The explanation for this has not been fully explored in the higher production regions but we believe aspirational yields exceeding 8t/ha should be possible in Faba Beans.

For more details on this project contact:

Rachel Hamilton – HYC Communications and Events, FAR Australia
Email: rachel.hamilton@faraustralia.com.au

Aaron Vague – Managing Personnel, FAR Australia
Email: aaron.vague@faraustralia.com.au

Millicent Crop Technology Centre 2022 Climate Update

Growing Season Rainfall to date

The current 2022 rainfall at Millicent is tracking on average with long term trends, unlike much of the wheat belt north. Up until the start of October the March – October rainfall was 500mm compared to long term median of 505 mm for the same time period. This is still less than the 2016 season which was renowned for being the wettest season on record.

Long-term growing season rainfall and yield potential

The long-term median rainfall for Wallendbeen from April – October is 505 mm of rain. Using a French and Schulz equation, assuming 60mm is lost to evaporation, ignoring fallow rainfall, and a water use efficiency of 25kg/ha/mm in cereals a yield potential of > 12.5 t/ha should be possible in more than 50% of years. However, this assumes other climate factors light and temperature are non-limiting.

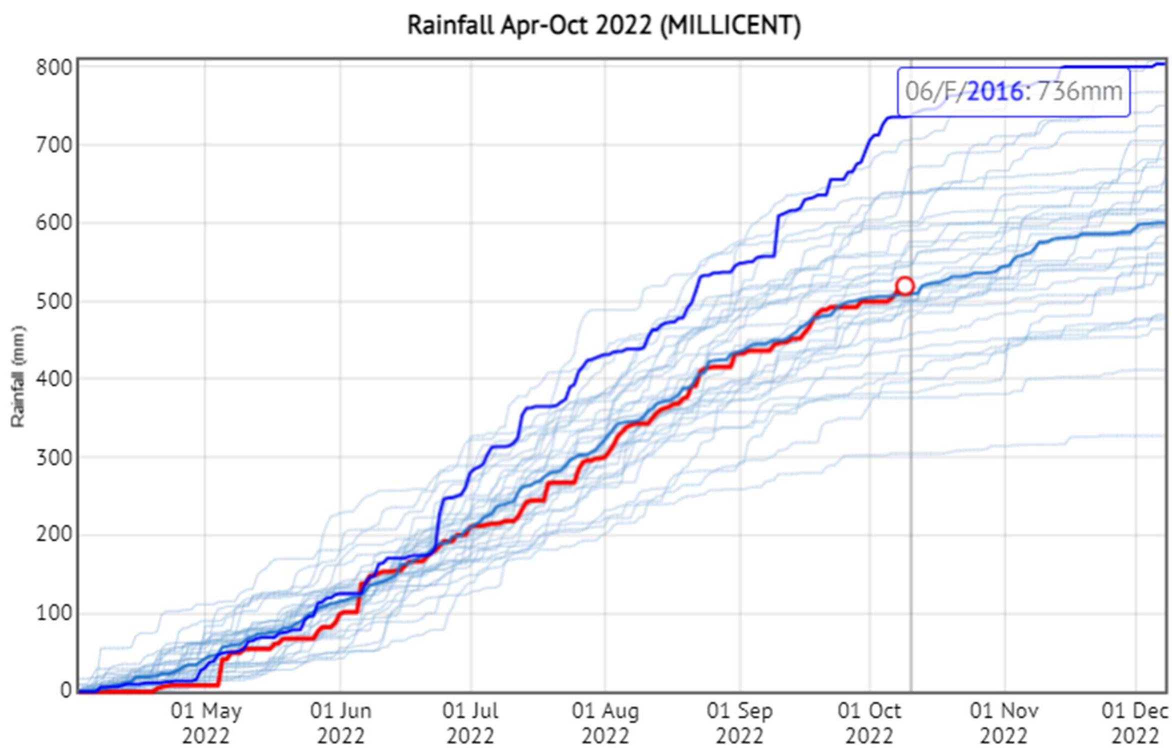

Figure 1. Long term rainfall (mm) trends for Millicent in the period from Apr – Dec. The dark line represents the **long-term median,** and red line the 2022 season tracking relative to other seasons light blue deciles. 2016 is highlighted. (DATA Source: Australian CLIMATE online 2022).

Solar Radiation and Temperature (figures 1 and 2)

In parts of the high rainfall zone solar radiation and temperature during the critical period (20 - 30 Oct) are the limiting factors to yield more often than water supply. This was a defining feature of 2021, with temperature consistent or slightly warmer than long term trends, however solar radiation lower than average leading to reduced photosynthesis and grain number potential. As of Oct 1 in 2022 temperatures are consistent with long term trends, however solar radiation is significantly lower in 2022 see paper discussing this.

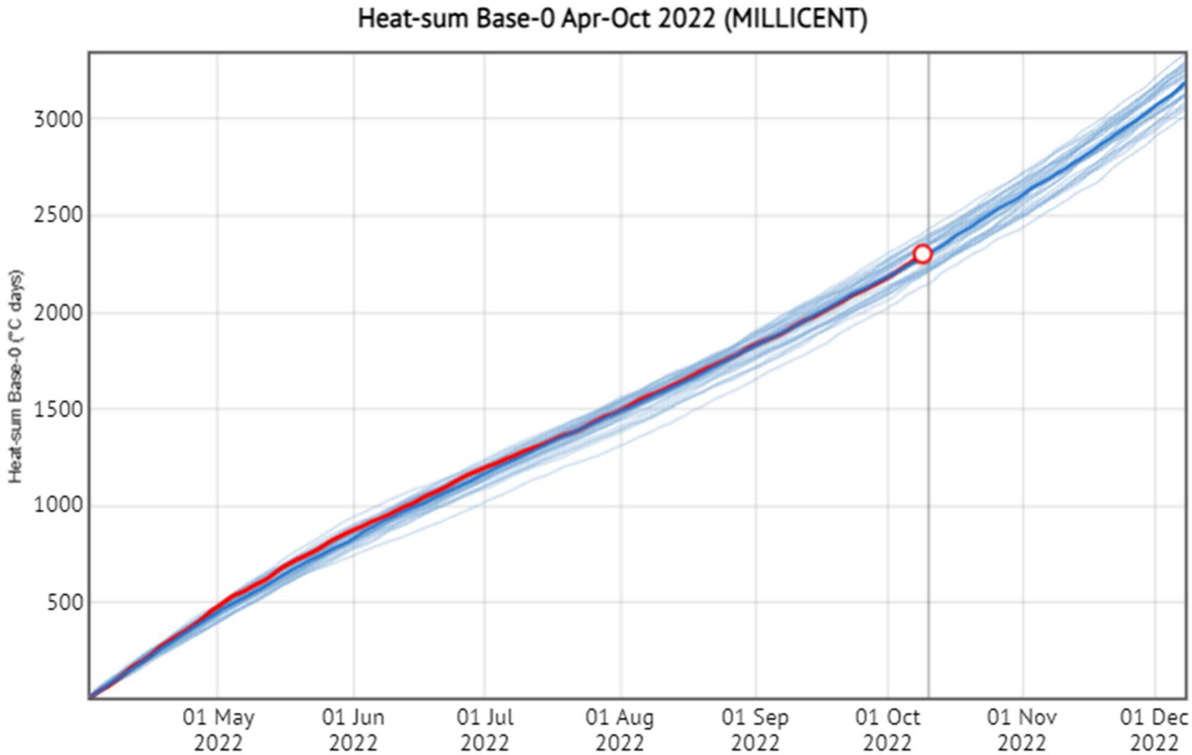

Figure 2. Long term **accumulated temperature** trends for Millicent in the period from Apr – Nov. The dark line represents the **long-term median,** and red line the 2022 season tracking relative to other seasons light blue deciles. (DATA Source: Australian CLIMATE online 2022).

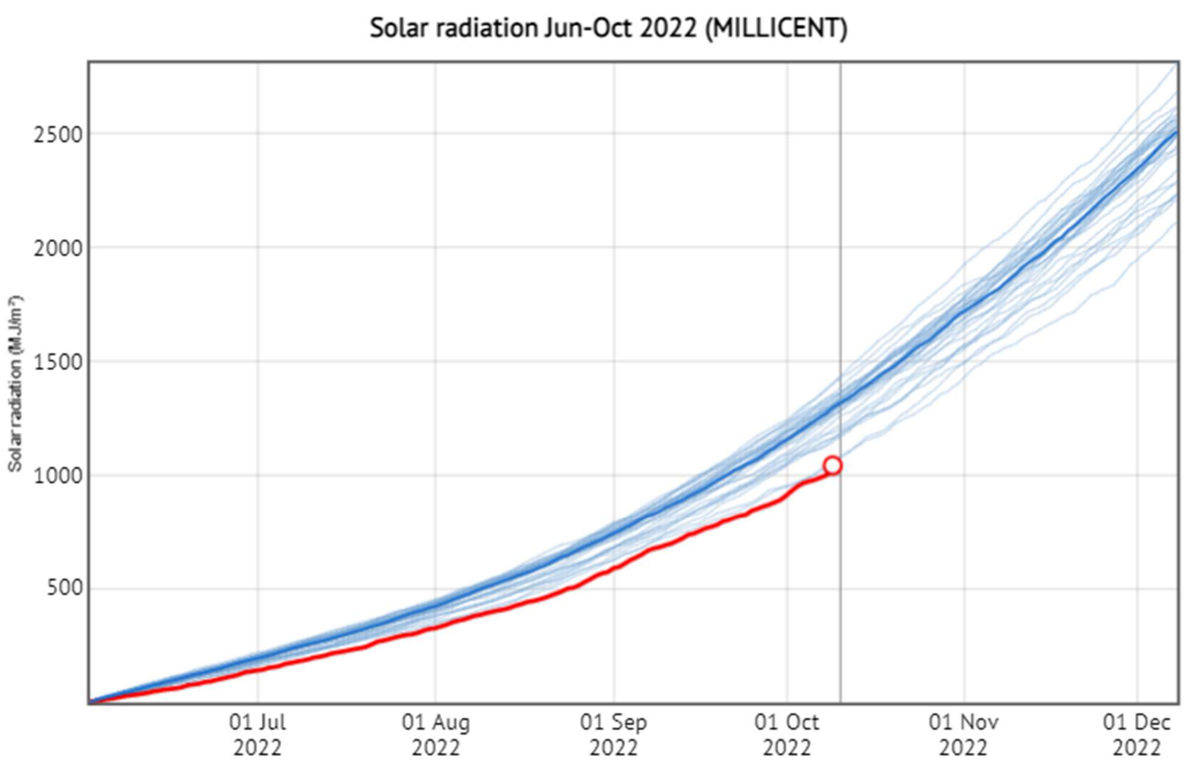

Figure 3. Long term **accumulated Solar Radiation** trends for Millicent in the period from Apr – Nov. The dark line represents the **long-term median,** and red line the 2022 season tracking relative to other seasons light blue deciles. 2021 is marked for comparison (DATA Source: Australian CLIMATE online 2022).

