Pulse Options for Northern SA Mallee

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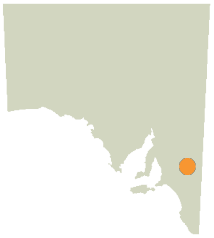


Why was the trial/project undertaken?

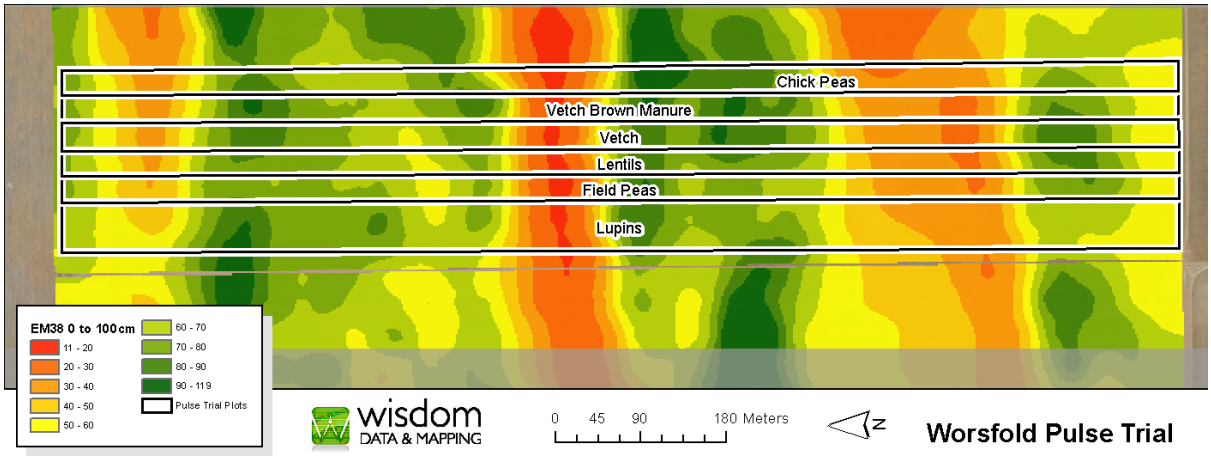
The use of break crops within intensive cropping systems in low rainfall areas is proving to be extremely important for controlling grassy weeds, reducing root disease and maintaining cereal yields. However, finding suitable and consistently profitable options that best achieve this in areas of less than 200mm GSR is not easy.

This trial builds on previous crop sequencing projects, using farmer equipment and paddock length trial strips to help assess both the profitability and practicality of various pulse options. This helps farmers see these crops growing for themselves, discuss the various issues involved and then better decide what may best suit their farming systems.

How was the trial/project done?

This trial was conducted on the Worsfolds' farm at Wunkar (near Loxton) which receives average annual rainfall of approximately 260mm and ave GSR of 165mm. The paddock was surveyed using EM38 to allow for a more direct comparison of plot yield results against soil types (Fig 1). This method is used to help account for paddock variation when using farmer scale trials. There was, however, no replication of plots at this site.

Figure 1. EM38 Site map with pulse treatments.



Three general soil zones were deep soil tested and characterised at the start of the season, ranging from deep sand, midslopes, to loamy flats (Tables 1-2). While there is a good soil type range, the subsoils at this site are not high in chemical constraints to root growth and moisture extraction.

In 2014 plots were sown with the farmer's airseeder for the length of the paddock (1km) and 2 passes wide. Varieties used in the trial were Twilight Peas, Blitz Lentils, Genisis 090 Chickpeas, Rasina Vetch and a blend of Jindalee and Mandelup Lupins.

Table 1. Topsoil test results for each zone.

Topsoils	Texture	Depth	Amm N	Nitrate N	Organic Carbon	Colwell P	Colwell K	S	EC1:5	pH (CaCl2)	pH (H2O)
0-10cm			mg/Kg	mg/Kg	%	mg/Kg	mg/Kg	mg/Kg	dS/m	pH	pH
Loam Flat	LS	0-10	2	10	0.58	23	302	1.4	0.041	6.7	7.2
Mid-slope	LS	0-10	0.5	6	0.55	24	266	1.5	0.068	7.6	8.6
Deep Sand	S	0-10	2	1	0.41	30	194	1.1	0.022	6.5	7.4

Table 2. Subsoil test results for each soil zone

Deep Soils	Depth	Amm N	Nitr N	S	EC 1:5	pH (CaCl2)	pH (H2O)	Exc. Al	Exc. Ca	Exc. Mg	Exc. K	Exc. Na	Boron	Cl	Moisture %
Description	cm	mg/Kg	mg/Kg	mg/Kg	dS/m	pH	pH	neq/100	neq/100	neq/100	neq/100	neq/100	mg/Kg	mg/Kg	%
Loam Flat	10-30	3	4	2.6	0.08	8.1	9	0.06	11.84	3.14	0.87	0.16	2	2.7	13.3
	30-50	3	5	3.8	0.18	8.3	9.2	0.05	9.99	6.38	0.85	1.49	3	6	19.6
	50-80	2	5	8.6	0.35	8.3	9.8	0.06	7.01	7.24	1.12	4.56	16	10	18.5
Mid-slope	10-30	7	4	2.7	0.12	8.2	9	0.05	12.17	2.79	0.85	0.65	2	3.3	12.3
	30-50	4	4	4.1	0.30	8.3	9.5	0.05	7.87	4.14	0.97	3.53	9	6.7	16.2
	50-80	2	5	6.9	0.47	8.2	9.9	0.04	6.11	2.94	1.09	5.37	13	7.8	14.3
Deep Sand	10-30	4	2	1.6	0.05	8.4	9.2	0.13	6.19	0.93	0.24	0.04	1	< 1.0	6.0
	30-50	4	2	1.2	0.07	8.4	9	0.13	6.86	1.46	0.2	0.03	1	2.2	6.1
	50-80	4	1	1.2	0.06	8.5	9.4	0.12	6.66	1.95	0.22	0.03	1	< 1.0	6.0

