

4.5.2 An Evaluation Of Pulse Variety, Time Of Sowing And Fit For The HRZ Cropping Region Of SW Victoria

Location: Mininera SFS Research Site.

Funding: Southern Farming Systems

Researchers:

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Acknowledgements:

Thanks to the SFS Streatham-Lake Bolac pulse group who formed three years ago to assist SFS growers in growing pulses and to ensure adequate trials and demonstrations of best management practices for the district were sown.

Rainfall (mm) April – November: GSR 430mm

Summary of Findings:

The reduced yield output from the pulse trials reflects the drier spring and late rains, but also appears to fit with what would have been expected from experiences elsewhere over time. Lupins and beans respond to early sowing, with yields and growth showing a drop off with the delayed sowing. Nura beans yielded significantly more when sown early (2.88t/ha vs 1.57t/ha), whilst the Farah in this trial did not show a significant response to sowing date. Peas and chickpeas need to be sown later, and in 2007 the time of sowing differences between June and July was relatively small. Bundi peas sown at both timings yield highest at 3.44t/ha and 3.19t/ha respectively, while Kaspas did not show a significant difference in yield. The trials have therefore adequately demonstrated that pulses can be grown in the district if variety choice, best management practices and optimum sowing dates for the crop are used.

Background:

Early sowing of pulses has proved beneficial in previous year SFS trials. Actual dates depend on the pulse sown. Arguments against are that sowing too early may result in excessive growth, poor pod set and more disease, possibly frost damage. Late sowing may mean less competitive crops, greater weed control opportunities, lower yield potential, but less disease and perhaps improved pod set.

Pulse crops fit well into rotations with cereals and canola. Grass-free crops reduce cereal root diseases.

Pulses bring benefits to cereal rotations:

- As a cash crop
- As a legume crop (pulse) which fits well into cereal rotations, increasing the yields of following cereal crops and allowing an extended phase of cropping,
- Decrease many cereal diseases - pulse crops that are grass free break the life cycle of the root diseases CCN and Take-all,
- As a crop with alternative herbicides to rotate the herbicide groups used as part of herbicide resistance management,
- Control weeds - grass selective herbicides can be used on peas to control competitive grass weeds which are difficult to control in cereal crops, *eg* Brome Grass and Barley Grass,
- Can be crop topped to prevent herbicide resistant weeds from setting seed,
- Available soil nitrogen is maintained or improved – pulses gain most of their nitrogen needs from fixation rather than the soil. In contrast, other crops such as cereals and oilseeds deplete available soil nitrogen and require fertiliser N to be added,
- Some pulse stubbles (*eg* beans) provide valuable grazing and can integrate into livestock finishing systems,
- Pulses are not a crop to grow when herbicide resistant weeds predominate with high seed numbers. Also, be aware of herbicide residues and plant-back requirements in the rotation as they do differ between the pulse species.

Trial Inputs:

This trial was sown with a mix of 50% single super at 50kg/ha, mixed with Granulock Supreme CuZn @ 50kg/ha.

The first time of sowing was on the 27th April, with Lupins and Beans sown.

For the second time of sowing on the 14th June, beans and lupins were sown alongside peas and chickpeas.

On the third time of seeding, 23rd July, peas were sown alone. Lupins were sown at 95kg/ha, beans at 200kg/ha, peas at 120kg/ha and chickpeas at 150kg/ha.

▼ **Table 4.36: Herbicides used on SFS Mininera pulse trials; consisting of knockdowns, PSPE and in crop applications. No desiccation was used.**

Description	Beans	Lupins	Peas	Chickpeas
Knockdown Herbicides	Roundup, 1.5l/ha + 1.5l/ha Triflur	Roundup, 1.5l/ha + 1.5l/ha Triflur	Roundup, 1.5l/ha + 1.5l/ha Triflur	Roundup, 1.5l/ha + 0.8l/ha Triflur
Post Sow, Pre-Ems	Simazine 2.0l/ha	Simazine 2.0l/ha	Dual Gold, 0.5l/ha	Dual Gold, 0.5l/ha
Post Emergence	Select, 0.3l/ha	Select, 0.3l/ha	Select, 0.3l/ha	Select, 0.3l/ha
Insecticide @ podset	Fastac, 0.2l/ha	Fastac, 0.2l/ha	Fastac, 0.2l/ha	Fastac, 0.2l/ha

Trial Design:

This trial was sown as a randomized block design. The data was analyzed in a block of crop and time of sowing.

