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FRONTIER FARMING SYSTEMS

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FIELD DAY - DAYSDALE

NSW PULSE AGRONOMY:

Closing the economic yield gap and maximise farming systems benefits from grain legume production in NSW

Friday 28th October 2022

Trial site courtesy of:
Dennis Tomlinson

SOWING THE SEED FOR A BRIGHTER FUTURE

VISITOR INFORMATION

We trust that you will enjoy today's pulse agronomy field walk. Your health and safety is paramount, therefore whilst on the property we ask that you both read and follow this information notice.

HEALTH & SAFETY

- COVID-19: Please ensure you practice social distancing rules, wear a face mask at all times and use the hand sanitiser provided.
- All visitors are requested to follow instructions from FAR Australia staff at all times.
- All visitors to the site are requested to stay within the public areas and not to cross into any roped off areas.
- All visitors are requested to report any hazards noted directly to a member of FAR staff.

FARM BIOSECURITY

- Please be considerate of farm biosecurity. Please do not walk into farm crops without permission. Please consider whether footwear and/or clothing have previously been worn in crops suffering from soil borne or foliar diseases.

FIRST AID

- Should you require any assistance, please ask a member of the FAR Australia team.

LITTER

- We ask that you dispose of all litter considerately.

VEHICLES

- Vehicles will not be permitted outside of the designated car parking areas. Please ensure that your vehicle is parked within the designated area(s).

SMOKING

- There is No Smoking permitted inside any marquee or gazebo.

Thank you for your cooperation, enjoy your morning.

COVID-19

Help us keep COVID-19 away

If you are visiting FAR Australia offices or trial sites, please observe the following good hygiene practices to reduce the risk of COVID-19 infection:

- Sanitise your hands when entering the office or trials site and at regular intervals.
- 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 of 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.

WELCOME TO THE 2022 PULSE AGRONOMY FIELD WALKS DAYSDALE (NSW) AND BUNDALONG SOUTH (VIC)

On behalf of both project team, I am delighted to welcome you to our 2022 Pulse Agronomy field walk for the region.

Today you will have an opportunity to discuss the following:

- Disease management in faba beans - are there more sustainable ways to control disease in faba beans?
- Nutrition and biomass production in faba beans - how can we maximise pulse nutrition and biomass production?
- How do farmyard manures interact with pulse stubble in the following wheat crop?'

In **Bundalong**, there will also be an opportunity to hear from Dr Dorin Gupta and Waseem Ashfaq who will present on the Future Drought Fund and The University of Melbourne trial on drought resilience. *'This project received funding from the Australian Government's Future Drought Fund'*

Should you require any assistance throughout the day, please don't hesitate to contact a member of the FAR Australia team who will be more than happy to help.

If you would like to learn more about the results from this GRDC investment, please contact Rachel Hamilton at rachel.hamilton@faraustralia.com.au.

Thank you once again for taking the time to join us today; we hope that you find the presentations useful, and as a result, take away new ideas which can be implemented in your own farming business. Have a great day and we look forward to seeing you again at future project events.

Nick Poole, Managing Director, FAR Australia

Funding Acknowledgements
The Pulse Agronomy project teams would like to place on record their grateful thanks to the Grains Research & Development Corporation (GRDC) for their funding support for this event and featured project.

Other Acknowledgements
Thank you to our host farmers Dennis Tomlinson and Adam Inchbold for all their support throughout the season.

Pulse Agronomy Project

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 (rachel.hamilton@faraustralia.com.au)
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NSW Pulse Agronomy Development and Extension Project

2021 summary of field trial results

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

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

Aaron Vague, 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.

Disease Management for Faba 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 (Figure 1). 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 NSW, and Vic NE environment is that humidity and frequency of rainfall events are typically lower than the South, and thus grower maybe 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. 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?**

Here we present disease management results from 3 contrasting environments across Vic and NSW.

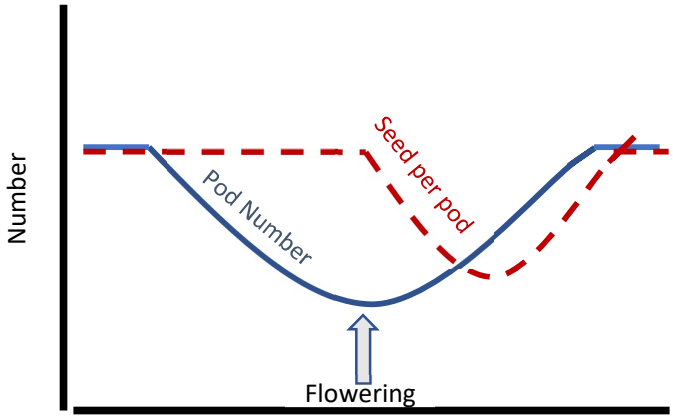

Figure 1. Effect on the timing of stress on (a) pod number and (b) seed per pod. Adapted image and based on shading experiments conducted and published by Lake et al 2019.

Faba Bean Disease Management Trials: Key Learnings from 2021

- Bendoc showed higher levels of chocolate spot due to its poorer genetic resistance to the disease.
- PBA Amberly 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 the was no yield response to fungicide at Bundalong under lower levels of disease pressure at the site
- At the HRZ SW Vic site untreated yields were 4.43t/ha, and disease managed treatments yielded as high as 7.5t/ha. Hhighlighting the differences between sites and NE Vic and SW Vic.
- Under high disease pressure similar (similar to 2022) at SW Vic.
    - Working backwards a 1 spray unit 28 days post flower yielded 6.03t/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 7.18t/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.

