Is it possible to increase barley yield potential in southern NSW?

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Key findings

- Grain yield and lodging increased with additional nitrogen application for all varieties and plant growth regulator (PGR) treatments.
- Applying Moddus® Evo reduced lodging and increased grain yield of both Rosalind(ф) and La Trobe(ф).
- Applying PGRs did not significantly affect either lodging score or grain yield of Compass(ф), despite it lodging severely.

Introduction

Recent improvements in barley genetics and agronomic management have resulted in growers achieving high barley yields. An experiment was conducted at Wagga Wagga in 2016 to determine whether optimising agronomic inputs could further increase barley yield.

Site details

Location	Wagga Wagga Agricultural Institute, NSW
Soil type	Red chromosol
Previous crop	Canola
Sowing	Direct drilled with DBS tynes spaced at 240 mm using a GPS auto-steer system Target plant density: 150 plants/m^2
Soil pH_{Ca}	5.1 (0–10 cm)
Mineral nitrogen at sowing (1.5 m depth)	142 kg N/ha
Fertiliser applied	100 kg N/ha mono-ammonium phosphate (MAP) (sowing)
Weed control	Knockdown: glyphosate (450 g/L) 1.2 L/ha Pre-emergent: Sakura® 118 g/ha + Logran® at 35 g/ha
Disease management	Seed treatment: Hombre® Ultra 200 mL/100 kg Flutriafol-treated fertiliser (400 mL/ha) In-crop: Prosaro® 300 mL/ha at GS30 and GS37
In-crop rainfall (April–October)	592 mm (long-term average is 355 mm)

Treatments

A complete factorial design (all possible combinations of treatment factors) consisting of treatment combinations of three varieties, seeding density, applied nitrogen and plant growth regulators (PGRs) were included (Table 1).

Results

Rosalind(ф) had significantly higher grain yields than Compass(ф) and La Trobe(ф) across all treatments. Grain yield and lodging of all varieties increased with additional nitrogen. There were no significant interactions between nitrogen treatments, variety or PGR treatment.

Two applications of Moddus® Evo on La Trobe(ф) and Rosalind(ф) significantly reduced lodging and increased grain yield (Table 2). There was no effect from PGR application to Compass(ф) on either lodging or grain yield despite Compass(ф) having significantly higher lodging scores than La Trobe(ф) and Rosalind(ф). There was no significant effect of seeding density on either grain yield or lodging (data not presented).

Table 1. Treatment factors included in an experiment at Wagga Wagga, 2016.

Treatment factor	Description	
Variety	Compass(Ф)	High yield potential, weak straw strength, medium–tall height
	La Trobe(Ф)	High yield potential, moderately good straw strength, medium height
	Rosalind(Ф)	High yield potential, good straw strength, medium height
Seeding density	150 plants/m^2	
	250 plants/m^2	
Nitrogen	Nil	
	Nil at sowing + 40 kg N/ha at GS22	
	40 kg N/ha at sowing + 40 kg N/ha at GS22	
	40 kg N/ha at sowing + 80 kg N/ha at GS22	
Plant growth regulator	No PGR	
	400 mL/ha Moddus® Evo at GS31–32	
	400 mL/ha Moddus® Evo at GS31–32 + 200 mL Moddus® Evo at GS37–39	

Table 2. Grain yield and lodging scores (0, no lodging to 9, completely lodged) for combination of treatment factors (variety, nitrogen and PGR treatments) at Wagga Wagga, 2016.

Variety	Nitrogen treatment	Grain yield (t/ha)			Lodging score (0–9)		
		PGR treatment			PGR treatment		
		No PGR	Moddus® Evo at GS31	Moddus® Evo at GS31 + 39	No PGR	Moddus® Evo at GS31	Moddus® Evo at GS31 + 39
Compass	Nil	6.16	6.25	6.46	6.5	4.7	3.2
	0_40	6.56	6.80	6.93	6.4	3.2	6.9
	40_40	6.80	7.09	6.55	6.6	6.3	7.5
	40_80	7.15	7.40	7.33	6.4	6.9	6.5
La Trobe	Nil	5.85	6.60	6.39	4.8	1.2	2.1
	0_40	5.55	7.06	6.24	7.7	3.6	3.2
	40_40	5.93	7.10	7.04	5.7	4.5	3.7
	40_80	5.06	6.63	7.60	8.3	5.3	4.5
Rosalind	Nil	7.57	7.30	8.71	2.7	2.3	2.8
	0_40	7.01	7.71	8.18	2.8	1.9	1.3
	40_40	7.44	8.75	8.18	3.7	3.9	1.8
	40_80	7.51	8.55	8.55	6.2	3.7	1.8
l.s.d. ($P = 0.05$) variety		0.27			0.6		
l.s.d. ($P = 0.05$) nitrogen		0.32			0.8		
l.s.d. ($P = 0.05$) PGR		0.28			0.6		
l.s.d. ($P = 0.05$) variety × PGR		0.48			1.2		

Treatment factors are described in Table 1.

Summary

Applying Moddus® Evo reduced lodging and increased grain yield in Rosalind(Ф) and La Trobe(Ф). However, it did not have a significant effect on lodging or grain yield in Compass(Ф). Strategically using PGRs in barley might offer opportunities for increasing grain yield in mid–high rainfall areas in specific varieties, where lodging is moderate. Further research will be undertaken in 2017 to explore varietal responses to PGRs and improving efficacy through timing PGR applications.

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