Plant growth regulators in wheat

This trial was funded by the GRDC and conducted in collaboration with Victor Sadras, SARDI and Glenn McDonald from the University of Adelaide.

Key findings

- Plant growth regulators had no significant impact on wheat grain yield in 2012, at four different sites
- Plant growth regulators can reduce grain yield and quality with incorrect application timing, especially to crops under stress i.e dry, nutrient deficient, frost, waterlogging

Why do the trial?

Plant growth regulators (PGR's) are routine inputs for cereal crops in Europe and New Zealand, where their main role is in the prevention of crop lodging. In southern Australia much work has previously been conducted on PGR's, with the results generally being inconsistent. Even where crop height is significantly reduced, grain yield and crop water use efficiency does not always increase.

To measure the effect of plant growth regulants and their interaction with nitrogen on wheat grain yield and quality, in the absence of lodging.

The trials were conducted on WUE sites established in 2008 on different soil types and rainfall zones in selected grower paddocks. The sites established are:

- Hart, 400mm annual rainfall, sandy clay loam
- Condowie, 350mm, sandy loam
- Spalding, 450mm, red brown earth
- Saddleworth, 500mm, black cracking clay

How was it done?

Plot size	8m x 10m			
Seeding date	Hart 30th May 2012	**Fertiliser**	Hart	DAP@80kg/ha+2% Zn
	Condowie 21st May		Condowie	DAP@65kg/ha+2% Zn
	Spalding 17th May		Spalding	DAP@80kg/ha+2% Zn
	Saddleworth 18th May		Saddleworth	DAP@100kg/ha+2% Zn

Post emergent nitrogen:

The Hart site received 40kg N/ha on the 24th July and the other sites on the 13th August.

The PGR treatments received an extra 46kg N/ha on the 3rd of September.

The PGR treatment (1L/ha Cycocel + 200ml/ha Moddus Evo) was applied on the 13th August. The crops ranged between later tillering to early stem elongation (GS31).

Each trial was a randomised complete block design with 3 replicates using Gladius wheat at each site. The trials were sown with 50mm chisel points and press wheels on 225mm (9") row spacing.

All cereal grain plots were assessed for grain yield, protein, and wheat screenings with a 2.0mm screen.

Results

All PGR treatments significantly reduced stem internodes and therefore overall crop height by at least 10cm. This was very visual and the plots could be easily spotted.

The PGR application did not increase grain yield at any of the sites. At Spalding, the PGR significantly reduced grain yield by 0.20t/ha. The addition of nitrogen with the PGR did not produce any yield increases (Table 1).

The application of nitrogen in early September significantly increased grain protein at each site and did not affect screenings. The PGR application had little effect on protein or screenings. The exception being Spalding, where the PGR increased screening levels to 7.2%.

Table 1. The interaction of PGR's and nitrogen on the grain yield and quality of gladius wheat at Hart, Condowie, Saddleworth and Spalding in 2012.

Site	Treatment		Grain yield	Protein	Screenings
	PGR	Nitrogen	(t/ha)	(%)	(%)
Hart	No	0	2.01	11.0	2.2
	No	46	1.73	11.5	2.5
	Yes	0	1.89	10.4	2.2
	Yes	46	1.70	10.8	2.1
LSD (0.05) Nitrogen, PGR, Nitrogen * PGR			ns, ns, ns	0.36, 0.36, ns	ns, ns, ns
Saddleworth	No	0	4.46	5.9	2.5
	No	46	4.89	6.4	2.5
	Yes	0	4.75	6.0	2.7
	Yes	46	4.88	7.1	2.5
LSD (0.05)			ns, ns, ns	0.73, ns, ns	ns, ns, ns
Condowie	No	0	2.50	10.1	2.7
	No	46	2.62	10.4	2.8
	Yes	0	2.47	10.2	2.3
	Yes	46	2.45	10.7	2.2
LSD (0.05)			ns, ns, ns	0.28, ns, ns	ns, ns, ns
Spalding	No	0	2.85	10.9	5.1
	No	46	3.16	12.0	4.8
	Yes	0	2.65	11.5	7.2
	Yes	46	2.83	13.1	7.1
LSD (0.05)			0.17, 0.17, ns	0.47, 0.47, ns	ns, 0.54, ns

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Photos: The effect of a PGR treatment on crop height at Hart on the right and Saddleworth on the left.