

18. Pulse Evaluation in the High Rainfall Zone of the South East

Katrina Copping, walteela410@gmail.com

Trial Manager: Amanda Pearce, SARDI, Amanda.pearce@sa.gov.au

KEY MESSAGES

- A range of agronomic and variety trials for pulse and alternative crops were sown at sites across the High Rainfall Zone (HRZ) of the South East in 2017.
- Trials across this zone are part of national breeding program trials (adding varietal information to GRDC National Variety Trials database) or funded by MFMG.
- Results suggest a variety of pulses and alternative crops may be adapted to the south east.
- Agronomic treatments applied at Millicent did not alter broad bean performance.
- Trial planning for 2018 is underway.

Background

As in the Medium Rainfall Zone (MRZ), in the High Rainfall Zone (HRZ), non-cereal break crops such as pulses and pastures in the cropping rotation can reduce disease incidences for cereals, offer additional weed control methods, improve soil fertility and reduce the impact of fluctuations in commodity prices and seasonal conditions through a greater range of grain products.

Activities

All trials in the undertaken endeavour to answer relevant questions aimed at improving break crop performance in integrated farming systems in the HRZ.

National Variety Trials (NVT's) (GRDC funded) is a national program of comparative crop variety testing with standardised trial management, data generation, collection and dissemination. NVT data is accessible online at www.nvtonline.com.au. Long-term data is available online for NVT's.

In 2017, MFMG funded a bean variety trial, two broad bean agronomic trials and an alternative pulse crop trial. The trials were undertaken at either Conmurra or Millicent. Pulse trial data from earlier trials is available in previous MFMG Annual Result Books.

Faba Bean and Broad Bean Evaluation

In 2017 there were two national breeding program trials located at Bool Lagoon (sown 9 May) and Millicent (sown 22 May). These trials are added to the NVT database to provide additional varietal information. A further bean variety trial funded by MFMG was undertaken at Conmurra (sown 11 May).

The results for the Bool Lagoon and Millicent trials are shown in Table 1. These sites included two varieties of broad beans (Aquadulce and PBA Kareema). The mid maturity faba bean variety PBA Samira was the highest yielding variety at Bool

Lagoon (3.40 t/ha) however it was only significantly higher than Aquadulce (2.31 t/ha) and PBA Rana (2.29 t/ha). PBA Rana (3.98 t/ha) and PBA Zahara (3.95 t/ha) yielded well at Millicent, however they were only significantly higher than Nura (2.94 t/ha) which also yielded significantly less than Aquadulce and PBA Samira. Further trial information and long-term data is accessible online at www.nvtonline.com.au

The MFMG Conmurra trial results are shown in Table 2. Seeding rates were 24 plants/m² for faba beans and 18 plants/m²

for broad beans. The Conmurra trial resulted in no significant differences in grain yield between varieties, with a trial average of 2.78 t/ha.

When making decisions around varieties in the HRZ of the South East several things need to be taken into account including; the water tolerance of varieties, the disease package that each variety provides, target market and market accessibility, the likelihood of the variety achieving the desired grade within that market and the premiums that may be achieved.

Varietal information from the 2018 Sowing Guide can be accessed online at <https://grdc.com.au/2018SowingGuideSA> and notes on selected faba bean and broad bean varieties are also included in Chapter 18.

Table 1. 2017 Lower South East (Bool Lagoon and Millicent) bean variety trial yields (t/ha).

Bean Variety		Bool Lagoon		Millicent	
		Yield	% Site Mean	Yield	% Site Mean
		(t/ha)	(%)	(t/ha)	(%)
Farah	Faba Bean	2.76	87	3.42	98
Fiesta VF	Faba Bean	2.92	92	-	-
Nura	Faba Bean	2.88	91	2.94	85
PBA Rana	Faba Bean	2.29	72	3.98	114
PBA Samira	Faba Bean	3.40	107	3.72	107
PBA Zahra	Faba Bean	2.76	87	3.95	114
Aquadulce	Broad Bean	2.31	73	3.77	108
PBA Kareema	Broad Bean	2.77	87	3.52	101
Site Mean		3.17		3.48	
P Value (0.05)		<0.001		<0.001	
LSD		0.68		0.65	
CV %		11.9		11.4	
- _not sown					

Table 2. 2017 Conmurra MFMG bean variety yields and seed size.

