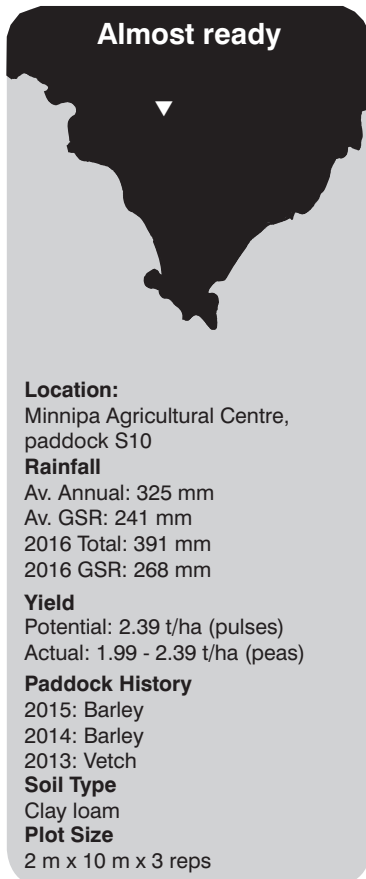


# Evaluating alternative pulse options for low rainfall regions

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RESEARCH



Break Crops

are likely to be a lower risk and more profitable option in seasonal conditions that are less favourable for alternative pulse options.

- Chickpeas are generally less suited to many cropping regions of South Australia, and with a change in the ascochyta blight pathogen growers need to carefully consider their risk to AB infection and ability to effectively control the disease, including in low rainfall regions.

## Why do the trial?

There has been increasing interest from growers and agronomists in low rainfall farming regions to evaluate alternative break crop options to field peas. Field peas are generally well suited to low rainfall farming systems and have historically been the main pulse option for the upper Eyre Peninsula region. However, relatively high prices, production success stories and availability of varieties with improved agronomic characteristics has renewed interest in alternative pulse options and driven an increase in lentil production in low rainfall regions. This is the third consecutive year that this pulse comparison trial has been conducted. Pulse performance in 2016 was generally improved over the previous two years and mean crop yields from each year have been included for comparison.

## How was it done?

A pulse field demonstration trial was set up at Minnipa in 2016 to compare newly released faba

bean, chickpea, field pea and lentil varieties. Five varieties of chickpea, six varieties of faba bean, and seven varieties of lentil and field pea were selected for comparison. Included in the variety selection were Nura faba bean, Genesis TM 090 chickpea, Kasper field pea and Nugget lentil as traditional commercial standards. Chickpea, field pea and lentil seed was treated with P-Pickle-T and field pea were treated with Apron seed treatment prior to sowing. All crops were sown on 18 May. The different crop types were sown as individual trials for ease of crop management and harvest. Faba beans were sown with Group F inoculum at 24 plants/m<sup>2</sup>, field peas with Group E at 55 plants/m<sup>2</sup> and lentils with Group F at 120 plants/m<sup>2</sup>. Chickpeas were sown with Group N inoculum. Desi chickpeas were sown at 50 plants/m<sup>2</sup> and kabuli chickpea varieties were sown at 35 plants/m<sup>2</sup>. Throughout the growing season pests and weeds were controlled as required in line with standard pulse crop management. Emergence and flowering were recorded during the growing season and grain yields were taken at harvest. Field peas and lentils were harvested on 4 November. Faba beans and chickpeas were harvested on 24 November.

