Productive and profitable pulse crops in the Northern Victorian Mallee

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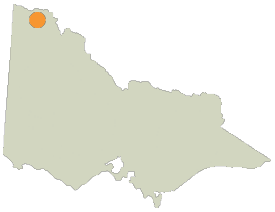

Why was the trial/project undertaken?

Selecting which break crop to grow is challenging as there is little comparative information on the performance of break crops and varieties in the Northern Mallee. To address this, Mallee Sustainable Farming (MSF) implemented pulse crop demonstration trials at the GRDC funded Low Rainfall Crop Sequencing project site near Mildura. The aim of the trials was to provide farmers with more information on the productivity of legume break crops in the northern Victorian Mallee region.

How was the trial/project done?

Two separate trials were implemented in 2014 with one trial comparing the productivity of pulse crops with the intention of grain yield and the other trial to compare the productivity of pulse crops with the intention of using as a brown manure.

- **Pulse Trial**: Field Pea (PBA Wharton, PBA Twilight and PBA Pearl), Chickpea (PBA Striker, Genesis 090 and PBA Monarch), Lupin (Narrow leaf: Mandelup, PBA Barlock and Albus: Luxor), Faba Bean (Farah and PBA Samira), Lentil (PBA Bolt).
- **Brown Manure Trial**: Field Pea (PBA Hayman and PBA Coogee) and Vetch (Rasina and Volga)

Key Messages

- Field peas were the stand out crop in terms of both dry matter production (5.8-6.5 t/ha) and grain yield (1.7-2.3 t/ha)
- Excellent grain yields were generally achieved for the other pulse crop options; chickpea (1.5-1.6 t/ha), lentil (1.5 t/ha), faba bean (1.4 t/ha) and lupins (0.9-1.2).
- Over two seasons at the site, Kabuli chickpeas have been the most profitable crop option followed by Desi chickpeas and field peas. Lentils were the most profitable option in 2014.
- There were no significant dry matter differences between treatments in the Brown Manure trial with all producing about 4.5 t/ha

Background

There is little doubt that break crops are now an important component for the sustainability of Northern Mallee cropping rotations as they can reduce weed and disease pressures and can contribute nitrogen if a legume option is chosen. However productive and reliable break crops are required if rotations involving break crops are to be more profitable than maintaining cereal intensive cropping sequences.

Selecting which break crop to grow is challenging as there is little comparative information on the performance of break crops and varieties in the Northern Mallee. To address this, Mallee Sustainable Farming (MSF) implemented pulse crop demonstration trials at the GRDC funded Low Rainfall Crop Sequencing project site near Mildura. The aim of the trials were to provide farmers with more information on the productivity of legume break crops and varieties in the northern Victorian Mallee region.

About the trial

Two separate trials were implemented in 2014 with one trial comparing the productivity of pulse crops with the intention of grain yield and the other trial to compare the productivity of pulse crops with the intention of using as a brown manure. The varieties used in both trials were selected after consultation with industry experts to determine which varieties for each of the pulse crops were likely to be best adapted to the northern Mallee cropping region (Table 2).

The soil type at the site has a sandy loam texture with a topsoil pH ($CaCl_2$) of 7.5. In 2014 the site received 230 mm of rainfall with the majority of this rain falling in the first six months. Frosts occurred in the region during July, however they did not appear to severely impact the trial.

The Mildura site was sown dry on 5 May into a moist seed bed with a full profile of soil moisture. Both trials were sown into standing cereal stubble with a No-Till plot seeder using narrow profile tynes and press wheels at seeding rates optimised for each crop and variety (Table 1). Single Super (0-9-0-11) was banded below the seed at 100 kg/ha. Glyphosate and Trifluralin (1.5 L/ha each) and Terbyne® (1 kg/ha) were applied prior to sowing. Verdict was applied on 26 June to control Brome grass. There were no other weeds impacting the trial. No in-crop fungicides were required due to a dry growing season, however 600 mL/ha of Affirm insecticide was applied on 21 September to control Native Budworm.

Gross Margins were calculated for each treatment in each season using the '2015 Farm Gross Margin and Enterprise Planning Guide' (Rural Solutions, 2015). The key gross margin parameters for each commodity are provided in Table 1.

Table 1. Summary of the price received and costs used to construct gross margins for each commodity group.

