

Vetch, sowing time x soil type, North Central (Pyramid Hill), Victoria  
Lentil, sowing time x soil type, North Central (Pyramid Hill), Victoria  
Faba Bean, sowing time x soil type, North Central (Pyramid Hill), Victoria  
Field Pea, sowing time x soil type, North Central (Pyramid Hill), Victoria  
Chickpea, sowing time x soil type, North Central (Pyramid Hill), Victoria  
Lupin, sowing time x soil type, North Central (Pyramid Hill), Victoria

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## Aim

To compare the performance of a range of pulse varieties and sowing dates in two contrasting soil types in North Central Victoria.

## Treatments

Soil Types: See Soil characterisation for Pyramid Hill East and West.

Sowing Dates: April 12, May 14, June 5

Varieties/Breeding Lines: See Tables below

### Other Site Details

Pyramid Hill	
Sowing Dates	April 12, May 14, June 5
Plant Density (plant/m <sup>2</sup> )	Varied by crop type
Stubble height (cm)	10
Row Spacing (cm)	30
Fertiliser (kg/ha) <sup>1</sup>	60

<sup>1</sup>Granulock Z (N 11, P 21.8, S 4, Zn 1)

## Results and Interpretation

- **Key Messages:** Field pea and vetch hay was most economical due to strong hay prices this year. Field peas were the best performing grain crop (Table 1). Early sowing maximised biomass (hay) and grain yield.

**Table 1. Potential gross margins from the highest yielding varieties and treatments selected from these trials**

	Lentil	Vetch Hay	Field Pea	Field Pea Hay	Chickpea	Faba Bean	Lupin
Variety	Hallmark	Volga April	Butler	Hayman	Striker	Samira	Mandelup
Sow Date	May 14	12	April 12	April 12West	May 14	May 14	April
Location	West	East	West		East	West	12East
Yield (t/ha)	1.16	4.90	2.08	5.30	0.48	1.25	0.35
Price (\$/t)	496	315	421	315	776	478	538
Income (\$/ha)	575	1544	876	1670	373	598	188
Input Costs (\$/ha)	200	166	194	194	270	183	183
Gross Margin (\$/ha)	375	1378	682	1476	103	415	5

- Timely sowing and choice of appropriate varieties produced break even yields when managed appropriately. In a season like this, the impact of sowing outside the optimum window resulted in significant yield penalties. Delayed sowing should generally be avoided, unless there is a strategic reason to do so (disease, weed, frost management, etc.). The detrimental impacts of late sowing on yield, caused by heat stress and low spring rainfall, will generally be more pronounced than frost-related penalties from earlier sowing.
- Vetch: Vetch when sown April 12 produced 80% more biomass (4.5 t/ha) on average across varieties when compared to sowing June 5 (2.4 t/ha; Table 2). This was related to favourable growing conditions earlier in the season promoting vigorous early growth, drying spring conditions slowed growth of later sown treatments. The biomass differences between the April 12 and May 14 varied with the variety.

Generally, yields of long duration varieties fell more dramatically with later sowing dates than the quicker maturing varieties. Volga appears to be a versatile variety, performing well across the range of sowing dates and soil types. Biomass yield is the main determinant for the selection of vetch varieties but requires due consideration of logistics around sowing, cutting, bailing and grain harvest.

**Table 2. Biomass (hay) yield (t/ha) of vetch varieties across three times of sowing (TOS) at two sites**

Variety	Pyramid Hill East				Pyramid Hill West				Average
	April 12	May 14	June 5	Average	April 12	May 14	June 5	Average	
Volga	4.9	4.6	3.1	4.2	4.3	3.8	3.1	3.7	3.9
Timok	4.9	4.1	2.5	3.8	3.9	3.5	2.9	3.4	3.5
Morava	4.5	4.0	2.8	3.7	3.5	3.0	2.3	2.9	3.2
RM4	3.9	3.6	2.2	3.2	4.5	3.2	2.5	3.4	3.2
Rasina	4.3	3.6	2.2	3.4	4.0	2.9	2.3	3.0	3.1
Popany	4.3	3.1	1.9	3.1	4.1	3.6	1.9	3.2	3.0
Average	4.5	3.9	2.4	3.6	4.0	3.3	2.5	3.3	
LSD (P<0.05) $T_{OS} = 0.5$ LSD (P<0.05) $Variety = 0.7$ LSD (P>0.05) $T_{OS} \times Variety = NS$ CV% = 19.0					LSD (P<0.001) $T_{OS} = 0.3$ LSD (P<0.05) $Variety = 0.4$ LSD (P>0.05) $T_{OS} \times Variety = NS$ CV% = 13.6				