Hyper Yielding Canola – more than just urea and fungicide

Key Points

- 2020 and 2021 Hyper Yielding Canola trials have shown that yield potential can be raised through increased attention to nutrient management and variety choice.
- At Hyper Yielding Canola sites in four states in 2021, canola yield was improved where animal manure (chicken or pig) was applied.
- 2022 trials will provide a better understanding of the reasons for the manure response and if the response can be replicated with the application of inorganic nutrition alone.
- 45Y95 CL was the standout variety at Millicent in 2021, yielding above 6 t/ha in a Genotype * Environment * Management (GEM) trial.
- Fungicide use has not provided any yield benefit for canola in either 2020 or 2021.
- In both 2020 and 2021 at Millicent, there was a benefit where plant density increased from 15 to 30 plants/m^2.

Importance of nutrition for Hyper Yielding Canola

The aim of the canola component of the Hyper Yielding Crops project is to determine management practices that achieve 5 t/ha canola grain yield in high yield potential environments. Nitrogen management has been prioritised as one management strategy that is important for canola yield. At Millicent in 2021 there was a yield benefit of 0.7 t/ha from applying 75 kg/ha N (compared to nil N) but with no further yield benefit from higher N rates. This was largely due to the very high fertility of the paddock with 9.7% Organic Carbon. Over and above N application (at the 225 kg/ha N rate) there was a response to the application of pig manure at 6.7 t/ha. This supplied 169 kg/ha N and 85 kg/ha P and increased yield by 0.6 t/ha. Animal manure may not be readily available and/or the cost may be prohibitive, so 2022 trials are looking further into the reasons for the response to manure. The trials will determine if a similar response can be achieved by matching the nutrition supplied in manure with inorganic inputs. Is it a matter of simply increasing the NPK inputs to match or is there a benefit from manure beyond just the nutrient content? Does the manure increase nutrient supply when it is most required, i.e., through the crop critical period?

The positive response from manure application was mirrored at all four HYC Canola sites in 2021, including:

- Gnarwarre, Victoria (pig manure)
- Wallendbeen, NSW (chicken litter)
- Kojonup, WA (chicken manure)

There was a range in yield response from 0.5 t/ha at Wallendbeen to 0.8 t/ha at Gnarwarre and Kojonup.

Variety Choice 2021

Once nutrition is optimised, a variety needs to be chosen that will capitalise on the investment in soil fertility. In a Genotype * Environment * Management (GEM) Trial at Millicent in 2021 the standout for grain yield was 45Y95 CL, being at least 0.7 t/ha higher yielding than all other varieties (Table 1).

Table 1. *Yield of spring canola varieties at four national HYC canola sites in 2021.*

	Gnawarre Vic	Kojonup WA	Millicent SA	Wallendbeen NSW
ATR Wahoo	3.5	1.8	3.3	3.6
HyTTec Trifecta	3.9	2.7	4.4	5.2
45Y95 CL	*	*	6.4	6.4
45Y93 CL	*	*	5.7	5.6
45Y28 RR	4.5	2.9	5.1	4.9
Condor XT	3.9	3.4	5.1	5.2
l.s.d. (p<0.05)	0.21	0.13	0.34	0.36

Detailed assessment of 45Y95 CL at the Wallendbeen (NSW) site showed that it had high biomass at maturity but also a high harvest index, with 36% of final biomass being grain (Figure 1). 45Y95 CL had a high number of seeds per pod (21) with a high number of pods/m² (8422) (Table 2), the only variety that was above average for both components. Experiments and measurements will be completed again in 2022 as subtle differences in final biomass and harvest index can magnify into large differences in crop profitability.

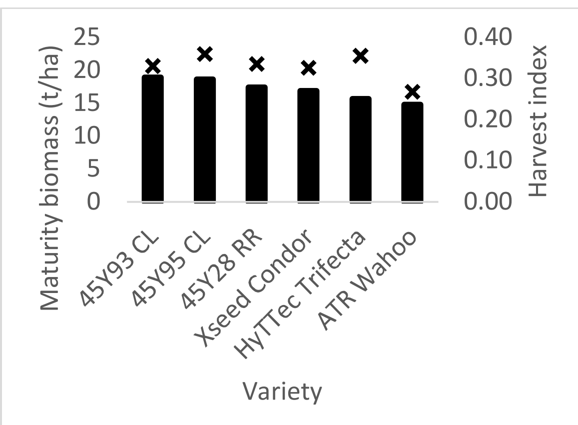

Figure 1: *Maturity biomass (bars) and harvest index (X) of six canola cultivars in Wallendbeen GEM trial 2021.*

Table 2. *Seeds/pod and pods/m² of six spring canola varieties in Wallendbeen HYC GEM trial 2021.*

	Seeds/pod	Pods/m²
ATR Wahoo	21	5240
HyTTec Trifecta	17	8003
45Y95 CL	21	8422
45Y93 CL	18	8692
45Y28 RR	18	7628
Condor TF	15	8263
Mean	*18*	*7708*

There was also a winter version of the Hyper Yielding Canola GEM site, where the highest yielding variety was Hyola Feast CL at 4.2 t/ha.

YieldMax Trial 2022

The YieldMax Trial has been included in 2022 which gives an opportunity to evaluate the best varieties with a strong nutrition package. The nutrition treatments include:

- High Input – 40 kg/ha P, 225 kg/ha N + Chicken Manure
- Low Input – 15 kg/ha P, 150 kg/ha N.

And the varieties include:

- Triazine Tolerant
    - Hyola Blazer TT
    - HyTTec Trifecta
- Clearfield
    - 45Y93 CL
    - 45Y95 CL
- Glyphosate Tolerant
    - Nuseed Condor TF
    - 45Y28 RR

HYC Canola Disease Management

With large biomass canola crops in high yield potential environments, it might be expected that growers would need to increase fungicide inputs to protect crops from disease. However, across the project in 2021 the yield response to fungicide (difference between Intensive and Nil fungicide program) ranged from nil in four (of seven) trials to 0.9 t/ha in a trial at Wallendbeen in 45Y28 RR canola (Figure 3). Intensive fungicide program included Saltro Duo on seed, Prosaro at 4-leaf stage, Aviator Xpro at 20% bloom stage and a follow up Prosaro at 50% bloom stage. The single best value fungicide application in 2021 (across the project area) was the use of an SDHI product (e.g. Aviator Xpro, Miravis Star) at 20-30% bloom stage. However, across the two years of trials, fungicide has not improved grain yield outcomes at Millicent.

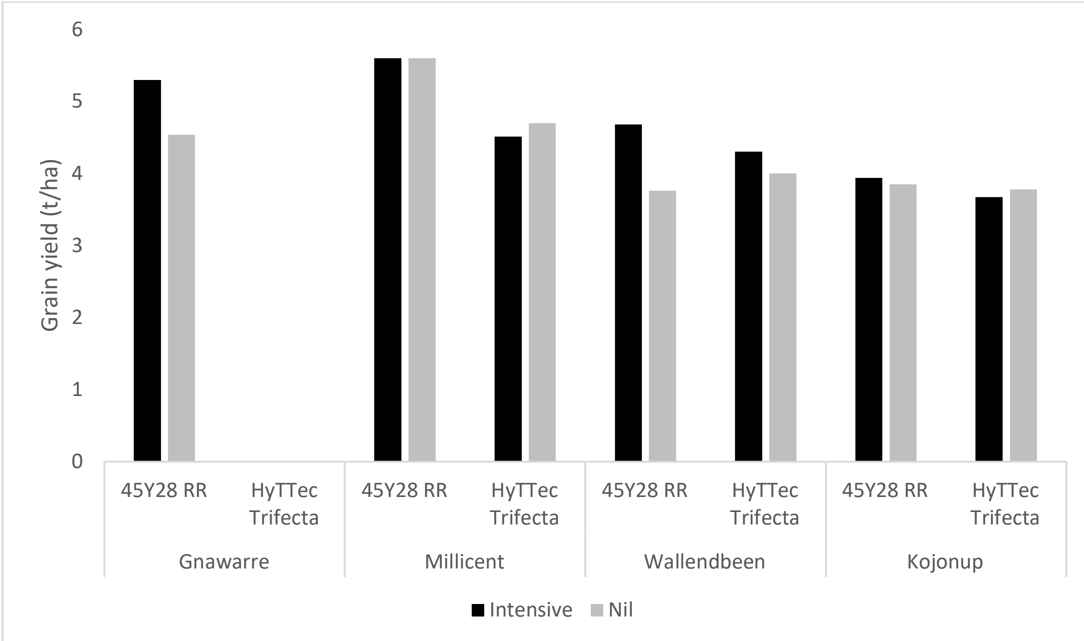

***Figure 4**: Effect of fungicide program (Intensive versus Nil) on grain yield of 45Y28 RR at Gnarwarre, Millicent and Wallendbeen and on HyTTec Trifecta at Millicent and Wallendbeen in 2021.*

Plant density for Hyper Yielding Canola

Increasing plant density from 15 to 75 plants/m² has not affected yield outcomes at the NSW, Vic and WA sites but there has been a yield benefit of increasing plant density from 15 to 30 plants/m² for spring canola at Millicent in both 2020 and 2021. The benefit was 0.2 t/ha in 2020 (3.8 to 4.0 t/ha) and 0.9 t/ha benefit in 2021 (4.9 to 5.8 t/ha). The climate in winter at Millicent is relatively mild with high minimum temperatures, but with a lot of cloudy skies in winter, vegetative growth may be limited. Targeting a population of ~30 plants/m² would be recommended to ensure canola grows enough biomass to be able to capture as much radiation as possible during the crop critical period post-flowering.

Hyper Yielding canola results

Full results from 2021 are available at https://faraustralia.com.au/wp-content/uploads/2022/04/HYC-2021-Results-FINAL.pdf. Results from 2022 will also be made available through the FAR Australia website and various other channels such as through social media and GRDC Updates.

