Trial 2. Lodging Control in Irrigated Crops – Winter and Spring Barley

Protocol Objective:

To compare and contrast plant growth regulation strategies in spring barley germplasm.

Location: Kerang, Victoria   **FAR Code:** ICC B21-09-2

Sown: 12th May 2021   **Cultivar:** RGT Planet

Harvested: 30th November 2021

Rotation position: Wheat (2020), Dryland vetch/brown manure (2019), Wheat (2018)

Soil Type: Neutral medium grey clay

Irrigation: Surface irrigation. Pre-irrigation in autumn plus 2 spring irrigations totalling 330mm (3.3 ML/ha)

GSR: April-October 160mm. Total water available 490mm

Key Messages:

- *Lodging began in early October in the control (no PGR) and trace element treatments.*
- *The application of the micronutrients copper and manganese had no effect on plant height or in reducing lodging.*
- *The grazing and Moddus Evo were effective in reducing plant height and lodging.*
- *Yield was increased by all treatments over the control.*
- *Grazing had a negative effect on grain protein and retention. This reduced the grain quality to feed grade (too low in protein).*
- *Grazing did result in 1.4 t/ha of dry matter being taken off the plots.*

Table 1. Treatment summary

Treatment	
1	Control (no PGR)
2	Grazing @ GS30-31
3	Moddus Evo 200 ml/ha @ GS30 and GS32
4	Moddus Evo 400 ml @ GS30
5	Micronutrient Application Cu and Mn @ GS30

1.0 l/ha $MnCO_3$ (400 g/l) 0.5 l/ha CuO_2 (500g/l)

Table 2. Yield and grain quality and plant height at harvest.

Treatment	Yield (t/ha)		Protein (%)		Retention (%)		Test Weight (kg/hl)		Plant Height (cm)	
Control	7.57	b	9.8	a	94.2	a	70.0	-	80.0	a
Grazed	7.96	ab	8.7	b	91.2	b	70.3	-	68.8	c
ME 200+200	8.24	a	9.3	a	94.8	a	70.8	-	75.0	b
ME 400	8.27	a	9.1	a	94.7	a	69.8	-	73.8	b
CU + Mn	7.98	ab	9.6	a	93.9	a	71.0	-	78.8	a
P val	0.041		0.045		0.024		0.536		0.003	
LSD	0.48		0.7		2.2		ns		4.9	
cv%	3.9		4.7		1.6		1.6		4.4	

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Both Moddus Evo treatments resulted in higher grain yields than the control. Grazing and the copper/manganese treatment yields were not statistically different to that of the control.

Grazing at GS30-31 did result in lower grain protein and retention and the most impact on plant height. Grazing to a height of 45mm did see the removal of 1.41 t/ha of dry matter.
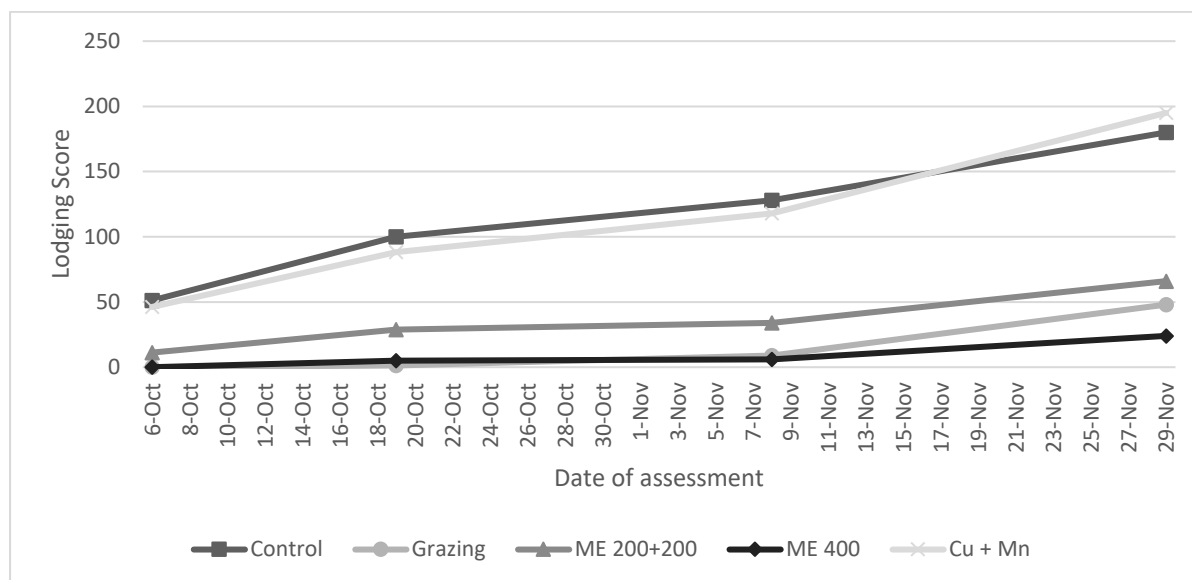

Figure 1. Lodging assessment over time.

Lodging Score is calculated by % of plot affected multiplied by the degree of lodging where 0 = no lodging and 5 = prostrate.

Grazing and both Moddus Evo treatments reduced lodging when compared to the untreated control. The application of the micronutrients copper and manganese had little impact on either crop height or lodging.

SAGI statistical analysis (Predicted values for Yield, test weight, retentions, screenings and grain protein) The following statistical analysis of key harvest assessments has been carried out by SAGI. This analysis uses spatial statistical analysis to refine predicted values for key assessment values.

Table 1: Harvest Traits for the Treatments

Treatment	Grain Yield (t/ha)	Test Weight (kg/hL)	Protein (%)	Retention (%)	Screening (%)
Treatment1	7.57 ± 0.22 -	70.36 ± 0.46 -	9.76 ± 0.29 -	94.13 ± 0.8 - ab	0.9 ± 0.16 -
Treatment2	8.27 ± 0.22 -	69.82 ± 0.46 -	9.19 ± 0.29 -	94.25 ± 0.81 - ab	0.87 ± 0.16 -
Treatment3	8.24 ± 0.22 -	70.6 ± 0.46 -	9.23 ± 0.29 -	94.17 ± 0.8 - ab	0.91 ± 0.16 -
Treatment4	7.96 ± 0.22 -	70.39 ± 0.46 -	8.72 ± 0.29 -	91.06 ± 0.78 - a	1.65 ± 0.29 -
Treatment5	7.83 ± 0.22 -	70.84 ± 0.46 -	9.51 ± 0.29 -	94.57 ± 0.81 - b	0.84 ± 0.15 -

Note: values expressed as mean ± standard error of prediction
- no subscripts relevant for this response

A summary of the experiment statistics is below:

Table 2: Key statistics for each response analysed

Statistic	Grain Yield (t/ha)	Test Weight (kg/hL)	Protein (%)	Retention (%)	Screening (%)
LSD	0.472	1.420	0.644	0.021	0.457
Mean	8.000	70.400	9.300	93.600	1.000
Treatment_p-value	0.062	0.623	0.064	0.035	0.060
CV	5.918	1.280	6.857	2.138	42.237