- Field Pea: PBA Wharton and PBA Butler were the better performing varieties in these trials producing higher grain yields than other varieties. Two Kaspia seed type breeding lines, OZP1603 and OZP1408 showed potential as emerging varieties. OZP1408 seems to have increased tolerance to salinity, which may offer potential to explore saline soils in years to come.
- Bacterial blight was a challenge for many field pea growers in 2019 but was not an issue in these trials. Among the current commercial varieties tested in these trials, PBA Butler demonstrates the highest level of resistance against bacterial blight, but can still suffer significant grain yield loss, when the disease is present. PBA Percy is most resistant current variety.
- Biomass yields were generally good, ranging from 2.2t/ha to 5.3t/ha (Tables 3 and 4). PBA Butler appears an adaptable option with steady grain and hay yields across a range of sowing dates and environments. PBA Hayman has not displayed any major hay yield benefit in comparison to the dual-purpose types. As is the case with vetch hay, the earlier sown treatment performed significantly better than the later sown.
- Field pea produced 35% more grain yield across varieties on average when sown April 12 compared to June 5, particularly at the western site (Tables 5 and 6). Thus, there may be an opportunity to sow field peas slightly earlier. The highest yields at the eastern site were achieved on May 14, followed April 12, indicating a far greater penalty from sowing late.

**Table 3. Hay yield (t/ha) of field pea varieties across times of sowing (TOS) and two sites.**

Variety	Pyramid Hill East				Pyramid Hill West				Average
	April 12	May 14	June 5	Average	April 12	May 14	June 5	Average	
PBA Butler	4.9	4.3	2.9	4.0	4.1	4.4	3.0	3.8	3.9
PBA Hayman	4.9	4.2	2.2	3.7	5.3	4.4	3.0	4.2	3.8
PBA Coogee	4.9	4.6	2.5	4.0	5.0	2.8	2.9	3.6	3.6
PBA Wharton	4.4	3.7	2.3	3.4	4.0	3.5	2.9	3.5	3.4
Average	4.8	4.2	2.5	3.8	4.6	3.8	3.0	3.8	
LSD (P<0.001) $T_{OS} = 0.4$ LSD (>0.05) $Variety = NS$ LSD (P>0.05) $T_{OS} \times Variety = NS$ CV% = 13.1					LSD (P<0.001) $T_{OS} = 0.5$ LSD (P>0.05) $Variety = NS$ LSD (P<0.05) $T_{OS} \times Variety = 1.0$ CV% = 15.1				

**Table 4. Hay yield (t/ha) of field pea varieties and breeding lines across the two sites sown 14 May (TOS2).**

Variety	Pyramid Hill East	Pyramid Hill West	Average
PBA Butler	4.3	4.4	4.3
PBA Hayman	4.2	4.4	4.3
OZP1408	3.9	3.6	3.8
OZP1702	4.0	3.3	3.7
PBA Coogee	4.6	2.8	3.7
PBA Wharton	3.7	3.5	3.6
OZP1603	3.8	3.3	3.5
OZP1604	3.8	2.3	3.0
LSD (P>0.05) = NS    LSD (P<0.05) = 1.0			
CV% = 15.1                  CV% = 17.1			

**Table 5. Grain yield (t/ha) of field pea varieties across the three sowing dates and two sites.**

Variety	Pyramid Hill East				Pyramid Hill West				Average
	April 12	May 14	June 5	Average	April 12	May 14	June 5	Average	
PBA Wharton	1.39	1.46	0.88	1.24	1.99	1.78	1.46	1.74	1.45
PBA Butler	1.08	1.26	0.75	1.03	2.08	1.83	1.39	1.76	1.34
PBA Coogee	0.77	0.84	0.89	0.83	1.96	1.62	1.61	1.73	1.24
PBA Hayman	0.25	0.43	0.43	0.37	1.20	1.29	0.91	1.13	0.74
Average	0.87	1.00	0.74	0.87	1.81	1.63	1.34	1.59	
LSD (P<0.001) <sub>ToS</sub> = 0.08 LSD (P<0.001) <sub>Variety</sub> = 0.09 LSD (P<0.001) <sub>TOS x Variety</sub> = 0.15 CV% = 10.4					LSD (P<0.05) <sub>ToS</sub> = 0.32 LSD (P<0.05) <sub>Variety</sub> = 0.37 LSD (P>0.05) <sub>TOS x Variety</sub> = NS CV% = 23.8				