Grain Legume Production

Event Evaluation 2022

GRDC Southern Grain Legume Agronomy
Learnings from 2021 Med – High rainfall production zones

Aaron Vague, Max Bloomfield, Tom Price, Ben Morris, Darcy Warren, Nick Poole, Kenton Porker

Background
Grains Research & Development Corporation (GRDC) investment across eastern Australia aims to close the economic gap in grain legume production. NSW by Brill Ag, Victoria by Agriculture Victoria, and South Australia is led by SARDI. Other regional partners are contributing to the investment, including FAR Australia who managed a pulse spoke site at Buraja/Coreen, Bundalong, and Gnarwarre in the HRZ in 2021. As part of the GRDC Southern grain legumes project we are targeting 6-8 t/ha dryland yields in faba beans in NE Victoria and SW Vic, and 4-6 t/ha at Buraja in NSW. SE SA is different, pulse crop adoption in lower SE SA has generally been either faba beans or broad beans, while there are some longer-term legume pastures. The region can successfully grow faba beans with the major production constraint disease. This spoke site aims primarily to address disease management, nutrition and canopy management. Growers choose to grow broad beans due to adaptation to acid soils, waterlogging, and market opportunities. Local growers have expressed desires to investigate different trace element formulations in pulses. This presents an opportunity to benchmark broad beans with faba beans for the HRZ.

In 2021 we conducted an experiment at Millicent to determine whether bean production may be limited by nutrition supply and to more sustainably use new fungicide chemistry. Our focus was to maximise faba bean productivity and benchmark faba bean production (biomass and N fixation) with other higher value crops such as broad beans and spring sown lentils.

Trial 2: Nutrition and N fixation in faba beans and benchmarking broad beans

Experimental details
Sown: Faba/broad beans sown 8 May 2021; spring-sown lentils sown 18 August 2021.
Harvested: Faba/broad beans on 13 January 2022; spring-sown lentils on 25 January 2022.
Soil type & management: Neutral-slightly alkaline Organosol (Peat soil) – high organic matter.
Colwell P (ppm): 56.
pH ($CaCl_2$): 7.7.
Organic Carbon (%): 9.7% (0-10cm).
Objective: Maximise Faba bean productivity and benchmark Faba bean production (Biomass and N fixation) with other higher value crops such as Broad beans and spring sown lentils.

Key messages:

- Broad beans grew larger, had greater early vigour and were more tolerant of the potential trace element constraints in the organosol, leading to better weed suppression than faba beans.
- Adding 100 kg N/ha reduced harvest dry matter of faba beans.

Treatments: Four nutrient treatments on one cultivar of faba bean (PBA Amberley) and one cultivar of broad bean (Aquadulce) (Table 1).

Table 1. *Nutrition treatments, products and nutrient contents, and application rates and timings.*

	Treatment	Product	Nutrients	Rate	Application timing
1	**Untreated**				
2	**Micronutrients (standard)**	Smartrace Triple	Zn 4% Mn 5% Cu 1.5% S 4.9%	5000 mL/ha	5 August, 5 October
		Boly	B 5% Mo 3% N 3%	4000 mL/ha	
3	**Micronutrients (standard) + 100 kg N/ha**	Smartrace Triple and Boly (as above)			
		Extra N (Urea)	N 46%	217 kg/ha	5 July
4	**Micronutrients (region)**	Rapisol Combi 7	Fe 3% Zn 3% Mn 3% Cu 1% Mg 1% B 0.65% Mo 0.3%	1500 g/ha	5 August, 5 October

Faba beans were less adapted to this soil type and had poor early vigour, showing symptoms of yellowing and trace element deficiency. This factor led to poor early growth in the faba beans and reduced weed competition. The broad beans in the nutrition management trial were not as affected due to their larger canopy and height providing denser canopies that better suppressed weeds, showing their greater adaptability. Biomass of faba bean varied from ~8 to 11.4 t/ha (Figure 1) under the four treatments, the Rapisol Combi 7 treatment achieved 11.4 t/ha of dry matter, whereas the lignosulfonates (standard) achieved 9.68 t/ha, similar to the untreated. There was no evidence of additional biomass with applied N. Yield and harvest index, and nitrogen removal results have not been processed at the time of publication. However, based on our estimates (and using 20 kg N fixed per tonne of dry matter) this equates to between 160 – 220 kg N.

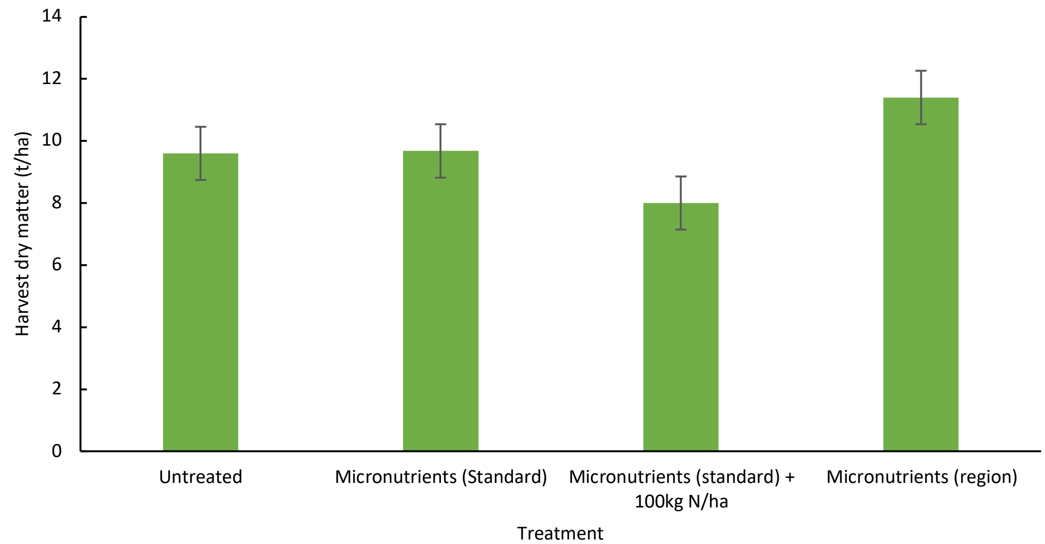

Figure 1. *Harvest dry matter (t/ha) of faba bean (cv. PBA Amberley) with different nutrition treatments (see Table 1) sown 8 May and harvested by hand 21 December. P-value = 0.024, LSD (P = 0.05) = 1.6.*

Despite visual differences in crop growth, there were no significant differences in yield of broad bean (3.92 to 4.23 t/ha) or faba bean (1.60-1.87 t/ha) under the four treatments (Figure 2).

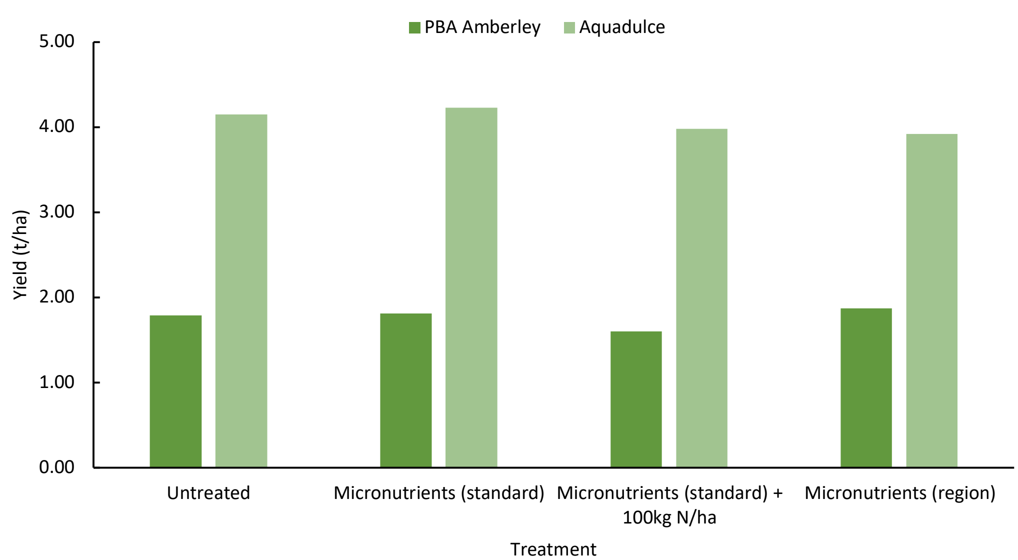

Figure 2. *Grain yield (t/ha) of broad bean (cv. Aquadulce) with different nutrition treatments (see Table 1) sown 8 May and harvested 13 January 2022. LSD (P = 0.05) = 0.63 (treatment x cultivar).*

Discussion and conclusions

The 2021 nutrition management trial showed little advantage of additional nitrogen at this site in 2021. There were significant differences across treatments for harvest biomass in PBA Amberley. While N content has yet to be calculated, based on our estimates (and using 20kg N fixed per tonne of dry matter) this equates to between 160 – 220kg N fixed between the lowest and highest treatment, and shows the importance of crop nutrition for N fixation. This is not factoring in how much N would be exported in the crop. Grain yield, harvest index, and nitrogen removal results have not been processed at the time of publication.

The same nutrition treatments had no significant difference on the grain yield in Aquadulce broad bean. This may have been due to the high organic carbon and organic matter at the site. This experiment will be repeated in 2022.

Disease Management for Faba and Broad Beans
This is the key question FAR Australia is addressing in the GRDC Grain Legumes projects in SA, Vic and NSW. Fungicide products and timing should target the leaves most critical to yield determination. Given beans are indeterminate, pod number is determined in the period prior and post flowering, whereas the number of seeds per pod are determined post flowering. It is important to think about the difference between growth and development and how this links with disease management.

Development rate of branches and leaves, the progression towards flowering, pod set and disease development are all influenced by temperature, whereas humidity and rainfall influences disease development. A key feature of the Millicent environment and in SW Vic is that it's generally colder but rainfall events are more frequent, compared to northern environments such as NSW, and Vic NE environments. Differences between regions in disease pressure means growers may be able to apply a more practical and flexible approach to disease management. This should include protecting segments of the canopy that are most likely to contribute to yield and adjusted for differences in development rates. The key question we will address in the fungicide trials is **When should we apply fungicides in the canopy to offer the greatest return on yield?**

Faba Bean Disease Management Trials: Key Learnings from 2021

Objective: Evaluate the potential to manage disease more sustainably in faba beans through improving management guidelines that dissect the interaction between fungicide application timing and improved genetic resistance.