2021 Site Descriptions

	Bundalong Vic	**Buraja NSW**	**Gnarwarre Vic**
Sowing Date	20 April 2021	7 May 2021	1 May 2021
Sowing Fert	80kg MAP/ha	80kg MAP/ha	100kg MAP/ha
Growing Season Rainfall (mm) (Apr-Oct)	325.6	330.7	401.0 (Apr- Nov)
0-10cm Soil			
pH ($CaCl_2$)	5.3	4.6	5.8
Organic Carbon %		1.1	1.6
Colwell P mg/kg	72	55	54
Aluminium %		3.9	<1
Calcium %	79.68	61	57
Magnesium %	8.8	24	33
Sodium % (ESP)	2.17	3.2	5.6
Potassium %	9.27	8.2	5.5

A disease management trial was established at all sites.

Buraja NSW and Bundalong (NE Vic)

Treatments:

At the Buraja spoke, a disease (Chocolate spot) susceptible faba bean cultivar (PBA Bendoc) and a moderately resistant faba bean cultivar (PBA Amberly) were sown on 7

May. Five different fungicide strategies were implemented on each cultivar with the aim of protecting key segments of the canopy from a physiological perspective.

Table 1. Fungicide treatments applied at Buraja spoke site.

Treatment No.	***1st Flowers open on main stem – GS 61 (26 Aug)***	***1st Flower (GS 61) + 14 days* (14 Sep)**	***1st Flower (GS 61) + 28 days (14 Oct)***
Active Ingredient	***Mancozeb 750 2.0l/ha + Procymidone 240g/ha***	***Chlorothalonil 2.3l/ha + Carbendazim 0.5l/ha***	***Chlorothalonil 1.5l/ha + Carbendazim 0.5l/ha***
1. Untreated	-	-	-
***2. 1 F** (Fungicide units)*	-	-	☑
***3**. 2 **F** (Fungicide units)*	-	☑	☑
***4. 3 F** (Fungicide units)*	☑	☑	☑
***5. Flexible** Program (2 Fungicide Units) **		***Miravis Star 0.75l/ha****	***Veritas 0.75l/ha****
	-	☑	☑

*Chlorothalonil and Carbendazim excluded.

At the Bundalong spoke, a faba bean cultivar (PBA Samira) was sown by the host farmer (20 April) in which small plots were marked out and 6 different fungicide strategies were implemented and are aimed at critical growth stages and protecting key segments of the canopy from a physiology perspective.

Table 2. Fungicide treatments applied at Bundalong spoke site.

Treatment No.	***4 nodes – GS 14* (28 June)**	***1st Flowers open on main stem – GS 61 (29 Aug)***	***1st Flower (GS 61) + 21 - 42 days (27 Oct)***
Active Ingredient	***Tebuconazole 145ml/ha***	***Mancozeb 750 2.0l/ha + Procymidone 240 g/ha (Nosclex 800 300g.ha)***	***Chlorothalonil 2.3l/ha + Carbendazim 0.5l/ha***
1. Untreated	-	-	-
***2**. 1 F (Fungicide units)*	-	-	☑
***3.** 3 F (Fungicide units)*	-	☑	☑
***4.** 4 F (Fungicide units)*	☑	☑	☑
***5.** 1 F Early*		☑	
Active Ingredient			***Veritas 0.75l/ha****
***6**. Flexible Program (1 Fungicide Unit) **		-	☑

*Chlorothalonil, and Carbendazim excluded

At each fungicide timing, the canopy was tagged at the newest emerged leaf to allow assessment of disease-based spray timings.

Results

Disease levels varied between sites and between cultivars. At Bundalong, despite having dense canopy which is usually conducive for disease, disease levels were low with less than 5% leaf area infected in mid-November. At Buraja however, disease pressure was higher (Figure 1). PBA Bendoc showed higher levels of chocolate spot due to its poorer genetic resistance to the disease. Both cultivars showed a reduction in disease infection as a result of a single fungicide application.

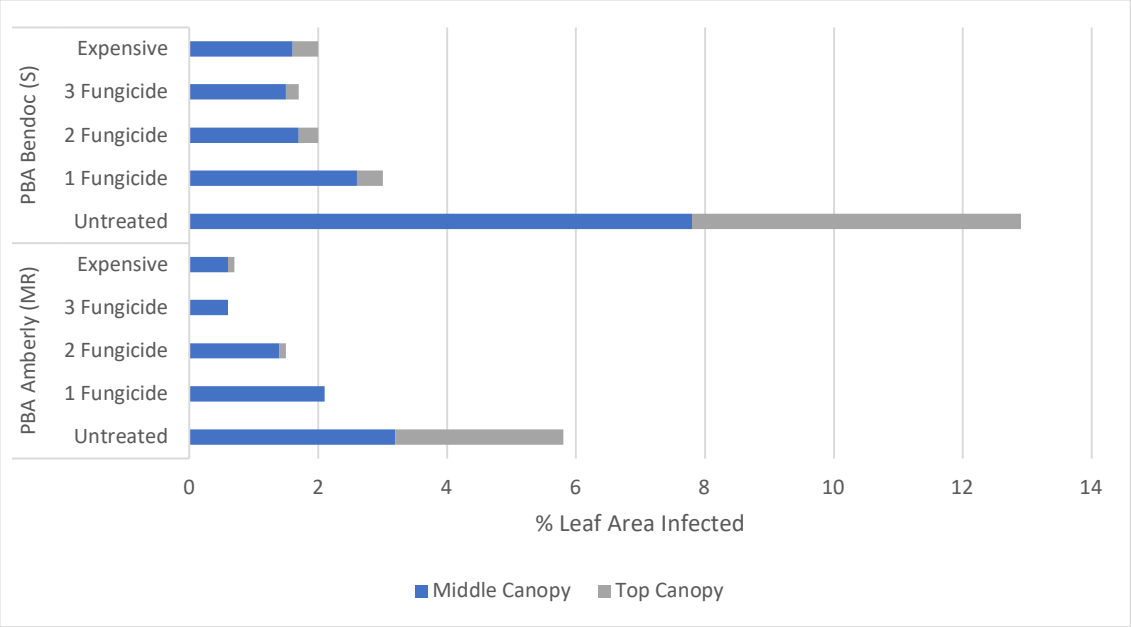

Figure 1. Effect of fungicide strategy on disease infection (chocolate spot) at different canopy levels. Assessed 11 Nov. Lower canopy layers not assessed due canopy senescence.