**Table 6. Grain yield (t/ha) of field pea varieties and breeding lines across the two sites sown 14 May (TOS2).**

Variety	Pyramid Hill East	Pyramid Hill West	Average
OZP1603	1.41	1.96	1.69
OZP1408	1.27	2.01	1.64
OZP1702	1.40	1.80	1.60
OZP1604	1.27	1.54	1.41
PBA Wharton	1.46	1.78	1.62
PBA Butler	1.26	1.83	1.54
PBA Coogee	0.84	1.62	1.23
PBA Hayman	0.43	1.29	0.86
LSD (P<0.001) = 0.2    LSD (P>0.05) = NS			
CV% = 9.7                  CV% = 19.4			

- Lentil: The two lentil varieties in these trials performed similarly, providing some opportunities for flexibility in weed management and crop rotation decisions (Table 7). The May 14 sowing produced higher grain yields compared to other sowing times for both varieties and both locations. The 'imi' tolerant PBA Hallmark XT presents a good opportunity for paddocks with heavy weed burdens, or those with Group B herbicide residues.

**Table 7. Grain yield (t/ha) of lentil varieties across the three sowing dates and two sites.**

Variety	Pyramid Hill East				Pyramid Hill West				Average
	April 12	May 14	June 5	Average	April 12	May 14	June 5	Average	
PBA Bolt	0.47	0.90	0.77	0.71	0.79	1.12	0.90	0.94	0.85
PBA Hallmark XT	0.61	0.81	0.68	0.70	0.75	1.16	0.90	0.94	0.85
Average	0.54	0.85	0.73	0.71	0.77	1.14	0.90	0.94	
LSD (P<0.001) <sub>ToS</sub> = 0.08 LSD (P>0.05) <sub>Variety</sub> = NS LSD (P<0.05) <sub>TOS x Variety</sub> = 0.11 CV% = 8.6					LSD (P<0.05) <sub>ToS</sub> = 0.18 LSD (P<0.001) <sub>Variety</sub> = NS LSD (P<0.001) <sub>TOS x Variety</sub> = NS CV% = 14.7				

- Chickpea: Chickpeas performed poorly this season with yields ranging from 0.24t/ha to 0.48t/ha (Table 8). High salinity at the western site was a major limiting factor. Sowing dates did not influence grain yields, which were very poor for this season (Table 8).

**Table 8. Grain yield (t/ha) of PBA Striker chickpeas across the three sowing dates and two sites.**

Variety	Pyramid Hill East				Pyramid Hill West				Average
	April 12	May 14	June 5	Average	April 12	May 14	June 5	Average	
PBA Striker	0.36	0.48	0.40	0.41	0.24	0.28	0.24	0.26	0.34
	LSD (P>0.05) = NS CV% = 12.8				LSD (P>0.05) = NS CV% = 8.0				

- Lupin: Lupins performed poorly in this environment. However, sowing earlier (TOS1) doubled grain yields than when sown on TOS3 (Table 9). Like chickpeas, high salinity at the western site was a major limiting factor for production.

**Table 9. Grain yield (t/ha) of Mandelup lupins across the three sowing dates and two sites.**

Variety	Pyramid Hill East				Pyramid Hill West				Average
	April 12	May 14	June 5	Average	April 12	May 14	June 5	Average	
Mandelup	0.35	0.32	0.17	0.28	0.19	0.19	0.08	0.15	0.21
	LSD (P<0.001) = 0.04 CV% = 8.9				LSD (P>0.05) = NS CV% = 65.6				

- Faba Beans: Given the seasonal conditions, faba bean yields were reasonable, ranging from 1.25t/ha to 0.41t/ha (Table 10). Sowing early (April 12) increased grain yields by 90% and 150% compared to sowing late (TOS3) and similar trend was seen for biomass production.

**Table 10. Grain yield (t/ha) of PBA Marne faba beans across the three sowing dates and two sites. Yield for PBA Samira was deduced from corresponding treatment in adjacent inoculant performance trial.**

Variety	Pyramid Hill East				Pyramid Hill West				Average
	April 12	May 14	June 5	Average	April 12	May 14	June 5	Average	
PBA Marne	1.02	0.90	0.41	0.77	1.01	0.97	0.53	0.84	0.78
PBA Samira					1.25*				
	LSD (P<0.05) = 0.23 CV% = 7.0				LSD (P<0.05) = 0.24 CV% = 6.6				

*\*From adjacent inoculant trial*

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