

B2 Canopy Management MRZ Wimmera (Pimpinio) and HRZ South West (Westmere), Victoria

Contributions by Keshia Savage

Aim

To determine the effect of agronomic practices, various herbicides and a plant growth regulator canopy architecture and grain yield of faba bean.

Treatments

1. Nil

Agronomy

2. Mechanical (Hedge Trimmer - cut to half height), Flowering
3. Mechanical (Hedge Trimmer - tips cut), Flowering
4. Mechanical (Slashed), 8 node
5. Lime White Wash (Low), 8 node
6. Lime White Wash (High), 8 node
7. Wick Wiper (Glyphosate), Flowering

Herbicides #

1. Glyphosate (r1), 8 node
2. Glyphosate (r2), 8 node
3. Glyphosate (r3), 8 node
4. Flumetsulam (r1), 8 node
5. Flumetsulam (r2), 8 node
6. Imazamox (r1), 8 node
7. Imazamox (r2), 8 node
8. Imazamox (r3), 8 node
9. Imazethapyr (r1), 8 node
10. Imazethapyr (r2), 8 node
11. Imazethapyr (r3), 8 node

Plant Growth Regulator (PGR) Hormones #

1. Ethephon (r1), 8 node
2. Ethephon (r2), 8 node

All treatments are unregistered for use on Faba bean, and chemical rates are experimental only.

Other Details

Varieties:	AF05095-1 & AF07125
Sowing date:	9 th May (Pimpinio); 18 th May (Westmere)
Fertiliser:	MAP + Zn (2.5%) @ 60 kg/ha (Pimpinio); 100 kg/ha (Westmere)
Plant Density:	20 plants/m ²
Row Spacing:	36cm (Pimpinio), 20cm (Westmere).
Stubble:	Pimpinio - Standing (approximately 15 cm), sown inter-row; Westmere – worked, no stubble.

Background

Large bean canopies can cause significant management issues resulting in increased disease, necking and lodging, lower grain yield and quality. Manipulation of faba bean crop height and canopies could potentially allow for greater pod set, improved fungicide penetration, and encourage more resources to be put into seed production rather than biomass, potentially increasing grain yield.

Results and Interpretation

- Key Message: No canopy management treatments had a positive effect on grain yield in 2014, and many caused a significant yield reduction.
- Establishment and Growth – At both sites establishment and early plant growth was excellent. At Pimpinio growth until August was adequate and as expected given the seasonal conditions. However, it slowed during the August to October period and the dry conditions combined with many frosts caused significant flower and pod abortion during the reproductive phase. The ongoing dry conditions ensured plants experienced significant drought stress that rapidly progressed maturity and reduced grain yields. Necking occurred following high temperatures in late September and early October, with

AF5095-1 showing worse symptoms than AF07125. At Westmere, dry conditions and extreme weather events were not as severe as at Pimpinio, meaning little necking was observed and frosts had little impact on flowering and pod set. The dry and hot finish, did however reduce grain yields.

- Crop Damage – Both varieties performed similarly in terms of crop damage. At Pimpinio, crop damage scores were recorded about 4 and 9 weeks after application of the '8 node' treatments (1-6 weeks after flowering). All mechanical treatments and the glyphosate and flumetsulam herbicide treatments caused significant crop damage symptoms Aug 14 (4 weeks after application). However, the mechanical treatments had recovered by Sept 18 and the Ethephon high rate treatment had developed significant damage (Table 1). At Westmere, all treatments displayed significant crop damage symptoms, except, the lime applied at the lower rate. In addition, to crop damage it was observed that disease (primarily chocolate spot) was more prevalent in herbicide and mechanical treatments.
- Grain yield – Similar to crop damage, both varieties performed similarly in terms of crop damage, however overall yield of the varieties was significantly different. For example in the 'Nil' treatment AF05095-1 had yields of 2.72t/ha at Westmere and 0.75 t/ha at Pimpinio, while AF07125 was 1.77t/ha and 0.83t/ha. The untreated control of two varieties, AF05095-1 and AF07125 produced an average grain yield of 0.76t/ha and 0.85t/ha. There was no significant difference between varieties. There were significant yield losses compared with the Nil treatment across most Mid and High Herbicide treatments (excluding Raptor) and higher biomass cut backs (hedge trimming at half height and slashing).

Key Findings and Comments

- No canopy management treatments had a positive effect on grain yield in 2014. Many treatments caused significant crop damage and a significant yield reduction. The relative differences in yield between varieties again highlight the adaption of AF05095-1 to the HRZ, but not lower rainfall environments.
- The use of herbicides at sub-lethal doses for canopy management was assessed as low rates of certain products may significantly reduce plant height with little or no effect on grain yield. It may have the added benefit of providing some level of weed control. Imazamox at all rates and imazethapyr at the low rate were the only treatments to not result in a significant yield loss across both sites, but significant crop damage was observed at Westmere. The was some improvement in weed control in the herbicide treatments, but these benefits are unlikely to outweigh the losses from the reduced growth and yield.
- The plant growth regulator unfortunately caused significant crop damage and yield reduction in this trial. It is unclear why this occurred and further investigation needs to occur at a broader range of application rates and timings.
- None of the novel agronomic treatments showed significant potential to improve grain yield in faba beans.

Table 1. Effect of canopy management treatments (agronomic, herbicides and plant growth regulator) on crop damage score (0, no damage; 100, crop death) and grain yield. *Shading denotes significant difference relative to the Nil treatment.*

Canopy Treatment	Westmere		Pimpinio		
	Damage Score (0-100)	Grain Yield (t/ha)	Damage Score (0-100)	Grain Yield (t/ha)	
	15-Oct		14-Aug	18-Sep	
Nil	0	2.24	0	0	0.79
Agronomy					
Mech (Half), Fl	52	1.31	49	3	0.50
Mech (Tips), Fl	12	2.40	18	1	0.59
Mech (Slash), Fl	17	1.51	37	8	0.47
Lime (x1), 8N	3	2.40	3	17	0.62
Lime (x2), 8N	7	2.15	0	1	0.83
Wick Wiper, Fl	94	0.19	0	9	0.56
Herbicides					
Glyphosate (r1), 8N	80	0.40	10	13	0.52
Glyphosate (r2), 8N	74	0.37	23	39	0.38
Glyphosate (r3), 8N	91	0.18	33	72	0.19
Flumetsulam (r1), 8N	32	1.53	22	6	0.64
Flumetsulam (r2), 8N	42	1.30	53	24	0.47
Imazamox (r1), 8N	28	1.91	2	1	0.63
Imazamox (r2), 8N	23	2.18	3	5	0.73
Imazamox (r3), 8N	22	1.88	2	0	0.64
Imazethapyr (r1), 8N	23	1.95	2	0	0.65
Imazethapyr (r2), 8N	40	1.43	4	0	0.50
Imazethapyr (r3), 8N	55	1.02	5	3	0.50
Plant Growth Regulator					
Ethephon (r1), 8N	62	1.30	10	14	0.54
Ethephon (r2), 8N	62	0.89	8	33	0.39
LSD (P<0.05)	4	0.47	11	15	0.24