

M2. Low Rainfall Pulse Evaluation, Upper Eyre Peninsula (Minnipa), South Australia

Aim

To evaluate pulse options in the upper Eyre Peninsula region following recent increased interest in alternative pulse options to field peas from growers and agronomists.

Table 1: Varieties and sowing densities (plants/m²) of pulses sown at Minnipa, 2014

Varieties			Plant density
Field Peas	PBA Wharton	PBA Pearl	55 plants/m ²
	OBA Oura	Kaspa	
	PBA Twilight		
Lentils	PBA Hurricane XT	Nugget	120 plants/m ²
	PBA Bolt	PBA Flash	
	PBA Blitz		
Faba Beans	Fiord	Nura	24 plants/m ²
	AF09167	Farah	
	PBA Samira		
Chickpeas	PBA Slasher	Genesis TM 079	Desi = 50 plants/m ²
	PBA striker	Genesis TM 090	kabuli = 35 plants/m ²
	PBA Monarch		

Other Details

Sowing date: 5th of May
Fertiliser: DAP @ 59 kg/ha at sowing
Seed treatment: P-Pickel T (200 ml/100kg seed)
Inoculant: Group N (Chickpea only)

Results and interpretation

- Faba beans, averaging a yield of 1.8 t/ha, were the highest yielding pulse in 2014, 6% higher than field peas (1.7 t/ha). Lentils averaged 1.4 t/ha while chickpeas were the lowest yielding crop (27% lower than field peas), with an average yield of 1.3 t/ha.
- Faba beans – Fiord yielded higher than all other varieties, except for AF09167 (Table 1). These two varieties are the earliest maturing faba bean varieties used in this trial. Fiord has a short plant type and early maturity but poor disease resistance and seed quality.
- Field peas – Early maturing PBA Wharton yielded higher than all other varieties except for PBA Oura. Kaspa showed the lowest yields perhaps due to its late maturity.
- Lentils – PBA Hurricane XT and PBA Bolt were the two highest yielding varieties, followed by PBA Blitz. PBA Hurricane XT and PBA Bolt were approximately 75% higher yielding than Nugget. The low yield from PBA Flash is unexpected and unexplained and should be treated with caution. Observations and scores during growing season do not support this yield performance in PBA Flash.
- Chickpeas – Desi chickpeas tended to be higher yielding, due to their earlier maturity and broader adaptation to a range of soil types. PBA striker was the highest yielding variety. PBA Slasher, GenesisTM 079 and PBA Monarch yielded similarly and have similar maturities. GenesisTM 090 is the latest maturing variety and this was the lowest yielding variety.

Table 2. Field pea, lentil, faba bean and chickpea variety performance, Minnipa 2014 (listed in descending order of grain yield).

Field Pea variety	Yield (t/ha)			Lentil variety	Yield (t/ha)	Flower day (Julian)	Maturity rating
PBA Wharton	2.12	221	Early	PBA Hurricane XT	1.8	235	Mid
PBA Oura	1.88	218	Early	PBA Bolt	1.76	238	Early-mid
PBA Twilight	1.73	216	Early	PBA Blitz	1.70	236	Early
PBA Pearl	1.68	223	Early-mid	Nugget	1.01#	240	Mid-late
Kaspa	1.52	225	Mid	PBA Flash	0.93#	238	Early-mid
Crop mean (t/ha)	1.79				1.43		
LSD (0.05)	0.31				0.04		
Faba bean variety	Yield (t/ha)	Flower day (Julian)	Maturity rating	Chickpea variety	Yield (t/ha)	Flower day (Julian)	Maturity rating
Fiord	2.13	208	Early	PBA Striker	1.52	233	Early
AF09167	1.92	210	Early	PBA Slasher	1.35	236	Mid
PBA Samira	1.84	223	Early-mid	Genesis079	1.34	235	Early
Nura	1.80	225	Early-mid	PBA Monarch	1.23	233	Early
Farah	1.79	210	Early-mid	Genesis090	1.09	237	Mid
Crop mean (t/ha)	1.89				1.30		
LSD (0.05)	0.22				0.16		

