2016

Comparing break crop performance in the SA Mallee

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Why was the trial was done?

Trials were implemented to compare break crop productivity and profitability on major soil types in the northern South Australian Mallee. This information will help farmers in the region to select the most appropriate break crop for their farming system.

How was the trial was done?

Trials were established at Waikerie and Loxton with two trials implemented at each site on contrasting soil types. At the Waikerie site, one trial was located on a sandy loam and the other on a shallow heavier soil with limestone. At Loxton, the trials were located on either a red loam or a deep sand. The break crops represented in the trial were field pea, vetch, chickpea, lentil, lupin and canola. In 2016, the sites were sown soon after the break of the season with the Loxton site sown on 27 May and the Waikerie site on 30 May.

Key Messages

- Grain yield across all crops were exceptional in 2016 despite a relatively late break and sowing date. Yields were aided by exceptional spring conditions where there was abundant moisture and cool finishing conditions.
- Field peas were the most productive crop grown across all soil types in 2016 and averaged an exceptional 2.9 t/ha. Vetch (2.2 t/ha), narrow leaf lupin (2.1 t/ha) and lentils (2.1 t/ha) also averaged over 2 t/ha across the four trial sites. Faba beans yielded just under 2 t/ha while both chickpea treatments yielded above 1.5 t/ha (Kabuli 1.5; Desi 1.8 (t/ha). Both canola and albus lupins averaged less than 1.5 t/ha.
- High value crops such as desi and kabuli chickpeas produced extremely high gross margins on approximately $2000/ha. Lentils also had an average gross margin of over $1000/ha across the four trial sites.
- Break crop productivity and profitability was very different between common Mallee soil types with the poorest break crop productivity and profitability on the deep sand at Loxton in 2016.

Background

Mallee farmers are looking to increase the proportion and diversity of broadleaved break crops in their paddock rotations, however very little localised information is available to support break crop selection and management in low rainfall environments. Furthermore, there is an extreme soil type variability between Mallee paddocks, which adds additional complexity when selecting an appropriate break crop for these farming systems. To address these knowledge gaps, Mallee Sustainable Farming (MSF) with funding from South Australian Grains Industry Trust (SAGIT), commenced a three-year project in 2015 to compare broadleaved break crop performance across four soil types in the northern Mallee of South Australia (SA). The aim of these trials is to provide farmers with information on the relative productivity of legume break crops in this low rainfall Mallee region.

About the trial

The trials are located at Waikerie and Loxton in the northern SA Mallee with one trial located on each of two contrasting soil types within the same paddock. A brief description of each of the four trial sites is provided below:

- **Loxton Flat:** Red loam located in a swale
- **Loxton Sand:** Deep yellow sand located on the top of an east-west dune
- **Waikerie Flat:** Heavy red-grey soil with limestone from 20-30 cm below the surface
- **Waikerie Sand:** Red sandy loam located mid-slope

Each trial has nine different broadleaved crop options replicated four times. Table 1 shows the crop type, variety, target plant population and seeding rate used for each treatment. Each treatment at each site was managed independently to ensure that it had every opportunity to reach its potential. Agronomic management differences included herbicide choice, fertiliser rates and fungicide and pesticide applications.

The Loxton sites were sown on 27 May 2016 and the Waikerie site on 30 May 2016. All plots received 100 kg/ha of single super phosphate banded below the seed and all legumes were inoculated just prior to seeding with their specific Rhizobian strain using a peat inoculant.

All canola received an additional 100 kg/ha of urea applied immediately prior to sowing and incorporated by the sowing operation. Pre-emergence herbicide packages and rates were specific for each treatment and soil type. Grass weeds were controlled with an application of clethodim and haloxyfop on 21 July. Broadleaved weeds were controlled to an acceptable level by the knockdown and pre-emergence herbicide applications, except for the Waikerie sand site where a significant medic infestation affected all treatments except for desi and kabuli chickpeas. Due to significant spring rainfall, two applications of chlorothalonil were applied as preventative treatments to the lentil, chickpea and faba bean treatments on the 19 September and the 7 of October. Native budworm was controlled at all sites on 19 September using alpha-cypermethrin.