Seasonal conditions

This northern Mallee site had excellent rainfall through February-April, but a very poor finish to the season. While the loams and mid-slope soils were able to draw subsoil moisture to carry through, much of the deep sand on the tops of rises suffered severe moisture stress through August and September. This trial also suffered from early frost damage which badly affected both the lupins and the peas in patches as well as some vetch, which should be taken into account when assessing results.

Results

Figure 2. Comparative pulse yields across each EM38 range

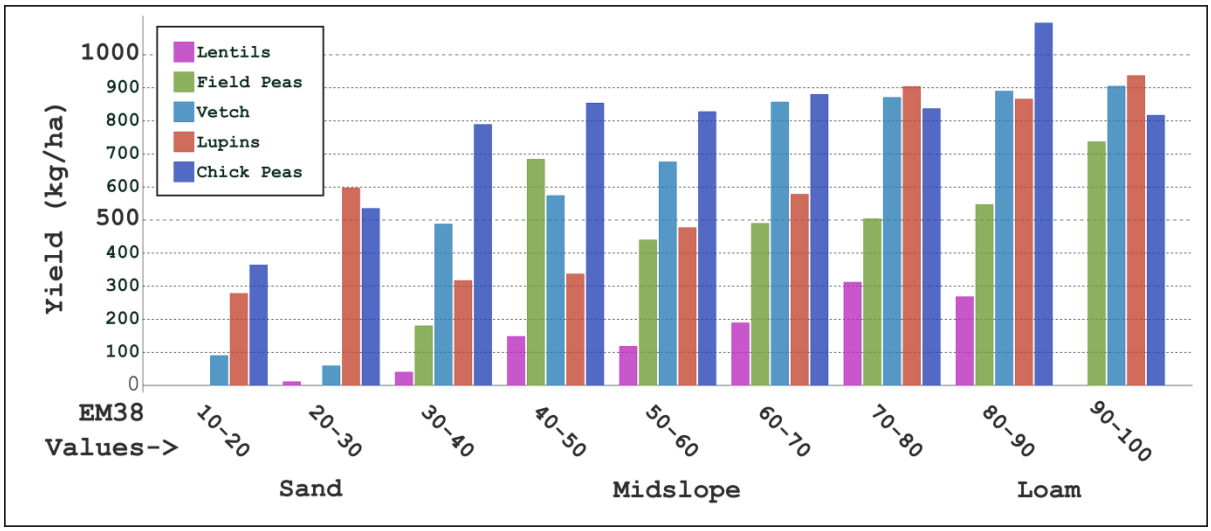


Table 3. Yield and Gross Margin Comparisons of pulses across broad soil types.

Pulse type	Input costs	Seed Price	Seed Rate	Sand EM38 10-30		Mid-slope EM38 30-60		Loam EM38 60-100	
	$/ha	$/t	kg/ha	Yield t/ha	GM $/ha	Yield t/ha	GM $/ha	Yield t/ha	GM $/ha
Lupins*	161	420	80	0.44	23	0.38	-2	0.82	184
Peas*	171	460	95	0	-171	0.42	23	0.57	92
Lentils	152	820	30	0.01	-143	0.10	-68	0.26	58
Vetch	142	700	22	0.08	-90	0.58	263	0.88	474
Chickpeas	176	580	85	0.45	85	0.82	302	0.91	350

* badly frosted in patches

Key Messages

- Chickpeas were consistently amongst the highest yielding pulses at this site across all soil types (Fig 3) and EM38 ranges. They produced the highest gross margins on both the deep sand and mid-slope soils.
- Chickpeas appear to be a viable option for northern Mallee farmers, with ease of reaping being a distinct advantage over other pulse options. There is however much to be learnt about the challenges and risks involved in maintaining good seed size and high quality for marketing in these environments. While there may be less disease pressure in low rainfall areas, good agronomic management is still very important, as each decline in grade quality can significantly affect price and profitability. Many of these issues will be sorted out as more farmers grow chickpeas in these areas.
- Vetch produced the highest gross margin on the high EM38 loamy soils, mainly due to its lower input costs due to a lower seeding rate (Table 1). Vetch remains a relatively safe, easily marketable, versatile break crop option. The brown manured section of the vetch plot will be tested against all other treatments for N contributions in March 2015. Other recent Mallee soil survey work has shown vetch to contribute significantly higher levels of N to the following crops than other pulse options (see http://msfp.org.au/vetch-maximises-n-advantage/).
- Lentils grew very poorly on the sand and only produced a positive gross margin on the loamy flats (Table 1).
- While the timing of the severe early frosts affected both lupins and pea yields in patches, it is also recognised that peas often grow well in northern Malllee although their frost risk remains very high in most seasons.

Acknowledgements

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