- PBA Bendoc showed higher levels of chocolate spot due to its poorer genetic resistance to the disease.
- PBA Amberley has improved genetic resistance to disease and at the lower rainfall Buraja site showed no yield response to fungicide.
- The disease susceptible cultivar, PBA Bendoc, showed a yield response to the application of fungicide – highlighting the importance of a different fungicide strategies in a cultivars of contrasting disease resistance.
- Despite yields approaching 7t/ha there was no yield response to fungicide at Bundalong in NE VIC under lower levels of disease pressure at the site. Under high disease pressure similar (similar to 2022) at SW Vic .
- At the HRZ SW Vic site untreated yields were 4.43t/ha, and disease managed treatments yielded as high as 7.5t/ha, highlighting the differences between sites and NE Vic and SW Vic.

- Working backwards a 1 spray unit 28 days post flower yielded 6.03 t/ha, 2 units at 14 days and 28 days post flower yielded 6.42, and 1 at 1st flower, 14 days and 28 days post flower yielded 7.18 t/ha.
- The addition of tebuconazole to at an earlier timing did not further increase yield to a 3-spray strategy.
- A two-spray strategy combining a SDHI fungicide at 14 days after the first flower yielded similar to a 4 and 3 spray strategy combining cheaper fungicides highlighting the efficacy of this chemistry.

Disease management under higher disease pressure in SW Vic

Table 2. Influence of faba bean cultivar and disease management on grain yield (t/ha) at Gnarwarre 2021.

					Grain Yield (t/ha)					
Trt	4th node	**1st flower**	**1st flower +14 days**	**1st flower +28 days**	**PBA Amberley (MR)**		**PBA Bendoc (S)**		**Mean**	
1	---	---	---	---	4.29	-	4.57	-	**4.43**	**d**
2	---	---	---	Chlorothalonil +Carbendazim	6.01	-	6.05	-	**6.03**	**b**
3	---	---	Chlorothalonil +Carbendazim	Chlorothalonil +Carbendazim	6.25	-	6.59	-	**6.42**	**b**
4	---	Mancozeb	Chlorothalonil +Carbendazim	Chlorothalonil +Carbendazim	7.50	-	6.86	-	**7.18**	**a**
5	Tebuconazole	Mancozeb	Chlorothalonil +Carbendazim	Chlorothalonil +Carbendazim	7.34	-	6.85	-	**7.10**	**a**
6	---	---	Miravis Star	Veritas	7.45	-	6.70	-	**7.08**	**a**
7	---	---	---	Veritas	5.56	-	5.18	-	**5.37**	**c**
Mean					**6.34**	**-**	**6.11**	**-**	**6.23**	
Cultivar LSD p=0.05					ns		P val		0.101	
Fungicide Strategy LSD p=0.05					0.48		P val		<0.001	
Cultivar x Fungicide LSD p=0.05					ns		P val		0.125	

Tebuconazole applied at 145ml/ha, Mancozeb 750 at 2.00L/ha, Chlorothalonil at 2.30L/ha, Carbendazim at 0.50L/ha, Miravis Star at 0.75L/ha and Veritas at 0.75L/ha

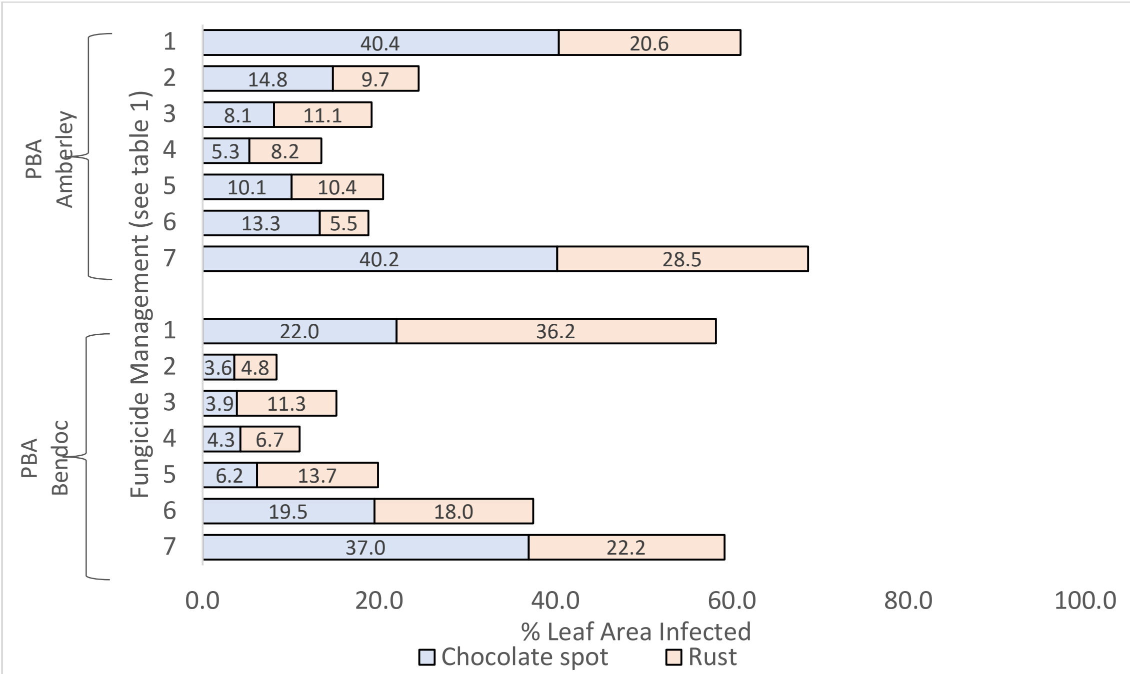

Figure 3. Effect of fungicide strategy on disease (chocolate spot and rust) on the top third of the canopy (% leaf area infected), assessed on 9 November.

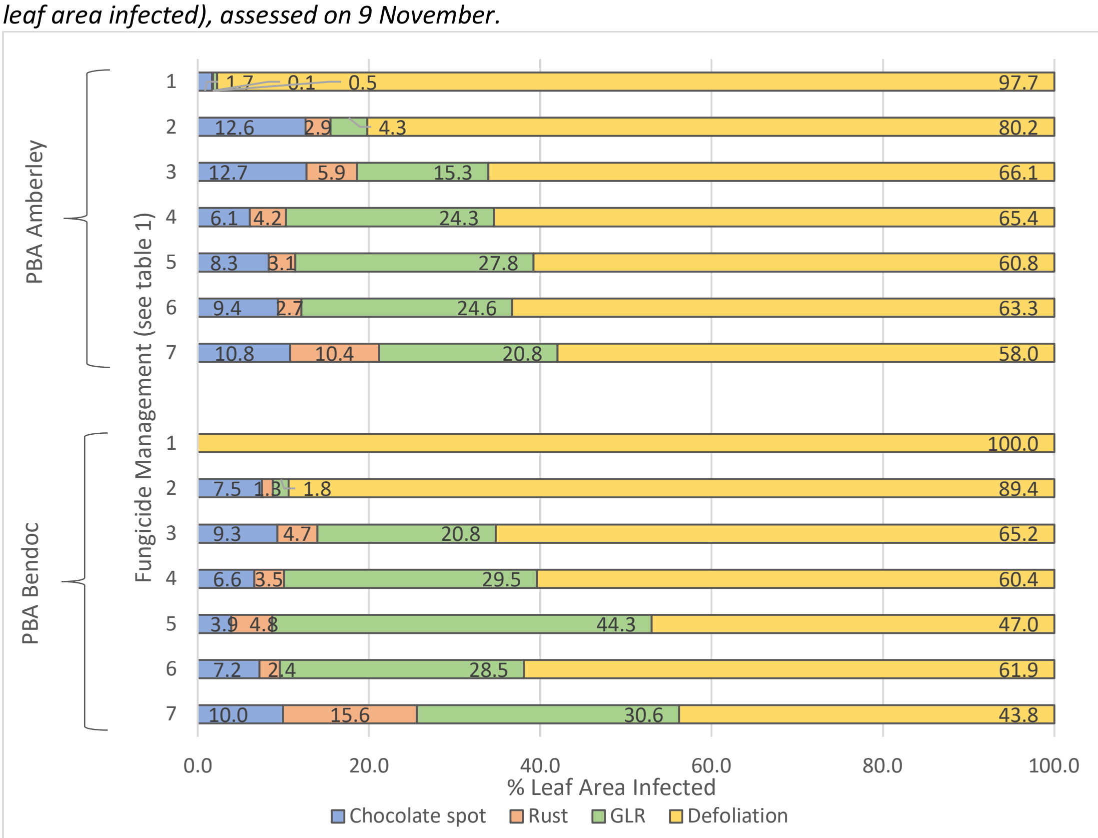

Figure 4. *Effect of fungicide strategy on disease (chocolate spot and rust) and green leaf retention on the middle third of the canopy (% leaf area infected), assessed on 9 November.*

Table 3. *Details of the management levels (kg, g, ml/ha).*

Sowing date:		**1 May**
Variety:		PBA Amberley & PBA Bendoc
Seed Rate:		24 Seeds/m2
Sowing Fertiliser:		100kg MAP