Crop performance was assessed by measuring establishment, peak crop biomass and grain yield. The trials were machine harvested across two dates (17 November and 5 December) ensure grain yield was measured soon after crops matured. Rainfall was recorded at both locations using automatic rain gauges and temperature was recorded at hourly intervals using iButton temperature loggers. One logger was placed at a height of 1.2 m above ground level (similar to official met gauges) and the other at 0.5 m to reflect crop canopy height.

Gross Margins were calculated for each treatment using the Rural Solutions Farm Gross Margin and Enterprise Planning Guide. The January grain prices from the 2017 guide were used to undertake the economic analysis (Table 1).

Table 1. *Break crop treatment details for Loxton and Waikerie trial sites*

Crop	Variety	Target plants per m^2	Seeding rate (kg/ha)	Price ($/t)
Field Pea	PBA Wharton	45	90	350
Vetch	Rasina	60	40	300
Narrow-leaved Lupin	PBA Barlock	50	100	230
Albus Lupin	Luxor	35	120	230
Faba Bean	PBA Samira	20	150	270
Lentil	PBA Hurricane	120	50	680
Desi Chickpea	PBA Striker	45	90	1350
Kabuli Chickpea	Genesis 090	35	100	1450
Canola	Stingray	40	2.5	520

What happened?

Seasonal Conditions

Both sites experienced a late break with significant autumn rainfall not occurring until the last week in May. Rainfall for the remainder of the season was well above average with exceptional rainfall occurring in September (approximately 100 mm at both sites). In contrast to the 2015 season, frost did not appear to impact any of the sites while the end of the season was generally cool allowing for an extended flowering and podding period for all the break crop treatments.

Grain Yield

Field peas had the highest average grain yield across all four sites producing 2.9 t/ha and was the standout treatment at both Waikerie sites. Vetch (2.2 t/ha) lentils (2.1 t/ha) and narrow leaf lupins (2.1 t/ha) also had an average yield of more than 2 t/ha across all four sites. Narrow leaf lupins were the only crop to produce greater than 2 t/ha on the deep sand at Loxton while lentils struggled on the deep sand but excelled on the heavier soil types at both Loxton and Waikerie.

Faba bean's averaged 1.9 t/ha across all sites while desi chickpea and kabuli chickpea yielded 1.8 and 1.5 t/ha respectively. Both chickpea treatments preformed relatively well at the Waikerie sand site which is possibly partly due to improved medic control in these treatments with the use of Balance herbicide. Canola averaged 1.4 t/ha, however canola grain yield was least variable (1 – 1.6 t/ha) across all sites. Albus lupins had the poorest average yield of 1.2 t/ha.