Bean Variety		Yield (t/ha)	% Site Mean (%)	100 seed weight (g)
Aquadulce	Broad Bean	2.66	96	110.4
PBA Kareema	Broad Bean	2.95	106	179.7
PBA Samira	Faba Bean	2.48	89	74.3
PBA Zahra	Faba Bean	3.01	108	77.2

Site Mean	2.78
P Value (0.05)	0.673
I.s.d	NS
CV (%)	11.2
NS = not significant	

Millicent 2017 Broad Bean Agronomic Trials - Inoculation (Trial 1) and Soil Amelioration (Trial 2)

Broad bean growers in the HRZ of the South East commonly observe crop yellowing during cool wet seasonal conditions in winter. Two broad bean agronomic trials were undertaken by the MFMG at Millicent in 2017 to explore practices that may improve crop performance under these growing conditions. The trials evaluated seed inoculation treatments (Trial 1) and pre-seeding soil amelioration (Trial 2) on crop performance of the broad bean variety PBA Kareema. Trials were sown at Millicent on 22 May with a seeding rate of 18 seeds/m².

The site for both the inoculation and soil amelioration broad bean agronomy trials experienced severe waterlogging during the growing season with high variability observed. The following results from the 2017 trial should be interpreted with caution.

Broad beans have the ability to 'fix' their own nitrogen from the air via nodules on their roots providing specific nitrogen fixing bacteria (rhizobia) are available. Unless the right strain is present in the soil or has been supplied by adding a commercial inoculant at seeding time, effective root nodulation will not occur. This may not become obvious for some time and cannot

be easily overcome after sowing. In the inoculation trial (Trial 1), seven inoculation treatments were evaluated; seed was either untreated (NIL) or inoculated with the commercially produced *Rhizobium leguminosarum* strain WSM-1455 (Group F) inoculant (with, and without, Pulse Seed Coat) or experimental inoculants provided by SARDI rhizobiologists.

The Inoculation trial (Trial 1) resulted in no differences in nodulation throughout the growing season between the NIL treatment and the experimental treatments - as assessed both visually and by root nodulation scoring; completed within 10 weeks post-seeding. Grain yield averaged 1.46 t/ha with no significant differences observed compared to the NIL treatment (Table 3).

The use of the soil ameliorant gypsum was evaluated in Trial 2. Gypsum is a source of sulphur and calcium and is often used to improve dispersive clay soils. Grain yield averaged 1.35 t/ha and the pre-seeding application of gypsum at two different rates did not increase yield above the NIL treatment (Table 4).

Table 3. 2017 Millicent PBA Kareema broad bean Inoculation trial (Trial 1), grain yield and seed size.

Inoculant Treatment @ sowing	Yield (t/ha)	100 seed weights (g)
Nil	1.51	112.98
Commercial Inoculant (WSM-1455)	1.59	111.50
Commercial Inoculant (WSM-1455)+ Pulse Coat	1.48	119.09
Experimental Inoculant #1	1.34	125.95
Experimental Inoculant #2	1.44	121.96
Experimental Inoculant #3	1.33	121.55
Experimental Inoculant #4	1.50	118.39

Site Mean	1.46
P Value (0.05)	0.069
I.s.d	NS
CV (%)	26.1
NS = not significant	

Table 4. 2017 Millicent PBA Kareema broad bean Soil Amelioration trial (Trial 2) grain yield and seed size.

Pre-seeding Gypsum Rate	Yield (t/ha)	100 seed weights (g)
0 t/ha	1.40	113.49
2.5 t/ha	1.33	112.35
5.0 t/ha	1.32	116.78

Site Mean	1.35
P Value (0.05)	0.64
I.s.d	NS
CV (%)	28.1
NS = not significant	

Alternative Pulses, Messina and Linseed Evaluation

With ongoing improvement in varieties and understanding of optimal management practices, pulses are becoming a more reliable and profitable option in cropping systems. In the high rainfall zone of the South East, beans are often perceived to be the lowest risk pulse crop due to their adaptability to a range of soil types and waterlogging. However, uptake and overall production of pulses remains relatively low compared with other cropping zones in South Australia. Potential reasons are varied, but generally relate to risks associated with waterlogging, disease and weed management, unreliable yields and fluctuating prices, especially if food grades cannot be produced.

Following on from observation trials conducted at Conmurra in 2016, a trial was undertaken at Conmurra in 2017 funded by MFMG showcasing the performance of alternative pulses, linseed and messina under local conditions in the HRZ. A range of varieties, selected for adaptation to the south east, varying maturity, different seed sizes and colour (market opportunities) were evaluated.