Inoculant		Nodulator
Nitrogen:		Nil
Fungicide:		As per treatment list

Contact details

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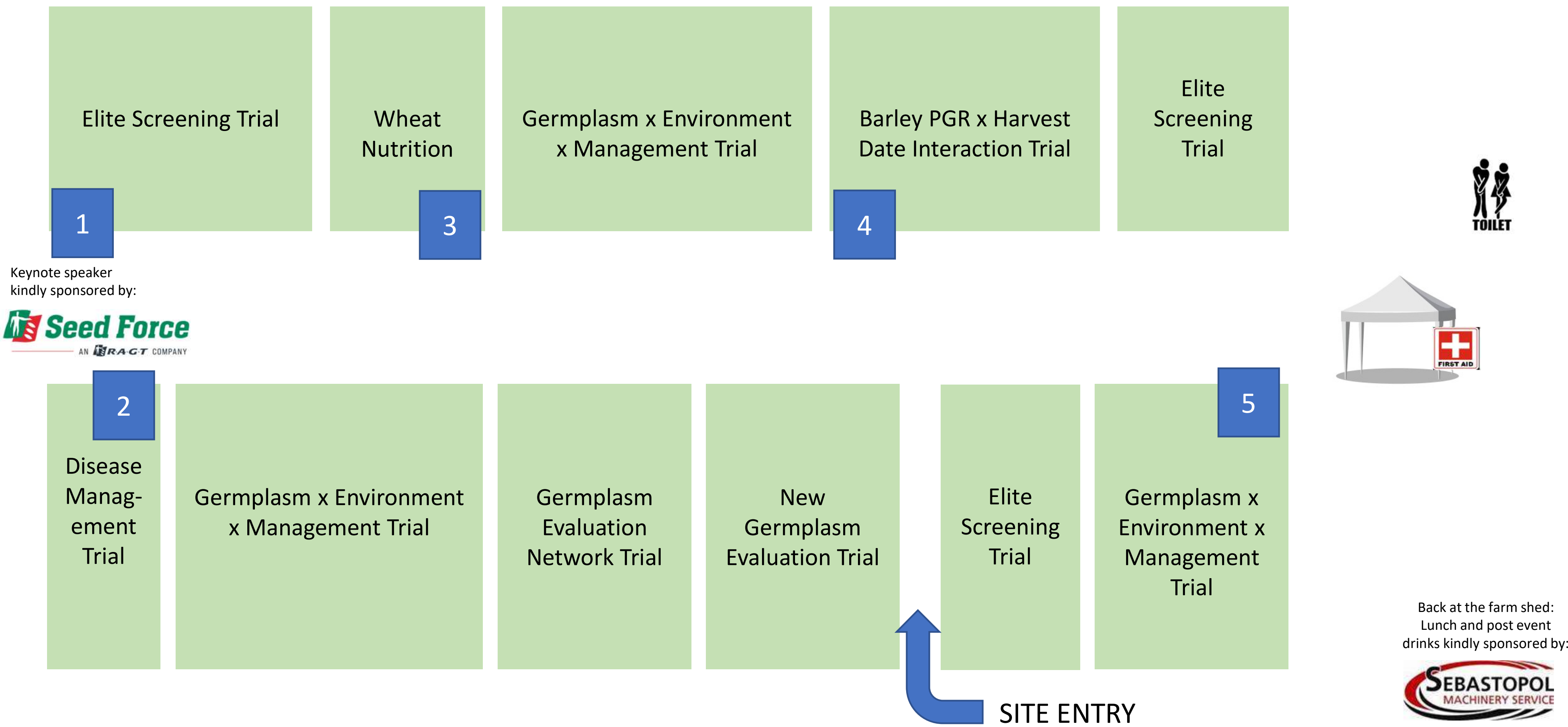
2022 SITE MAP:

Featuring the GRDC's Hyper Yielding Crops



SA CROP TECHNOLOGY CENTRE

TIMETABLE

SA CROP TECHNOLOGY CENTRE FIELD DAY (MILLICENT): THURSDAY 20 OCTOBER 2022

Featuring the GRDC's Hyper Yielding Crops

Thanks to our keynote speaker sponsor: Seed Force, an RAGT company

In-field presentations	Station No.	9:30am-12:00noon	12:30	1:15	1:30	2:00	2:30	3:00	3:30	4:00
Rohan Brill, Brill Ag and HYC Canola Research Lead will be joined by Nick Poole (FAR Australia) to discuss *Hyper yielding canola in SA what have we learnt so far?*	Pulses & Canola research sites	ALL	Lunch kindly sponsored by Sebastopol Machinery Service	Opening address by Andrew Smith, Manager Agronomy Soils & Farming Systems, GRDC South and Nick Poole, FAR Australia's Managing Director for an introduction to the cereal research programme.						Closing address followed by refreshments kindly sponsored by Sebastopol Machinery Service
Mr Dave Grant, NZ Grower *Recipe for higher yields in NZ, what does the farming system look like?* (Seed Force)	1				1			2		
Dr Kenton Porker & Max Bloomfield, FAR Australia *Achieving wheat yield potentials greater than 10t/ha more sustainably with new genetics & management.*	2					1			2	
Nick Poole, FAR Australia *Removing N limitation in the HRZ, N Banks, and fertile farming systems.*	3				2		1			
Jon Midwood, Techcrop and Jen Lillecrapp, MFMG *Hyper Yielding Crops: Capturing yield potential through innovation and benchmarking.*	4					2		1		
Dr Kenton Porker & Nick Poole, FAR Australia *Canopy Management in high rainfall barley, is it harder than wheat to achieve high yields?*	5						2		1	
In-field presentations	Station No.	9:30am-12:00noon	12:30	1:15	1:30	2:00	2:30	3:00	3:30	4:00

For the afternoon's presentations, would be obliged if you could remain within your designated group number.

Thank you for your cooperation.

Group
1
2

GRDC Grains Research & Development Corporation

FAR Australia

Recipe for higher yields in NZ, what does the farming system look like?

Dave Grant, Grower, NZ

Farm Overview

Farm location Methven - Upper Canterbury plains.

700 ha cropped, all irrigated.

Home block 340m above sea level with an annual rainfall of 900mm.

A three-year rotation of Wheat / Ryegrass seed / Break Crops.

Wheat and Ryegrass autumn sown, Break Crops spring sown.

Our best Wheat results 2019/20 & 20/21 an average of approx.. 15t/ha, not this past season-very wet.

This year 950 dairy cows wintered & 3000 lambs traded between May sold next month (Nov).

It’s been wet and cool, but this doesn’t always mean that Millicent 2022 is on target for 10 tonne yields – how does this compare to other seasons?

Kenton Porker, Nick Poole, John Kirkegaard, Max Bloomfield

2022 has been extremely wet and the water supply for a 12.5 t/ha cereal crop has already been achieved based on water use efficiency metrics. However, this doesn’t mean that >12 t/ha yields are attainable due to other climatic constraints solar radiation and temperature in the critical period.

Solar radiation and temperature drives yield when water and N is non-limiting.
All crops have a ”critical period” in which the number of grains is set, and increasing grain number is the key to higher yields. In cereals, the critical period is occurring in the 3 weeks before flowering. The importance of the critical period for crop management must be given greater attention in high rainfall environments.

Minimising stress and maximising growth in this critical period are the key to high yields. To minimise stress, flowering should be timed to minimise the risk of frost, heat and drought and ensure water and nutrients are in good supply. Other factors that limit photosynthesis such as disease and lodging also need to be managed. Other papers will discuss this.

To maximise growth, the crop requires cool temperatures – which increase the duration of the critical period - and sunny days which increase photosynthesis for growth. A common way to measure this effect is the photo-thermal quotient (PTQ) which is simply (total radiation/average temperature) in the critical period. A high PTQ means more photosynthesis for more days and in turn more grain and more yield. Crop yield is proportional to the duration of the critical period, and the critical period shortens with a lower photothermal quotient. This is why higher yields can be achieved in Tasmania, and other places like NZ which have high PTQ with crops flowering in long summer days, with cool temperatures more similar to those experienced in September at Millicent.

Based on long term data and experience the 25th October is considered the most optimal time to be flowering at Millicent to achieve this goal.

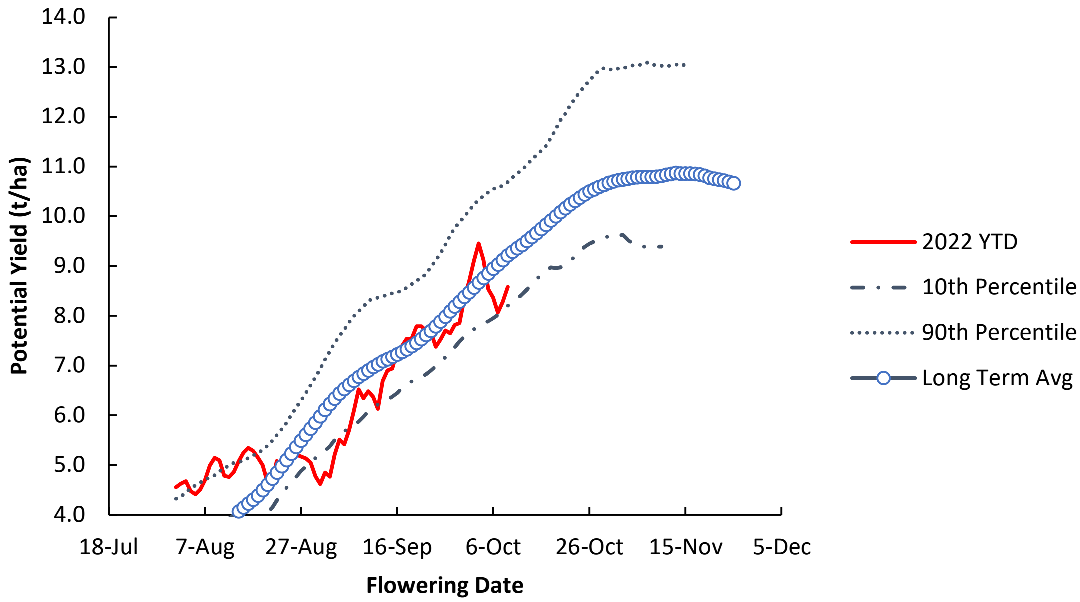


Figure 1. Long Term (last 20 years) yield potential and relationship with flowering date at Millicent based on the photothermal quotient compared to 2022 YTD. Note this is the upper ceiling of yield potential and does not factor in frost and heat risk and assumes water is non limiting.

The PTQ puts an upper limit on the potential yield in any environment and can vary from season to season. This is highlighted above with solar radiation currently being lower than the long term average at the start of October despite the extra rainfall. This means the only likely way to achieve 10 t/ha in 2022 will be if later flowering crops experience conditions of higher PTQ in the next few weeks and remain stress free (late October). Similar trends were observed in 2021 yield results with a mild and wet finish, with later flowering cultivars like Reflection for example achieving higher yields due to a higher PTQ (figure 2).

- In SA in 2021 PTQ improved in mid October favouring late sown crops and late flowering European wheats.
- The UK wheat Reflection (which is usually too long for Millicent) was the highest yielding wheat at 12.74 t/ha
- It is now acknowledged in Millicent that we maybe more limited by solar radiation than water limited in the majority of seasons if flowering in early spring at Millicent.