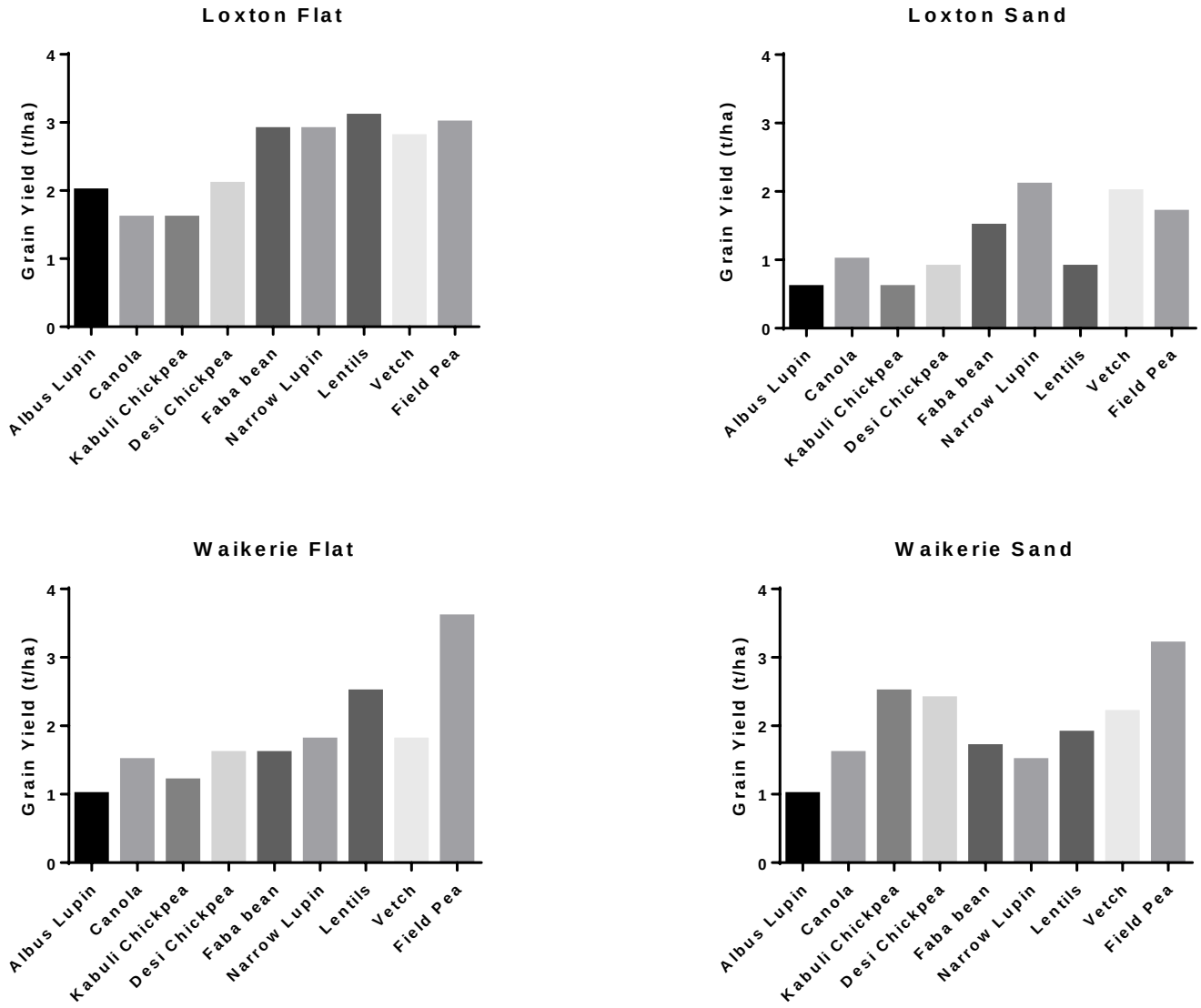

Figure 1 *Break crop grain yield for the four trial sites*

Profitability

Chickpeas were the standout crop in terms of profitability across all four sites in 2016 due to exceptionally high prices of nearly $1500/t. Desi chickpea had an average gross margin of $2037/ha and kabuli chickpea had a gross margin of $1759 across the four sites. Lentil's ($1111/ha) also had an average gross margin of more than $1000/ha across the four sites. Field peas also produced an exceptional average gross margin ($710/ha). Canola was the fifth most profitable break crop option across all sites in 2016 with an average gross margin of $471/ha which was similar to vetch grain at $443/ha. Low grain prices narrow leaf lupins and faba beans restricted the profitability of these crops in 2016 despite average grain yields of approximately 2 t/ha. Narrow leaf lupin had a gross margin of $259/ha and faba bean averaged $222/ha across the four sites. Despite the excellent growing season, the profitability of albus lupin was very low at only $70/ha.