lower yields of these varieties are unexplained, treat with caution

Key findings and comments

- Grain yields of all pulses evaluated in 2014 were very much higher than their long term averages and also than those achieved in 1999, the last time these four pulse types were compared at Minnipa.
- The higher yields achieved last year are largely a result of the more favourable season that occurred in 2014 compared with 1999. Growing season rainfall was 85 mm higher in 2014 and annual rainfall 144 mm higher. Another major factor was the earlier sowing date in 2014 (May 5) compared with May 28 in 1999.
- Previous studies on the Upper Eyre Peninsula have shown that field pea yield is reduced by between 0.1 – 0.2 t/ha for every week sowing is delayed. The other critical seasonal difference in 2014 was the absence of hot days during the flowering and grain fill period. In 1999 a severe hot day in early September (33°C) drove crops rapidly towards premature maturity, the absence of these type of events in 2014 allowed crops to finish last year despite the lack of significant rainfall after July.
- Under favourable conditions there was little separation in grain yield between the pulse types in 2014. Field pea yields are likely to have been reduced by the high disease infection that occurred last year while the later maturing chickpeas were lower yielding than all other crops. Generally earlier maturing varieties yielded higher than those maturing later across all crops and this reflected the dry finish to the season.
- Apart from in faba beans recent early maturing variety releases (PBA Wharton & PBA Oura field peas, PBA Blitz, PBA Bolt & PBA Hurricane lentils and PBA Striker and PBA Monarch chickpea) were all higher yielding than the older standard later maturing varieties (Kaspa field peas, Nugget lentils and Genesis 090 chickpeas). This reflects recent good progress being made by the relevant PBA breeding programs particularly when considering that a number of these varieties also contain agronomic improvements such as boron tolerance, disease resistance, harvestability and in the case of PBA Hurricane XT, herbicide tolerance. The PBA faba bean program is targeting medium to higher rainfall production areas with a large emphasis on improving disease resistance and seed quality and recent releases have not been aimed at low rainfall environments.
- In previous years PBA Wharton has generally performed similar to PBA Twilight and Kaspa at Minnipa however it was the highest yielding variety last year. It also was high yielding at many other sites in SA in 2014 most likely due to it being well suited to 'favourable' short season environments due to its early maturity and slightly lower biomass production than Kaspa. Its

suitability to years with lower winter rainfall levels is still questionable and requires further evaluation on the Upper Eyre Peninsula. Its combination of early maturity, boron tolerance and virus resistance makes it well suited to the lower rainfall regions and it has performed well in the Victorian mallee over a number of years.

- Clearly the results in table 1 show that successful and potentially profitable pulse crops can be grown in some regions of the low rainfall zone given favourable season conditions. Despite only similar yields to other crops in 2014 field pea remain the best adapted pulse to these regions, particularly in lower rainfall seasons due to their higher levels of winter biomass production and broader soil type adaptation.
- Pulses are not suited to all soil types in the low rainfall regions and should be targeted at the better loamy soil types free of herbicide residues, sticks and stones. Early sowing dates are also critical to maximise success but as seen in 2014 consideration with black spot risk is required with field peas particularly in the more reliable production areas and where sown in close proximity to the previous years pea stubble. Frost risk also needs careful consideration. Faba beans are the least susceptible to frost but still occur yield loss and the other three options are all susceptible. Delayed sowing does not guarantee frost avoidance and areas prone to regular frost events should be avoided.

Dual purpose field peas, forage peas or vetch all provide alternative options to the straight grain crops for these areas. Lentil, faba bean and chickpea despite varietal improvements and a similar performance to field pea at Minnipa in 2014 remain suited to the better soil types and more reliable production areas of the upper Eyre Peninsula. Outside of this they are at best opportunistic options in years with early season breaks and favourable seasonal outlooks. Where they are grown, correct varietal choice will be critical to success. Earlier maturing varieties with improvements in disease, boron and in particular improved height and lodging resistance to aid harvestability will all help to increase the chances of success and should be used where available. Timely insect control and harvest is critical to maximise yield and reduce seed quality down grading. Growers also need to be aware of the specific market requirements for pulses including limitations with market access, often on farm storage will be required until the appropriate market is secured.