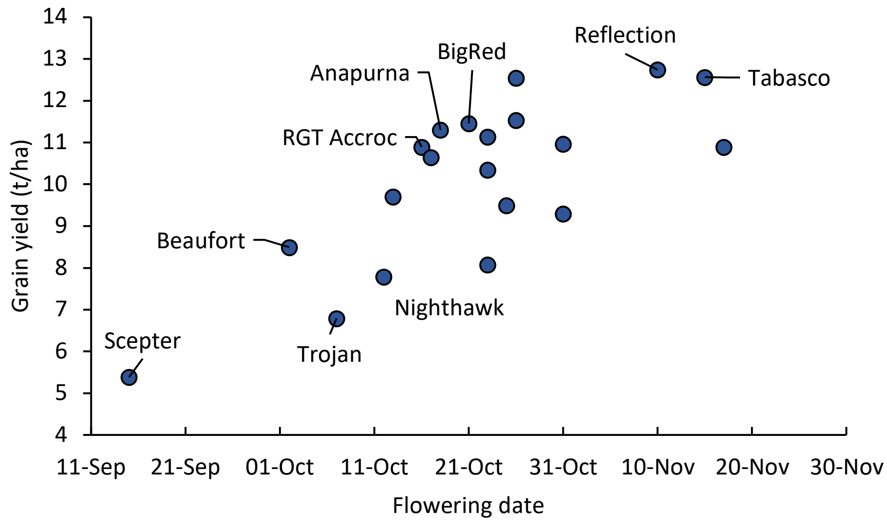


Figure 2. Grain yield and flowering time relationship from Millicent HYC 2021.

Long Term Yield Potentials

Based on simple water use efficiency metrics, and the photothermal quotient calculations outlined these data demonstrate that yields greater than **10 t/ha are possible in more than 50% of years since 2010.** When flowering on the 25th October for wheat, the following table highlights that grain yield has likely not been **water limited in 12 out of the last 13 years**. Whereas light limitation is always the major constraint to higher yields in other seasons. The question HYC research then aims to address is how to set crops up for 10 tonne per hectare and protect yield potential.

Table 1. Grain Yield potentials based on water use efficiency, and photothermal quotient equations for Millicent over the last 10 years (using SILO Bom Data) shaded cells indicates the factor with the lowest yield potential limiting yield under 10t/ha.

Year	Water Limited Yield Potential (t/ha)	Photothermal Quotient Yield Potential (t/ha)#
2010	>12.5*	12.3
2011	>12.5*	10.3
2012	>12.5*	9.5
2013	>12.5*	8.5
2014	9.40	9.5
2015	>12.5*	10.1
2016	>12.5*	11.7
2017	>12.5*	9.6
2018	>12.5*	8.2
2019	>12.5*	10.4
2020	>12.5*	10.2
2021	>12.5*	12.2
*2022 YTD**	11.73	*8.76*?*

**assumes runoff after 500mm of water supply and water supply enough for 12.5 t/ha*
#based on a flowering date of 25th October (except for 2022 was based on the 10th October for printing).

Choosing a cultivar and sowing date to achieve 10 tonne potential?

New genetics offer improved yield and may convert light and water into yield more efficiently than older genetics in the high rainfall zones. In particular, cultivars that are coming out of Europe where breeding for high yield potential is a greater focus.

Breeding programs in Australia are understandably more focused on breeding for improved water use efficiency for the wheat belt. However, as this data highlights, yield may be limited by solar radiation and temperature in 50% of years, and top end yield potential rather than water. For a cultivar to achieve 10 t/ha, it needs to have the genetic yield potential to do so, but it must also have the correct flowering behaviour to align its critical period with the environment. Some of the slower developing winter feed wheats have realised this potential in the southern states and when sown in the high rainfall environments, such as Tasmania. However, our data suggests that cultivars such as BigRed, RGT Cesario, RGT Accroc and Anapurna are equally as well adapted to Millicent, particularly when sown in April and mid may in seasons like 2020, 2021, and 2022 when yields are not water limited. This is because their critical period is aligned with the most optimal conditions to achieve 10 t/ha and they flower during the start of the 3rd week of October. Based on long term data, this date is the period in which highest yields could be achieved based on the photothermal quotient (light and temperature in the critical period) (figure 1). While it must be noted high yields can be achieve by flowering later than this in some seasons, the heat risk is considerably higher and will reduce yields.

Grain yields from 2021 - 2022 at Millicent reflect these differences in flowering time when disease is controlled (table 2). However, when the crop canopy was not managed the crop failed to achieve its potential, as outlined in the FAR Australia disease results.

Table 2. Flowering responses and yield data (when disease is controlled) at Millicent HYC 2020.

Cultivar	Flowering date	2020 Yield
Trojan (spring)	29 Sep	5.7
Scepter (spring)	29 Sep	5.8
Nighthawk (slow spring))	14 Oct	8.1
RGT Accroc (winter)	***12 Oct***	***8.7***
Anapurna (winter)	***14 Oct***	***9.7***
BigRed (winter)	***14 Oct***	***10.5***
Reflection (winter)	***15 Nov***	***10.1***
Variety (LSD)		0.768

The primary role of Field Applied Research (FAR) Australia is to apply science innovations to profitable outcomes for Australian grain growers. Located across three hubs nationally, FAR Australia staff have the skills and expertise to provide ‘concept to delivery’ applied science innovations through excellence in applied field research, and interpretation of this research for adoption on farm.

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SOWING THE SEED FOR A BRIGHTER FUTURE

Canopy management in barley for higher yields at Millicent SA – keeping crops green and standing

Dr Kenton Porker, FAR Australia

Take home messages

- 10.4t/ha was achieved in Pixel and 6 row winter barley in 2021 while Planet achieved 8.0t/ha, however winter cultivars are not yet as stable across seasons and yielded 7.1t/ha (Pixel), and 8.7t/ha (Planet) in the 2020 season.
- Planet⌽ barley remains the benchmark cultivar for achieving high yields across all higher production environments; higher yields can be achieved from early sowing with winter types, and with Laureate from later sowing, but these are both not as stable as Planet and Rosalind.
- In the barley cultivar Planet, **disease management is the number one factor to achieve high yields.**
- Fertile soils in the high rainfall zone (HRZ) limit the ability to manage yield and early biomass production with applied nitrogen in wetter environments. Mineralised N timing, and other canopy management factors such as plant growth regulators (PGR) and fungicide are equally or more important.
- Canopy management benefits of PGR and fungicides extend beyond the growing season and limit pre harvest yield losses (lodging, brackling, head-loss) and improve harvest logistics.
- Waterlogging tolerance of barley compared to wheat is poor in wetter seasons, however earlier sowing and slow developing cultivars increases the chances of improved yield recovery.

Canopy management is key to building and protecting high yielding crops

Canopy management is a broad term but fundamentally relies upon adopting techniques that allow crops to intercept more radiation (sunlight) and transpire more water into biomass at the right time in the season to contribute to yield. This is achieved by ensuring flowering is matched to environment and a high proportion of the upper crop canopy leaves remain intercepting light (green leaf area) during the 'critical period' for grain number formation (the month prior to flowering in cereals). Unlike low rainfall environments, excessive growth prior to stem elongation is unproductive and leads to lodging, shading and poorer light interception in the critical period. Equally nitrogen (N) limitation, and/or poor disease control during this period will lower grain number potential and yield either by limiting biomass production or its conversion into yield (harvest index). Harvest indices of greater than 50% should be possible with good management. Therefore to achieve 10 t/ha cereal grain yields, the final biomass needs to be greater than 20 t/ha.

Management is as important as Germplasm from early sowing

Feed winter barley is yet to achieve the same adoption as feed winter wheats in the SE. European introductions have demonstrated superior disease resistance to all spring cultivars, however, they grow too tall, and are more prone to yield losses from lodging, head loss, and grain shattering. These production constraints can be managed with principles of canopy management in both contrasting cultivar types highlighting the importance of disease resistance and fungicide lessons.

The summary of two seasons (three experiments) at Millicent SA, and Gnarwarre Vic of earlier sowing barley is below (Figure 1). A key finding was that the addition of an SDHI fungicide in the susceptible cultivar Planet⏀ increased yield by 1.2 t/ha (6.1 – 7.3 t/ha) irrespective of any other management factor. Whereas in the winter barley, yields were 6.6 and 6.7 t/ha under standard and increased disease management respectively. The addition of plant growth regulators or defoliation by grazing, or an extra 80 kg of applied N did not increase yield and demonstrates in the barley variety Planet⏀, that **disease management is the number one factor to achieve high yields.**

Essential role of disease management in better seasons: Irrespective of whether its medium or high rainfall zone (M-HRZ), it's essential growers and advisers consider disease management as one of the most important components of growing high yielding cereal crops in seasons with higher yield potential. While other management techniques can improve harvest index, they should not come at the expense of reduced final biomass. For example, grazing (mowing) spring and winter barley increases harvest index (HI) but yields were not increased due to lower biomass in both Planet and Winter barley (Figure 1).

In winter barley the use of plant growth regulators (PGRs) to reduce height, lodging and head loss increased yield and was more important than extra fungicide application alone, however in combination they both increased yield. Under standard management, grain yield increased by 0.4 t/ha (6.6 – 7.0 t/ha) with the application of a PGR, whereas the more robust fungicide strategy did not increase yield unless it was combined with the PGR, and then increased yield by 0.7 t/ha (6.6 – 7.3 t/ha). Grazing or extra N didn't further increase yield. This demonstrates the improved flexibility in fungicide management within cultivars of greater disease resistance.

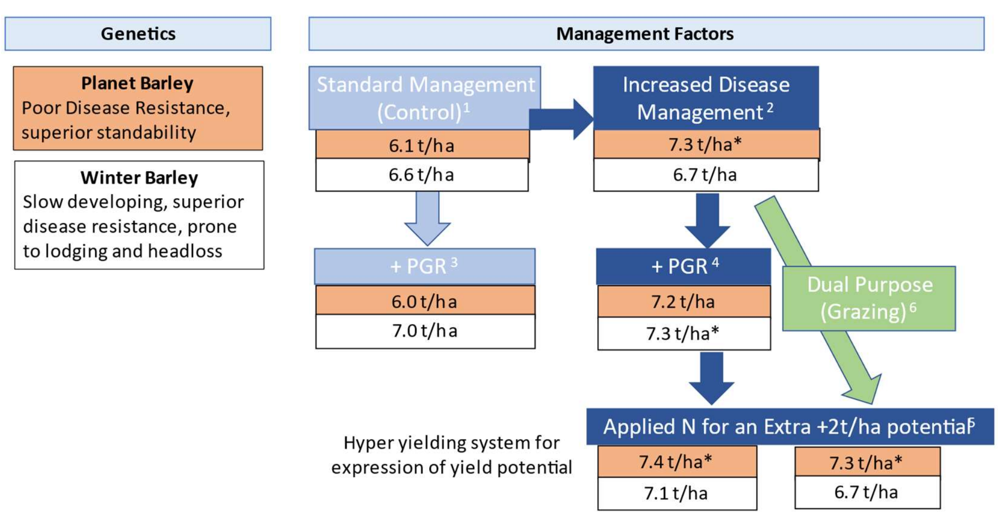


Figure 1. *Mean yields and response to canopy management factors, fungicide, plant growth regulators (PGR), nitrogen, and grazing in two contrasting barley cultivars across 3 earlier sown experiments (~20 April) in the HRZ of SA, Vic (2020/2021).*

Definitions of management factors

[1] Standard Management Control – 2 x cheaper foliar fungicide propiconazole (Tilt® 250 EC at 500mL/ha) @ GS31 and tebuconazole(Folicur® 430 SC 290 mL/ha) @ GS39-49. Nitrogen managed for 8 t/ha yield potential

[2] Increased disease management – Systiva® seed treatment, 2 x foliar fungicides including QoI (strobilurin) & SDHI combinations with DMIs) with third fungicide if required.