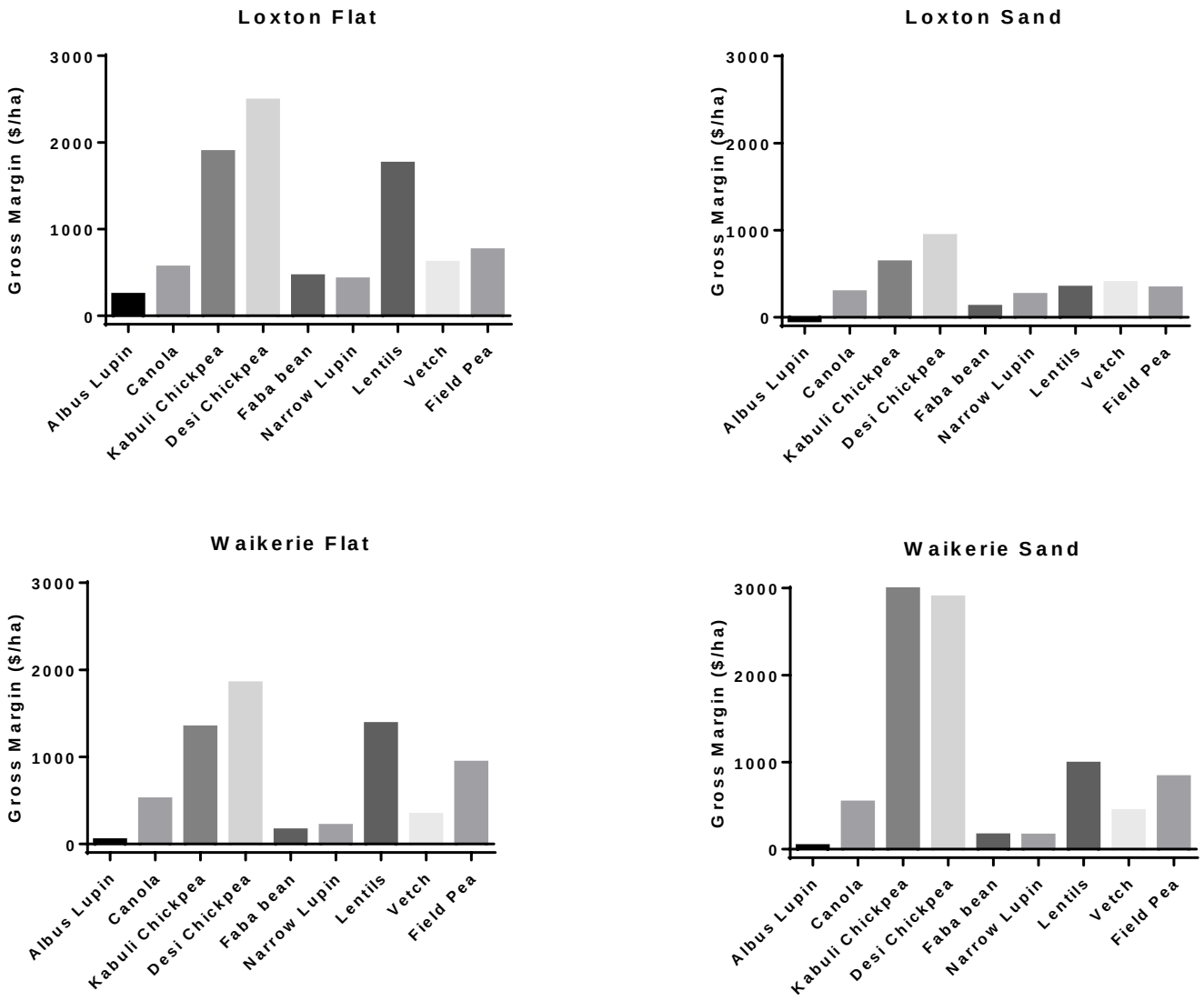

Figure 2 *Gross margin for each break crop at the four trial sites*

What does this mean?

The potential productivity and profitability that can be achieved by break crops in the northern Mallee was clearly demonstrated in 2016. Extremely favourable conditions in spring saw field pea's average nearly 3 t/ha across the four soil types and many break crops (vetch, lentil and narrow leaf lupin and faba bean) average near or above 2 t/ha. However, it was the profitability that can be created by high value crops that was most striking with desi and kabuli chickpea's producing extremely high gross margins on approximately $2000/ha. While planning for such returns on a routine basis is not possible, this result does show the benefits and opportunities of having a high level of diversity of enterprise options within the cropping sequence.

These trials highlight significant variability in the productivity and profitability between the break crop options that may be considered by Mallee farmers. Furthermore, there was large variation in break crop productivity and profitability between the soil types commonly found in Mallee paddocks. Trials are continuing at all four sites in 2017 to evaluate break crop performance across seasons and provide Mallee farmers with greater confidence when selecting break crops for inclusion in their farming system.

Acknowledgements

South Australian Grain Industry Trust (SAGIT) for providing funding for this project.
Matt Whitney (Dodgshun Medlin) for providing advice on trial management.
Todd McDonald (MSF) and Peter Telfer (SARDI) for their technical assistance on the trial.
Brenton Kroehn and the Lowbank Ag Bureau for assistance in selecting and setting up the Waikerie site and Bulla Burra staff for assistance at the Loxton site.

References and links

Rural Solutions SA (2015 and 2016). Farm Gross Margin and Enterprise Planning Guide.
http://www.grdc.com.au/FarmGrossMarginGuide

Further information

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