At Buraja where two cultivars were used, there was no significant yield differences between the susceptible and resistant cultivars when disease was controlled. PBA Amberly showed no yield response to fungicide despite there being evidence of reduced disease infection. The disease susceptible cultivar, PBA Bendoc, showed a yield response to the application of fungicide. Yields were maximised with the application of 2 fungicides on the 14th of Sep and 14th of Oct.

Table 1. Influence of faba bean cultivar and disease management on grain yield (t/ha).

	Grain Yield (t/ha)		
	PBA Amberly (MR)	**PBA Bendoc (S)**	**Mean**
Untreated	3.75 ab	3.17 c	**3.46**
1 Fungicide	3.61 ab	3.40 bc	**3.50**
2 Fungicide	3.78 a	3.80 a	**3.79**
3 Fungicide	3.72 ab	3.97 a	**3.84**
Flexible	3.76 ab	3.75 ab	**3.76**
Mean	**3.72**	**3.62**	

Cultivar	LSD p=0.05	ns	P val	0.169
Fungicide Strategy	LSD p=0.05	0.26	P val	0.013
Cultivar x Fungicide	LSD p=0.05	0.36	P val	0.033

Despite yields surpassing 7t/ha the was no yield response to fungicide at Bundalong under lower levels of disease pressure at the site (data not shown). For example the untreated control yielded 7.63t/ha and the most comprehensive expensive strategy similar at 6.69t/ha

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 Amberly (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

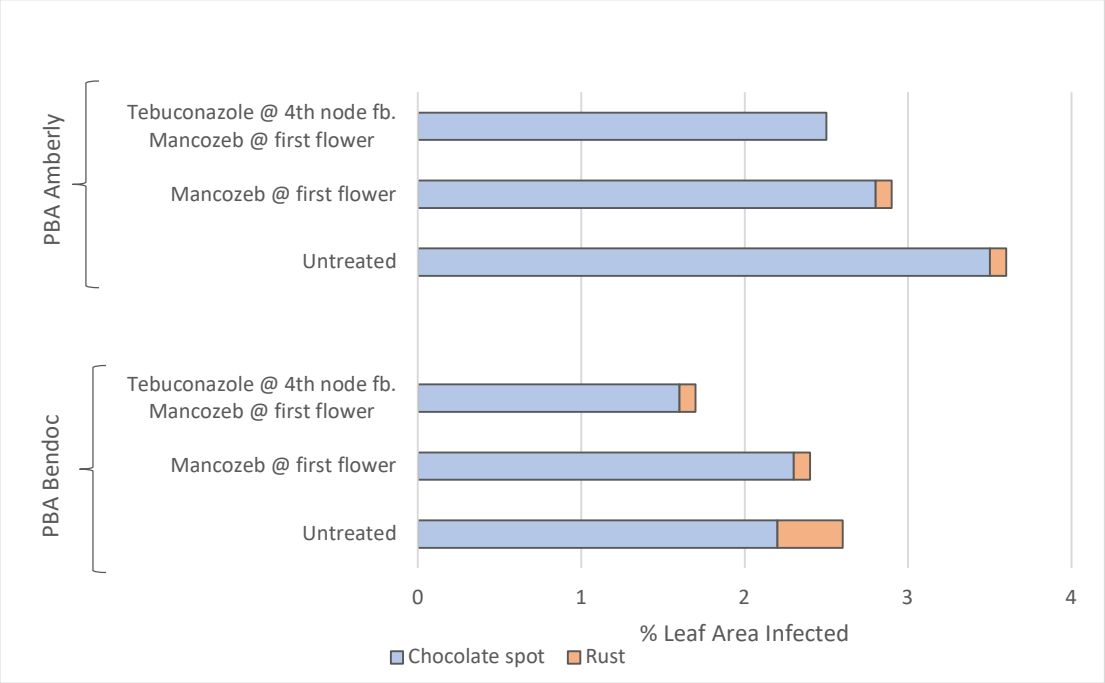

Figure 1. Effect of fungicide strategy on early season disease (chocolate spot and rust) on the lower third of the canopy (% leaf area infected), assessed on 22 September.

