Faba Bean Production Packages– Frankland

Stacey Hansch (Research Officer) and Mark Seymour (Senior Research Officer) Department of Primary Industries and Regional Development

Key Messages

- PBA Samira was damaged by Intercept, with damage including stunting, chlorosis and coupled leaves
- Double the rate of standard rhizobia and the new acid tolerant strain improved root nodulation compared to the recommended rate of the standard strain
- Fertiliser rate impacted on lodging only, with standard rate of P standing up slightly more
- All treatments achieved excellent yields >2.5 t/ha
- PBA Bendoc looked better all year and out yielded PBA Samira for all herbicide treatments

Aim

For newly released faba bean varieties: demonstrate production packages, including herbicide, fertiliser and rhizobia options that are the 'best bet' to maximise yield.

Background

In WA many pulses have a poor reputation based on previous experiences and perceptions within the industry. Disease issues in faba bean and limited weed control options compared to canola mean that growers are cautious about this option, commonly referring to them as 'failure beans'. PBA Bendoc was released in 2018 as the first faba bean variety with high tolerance to some imidazolinone herbicides when applied post-emergent. In the last 3 years, permits have also been granted for post-emergent use of imazamox (PER 60493/107342) and pyraflufen-ethyl products (PER14726) across all faba bean varieties, along with products containing both imazamox and imazapyr (PER86849) on tolerant faba bean varieties. These advances, along with improved strains of rhizobia, mean growers and their consultants are seeking localised information about how to achieve stable yields whilst managing diseases and weeds, particularly in the Albany port zone.

Site summary

Property	Simon Hilder. Shamrock Road, Frankland
Plot size & replication	1.54 m centres x 10 m sown x 3 reps
Soil type	Gravelly loam
Soil pH ($CaCl_2$)	0-10 cm: 5.4 10-20 cm: 5.3
EC (dS/m)	0-10 cm: 0.134 10-20 cm: 0.057
Sowing date	8/5/2019
Sowing rate	PBA Bendoc 252 kg/ha and PBA Samira 216 kg/ha. Target 30 p/m^2
Fertiliser	See treatment list
Herbicides & insecticides	IBS: 1.5 L/ha Sprayseed (135 g/L paraquat & 115 g/L diquat), 860 kg/ha Terbyne Xtreme (875 g terbuthylazine/kg) + 1.5 L/ha Treflan (480 g/L trifluralin) + 180 g/ha Terrain 500WG (500 g/kg flumioxazin). Post Em: 30/7/19: 500 mL/ha Select (240 g/L clethodim), + 80mL Verdict (520 g/L haloxyfop)
Fungicide treatments	Seed treatment: 200mL/100kg seed P-Pickle T (360 g/L thiram & 200 g/L thiabendazole). 9/8/19: 500 mL/ha Sumisclex (500 g/L procymidone)
Harvest date	27/11/19

Table 1. 2019 monthly rainfall (mm) from BOM Frankland station (9635).

Statistic	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
Mean	15	13	24	41	71	87	94	80	64	50	27	20	588
2019	2	0	58	35	24	74	54	92	30	33	19	6	425

Method

This trial was sown on 8 May in to moist soil with a small plot cone seeder. Peat rhizobia treatments were applied to seed 24 hours prior to sowing. Fertiliser treatments were drilled with seed. Post-emergent herbicide treatments were applied 6 weeks after sowing, on 18 June, when the crop was at 4-node stage.

Table 2. Treatments applied in this trial.

Varieties	Nutrition	Rhizobia	Herbicide - post emergent
PBA Bendoc	Standard (10kg P/Ha) - 10kg/Ha CSBP Superphosphate	Standard: WSM1455 250g/100kg seed	800 mL/ha Ecopar (20 g/L pyraflufen-ethyl)
PBA Samira	Double (20kg P/Ha) - 20kg/ha CSBP Superphosphate	Double: WSM1455 500g/100kg seed	45 g/ha Raptor (700 g/kg imazamox)
		New: Acid tolerant rhizobia SARDI969 250g/100kg seed	700 mL/ha Intercept (33 g/L imazamox & 15 g/L imazapyr)

Results

Despite adjusting seeding rates for seed size, PBA Bendoc (28ppm^2) established better than PBA Samira (23ppm^2) (*P=<0.001*).