## Key messages

- Production of alternative pulse options to field pea in low rainfall regions has potential to be successful under favourable seasonal conditions providing essential production criteria are met.
- Some new varietal options offer earlier maturity as well as improvements in harvestability, disease resistance and herbicide tolerance over older commercial standards, aiding production and profitability.
- Field peas have proven to be a reliable option on the upper Eyre Peninsula and

**Table 1 Faba bean, chickpea, field pea and lentil variety performance, Minnipa 2016 (listed in descending order of grain yield)**

Faba bean variety	Yield (t/ha)	Flower day (Julian)	Maturity rating	Chickpea variety	Yield (t/ha)	Flower day (Julian)	Maturity rating
Farah	2.13	225	Early/mid	PBA Striker	1.39	239	Early
PBA Samira	2.10	231	Early/mid	Genesis079	1.28	240	Early
Nura	2.08	230	Early/mid	PBA Monarch	1.23	238	Early
AF09169	2.00	224	Early	PBA Slasher	1.10	240	Mid
AF09167	1.98	224	Early	Genesis090	0.91	245	Mid
Fiord	1.97	225	Early				
<b>Crop Mean</b>	<b>2.04</b>			<b>Crop Mean</b>	<b>1.18</b>		
<i>LSD (P=0.05)</i>	<i>0.20</i>			<i>LSD (P=0.05)</i>	<i>0.26</i>		
<b>2015 mean</b>	<b>1.45</b>			<b>2015 mean</b>	<b>0.67</b>		
<b>2014 mean</b>	<b>1.89</b>			<b>2014 mean</b>	<b>1.30</b>		

Field pea variety	Yield (t/ha)	Flower day (Julian)	Maturity rating	Lentil variety	Yield (t/ha)	Flower day (Julian)	Maturity rating
PBA Pearl	2.39	231	Early	CIPAL1301	1.96	240	Early/mid
OZP1101	2.30	239	Mid/late	PBA Hurricane XT	1.95	242	Mid
PBA Twilight	2.25	227	Early	PBA Jumbo2	1.85	239	Mid
PBA Wharton	2.15	231	Early	PBA Bolt	1.77	239	Early/mid
Kaspa	2.01	239	Mid	CIPAL1422	1.73	240	Mid
PBA Oura	1.99	229	Early	PBA Blitz	1.31	235	Early
PBA Percy	1.99	224	Early	Nugget	1.26	243	Mid/late
<b>Crop Mean</b>	<b>2.15</b>			<b>Crop Mean</b>	<b>1.69</b>		
<i>LSD (P=0.05)</i>	<i>0.18</i>			<i>LSD (P=0.05)</i>	<i>0.16</i>		
<b>2015 mean</b>	<b>1.83</b>			<b>2015 mean</b>	<b>1.36</b>		
<b>2014 mean</b>	<b>1.79</b>			<b>2014 mean</b>	<b>1.43</b>		

## What happened?

Annual rainfall (391 mm) and growing season rainfall (268 mm) in 2016 were above average for Minnipa. Above average rainfall in the months leading up to seeding provided adequate soil moisture for good germination and early growth. Cool spring conditions combined with above average rainfall in September made for ideal conditions for the critical pod filling stage, producing more growth and higher yields compared to the previous two years.

In 2016 field peas yielded 35% above the 2011 to 2015 long term average yield (1.59 t/ha) for Minnipa and achieved the highest crop mean of 2.15 t/ha, followed closely by faba bean (2.04 t/ha), then followed by lentil (1.69 t/ha) and chickpea (1.18 t/ha) (Table 1). Faba bean, lentil and field pea had

improved yields in 2016 compared to the previous two years, however chickpea were higher yielding under the more favourable conditions of 2014.

PBA Pearl, OZP1101 and PBA Twilight were the highest yielding pea varieties in 2016. OZP1101 is a mid to late maturing 'kaspa' type currently being bulked up for release as a Kaspa replacement and out yielded this variety by 14%. Kaspa, PBA Oura and PBA Percy were the lowest yielding varieties, with Kaspa yielding 19% lower than PBA Pearl. The white seeded early to mid-maturing variety PBA Pearl has been the top performer in this trial in 2015 and 2016, as well as the highest performing field pea variety in long term yields (2011-2015) across SA.

Faba bean had an average yield of 2.04 t/ha at Minnipa in 2016,

only 5% behind field peas and no significant differences were seen between the different faba bean varieties. AF09169 is an advanced breeding line adapted to medium and low rainfall areas and has generally produced significantly higher yields than current varieties in regions that are generally considered marginal for faba bean production. Faba beans performed well in 2014 with yields slightly better than field pea, however under a dry finish in 2015 yields dropped significantly.