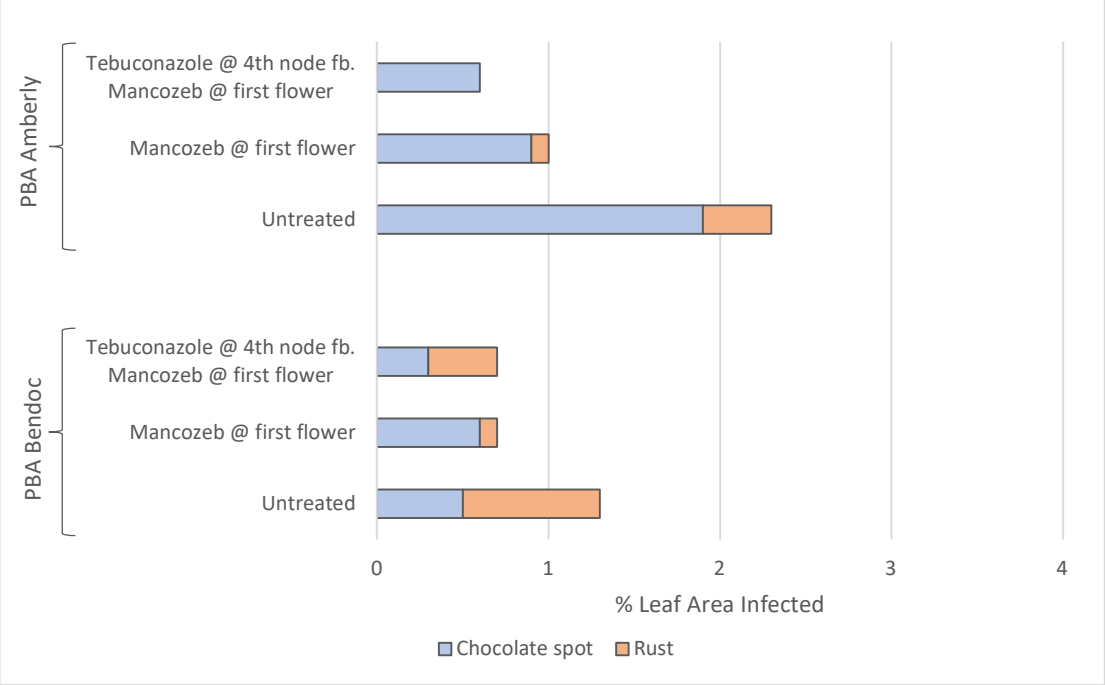

Figure 2. Effect of fungicide strategy on early season disease (chocolate spot and rust) on the middle third of the canopy (% leaf area infected), assessed on 22 September.

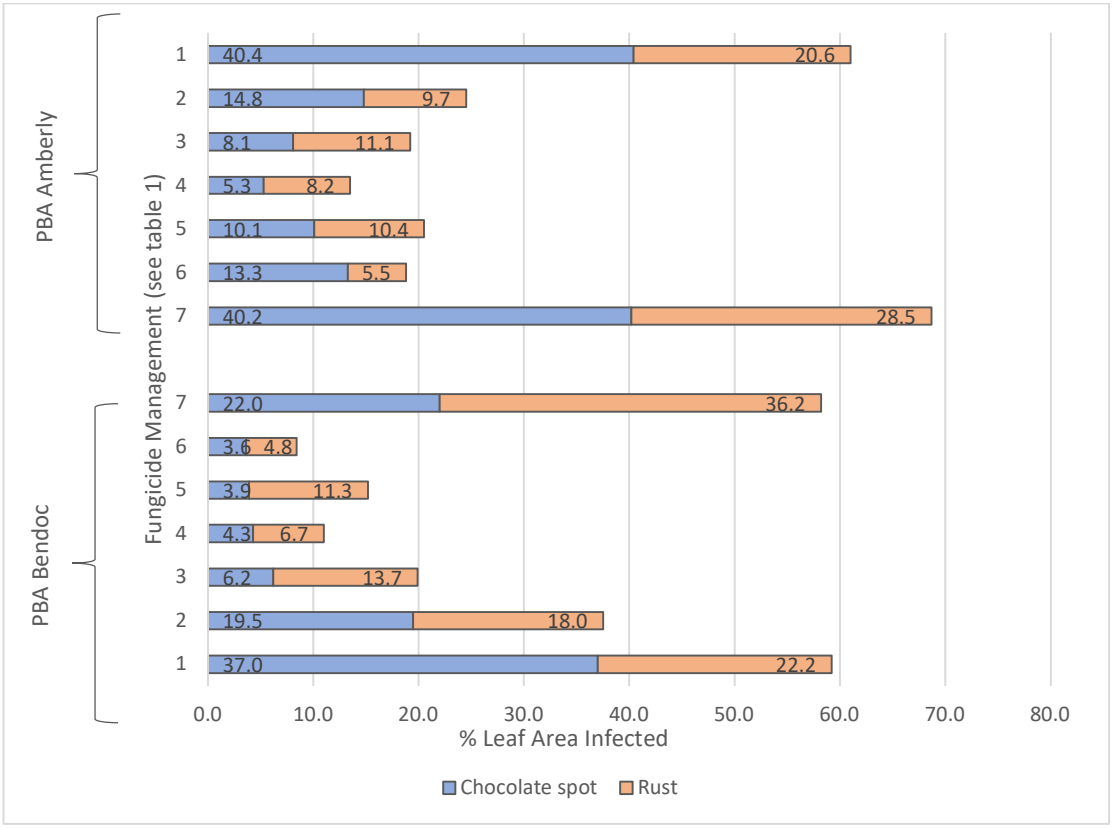

Figure 3. Effect of fungicide strategy on disease (chocolate spot and rust) on the top third of the canopy (% leaf area infected), assessed on 9 November.

