

B13 Canopy Management, MRZ Wimmera (Rupanyup), Victoria**B14 Canopy Management, HRZ South West (Rokewood), Victoria****Aim**

To evaluate the effect of various plant growth regulators (PGRs) on growth and yield of faba beans

Treatments

Plant growth regulators

Treatment	Active Ingredient ¹	Rate (gai/ha)	Timing	Physiological Response
Nil	Nil			
E_8N			8 node	
E_LV	Ethephon	1080	Late Vegetative (just prior to flowering)	Stimulate Lateral Branching
E_8N+LV			8 node & Late Vegetative	
T_8N			8 node	
T_LV	Trinexapac-Ethyl	70	Late Vegetative (just prior to flowering)	Reduced vegetative biomass
T_8N+LV			8 node & Late Vegetative	
D_LV	Dicarboxylic acids	20	Late Vegetative (just prior to flowering)	Improved flower and pod set, stress reduction
D_LV+MF			Late Veg + Mid Flower	
U_LV	Uniconazole	50	Late Vegetative (just prior to flowering)	Reduced height
U_MF			Mid Flower	
G_8N			8 node	
G_LV	Gibberellic Acid	4	Late Vegetative (just prior to flowering)	Biomass, Crop elongation, flower set
G_MF			Mid Flower	
G_8N+LV+MF			8 node & Late Vegetative & Mid Flower	
B_8N+LV+MF	6-Benzyladenine	380	8 node & Late Vegetative & Mid Flower	Thinning and Branch reduction
A_LV+MF	Aviglycine	125	Late Vegetative & Mid Flower	Flower and pod set
Th_8N+LV	Thiourea	1000	8 node & Late Vegetative	Increased Biomass and growth
M_8N	Mechanical ²		8 node	Stimulate branching
M_LV			Late Vegetative (just prior to flowering)	Stimulate flowering & Podding

- All chemical treatments except Trinexapac-Ethyl were applied with the wetter BS-1000
- In the mechanical treatment the growing tip was removed with a hedge trimmer

*****Some of the treatments in this research contain unregistered PGRs, application rates and timings and were undertaken for experimental purposes only. The results within this document do not constitute a recommendation for that particular use by the author or author's organisation.***

Other Details

	Trial Site	
	Rupanyup	Rokewood
Sowing Date	15 May	26 April
Stubble (height cm)	Standing(30)	Standing (20)
Row Spacing (cm)	36	36
Plant Density (plant/m ²)	20	20
Fertiliser (kg/ha) ¹	80	100

- MAP (9.2, 20.2, 0, 2.7) + Zn (2.5)

Results and interpretation

Results for the two sites have been combined and analysed jointly as trends were consistent.

- Key Findings: Several PGRs reduced height, but also caused crop damage and in some cases resulted in significant yield loss. No PGRs resulted in grain yields significantly higher than the 'nil' treatment.
- Plant growth and height: Establishment and growth throughout the season was excellent due to good opening rains and warm conditions following sowing. This vigorous early growth and rapid canopy development lead to conditions conducive for disease when combined with the high rainfall experienced from July onwards. Disease in these trials was managed with an intensive fungicide program. Plants reached more than 2m in height, before lodging during the reproductive phase. Continued rainfall, in the absence of major frost and heat events resulted in very high biomass production and grain yield in many treatments.

Only two of the PGR's caused visual symptoms following application. Ethephon caused significant leaf damage (necrosis/burning) and stunting of growth and gibberellic acid caused a slight yellowing (chlorosis) and visually appeared taller. Despite visually appearing taller, actual measurements showed no significant increase compared to the 'Nil' control (Table 1). The gibberellic acid applied 3 times (8 node, late vegetative and mid flowering) showed a significant 15% increase at Streatham (not shown), but no response at Rupanyup, resulting in a non-significant increase overall. Several PGRs caused a significant reduction in the height of faba beans (Table 1). Ethephon applied at the 8 node stage and 8 node + late vegetative stage reduced height by approximately 30%, and by 15% when applied at only the late vegetative stage. Trinexapac-Ethyl applied 8 node plus late vegetative and late vegetative stages reduced height reduced height by about 15%. The 8 node application timing of this chemical had no significant impact on height. The mechanical treatment of removing the growing tip results in height reduction of 10% and 15%, respectively, completed at the 8 node stage and the late vegetative stage.

- Grain Yield and Grain Weight: Grain yields were very high at both sites with 5t/ha and 6t/ha recorded in the 'nil' treatments at Rupanyup and Rokewood, respectively. No PGR's caused a significant positive yield response, however Ethephon, Trinexapac-Ethyl and Gibberellic acid all showed negative yield responses in some application timings. For Ethephon, there was a 28%, 36% and 49% reduction in yield for the 8 node, late vegetative and 8 node plus late vegetative application timings, respectively. For Trinexapac-Ethyl applied 8 node plus late vegetative and Gibberellic Acid applied mid flowering there was a 13% reduction in grain yield.

In this high rainfall season there were no major differences in lodging and harvestability, except Ethephon, which caused significant yield loss.

The only PGR to have a significant effect on grain weight was 6-Benzyladenine, which increased size by 5%. (Table 1).

Future research may be needed to improve application rates and timings plus using mixtures across application timing to see if a positive yield response is possible. The PGR's with most potential appear to be Uniconazole, Trinexapac-Ethyl, Dicarboxylic acids and Aviglycine.

Table 1: Plant height at flowering, grain yield and grain weight (g/100 seed) of faba beans averaged across sites (Rupanyup and Rokewood) sown in canopy management trials in 2016. Treatment

PGR Treatment	Height at Fl (cm)	Grain Yield (t/ha)	Grain weight (g/100seed)
U_MF	52	5.83	75.8
T_8N	49	5.52	75.6
D_LV+MF	52	5.48	74.9
T_LV	46	5.44	75.4
Nil	53	5.41	74.2
M_8N	47	5.33	73.9
A_LV+MF	51	5.31	75.6
D_LV	52	5.26	74.8
U_LV	50	5.12	74.4
M_LV	45	5.06	71.5
G_LV	54	4.97	76.5
Th_8N+LV	49	4.91	75.0
B_8N+LV+MF	49	4.86	78.1
G_8N+LV+MF	57	4.82	76.4
G_8N	50	4.81	73.6
T_8N+LV	47	4.70	74.7
G_MF	50	4.69	74.3
E_8N	38	3.88	73.6
E_LV	46	3.47	72.6
E_8N+LV	36	2.75	73.0
LSD ($P<0.05$)	5	0.70	2.9
CV (Rep)	4.5	5.9	7.2
(Rep.Plot)	2.7	4.6	1.3
(Site.Rep.Plot)	8.2	12.5	3.3