Lentils averaged 1.69 t/ha, yielding 27% lower than field peas. CIPAL1301, PBA Hurricane XT and PBA Jumbo2 were the highest yielding varieties. CIPAL1301 is a PBA Bolt replacement and yielded 11% higher than this variety. PBA Hurricane XT yielded 13% higher than CIPAL1422, an advanced breeding line with the same herbicide tolerance characteristics. Generally CIPAL1422 has been similar yielding to PBA Hurricane XT across National Variety Trials (NVT) in SA. It has improved resistance to botrytis grey mould (BGM) over PBA Hurricane XT and a medium seed size offering an alternative marketing option to this popular variety. Both CIPAL1301 and CIPAL1422 are anticipated to be available to farmers for seeding in 2018. PBA Blitz and commercial standard Nugget yielded significantly lower than all other varieties last year.

Chickpea was again the lowest yielding pulse crop in 2016, with average yields nearly half those of field peas. The early maturing desi variety PBA Striker was the highest yielding variety along with kabuli types PBA Monarch and GenesisTM079. PBA Striker yielded 26% higher than mid maturing desi variety PBA Slasher, while GenesisTM079 yielded significantly higher than fellow small seeded kabuli variety

GenesisTM090 with a 40% yield advantage.

Significant differences were seen in lentil yield between varieties within and across seasons (Figure 1). This demonstrates that variety performance is dependent upon seasonal conditions and that correct variety choice is paramount for achieving high yields if choosing to grow lentils in low rainfall cropping environments. Nugget performed similarly across the seasons with a slight yield increase, while PBA Blitz performed similarly with a slight decrease in yield. PBA Hurricane XT has generally been one of the highest yielding varieties across seasons in these trials but had significantly lower yield under the dry spring finishing conditions of 2015. PBA Bolt followed the same trend as PBA Hurricane XT however was higher yielding than the latter in 2015.

**What does this mean?**

The 2016 season saw higher yields than previous two seasons in field pea, lentil and faba bean. Chickpeas however performed better at Minnipa in 2014 due to adequate rainfall during the growing season and warmer temperatures during critical flower and pod fill stages. A virulence change in the ascochyta blight (AB) pathogen in southern

Australia now means that all current chickpea varieties are rated as either susceptible or moderately susceptible. Although often relatively lower yielding in low rainfall regions, moderately susceptible varieties GenesisTM090 and PBA Slasher will have a reduced production risk and require fewer fungicides than the higher yielding susceptible varieties such as PBA Striker. Chickpeas are generally less suited than other pulse options in many cropping regions in SA due to their relatively late maturity and increased sensitivity to cold temperatures during the flowering and pod filling phase.

Sowing dates over the previous three years have been relatively early (early-mid May), with flowering and pod filling growth stages generally lining up with mild conditions, critical for maximizing yield in faba bean. If delayed sowing is combined with dry finishing conditions as experienced in 2015 it is likely that the critical flowering period will be shortened and yields will be penalised. Hence, faba beans are an opportunistic pulse crop option in low rainfall regions best suited to years with a good early season break and favourable outlook conditions.