Each pulse crop was sown at two different sowing dates. Lupins and beans at the first two sowings (27 April, 14 June), peas and chickpeas at the second and third sowings (14 June, 23 July). Varieties include: beans (Farah, Nura), peas (Kaspa, Bundi), narrow leafed lupins (Jindalee, Mandelup), albus lupins (Luxor, Rosetta), Chickpeas (Genesis 090, Almaz).

Demonstration strips of lentils (Tiara), and other peas (SW-Celine, Yarrum, marrowfat types), lupin (Wonga) varieties were sown as unreplicated buffer strips to demonstrate and compare, to also see if they can be grown on acid soils in this environment, and also to show their disease resistance.


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Results:**▼ Table 4.37: Yield (t/ha) of pulse varieties at different sowing times.**

Crop and Variety		Sowing date			Statistical Analysis	
		27 April	14 June	23 July	LSD (P=0.05)	CV
Lupin	Mandelup	2.30b	1.71c	-	0.535	15.53
	Jindalee	3.03a	1.49c	-	"	"
Faba beans	Nura	2.88a	1.57c	-	0.573	16.15
	Farah	2.38ab	2.05bc	-	"	"
Peas	Kaspa	-	3.14a	2.81b	0.326	6.49
	Bundi	-	3.43a	3.19a	"	"
Kabuli chickpeas	Almaz	-	1.57b	1.90b	0.474	13.08
	Genesis 090	-	2.55a	2.89a	"	"

Means followed by the same letter do not significantly differ (P=0.05, LSD)

Jindalee lupins (late flowering maturity) significantly out-yielded Mandelup (early flowering) at the first sowing date (April 27), but not the second (14 June), as may be expected. Yields and crop heights dropped dramatically between the first and second sowings. Similarly with Nura faba beans, the benefit from early sowing outyielded Farah at the first sowing, but not significantly, while the second time of sowing saw a reduction in yield and a significant reduction in yield for Nuras. All beans were much shorter in the second time of seeding.

Regarding chickpeas, we would expect that Genesis 090 (small kabuli chickpea) would out-yield Almaz (large seeded kabuli), and this occurred at both sowings (June 14, July 23). The later sowing yielded more than the earlier one, a reflection of the late rains and chickpeas being later in maturing than other pulses. Field peas were the highest yielding pulses, with a small depression in yield from the later timing of seeding from June to July. Bundi as the earlier flowering and maturing white pea variety showed slightly higher yields than Kaspa, a dun type.

Buffer strips of other pulses and varieties cannot be directly compared with the trial plots, but do indicate the potential of these different varieties. In particular, the two new albus lupin varieties Luxor and Rosetta performed extremely well, and are worthy of a more detailed trial. Yields were comparable with the narrow leafed lupins (2.3 to 2.9t/ha), but their early vigour and crop height were more comparable with the faba beans than the narrow leafed lupins. We must however be aware that albus lupins require well drained soils as they are more susceptible to waterlogging than narrow leafed lupins. The individual plots of Celine field peas (very early flowering and maturing white pea) did well. Also Yarrum performed very well. It is a late maturing dun pea with powdery mildew resistance, but not as erect as Kaspa. It does have better tolerance to bacterial blight and viruses like Pea Seed-borne Mosaic Virus (PSbMV). Both Celine and Yarrum seemed to have outyielded Kaspa and Bundi. The single trial plot of Tiara lentil did demonstrate that lentils can be grown in this environment.