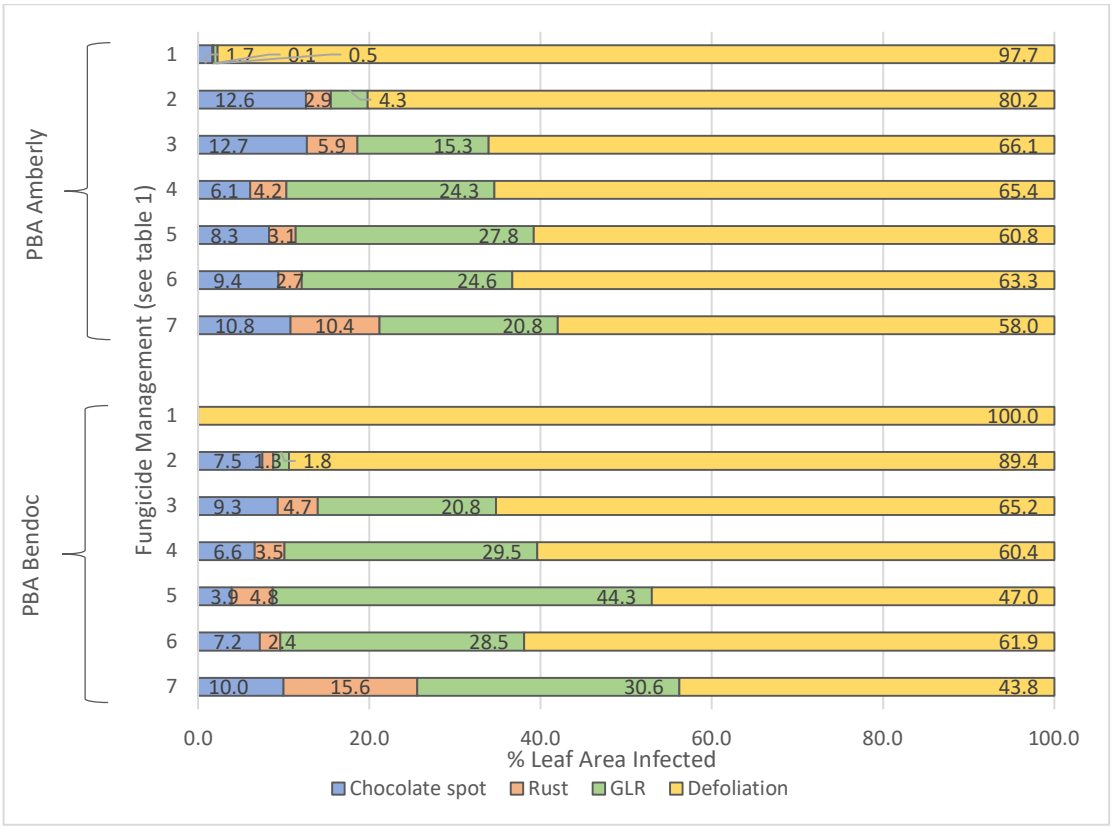

Figure 4. Effect of fungicide strategy on disease (chocolate spot and rust) and green leaf retention on the middle third of the canopy (% leaf area infected), assessed on 9 November.

Table 2. 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

Legume Nutrition

The use of grain legumes has the potential to reduce N inputs and increase N use efficiency in following crops and improve overall soil quality. Research has demonstrated that bagged (synthetic) N alone is not necessarily capable of supplying the crop with enough to achieve hyper yielding crops (canola yields >4t/h, and cereal yields >8t/h). As a general rule of thumb, on average 20 kg of shoot-N per tonne of dry matter is fixed by grain legumes and the actual amount of N fixed will vary depending on soil type, management, species, and season in the order of 15 — 25 kg (Peoples et al. 2009). However, a very important consideration that is often overlooked is the fact that the N fixation component provides the majority of the N demand of the grain legume crop itself, and a large part of the fixed N is exported in the grain, nodulation may also be reduced on acid soils and N maybe required. A nutrition trial was established at all sites with the aim to investigate whether yields of pulses may be limited by Nitrogen and or micronutrients.

2021 Key Learnings Nutrition Reponses

- The application of additional nitrogen early (7.92t/ha) in the season produced significantly higher yields compared to the control (7.43t/ha) at Bundalong
- When nitrogen was split or applied late there was no increase in grain yield.
- The application of any of the trace elements products on their own also didn't produce any significant yield responses. However, we saw our highest yield when trace elements and nitrogen were applied together.
- There was also evidence of improved yields with N at SW Vic. With untreated yielding 6.9 t/ha, compared to 7.47t/ha when 200kg N of was applied. Additional trace elements did not further increase yield
- Similar trends were not observed in Faba beans at Buraja at lower yield potentials. however the importance of inoculation was pronounced with 2.5t/ha in untreated control cf. to 3.35 t/ha when inoculant applied.
- These data highlight the at high yield potentials the crop may require extra N to achieve a higher yield potential, this will impact nodulation and requires for investigation

- In the HRZ site at Gnarwarre, seeding density was more important than nutrition. Higher seed densities were beneficial in 2021, 12 seeds/m2 yielded 6.1t/ha, 25 seeds/m2 at 7.1 t/ha, and 7.79t/ha at 35 seeds/m2 in PBA Amberley respectively

Nutrition at Buraja and Bundalong 2021

Treatments:

At the Buraja spoke, a faba bean cultivar (PBA Nasma) and a Vetch cultivar (RM4) were sown 7 May. 6 nutrition treatments were applied to each pulse species, with the aim to compare relative yields and biomass production of the two species using treatments designed to manipulate plant growth and maximise nutrition.

Table 3. Nutrition treatments, products and nutrient contents, and application rates and timings at Buraja

	Treatment	Inoculation (7 May)		6-8 Leaf (28 June)		Early Flowering (29 Aug)	
		Product	Rate (kg/ha)	Product	Rate	Product	Rate
1.	**Untreated**	Nodulator	4.6				
2.	**Trace Elements**	Nodulator	4.6	Smart Trace Triple Boly	2.5L/ha 2L/ha	Smart Trace Triple Boly	2.5L/ha 2L/ha
3.	**Trace Elements + 100 kg N/ha**	Nodulator	4.6	Smart Trace Triple Boly Nitrogen	2.5L/ha 2L/ha 50kgN/ha	Smart Trace Triple Boly Nitrogen	2.5L/ha 2L/ha 50kgN/ha
4.	**Trace Elements + 100 kg N/ha + PGR**	Nodulator	4.6	Smart Trace Triple Boly Nitrogen FAR21 PGR1 Or FAR21 PGR2	2.5L/ha 2L/ha 50kgN/ha *Applied 29 July	Smart Trace Triple Boly Nitrogen	2.5L/ha 2L/ha 50kgN/ha
5.	**Trace Elements + 200 kg N/ha**	Nodulator	4.6	Smart Trace Triple Boly Nitrogen	2.5L/ha 2L/ha 100kgN/ha	Smart Trace Triple Boly Nitrogen	2.5L/ha 2L/ha 100kgN/ha
6.	**Untreated Nil Inoculant**						

Table 4. Nutrition treatments, products and nutrient contents, and application rates and timings at Bundalong.