[3,4] Plant growth regulator (PGR) (Moddus® Evo 200 mL/ha @ GS30 & Moddus Evo 200 mL/ha @ GS33-37).

[5] Extra applied nitrogen (N) = Additional 80 units (kg of N) applied @ GS31

[6] Defoliation = simulated grazing @ GS16 and GS30 or before Aug 15 in winters.

All other inputs of insecticides and herbicides were standard across the trial. Timings of PGRs and fungicides were adjusted to take account of the differences in spring and winter barley phenology (development).

Achieving stable high barley yields

High yields and malt can be achieved in spring barley, particularly RGT Planet and Rosalind. However, introduction of higher potential winter feed barley cultivars could raise yield expectations.

The spring barley cultivar RGT Planet has been consistently higher yielding (8.5t/ha) across the four experiments on average 0.2 t/ha higher than Rosalind (8.3 t/ha) and 1.4 t/ha higher than the winter cultivar Cassiopee (7.1 t/ha).

One important consideration is yield stability, growers aim to achieve consistent high yields from a range of growing environments and seasons. Time of sowing plays an important role in this comparison, because for the first-time winter barley has now exceeded 10 t/ha under dryland conditions (Table 1) at Millicent in 2021. Yields of 10.4 t/ha were achieved in 6 row winter Pixel and 9.7 t/ha in 2 row winter Newton, while Planet⦶ achieved 8.0 t/ha from the same sowing date and 7.9 t/ha from a later more optimal sowing date. However, it is important to note this same cultivar Pixel achieved 7.4 t/ha, and Newton 7.1 t/ha in 2020, when Planet reached 8.7 t/ha. So averaged across both seasons from early sowing Planet is 0.6 t/ha less than Pixel, and similar to Newton.

The price spread is lower between feed and malt barley ($20 – $25) than feed and milling wheat. If 8 t/ha of malt barley was achieved with a price spread of $25 over feed, then an additional 0.7 t/ha (or 8.7 t/ha) of feed barley is required to provide an equal gross margin. This would suggest currently that cultivars like Planet are more profitable if it is managed for disease.

While Planet⦶ barley remains the benchmark cultivar for achieving high yields across all higher production environments, the new cultivar Laureate has yielded similar to Planet, but has demonstrated slightly higher yield potential than Planet from later planting dates (and spring sowing in TAS). Experiments and observations in 2022 will provide another season to confirm these findings.

Table 1. *Grain yield of selected spring and winter barley cultivars sown at Millicent across two sowing dates, and seasons under high yielding management conditions[1] Shaded cells represent the highest yielding cultivars.*

Cultivar	Type	2020 Millicent TOS1 (Sown 17 Apr)		2020 Millicent TOS2 (Sown 11 May)		2021 Millicent TOS1 (Sown 21 Apr)		2021 Millicent TOS2 (Sown 12 May)		Mean	+/- SD#
Controls											
RGT Planet	2R Spring	8.7	abc	9.6	abc	8.0	de	7.9	b	8.5	0.8
Rosalind	2R Spring	8.4	bcd	9.0	a-e	8.0	de	8.0	b	8.3	0.5
Cassiopee*	2R Winter	6.4	h-k	7.3	fg	7.9	e	6.7	c	7.1	0.7
Laureate*	2R Spring	7.8	b-g	9.8	a	8.0	de	8.4	b	8.5	0.9
Other Lines											
Minotaur	2R Spring	6.8	e-i	8.2	c-g	-		9.0	ab	-	
HV8 Nitro	2R Spring	7.7	b-h	9.8	ab	-		8.3	b	-	
Laperouse	2R Spring	7.3	c-h	8.7	a-f	-		8.1	b	-	
Madness*	2R Winter	6.8	f-i	-		8.7	cd	-		-	
Newton*	2R Winter	7.1	d-h	-		9.7	ab	-		-	
Pixel*	6R Winter	7.4	c-h	-		10.4	a	6.1	c	-	
Memento*	2R Winter	6.3	h-k	-		8.9	c	-		-	
Urambie	2R Winter	6.5	g-j	6.9	g	-		-		-	
AGTB0244*	2R Spring	-		9.3	a-e	7.9	e	6.2	c	-	
IGB1844*	2R Spring	-		9.6	abc	-		9.3	a	-	
Fpr Value		<0.001		<0.001		<0.001		<0.001			
LSD (5%)		1.34		1.40		0.75		0.62			

*[1] High yielding management conditions include a robust fungicide strategy, plant growth regulators and extra N described in the flow diagram below. *Lines are experimental and yet to be commercialised in Australia or receive a quality classification. #SD=standard deviation, a low SD indicates that the values tend to be close to the mean (ie stable) a high SD indicates that the values are spread out over a wider range and may indicate a cultivar has greater up and downside risk (less stable)*

Low test weights have been a common theme of slow developing cultivars in Europe, however we found little evidence of test weights lower than the 65 kg/hL required for malting specifications. A key limitation of Laureate was lower test weights relative to RGT Planet. The 6 row Pixel had lower test weights in 2020 (Table 2).

Table 2. *Test weights (kg/hL) of selected spring and winter barley cultivars sown at Millicent across two sowing dates, and seasons under high yielding management conditions[1] Shaded cells represent test weights under 65 kg/hL.*

Cultivar	Type	2020 Millicent TOS1 (Sown 17 Apr)		2020 Millicent TOS2 (Sown 11 May)		2021 Millicent TOS1 (Sown 21 Apr)		2021 Millicent TOS2 (Sown 12 May)	
Controls									
RGT Planet	2R Spring	64.5	abc	67.5	hi	65.9	bcd	71.0	bc
Rosalind	2R Spring	68.0	h-k	68.9	ef	64.1	de	71.6	cd
Cassiopee*	2R Winter	66.0	bcd	70.5	ab	69.7	cd	72.9	ef
Laureate*	2R Spring	64.1	b-g	66.5	jk	62.4	e	70.3	b
Other Lines									
Minotaur	2R Spring	67.6	e-i	68.9	ef			73.4	f
HV8 Nitro	2R Spring	67.6	b-h	70.3	abc			73.0	f
Laperouse	2R Spring	68.3	c-h	70.7	a			74.7	g
Madness*	2R Winter	67.4	f-i			69.7	a		
Newtown*	2R Winter	66.0	d-h			67.7	ab		
Pixel*	6R Winter	63.4	c-h			67.3	bc	70.2	b
Memento*	2R Winter	67.7	h-k			67.9	ab		

Urambie	2R Winter	65.3	g-j	68.6	fg				
AGTB0244*	2R Spring			65.2	lm	65.4	a	69.2	a
IGB1844*	2R Spring			69.3	def			72.8	ef
Fpr Value		<0.001		<0.001		<0.001		<0.001	
LSD (5%)		1.04		0.94		0.75		0.62	

Making plant growth regulators pay in barley?

Canopy management benefits extend beyond the growing season – disease control and the combined application of PGRs and timely harvest ensures pre harvest yield losses are reduced, particularly in barley (e.g., head loss and brackling).

In the cultivar Planet there is little evidence to suggest an economic response to plant growth regulators in the high rainfall zones when crops are harvested on time compared to untreated (Figure 2). This suggests Planet is relatively nonresponsive to PGRs and there has been little evidence of pre flowering lodging in this cultivar. Importantly, at least in the case of Planet, there is also little evidence that PGRs are causing yield penalties in the absence of lodging and not overregulating the crop. **When harvest was delayed there was no additional benefit of PGRs in Planet (data not shown).**

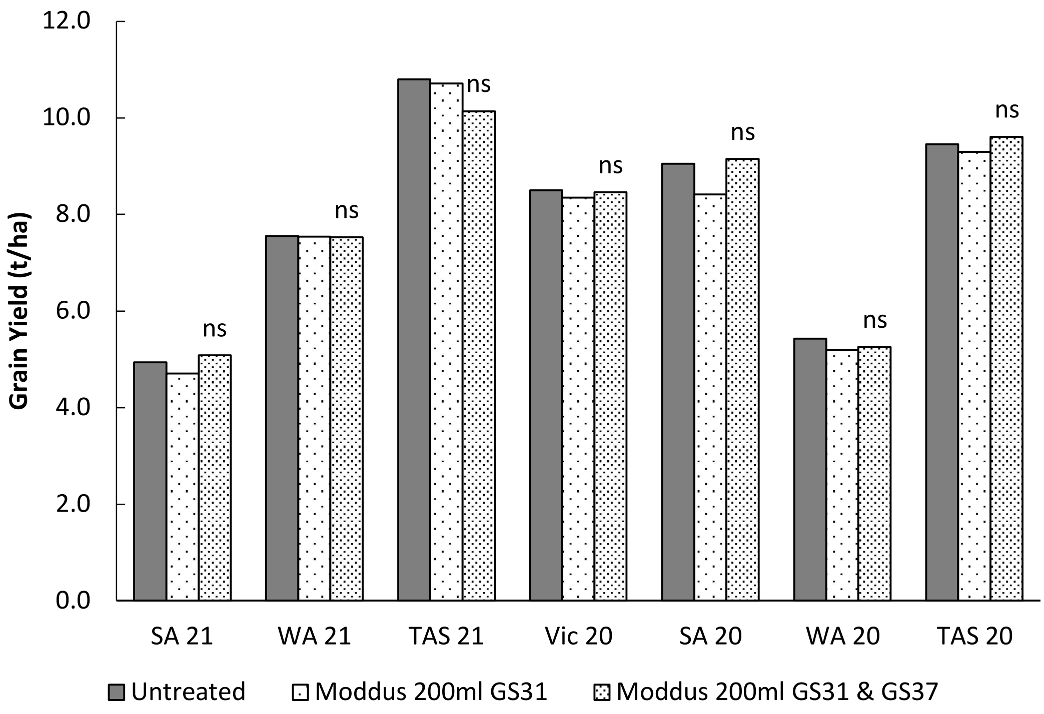


Figure 2. The yield responses to plant growth regulation (Moddus Evo) in barley in the Australian High rainfall Zone for Planet Barley when harvested on time.

