

F7 Field Pea breeding lines and historic varieties, LRZ Central Mallee (Ouyen), Victoria

F8 Field Pea breeding lines and historic varieties, HRZ South West (Rokewood), Victoria

F9 Field Pea breeding lines and historic varieties, MRZ Wimmera (Rupanyup), Victoria

Aim

To compare the growth, grain yield, quality and gross margins of field pea breeding lines and current and historic varieties.

Treatments

Varieties: See Table 1, 2 and 3 below

Other Details

	Trial Site		
	Ouyen	Rupanyup	Rokewood
Sowing Date	5 May	15 May	26 April
Stubble (height cm)	Standing (10)	Standing(30)	Standing (20)
Row Spacing (cm)	30	36	36
Plant Density (plant/m²)	40	40	40
Fertiliser (kg/ha)¹	60	80	100

1. MAP (9.2, 20.2, 0, 2.7) + Zn (2.5)

Results and Interpretation

- Key Message: The breeding lines OZP1101 and OZP1305 were consistently high yielding in the wet season of 2016, with grain yield higher than or similar to the highest yielding released variety PBA Oura. The blue pea OZ1308 also showed excellent yields at the medium and low rainfall zone sites. P-Pickel T phytotoxicity appeared to affect early crop growth of the breeding lines and varieties and requires further investigation.
- Establishment, early vigour & P-Pickel T (PPT) phytotoxicity: There was a significant difference in establishment among the field pea breeding lines/varieties at Ouyen in 2016. Kaska had the lowest establishment of 31 plants/m² and Maki highest with 43 plants/m² (Table 1). While not specifically counted, visual observations at Rupanyup and Rokewood indicated similar establishment pattern. The good establishment of most varieties in 2016 was probably related to adequate soil moisture at sowing, however the poorer establishment of Kaska was probably related to poor seed quality (from the 2015 harvest) and P-Pickel T phytotoxicity (discussed below).

At Rupanyup early vigour scores recorded four weeks after sowing showed significant differences among the field pea breeding lines and varieties. Similar visual observations were apparent at other sites, but not specifically recorded. Alma (8.0) and Dundale (7.7) had the highest plant vigour scores and Kaska (2.0) lowest (Table 1). The scores are probably related to PPT phytotoxicity which has been observed in previous seasons. It is difficult to interpret why the PPT phytotoxicity occurred, as it occurs irregularly in field trials. In previous trials (eg 2015) it appeared to be related to the sowing conditions, where the soil had only marginal moisture for establishment. There also appeared to be a genetic/varietal response, which was discussed in the 2015 report. In 2016, it appeared that seed quality could be the contributing factor. Kaska which was worst affected had seed in 2016 trials sourced from the 2015 drought, where Kaska was the latest to mature and yield and grain weights (30% less than long term average) were extremely low. Varieties such as Alma and Dundale were sourced from trials in 2013 which produced good quality large seed. These issues will continue to be monitored in trials, particularly as more growers could use PPT as part of a black spot management strategy with foliar fungicides.

Table 1. Establishment, days to flowering, plant height at flowering, biomass at maturity and harvest index at Ouyen, and early vigour scores 4 weeks after sowing (1, poor, 9 excellent) at Rupanyup of field pea breeding lines and varieties in 2016. Varieties ranked according to average grain yield across all sites in table 2.