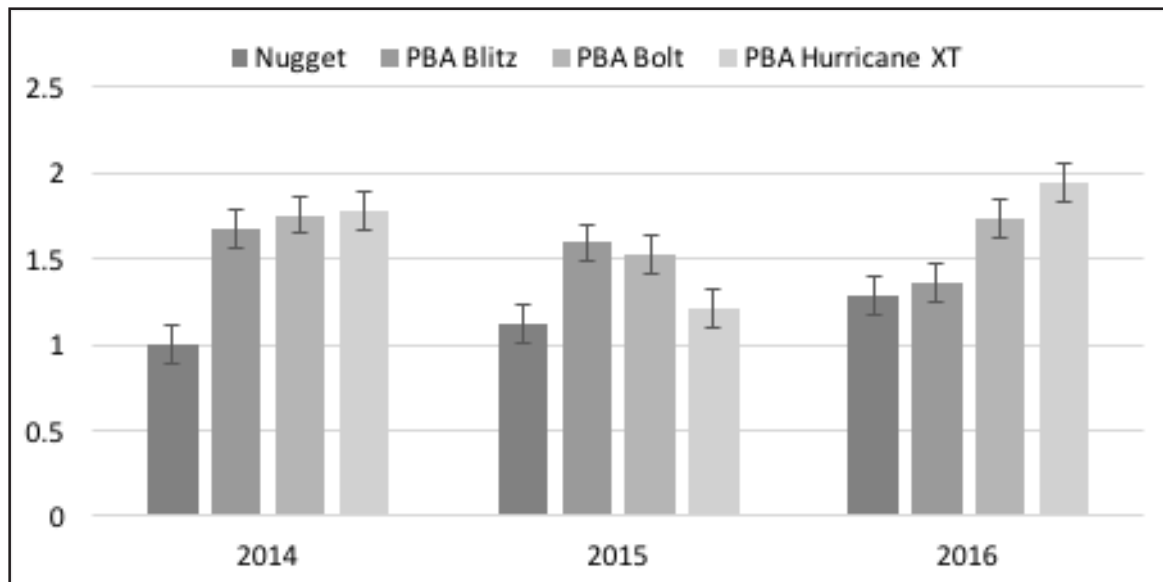


Figure 1 Long term lentil variety performance, Minnipa 2014-2016

Lentils have become increasingly popular across South Australia including low rainfall regions where they have not traditionally been grown. Lentil production in the upper and Eastern Eyre Peninsula is now estimated at similar levels to field pea production in these areas (PIRSA Crop Estimates, 2017). Lentils have performed well at Minnipa in the past three years under favourable conditions, however the newly released varieties need further evaluation in less favourable seasons to compare their performance to field peas. Field peas are well suited to low rainfall areas due to their relatively early maturity, high levels of winter biomass production and broader adaptation to different soil types. They have also proved to be the most reliable and stable pulse option over variable seasonal conditions in low rainfall cropping environments compared to alternative pulse options and will likely be the best pulse option in poor seasonal conditions, particularly if current high relative prices are not sustained in other options.

Lentil production in many cases has been successful across low rainfall areas in recent years with improved variety choice allowing growers to take advantage of favourable seasons and high grain prices. If the opportunity arises with

a good season break and outlook there are a number of things that growers need to consider before growing alternative pulse crops such as lentils. This includes paddock selection and soil type (particularly flat, free draining paddocks free of sticks and stones to improve harvestability), early time of sowing, correct agronomic management and variety choice, marketing and storage. Growers need to be aware of any specific market requirements and in some cases on farm storage may be required. The ability to complete lentil harvest timely and store grain on-farm must also be considered when growing lentils as seed quality is quickly reduced by rain events on the mature grain.

Correct variety choice is an important factor to consider, with newly released varieties offering earlier maturity and improvements in harvestability, disease resistance and tolerance to herbicide. Selections should be based upon all available information. The availability of the variety PBA Hurricane XT with improved tolerance to Group B residual herbicides has greatly improved the ease of production in these areas and is a popular choice for this reason. PBA Bolt with improved tolerance to boron and salinity and improved harvestability over many other

varieties has also been popular. Both of these varieties require fungicide protection for botrytis grey mould, which is not normally a problem in these areas but present in many crops last year.

With all information taken into consideration, further expansion of lentil into nontraditional growing regions is possible provided that all essential criteria for successful production are met. Growers need to be mindful that current relative high prices for alternative pulse options such as chickpea are unlikely to be sustainable and crop choice should be made on long term average grain yields and realistic prices. Faba bean remain an opportunistic pulse crop following a good season break and favourable season outlook in many soil types in these areas.

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