	Treatment	Pre-Sowing (20 April)		6-8 Leaf (28 June)		Early Flowering (29 Aug)	
		Product	Rate	Product	Rate	Product	Rate
1.	**Untreated + Lime**	Lime					
2.	**Micronutrients (Standard) + Lime**	Lime		Smart Trace Triple Boly	2.5L/ha 2L/ha	Smart Trace Triple Boly	2.5L/ha 2L/ha

3.	**Micronutrients (Standard) + N+ Lime**	Lime		Smart Trace Triple Boly Nitrogen	2.5L/ha 2L/ha 50kg N/ha	Smart Trace Triple Boly Nitrogen	2.5L/ha 2L/ha 50kg N/ha
4.	**100N Split + Lime**	Lime		Nitrogen	50kg N/ha	Nitrogen	50kg N/ha
5.	**100N Early + Lime**	Lime		Nitrogen	100kg N/ha		
6.	**100N Late + Lime**	Lime				Nitrogen	100kg N/ha
7.	**Untreated**						
8.	**Micronutrients (Standard)**			Smart Trace Triple Boly Nitrogen	2.5L/ha 2L/ha 50kg N/ha	Smart Trace Triple Boly Nitrogen	2.5L/ha 2L/ha 50kg N/ha
9.	**Micronutrients (Regional)**	Lime		Rapisol 321	1kg/ha	Rapisol 321	1kg/ha
10.	**Micronutrients (Regional)**	Lime		Rapisol321 Combi 7	1kg/ha 1.5kg/ha	Rapisol321 Combi 7	1kg/ha 1.5kg/ha

Results

The Bundalong site produced exceptional yields with the trial averaging 7.7t/ha, demonstrating that yields approaching 8t/ha are possible to achieve in a dry land faba bean crop. Nutrition treatments applied resulted in significant yield increases compared to the control (Figure 2). The application/exclusion of lime produced no differences throughout the growing season, this likely due to the already high pH of 5.3 at the site.

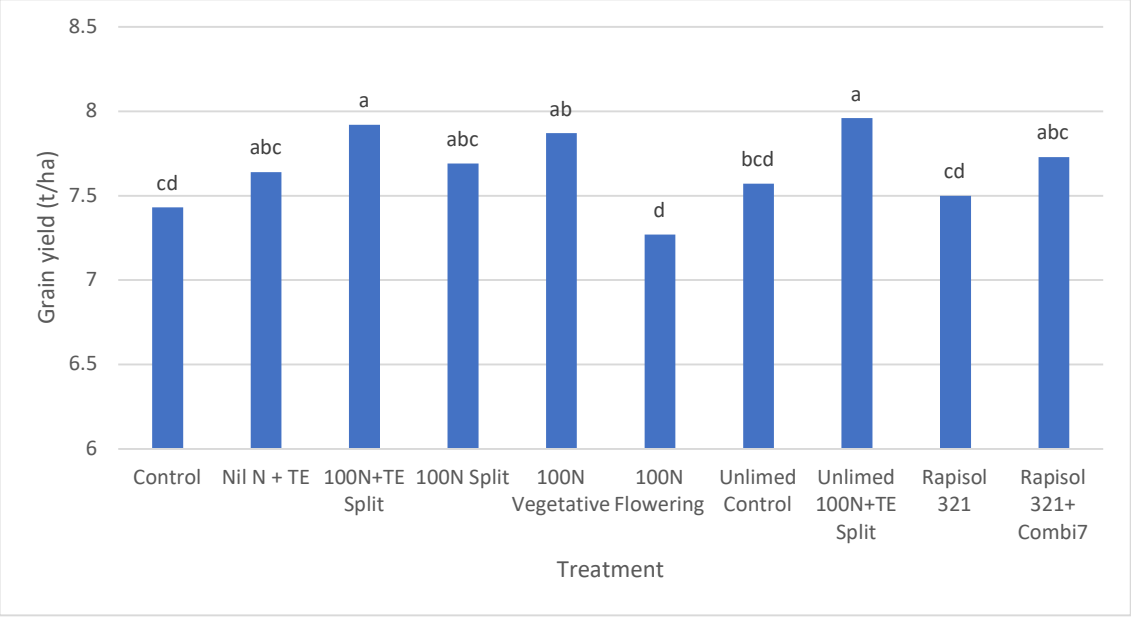

Figure 2. Influence of nutrition on faba bean grain yield at Bundalong. P=0.005, LSD=0.34t/ha.

The application of additional nitrogen early in the season produced significantly higher yields compared to the control. When nitrogen was split or applied late there was no

increase in grain yield. The application of any of the trace elements products on their own also didn't produce any significant yield responses. However, we saw our highest yield when trace elements and nitrogen were applied together.

Similar results were seen in faba beans at Buraja. Although not significant there was a trend showing that the combination on addition nitrogen and trace elements gave you an increase in yield while application of only trace elements did not (Figure 3).