Pulse prices rose dramatically through the harvest period and since, so predicting a price at time of sale is difficult. Faba beans achieved up to \$650 per tonne. Peas have now steadily risen to almost similar prices (\$600 per tonne plus) because of export demand for splitting. Lupins have achieved high prices, but fallen short of peas (\$400 per tonne plus). Lentils achieved in excess of \$700 per tonne. Chickpea prices have depended on seed sizes, but range from \$700 to \$1200 per tonne. Costs of production differ between the pulses and varieties, but overall lupins probably had the poorest gross margin, particularly if they were sown late. Late sown beans also gave poor returns relative to the early sown beans, and the peas and chickpeas that were sown later into the season.

Trial Observations:

Sub Clover Stunt Virus (SCSV) infected early sown beans, as a result of early aphid presence. It was most severe in shallower sown bean plots, but not an issue in the later sown beans. Lupins were unaffected by the virus. Dry, hot conditions in spring affected pod set of lupins.



▲ Photo 4.8: Peas with beans (in background) at Mininera trial site 2007



▲ Photo 4.9: Beans, Albus lupins and narrow leaved lupins at Mininera trial site 2007

Lupin variety comments:

Mandelup^A is a very tall, vigorous narrow-leaved lupin variety that is very early flowering and early maturing. This early maturity makes it a suitable variety for crop topping, with careful attention to correct timing. It has moderate resistance to anthracnose, excellent aphid resistance and moderate stem phomopsis resistance. It has good tolerance to metribuzin in WA compared with their older varieties. Mandelup has consistently been the highest yielding variety in most areas of southern Australia, providing growers with a high yielding alternative to all current varieties. Its tall growth habit can make it prone to lodging and possibly sclerotinia under high rainfall conditions. Mandelup is licensed to Graintrust Pty Ltd in eastern Australia.

Jindalee^A is resistant to phomopsis and is mid to late flowering. It requires a vernalisation period (cold) to flower. Jindalee is moderately tall and vigorous, and has improved brown leaf spot resistance over Merit.

In SA it appears to have improved resistance to root rots and premature wilting that occurs on duplex soils with shallow underlying clay. Being the latest maturing of all current varieties, Jindalee is best suited to medium to high rainfall districts with low anthracnose risk. Seed is available through AWB Seeds.

Luxor^A and **Rosetta^A** are two new albus lupin varieties released as locally developed replacements for Kiev Mutant. Luxor^A and Rosetta^A are higher yielding varieties from NSW with improved resistance to pleiochaeta root rot over Kiev Mutant (Luxor is most resistant), but susceptibility to anthracnose. Luxor is the earlier flowering of these two varieties (but still later than Kiev Mutant). Rosetta is later flowering and taller, and likely to be higher yielding than Luxor. Both these varieties are licensed to Graintrust Pty Ltd and seed should be available for sowing in 2008.

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Bean variety comments:

Nura^A is a medium sized faba bean with improved resistance to ascochyta blight (similar to Farah) and rust (better than Farah), and intermediate resistance to chocolate spot (better than Farah). All three resistance levels are better than Fiesta VF. It is susceptible to cercospora leaf spot, much the same as Farah and Fiesta VF. Nura is shorter than Fiesta VF and Farah and is less likely to lodge, however its bottom pods are closer to the ground. This can cause harvest problems with late sowing or in lower rainfall districts. Nura's long term yields are similar to Fiesta VF and Farah, however highest relative yields are achieved when sown early. It has good seed appearance, light buff in colour, with minimal seed staining and discolouration. Nura flowers about 7 days later than Farah, but matures about the same time. Its major advantage to growers is a likely reduction in fungicide sprays, with ascochyta and rust protection only required in high risk situations. Seed is available from AWB Seeds Pty Ltd, and an End Point Royalty applies.