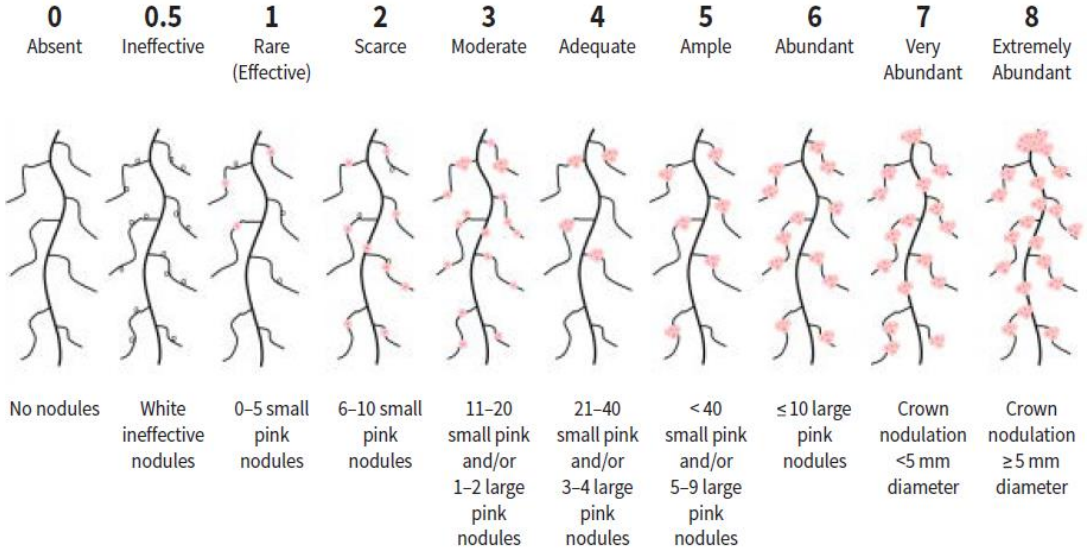

Figure 3: Nodulation rating scale used to asses samples from this trial. Howieson, J.G. and Dilworth, M.J. (Eds.). 2016. Working with Rhizobia. Australian Centre for International Agricultural Research: Canberra.

Table 3: Average nodulation scores for each rhizobia treatment, from samples taken on 18 July, using the rating scale in Figure 3.

Rhizobia	
Double	6.6
Acid tolerant	6.8
Standard	6.2

LSD = 0.19, *P=<0.001*.

Table 4: Average herbicide damage rating 18 July.

	Variety			
Herbicide	Bendoc		Samira	
Ecopar	0.00	a	5.28	c
Intercept	0.00	a	18.33	d
Raptor	1.39	ab	3.33	bc

LSD = 3.23, same herbicide = 2.68, same variety = 3.18, *P=<0.001*. Rating scale from 0-100, 20 indicates slight damage, discolouration and/or stunting clearly seen, recovery expected. Treatments that share a common letter are not significantly different.

Table 5: Average dry stem weight per plant (g) at full flower.

	Variety			
Herbicide	Bendoc		Samira	
Ecopar	6.7	b	6.4	b
Intercept	7.1	bc	5.6	a
Raptor	7.6	c	6.6	b

LSD = 0.1, same herbicide = 0.7, same variety = 0.1, *P=0.027*. Treatments that share a common letter are not significantly different.

Table 7: Average yield t/ha for each variety and herbicide combination.

	Variety			
Herbicide	Bendoc		Samira	
Ecopar	3.7	c	3.2	b
Intercept	3.8	c	2.8	a
Raptor	3.7	c	3.0	ab

LSD = 0.7, same herbicide = 0.2, same variety = 0.7, *P=0.001*.

Summary of results

Although rainfall in 2019 was below average for the Frankland area (Table 1), 315mm was recorded between sowing and harvest, allowing for good crop growth throughout the year and excellent yields in this trial (Table 7).

The soil in this paddock was not considered too acidic for good inoculation using standard faba bean rhizobia, however double the rate of standard rhizobia and the new acid tolerant strain did improve root nodulation compared to the recommended rate of the standard strain (Table 3). Regardless of these differences, all treatments achieved abundant nodulation.

Of the parameters measured in this experiment, lodging was the only one for which the rate of phosphorous applied was significant, although the differences are minor and unlikely to lead to variation in harvestability.

Despite adjusting seeding rates for seed size, PBA Bendoc established better and had more vigorous early growth than PBA Samira. It also handled the post-emergent Ecopar and Intercept better, as reflected in NDVI at 8, 10 and 13 weeks after sowing (data not presented) and herbicide damage rating 4 weeks after treatments were applied (Table 4). PBA Samira was more susceptible to damage from Intercept than the other herbicides, even then the damage from Intercept on PBA Samira was considered minor when rated 4 weeks after application and the damage was not visually obvious later in the season, making it appear as if the crop had recovered. However, PBA Samira treated with Intercept had significantly less above ground biomass at full flower (Table 5) and yielded 1 t/ha less than the tolerant variety PBA Bendoc with the same herbicide, suggesting that the Intercept did have a long lasting impact on PBA Samira.

Acknowledgements

This experiment was conducted as part of the DPIRD/GRDC co-investment “High Value Pulses - Raising awareness, optimising yield and expanding the area of lentil, chickpea and faba bean in Western Australia” (DAW1903-004RTX). Thanks to the Katanning TSU for trial management and Stirlings to Coast Farmers for their continued support in providing trial sites. Michelle Sampson provided technical assistance to ensure all treatments and measurements occurred in a timely and accurate fashion.

Paper reviewed by: Salzar Rahman

Contact
Stacey Hansch
Research Officer
Department of Primary Industries and Regional Development
Stacey.Hansch@dpird.wa.gov.au

Disclaimer: Please indicate any products that are registered trademarks to the first author of this article.