Cultivars more susceptible to head loss such as winter barley and Compass types are more likely to benefit from late applications of a PGR to retain heads and improve harvest logistics. For example in 2021 at Millicent the sequence PGR treatment that included a later application of Moddus achieved yields closer to when harvesting on time. However, harvesting on time was still more important but PGRs may assist in harvest logistics (Figure 3).

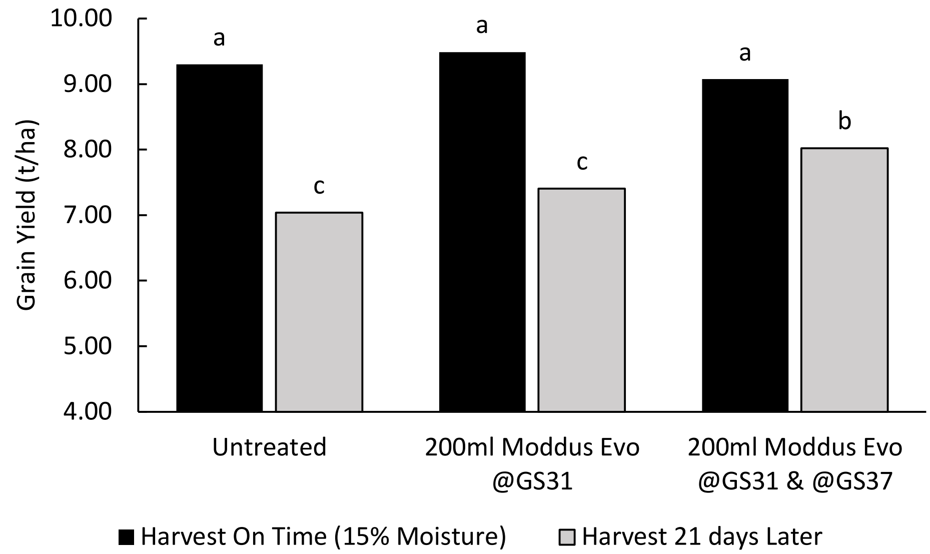
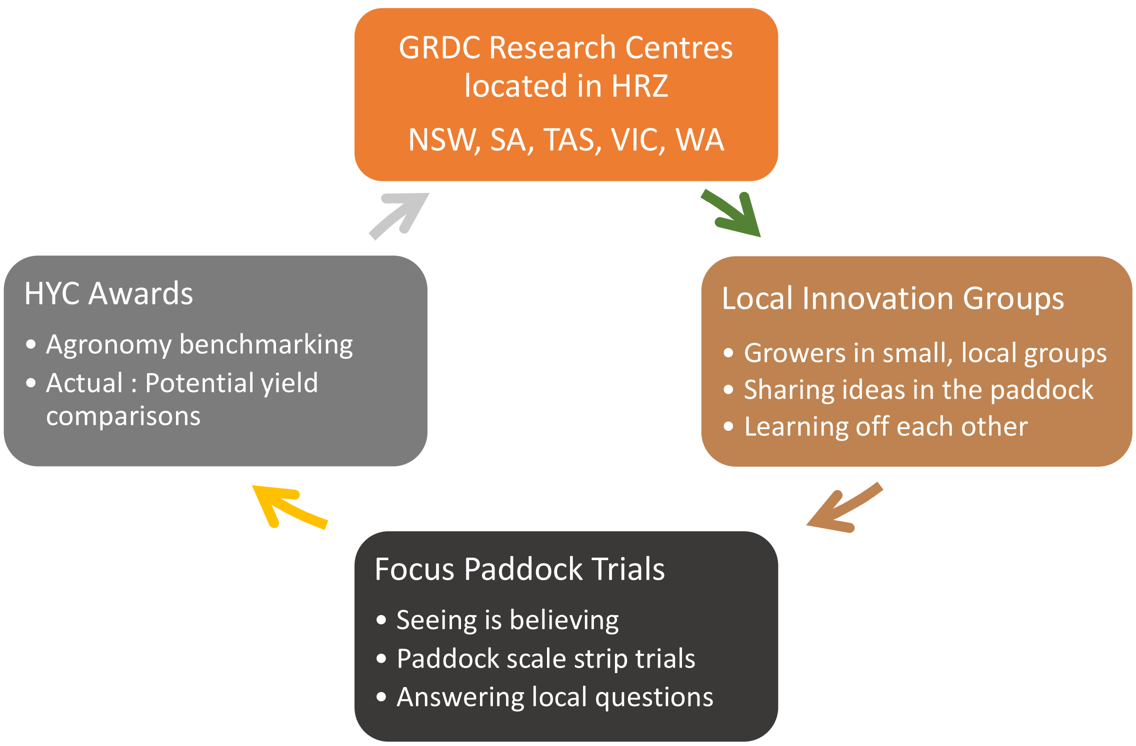


Figure 3. The yield responses to plant growth regulation in Pixel winter barley at Millicent in 2021 when harvested on time and when delayed by three weeks.

GRDC Hyper Yielding Crops SA

Jon Midwood, TechCrop

In 2020 the GRDC Hyper Yielding Crops project started. The project is being conducted in Victoria, Tasmania, South Australia, New South Wales, and Western Australia, with each state hosting a GRDC Centre of Excellence. These sites have been selected to run research trials to help determine some of the major factors growers and advisors can use, in their specific environment, to achieve optimum yields through variety and agronomic management of wheat, barley and canola. The following graphic shows the various outputs from the project and how they are inter-related with each other:



In combination with the research centres there is a large emphasis on local grower involvement in the project and so in the HRZ of SA, Mackillop Farm Management Group (MFMG) have been contracted to run this part of the project. As the graphic above shows, this involves the setting up of local grower led innovation groups, facilitating and setting up Focus paddock scale trials and gathering information and measurements for the local HYC Award paddocks. Jon Midwood (TechCrop) oversees this part of the project, in a national role, alongside Nick Poole as project leader.

Innovation groups

In 2020 MFMG set up two innovation groups in the southeast SA region. All groups had a spring crop walk during August, where the groups met out in a paddock and discussed not only the crops they looked at on the day, but also the specific questions the groups had and whether they could answer the question with a simple paddock strip trial. The layout, assessments and treatments of these strip trials were facilitated by the MFMG project officer and as a result a number of different trials were setup.

The following are details from two of these Focus paddock trials.

Focus paddock trials:

1. ***Millicent paddock trial***

Research question: What is the impact on yield from a third foliar fungicide application at GS60 on extending disease control, increasing green leaf area retention and controlling any head diseases

Paddock details

Crop	Cereal: Wheat
Variety	Accroc
Sow Rate	150.00 kg/ha
Sow Date	16-05-20
Harvest Date	31-01-21
Harvest Yield	10.93 T/ha
Stubble Management	Incorporated
Grazed – Start date	15-07-20
Grazed – End date	06-08-20
Previous crop	Broad beans
Row spacing	229mm

Fungicide Treatments

Treatment	**Product**	**Rate/ha**	**Growth Stage**
1. Control - Grower practice	Prosaro	0.4	GS32
	Aviator Xpro	0.5	GS39
2. Trial treatments	Prosaro	0.4	GS32
	Aviator Xpro	0.5	GS39
	Avior Gold	0.32	GS60

Results

Measurement type	Control (Grower)	Treatment 2	Sig Diff
Yield (t/ha)	10.93	11.84	Yes
Protein (%)	9.5	9.0	na
Screenings (%)	1.94	2.18	na
Test weight (kg/hL)	76.6	76.6	na

Conclusion

The season was a decile 6 and rainfall exceeded the long term average in each month during the spring. The application of Avior Gold (Azoxystrobin and Epoxiconazole) at the start of flowering gave a significant yield increase of nearly a tonne per ha.

HYC Awards

Award paddocks were nominated from the Innovation groups initially, with the aim being to collect and record specific wheat paddock information and to provide an agronomic benchmarking report which compares that paddock to all the others entered, both regionally and nationally. Nominated paddocks had their validated yields compared to a biophysical ‘potential yield’ for that paddock, which allows for the variability of soil types, rainfall, temperature and radiation across all regions. All agronomic information such as sowing dates, variety, crop development timings, soil data – pH, soil organic carbon, N, P, K etc., and in-season applications were collected by the project officer from MFMG. Paddock yields, harvest maturity samples, harvest index calculations and grain samples were also collected for analysis. Reports were sent out to all participating growers allowing them to benchmark their agronomy from over 50 factors and compare it to other growers in their region.

The winner for the highest yield in SA in 2021 was Tom Bell from Sebastopol with a 11.48 t/ha crop of Accroc wheat sown on 14 May, following a two year break of Broad Beans followed by Canola in 2020.

Tom also won the award for the highest yield as a percentage of the potential yield in SA. His 11.48 t/ha crop of Accroc wheat was 109% of the 10.5 t/ha potential for his paddock.

The following are an example of some of the agronomic benchmarks produced in the HYC Awards report for SA in 2021:

Agronomic Factor	Top 25% Award paddocks	Remaining 75%
Yield (t/ha)	11.2	8.9
N applied (kg N/ha)	173	163
N applied per tonne yield kg N/ha)	15.5	19
Fungicides ($/ha)	$63	$52
Fungicides ($/t)	$5.6/t	$6/t
Harvest biomass (t/ha)	25	23
Harvest index	54%	51%
Head count (m2)	606	586
Grains per head	33	38
1000 grain weight	50	49

Key take home messages from SA Award data 2021:

- Highest yielding paddocks targeted appropriate sowing date and variety phenology to achieve GS61 at the optimum timing
- Accroc gave the highest average yields followed by Anapurna and the lowest yields came from Rockstar at 1t/ha less than Accroc on average
- Wheat following canola or beans were approx. 1t/ha higher yielding than following a wheat (n=1) in 2021.
- The higher yielding group spent $11 more per ha on fungicides and used higher rates on average than those in the remaining 80%. Their cost/tonne was less!
- The higher yielding group had slightly higher crop biomass at harvest and 3% higher harvest index. They also had higher head counts by ~20/m2

Please contact Jen Lillecrapp (0427 647461) for information about being part of this exciting project or to enter a wheat crop as a HYC award paddock in 2022.

Hyper Yielding Crops: SA

Scan the QR code to download the 2021 results

FAR AUSTRALIA

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