Farah^A is a direct selection from Fiesta VF, licensed to PlantTech Pty Ltd with an End Point Royalty. It is identical in most respects to Fiesta VF, except for its moderate resistance to ascochyta seed staining and more uniform seed size and colour. Although the risk of suffering ascochyta seed staining is reduced with Farah, the risk is still present if ascochyta is not properly managed. Farah generally yields about the same or slightly higher than Fiesta VF in most areas of southern Australia. Farah has replaced Fiesta VF in many areas due mainly to its increased likelihood of achieving market standards for freedom from seed staining.

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Chickpea variety comments

GenesisTM 090 is the first kabuli type released in Australia with resistance to ascochyta blight. It is a small to medium seeded kabuli, having seed approximately 1mm smaller than Kaniva and therefore is unlikely to attract the higher prices of Kaniva. Genesis 090 is of medium height with erect branches. It has shown to be a well adapted, high yielding line in both desi and kabuli trials whether ascochyta blight disease pressure occurs or not. Genesis 090 likely requires fungicide protection during podding to prevent seed blemish and yield loss. This variety now offers chickpea growers a high yielding ascochyta blight resistant alternative to desi chickpeas with potential to get higher prices for grain than for desi's. Seed is available through Australian Agricultural Crop Technologies.

Almaz^A is a kabuli type released from CLIMA in WA and commercialised by AWB Seeds Pty Ltd. Its seed is generally similar or larger than Kaniva, and certainly bigger than seed of Genesis 090, so likely to provide a premium price over it. Almaz has improved ascochyta blight resistance over Kaniva, but inferior to that of Genesis 090. Evaluations suggest that Almaz is lower yielding than Genesis 090 and it also requires more fungicides than it to be successfully grown in southern Australia. It does require a longer growing season than Genesis 090 to fill its large seeds.

Pea variety comments

Bundi^A is a sister line to Kaspera with good resistance to downy mildew up until now, but this may be breaking down. It is earlier flowering and maturing than Kaspera and is resistant to pod shattering. It is however a medium seeded, white type pea with improved standing ability for the low rainfall areas or spring sowing in higher rainfall areas. It has been high yielding in many areas of southern Australia in dry years and environments and is seen as a Kaspera replacement in the drier areas, providing a suitable market is found for its grain. Its early maturity means it is well suited to crop topping. Bundi is licensed to Premier Seeds.

SW Celine^A

Celine is large seeded, early flowering, early maturing white pea type introduced into Australia from Swalof Weibul Seeds by Access Genetics and available through Crop Care Seed Technologies. It is semi-leafless, and appears to be earlier flowering than Bundi. Celine is currently being evaluated under Australian conditions, but appears to yield well in low to medium rainfall areas, so may suit spring sowing in high rainfall areas. It appears to be resistant to shattering, even though it does not have the 'sugar pod' gene for shattering resistance that Kaspera and Bundi have. Disease resistances appear to be relatively similar to Kaspera.

Kaspera^A is commercialised by AWB Seeds Pty Ltd. and is a semi-leafless, late flowering, shatter resistant pea with good early season vigour and moderate resistance to lodging. Kaspera had high levels of resistance to downy mildew but this is seen to be breaking down now. It is susceptible to powdery mildew and ascochyta. Kaspera generally starts flowering a week later than Parafield but time to maturity is similar or slightly earlier than Parafield, so it can therefore be successfully crop topped like Parafield. Kaspera is very high yielding in many areas of southern Australia, but due to its late and condensed flowering pattern it needs to be considered carefully in low rainfall or quick finishing situations. Kaspera also should be considered carefully in areas prone to frequent severe vegetative frosts due to potential for yield loss to bacterial blight.

Yarrum^A

Yarrum is a late maturing semi-leafless dun pea released from northern Australia. It is not as erect as Kaspera, and does not have the sugar pod trait for shatter resistance. It does however have powdery mildew resistance, and has improved tolerance of bacterial blight and viruses (eg Pea Seed-borne Mosaic Virus) than Kaspera.