The trial included the following; three lentil varieties (PBA Hurricane XT, PBA Jumbo 2 and PBA Greenfield); three field pea varieties (PBA Gonyah, PBA Oura and PBA Percy); Linseed and the recently released annual pasture legume, Neptune messina. Sowing occurred on 11 May with seeding rate dependant on crop type. Each crop was managed to maximise yield and was harvested upon maturity.

Lentil yields averaged 1.96 t/ha, however there was no significant difference between the lentil varieties evaluated at Conmurra (Table 5a). Differences in pea variety suitability were observed; PBA Percy failed to produce a harvestable yield in comparison to PBA Gonyah and PBA Oura at Conmurra in 2017. The field pea yield results should be interpreted with caution and were not analysed statistically (Table 5b).

Linseed (2.06 t/ha) and Neptune messina (2.14 t/ha) showed minor variation across in grain yield across replicates (Table 5c).

Table 5a. 2017 MFMG Conmurra Alternative pulses and crops – Lentil grain yield and seed size.

Lentil Variety		Yield (t/ha)	100 seed weight (gm)
PBA Hurricane XT	Small Red	1.82	4.09
PBA Jumbo 2	Large Red	2.05	3.51
PBA Greenfield	Medium Green	2.02	4.61
Site Mean		1.96	
P Value (0.05)		0.836	
I.s.d		NS	
CV (%)		10.8	
NS = not significant			

Table 5b. 2017 MFMG Conmurra Alternative pulses and crops – Pea grain yield and seed size.

Field Pea Variety		Yield (t/ha)	100 seed weight (gm)
PBA Gonyah	Dun (Kaspa Type)	5.53	21.16
PBA Oura	Dun	5.32	22.19

Table 5c. 2017 MFMG Conmurra Alternative pulses and crops – Linseed and messina yield.

Alternative Crop	Seed Yield (t/ha)
Linseed	2.06
Neptune Messina	2.14

Notes on Selected Varieties

Information on the bean, pea and lentil varieties is given in Chapter 17 and can be found on-line at <https://grdc.com.au/2018SowingGuideSA>.

Neptune messina (*Melilotus siculus*) is a recently released aerial seeding annual pasture legume for saline and waterlogging prone soils. Neptune has higher combined tolerance to salinity and waterlogging than all other current pasture legumes. It will supply nitrogen (N) to soils that are generally highly N-deficient, provided it is inoculated with a specially developed salt-tolerant *Rhizobium* strain for messina. Recommended for grazing in combination with other pasture species. Best suited to winter-wet saltland areas of southern Australia with ≥ 375 millimetres (mm) annual rainfall and soil pH(Ca) ≥ 5.5 . (Accessed online at www.seednet.com.au)



Figure 1. Bean Podding.



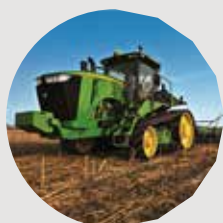
ACKNOWLEDGEMENTS

- SARDI's South East New Variety Agronomy Team, based at Struan, who co-ordinate and manage the trials;
- GRDC National Variety Trials initiative
- Co-operating growers



Wickham Flower
BORDERTOWN • NARACOORTE • KEITH

• JOHN DEERE • MAZDA • NISSAN • GOLDACRES • JCB • KUHN • GASON • BRIDGESTONE •



AGRICULTURAL SALES & SERVICE



VEHICLE SALES & SERVICE



SPARE PARTS



PRECISION AG



BRIDGESTONE (BORDERTOWN)

'Proudly Supporting Locals Since 1931'

Wickham Flower & Co has been serving South East South Australia and Western Victoria since 1931. With branches located throughout the south east, we are the leading agricultural equipment and motor vehicle supplier of the area.

You can rely on us for quality agricultural equipment, motor vehicles and tyres, supported by exceptional service and an extensive parts range.

BORDERTOWN VEHICLES

P: 08 8752 1755

41 Binnie St

NARACOORTE VEHICLES

P: 08 8756 2300

35 MacDonnell St

BORDERTOWN AG

P: 08 8750 1000

3 Cleggett Rd

NARACOORTE AG

P: 08 8762 3622

232 Smith St

KEITH AG

P: 08 8755 3066

Dukes Highway