Commodity	Price (5 year average)	Cost					
		[a]Seed	Fertiliser	Chemical	Freight	R&M + Fuel	[b]Sundry
	$/t	$/ha	$/ha	$/ha	$/t	$/ha	$/ha
Field Pea	323	47	35	61	25	46	25
Chickpea (Kabuli)	529	78	35	61	25	33	24
Chickpea (Desi)	450	67	35	61	25	33	20
Lentil	628	61	35	61	30	39	27
Faba Bean	414	83	35	61	25	33	18
Lupin (narrow)	265	32	35	61	25	33	9
Lupin (albus)	265	69	35	61	25	33	6

[a]Seed cost varies between varieties within a commodity

[b]Sundry expenses include insurance, levies and End Point Royalties and varies between varieties within a commodity.

Results

Field peas were the stand out crop in terms of both dry matter production and grain yield (Table 2). In the grain pulse trial, no other treatment produced more dry matter or had higher grain yields than the three field pea varieties; Twilight, Wharton and Pearl. Faba bean and lentils both produced in excess of 4.5 t/ha of dry matter followed by the chickpea varieties producing approximately 4 t/ha of biomass. However, grain yields of chickpea, lentils and faba beans were similar (approximately 1.5 t/ha). Lupin tended to be the least productive crop at the site in 2014.

There were no large differences between break options in the Brown Manure trial with all producing about 4.5 t/ha. The brown manure treatments were sown on the same time as the pulse trial, however brown manure options can often be sown earlier (because frost is not a threat to grain yield). Earlier sowing would have potentially improved the dry matter production of all treatments in the brown manure trial.

Table 2. Mean crop establishment (Estb.), dry matter production (measured on 18 September: early pod fill) and grain yield for each pulse option at Mildura in 2014. Treatments with the same letter in the Sig. Diff column are not significantly different ($p<0.05$) from each other

Crop	Variety	Seed Rate (kg/ha)	Estb. (plants per sq m)	Dry Matter (kg/ha)	Sig. Diff.	Grain Yield (t/ha)	Sig. Diff.	Gross Margin ($/ha)
Pulse Trial								
Field Pea	PBA Wharton	95	33	5768	abc	2.25	a	457
Field Pea	PBA Pearl	100	35	5850	ab	1.69	b	294
Field Pea	PBA Twilight	95	40	6455	a	1.67	b	290
Chickpea (Kabuli)	PBA Monarch	130	32	3960	defg	1.62	b	585
Chickpea (Desi)	PBA Striker	110	43	4162	def	1.57	bc	455
Chickpea (Kabuli)	Genesis 090	100	29	3848	efg	1.47	bc	528
Lentil	PBA Bolt	55	79	4881	bcd	1.46	bc	650
Faba Bean	PBA Simara	150	23	5654	abc	1.41	bc	318
Faba Bean	Farah	150	20	4836	cde	1.39	bc	310
Lupin (Narrow)	Mandelup	70	34	4096	def	1.23	cd	124
Lupin (Narrow)	PBA Barlock	70	44	3818	fg	0.94	d	50
Lupin (Albus)	Luxor	180	42	2990	g	0.87	d	4
Brown Manure Trial								
Field Pea	PBA Hayman	90	39	4731	a			
Vetch	Volga	40	43	4708	a			
Field Pea	PBA Coogee	95	36	4501	a			
Vetch	Rasina	40	52	4472	a			

Based on long term prices, all treatments at the site in 2014 had a positive gross margin. PBA Bolt lentils were the most profitable at $650/ha followed by Kabuli chickpeas which had an average return of around $550/ha. The profit achieved for both field peas and faba beans was around $300/ha with the exception of the high yielding PBA Wharton field peas with a gross margin of $457/ha. Lupin profitability was worst with Luxor lupins only breaking even.

Similar trials were run at the same location in 2013 (Moodie *et al,* 2014). Figure 1 shows the combined yield and gross margin for treatments which were common to the trial in both years. Over the two seasons, field peas had the highest grain production followed by chickpeas, narrow leaf lupins, faba beans and albus lupins. In terms of profitability, Kabuli chickpeas (Genesis 090) were the most profitable, followed by Desi Chickpeas (PBA Striker) and field peas (PBA Wharton). The other crop options were less than half as profitable as chickpea and field pea over the two years. Unfortunately, PBA Bolt lentils failed in 2013 due to herbicide damage, but high profits in 2014 indicate potential in the northern Mallee.