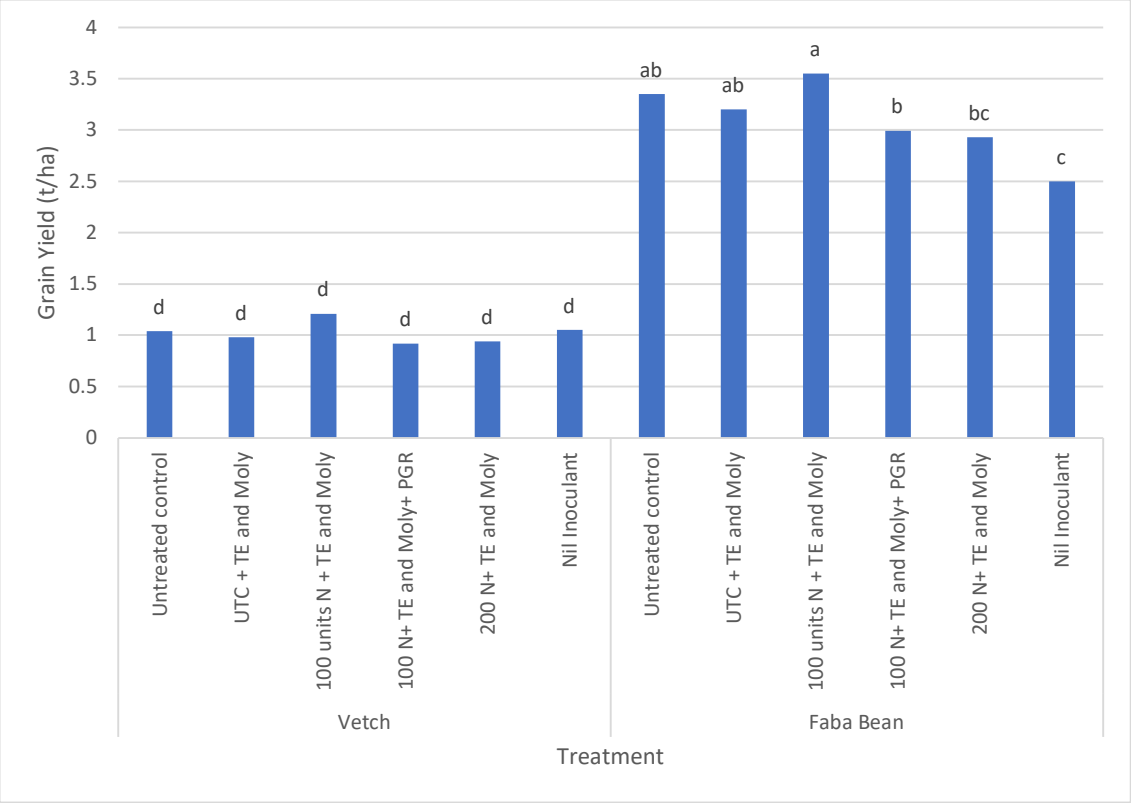

Figure 3. Influence of nutrition on grain yield of Vetch and Faba beans at Buraja. P<0.001, LSD=0.43t/ha.

Nodulation was assessed 14 Sep using 0-5 scale based on distribution and number of active nodules on the roots. Figure 4 clearly shows the effect of good inoculation when comparing the control to the nil inoculant treatment. There was a large reduction in the number and distribution of nodules where no inoculant was applied, the effects of this can be seen in figure 3 where there is a significant reduction in grain yield of Faba beans of 0.85t/ha.

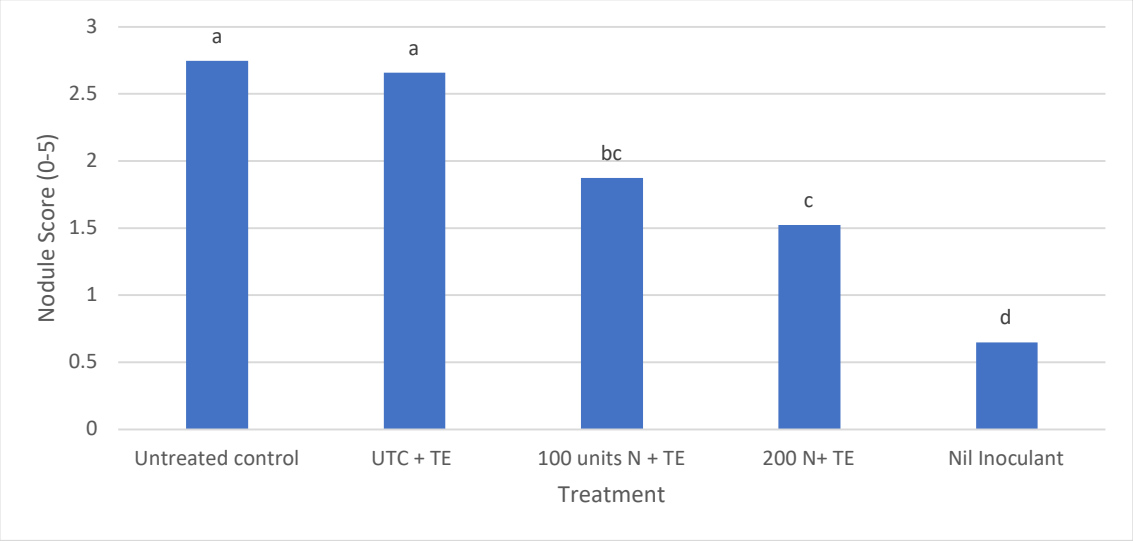

Figure 4. Influence of nutrition and inoculation of nodule scores at Buraja. P<0.001, LSD=0.50.

The application of additional nitrogen had a significant effect on nodule scores. Unlike grain yield, the addition of nitrogen had a negative effect on nodulation which would reduce the crop's ability to fix its own nitrogen. The fact that there was no reduction in grain yield or biomass suggests that we were able to replace fixed nitrogen with nitrogen from a bag (Urea). However, it is not known until we do follow up measurements how much N is available for following crops.