Variety	Ouyen					Rupanyup
	Establishment (pl/m ²)	Days to Flowering	Plant Height (cm)	Biomass (t/ha)	Harvest index	Vigour (1-9)
OZP1101	38	111	95	7.42	0.51	5.0
OZP1305	38	106	100	8.81	0.44	5.3
PBA Oura	35	106	77	6.23	0.60	3.0
OZB1308	38	102	101	7.05	0.48	5.7
PBA Pearl	35	106	85	6.38	0.48	3.0
PBA Percy	36	91	95	6.01	0.57	6.7
Mukta	36	111	82	7.35	0.44	6.0
PBA Coogee	34	106	102	7.08	0.46	4.3
Kaspa	31	116	69	5.29	0.56	2.0
PBA Gunyah	37	102	84	5.39	0.62	5.0
Morgan	35	116	105	7.71	0.42	4.3
Sturt	35	97	91	6.52	0.48	6.0
King	42	106	62	6.54	0.46	5.7
PBA Wharton	35	106	82	5.49	0.55	5.3
Parafield	38	97	101	6.97	0.51	7.3
OZP0916	36	97	93	5.94	0.49	6.3
Bohatyr	41	91	101	5.39	0.53	6.7
Alma	41	99	94	6.23	0.47	8.0
OZP0908	38	97	76	4.87	0.57	5.3
OZB1315	39	99	87	6.51	0.52	4.3
OZB1316	40	97	91	7.53	0.40	5.0
Dundale	39	97	86	6.21	0.40	7.7
Bluey	35	95	74	4.78	0.57	4.7
OZB1309	41	97	85	5.76	0.48	5.3
Maki	43	97	76	5.51	0.45	5.0
Snowpeak	37	91	95	6.54	0.38	6.0
Aragorn	39	95	76	5.47	0.44	5.0
Excell	39	95	82	5.22	0.42	5.0
LSD	8		14	2.07	ns	0.9
CV	12.5		10	20.1	20.9	10.2

- Plant growth and Biomass: Growth throughout the season was generally excellent due to the high annual and growing season rainfall experienced. Ouyen, Rupanyup and Rokewood received 57, 35 and 43% higher growing season rainfall (Apr-Oct) than their long term averages, respectively. Flowering (50% of plants with an open flower) at Ouyen occurred from 91 days after sowing for Snowpeak, PBA Percy and Bohatyr to 116 days after sowing for Kaspa and Morgan (Table 1). Crop height at flowering varied significantly among the varieties at Ouyen from 105 cm for Morgan to 62 cm for King. Kaspa (69 cm) due to poor vigour was shorter than generally expected compared with other varieties and breeding lines. Crop height was not correlated with flowering ($r=0.08$).

The longer than usual growing season resulted in extended vegetative growth stage and high biomass accumulation in all the varieties and breeding lines. Maturity biomass varied significantly from 8.81 t/ha for OZP1305 to 4.87 t/ha for OZP0908 (Table 1). Traditionally it has been suggested that the conventional type peas (eg. PBA Coogee, Parafield, Dundale) produce higher biomass than semi-leafless varieties. This data suggests there is little difference between many of the semi-leafless line and varieties (eg. OZP1101, OZP1305, PBA Oura, PBA Pearl) and the conventional types. Biomass at maturity was positively correlated with flowering date ($r=0.41$) and plant height ($r=0.56$).

- Grain Yield and Profitability: The relative ranking for grain yield, varied significantly across trial sites in 2016 (Table 2). The mean grain yield of field pea lines/varieties at Rupanyup was 25 and 45% higher than at Ouyen and Rokewood, respectively. The new breeding lines OZP1101 and OZP1305 were

consistently high yielding across all sites (123-142% of the site mean), while PBA Oura (113-134%) was the best released variety for yield stability (Table 2). Excell had consistently poor grain yields (46-72% of site mean). Several varieties and breeding lines showed variable response across sites. In particular, several conventional type peas (PBA Coogee, Parafield and Dundale performed relatively well at the high rainfall zone site (Rokewood) compared with other sites. The blue pea OZP1315 and the dun type PBA Gunyah were relatively high yield at the low rainfall zone site Ouyen, but not in the HRZ (Rokewood) site. Similar to biomass at maturity, grain yield at Ouyen was positively correlated with flowering date ($r=0.45$). Grain yield was also positively correlated with biomass ($r=0.61$).

In addition to their well-known benefits as a break crop it was estimated that the gross margin of the highest yield breeding line (OZP1101) was \$943, \$1463 and \$849/ha at Ouyen, Rupanyup and Rokewood, respectively

- Grain weight: Grain weights were generally highest at Ouyen and lowest at Rupanyup (Table 3). PBA Percy and PBA Oura had consistently high grain weights, while Dundale was always lowest.