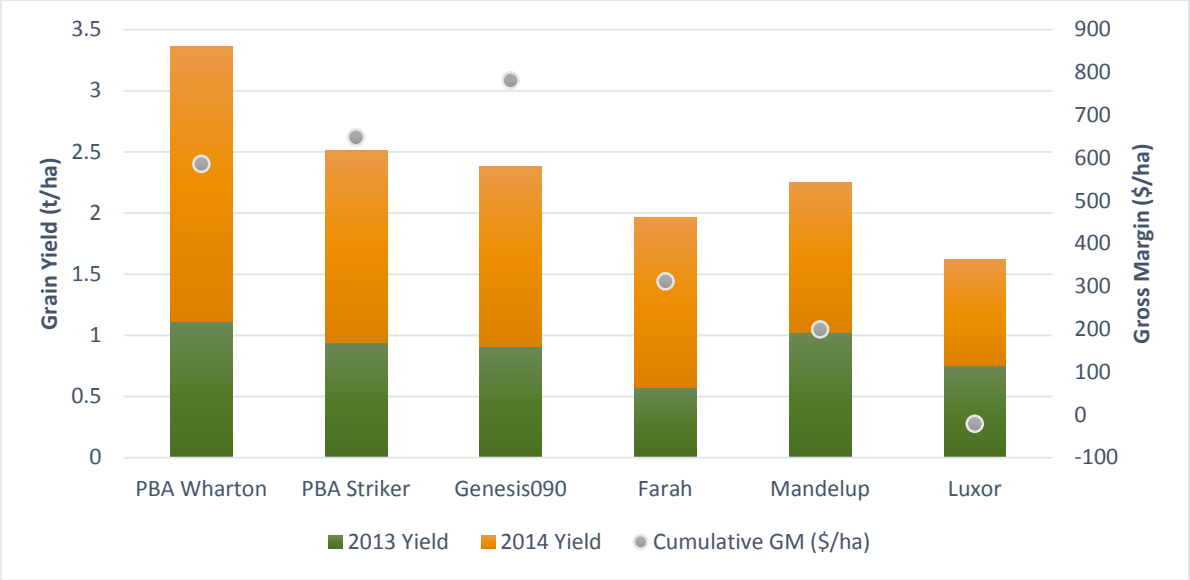

Figure 1. Cumulative grain yield and cumulative gross margin (GM) for selected treatments included in trials at Mildura site in 2013 and 2014.

Implications for commercial practice

The Mallee crop sequencing project has shown that diversifying cropping rotations is required to maintain productive and profitable low rainfall farming systems (Moodie *et al* 2014). These trials have highlighted that legumes crops have the potential to be both productive and profitable in the low rainfall Mallee. Field peas have been the most reliable pulse at the Mildura crop sequencing site with the highest grain yield achieved over two years. However, chickpea's have also proven to be a profitable pulse crop option at the site.

The limitation of these trials is that the pulse crops were grown on one soil type (sandy loam). Further research efforts are required to increase our understanding of break crop productivity and profitability across the range of soil types in Mallee paddocks. We also need to be mindful of the practicality of implementing break crop options in the Mallee. For example, ground cover retention, harvest height and grain marketing all pose challenges for pulse crops.

Links and references

Moodie, M and McDonald, T (2014). Betting on Pulse Crops in the Northern Victorian Mallee. Mallee Sustainable Farming Results Compendium 2013. www.msfp.org.au/research

Moodie, M. Wilhelm, N. Lawes, R., Telfer, P and McDonald, T (2014). Two year breaks profitably reduce agronomic constraints. Mallee Sustainable Farming Results Compendium 2014. www.msfp.org.au/research

Rural Solutions SA (2015). 2015 Farm Gross Margin and Enterprise Planning Guide. http://solutions.pir.sa.gov.au/news/news/newspaper_items/2014/farm_gross_margins_and_enterprise_planning_guide_2015

Acknowledgements

These trials were conducted as part of the Mallee Low Rainfall Crop Sequencing Project which is a collaboration between MSF and SARDI with funding from the GRDC. Thankyou to Jason Brand (DEDJTR) and Michael Lines and Andrew Ware (SARDI) for providing both seed and technical advice for this project.