Crop Nutrition and Seeding Density Experiment in SW Vic

Key Points:

- Higher seed densities were beneficial in 2021, 12 seeds/m2 yielded 6.1t/ha, 25 seeds/m2 at 7.1 t/ha, and 7.79t/ha at 35 seeds/m2 in PBA Amberley respectively.
- Samira yields were 7.48t/ha, Amberley 7.1, and Bendoc 6.61.
- There was also evidence of improved yields with N at SW Vic. With untreated yielding 6.9 t/ha, compared to 7.47t/ha when 200kg N of was applied. Additional trace elements did not further increase yield.

Table 3. Influence of faba bean cultivar, seed rate (seeds/m^2) and nutrition on grain yield (t/ha).

Trt	Variety	Seeds (m^2)	Nitrogen (kg N/ha)	Trace Elements	Grain Yield (t/ha)	
1	PBA Amberly	25	---	---	6.90	cd
2	PBA Amberly	25	---	TE and Moly	7.11	bcd
3	PBA Samira	25	---	TE and Moly	7.48	ab
4	PBA Bendoc	25	---	TE and Moly	6.61	d
5	PBA Amberly	25	200N	---	7.47	ab
6	PBA Amberly	25	200N	TE and Moly	7.35	abc
7	PBA Amberly	12	---	TE and Moly	6.10	e
8	PBA Amberly	35	---	TE and Moly	7.79	a
Mean					7.10	
LSD 0.05					0.51	
P Val					<0.001	
CV					4.89	

Table 2. Influence of seed rate (seeds/m^2) and nutrition on canopy structure at crop maturity for PBA Amberly.

Treatment	Dry Matter	Stems	Stem height	Pods	Lowest pod height	Highest pod height	Pod length on stem	Pod-stem density
Seed rate (m^2) + Nutrition	t/ha	m^2	cm	m^2	cm	cm	cm	Pods/ m
25	19.1 -	57.2 -	128.6 -	654.9 -	38.1 b	88.2 -	50.2 -	22.8 -
25 +TE	17.2 -	50.6 -	129.3 -	559.6 -	42.1 b	95.2 -	53.1 -	21.3 -
25 +N	18.0 -	56.1 -	130.3 -	566.4 -	41.3 b	91.2 -	49.9 -	20.8 -
25 +N +TE	15.6 -	51.7 -	134.0 -	566.0 -	43.4 b	97.9 -	54.6 -	20.8 -
12 +TE	23.0 -	55.6 -	128.6 -	663.4 -	40.3 b	94.1 -	53.8 -	22.3 -
35 +TE	14.5 -	57.2 -	125.3 -	547.1 -	51.0 a	90.3 -	39.3 -	24.2 -
Mean	17.9	54.7	129.4	592.9	42.7	92.8	50.1	22.0
LSD 0.05	ns	ns	ns	ns	7.2	ns	ns	ns
P Val	0.764	0.950	0.749	0.628	0.027	0.540	0.100	0.527

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

Sowing date:		**1 May**
Variety:		PBA Amberley, PBA Samira & PBA Bendoc
Seed Rate:		As per treatment list
Sowing Fertiliser:		100kg MAP
Inoculant		Nodulator
Nitrogen:		As per treatment list
Fungicide:	4 Node	Tebuconazole 145ml/ha
	1st Flower	Mancozeb 750 2.0l/ha + Procymidone 240g/ha
	1st Flower+ 14 days	Chlorothalonil 2.3l/ha + Carbendazim 0.5l/ha
	1st Flower+ 28 days	Veritas 0.75l/ha

What makes up a 7t/ha Faba Bean Crop?

Hyper yielding pulse crops are achievable in Northern Vic/Southern NSW. When looking at what makes up a 7t/ha faba bean crop (Table 5), biomass at harvest seems to be a driver for high yields. At Bundalong in 2021, early sowing and a favourable growing season allowed for a biomass production of 14t/ha and with a harvest index of close to 50% was able to convert most of this to yield. At Dookie in 2020 however, a late sowing date didn't give the crop the opportunity to produce the biomass needed to generate hyper yields.

While N content has yet to be calculated, based on our estimates (and using 20kg N fixed per tonne of dry matter rule of thumb) the dry matters achieved equates to between 180 – 280kg 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 nor the result of poor nodulation on lower ph. soils, or under higher N treatments. Grain yield, harvest index, and nitrogen removal results have not been processed at the time of publication.

Table 5. Yield components of faba bean crops. Dookie and Bundalong cv. PBA Samira, Finley cv. PBA Bendoc.

Yield Component	Dookie 2020 (Sown 14 May)	Bundalong 2021 (Sown 20 April)	Finley 2020 (Sown 28 April, Irrigated)
Plants/m^2	22	19	20
Stems/m^2	77	58	60
Pods/stem	5.4	8.8	7.6
Pods/m^2	404	491	453
Harvest Dry Matter (t/ha)	9.4	14.0	13.6
Grain Yield (t/ha)	4.0	7.4	7.5
Harvest Index (%)	38.7	47.7	47.4

Finley being our irrigated research centre, we are able to sow slightly later than dryland as we have the ability supply water when the crop needs it to allow biomass production during the growing season and allow for the best ability to fill pods come the end of the season.

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Trial Layout for 2022 Experiments:

Bundalong, Vic Site: Sown 22nd April 2022

	Faba Bean Disease	**Faba Bean Nutrition Trial**	**Faba Bean Canopy Management**

Daysdale, NSW Site: Sown 17th Amy 2022

Faba Bean Fungicide	**Faba Bean Variety**	**Vetch Cultivar**	**Chickpea Cultivar**	**Lentil Cultivar**

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