Table 2. Grain Yield (GY, t/ha), and % of site mean of field pea breeding lines and varieties at Ouyen, Rupanyup and Rokewood in 2016. *Varieties ranked according to average grain yield across all sites.*

Variety	Ouyen		Rupanyup		Rokewood		Average	
	GY (t/ha)	% SM	GY (t/ha)	% SM	GY (t/ha)	% SM	GY (t/ha)	% M
OZP1101	3.67	123	5.27	142	3.38	132	4.11	133
OZP1305	3.89	131	4.63	124	3.56	139	4.03	130
PBA Oura	3.55	119	4.19	113	3.43	134	3.72	121
OZB1308	3.33	112	4.78	129	2.68	104	3.60	116
PBA Pearl	3.02	101	4.34	117	3.30	129	3.55	115
PBA Percy	3.40	114	4.46	120	2.77	108	3.54	115
Mukta	3.15	106	4.81	129	2.55	99	3.50	113
PBA Coogee	3.04	102	3.51	94	3.63	141	3.39	110
Kaspa	2.94	99	4.42	119	2.80	109	3.39	110
PBA Gunyah	3.35	112	4.51	121	2.25	88	3.37	109
Morgan	3.16	106	3.82	103	3.11	121	3.36	109
Sturt	3.13	105	4.22	113	2.71	106	3.35	109
King	2.70	91	4.56	123	2.55	99	3.27	106
PBA Wharton	2.97	100	3.81	102	2.75	107	3.18	103
Parafield	3.14	105	3.29	88	2.95	115	3.13	101
OZP0916	2.89	97	2.99	80	3.01	117	2.96	96
Bohatyr	2.84	95	3.63	98	2.24	87	2.90	94
Alma	2.92	98	2.74	74	2.83	110	2.83	92
OZP0908	2.73	92	3.29	88	2.36	92	2.79	90
OZB1315	3.37	113	3.02	81	1.93	75	2.77	90
OZB1316	3.02	101	3.02	81	2.12	83	2.72	88
Dundale	2.40	81	2.49	67	3.03	118	2.64	85
Bluey	2.65	89	3.24	87	1.93	75	2.61	84
OZB1309	2.67	90	3.29	88	1.82	71	2.59	84
Maki	2.47	83	3.55	95	1.70	66	2.57	83
Snowpeak	2.47	83	3.20	86	2.03	79	2.57	83
Aragorn	2.39	80	2.99	80	1.26	49	2.21	72
Excell	2.13	72	2.06	55	1.19	46	1.79	58
Site Mean	2.98		3.72		2.57		3.09	
LSD	0.47		1.00		0.70			
CV	9.7		16.2		17.4			

Table 3. Grain weight (GW, g/100 seed) of field pea breeding lines and varieties at Ouyen, Rupanyup and Rokewood in 2016. Varieties ranked according to average grain yield across all sites.

Variety	Ouyen	Rupanyup	Rokewood	Average
OZP1101	23.0	19.1	21.3	21.1
OZP1305	21.4	16.8	20.4	19.6
PBA Oura	25.9	21.2	24.0	23.7
OZB1308	23.5	17.7	20.2	20.5
PBA Pearl	23.5	18.8	21.5	21.3
PBA Percy	26.0	21.7	26.6	24.7
Mukta	20.4	18.3	20.7	19.8
PBA Coogee	20.9	18.2	21.4	20.2
Kaspa	21.8	18.9	23.5	21.4
PBA Gunyah	25.5	20.4	20.5	22.1
Morgan	17.3	15.7	19.3	17.4
Sturt	21.7	18.0	20.7	20.1
King	20.5	17.2	18.1	18.6
PBA Wharton	23.8	18.2	23.2	21.7
Parafield	20.5	15.5	20.3	18.8
OZP0916	18.5	15.7	19.5	17.9
Bohatyr	25.6	16.4	20.3	20.8
Alma	20.1	17.6	21.2	19.6
OZP0908	27.4	19.1	23.9	23.5
OZB1315	22.6	17.1	19.0	19.6
OZB1316	22.7	18.6	20.5	20.6
Dundale	16.3	13.9	17.2	15.8
Bluey	25.2	19.0	20.7	21.6
OZB1309	22.8	17.9	17.8	19.5
Maki	24.4	19.9	21.6	22.0
Snowpeak	22.1	16.9	21.7	20.2
Aragorn	23.9	19.8	20.1	21.3
Excell	22.0	17.4	18.4	19.3
<i>Site Mean</i>	22.5	18.0	20.8	20.4
LSD	1.9	1.5	2.1	
CV	5.3	5.2	6.3	