3.4.9 Seed treatment plant growth promotion trial (wheat) - Dunkeld, Vic

Location:
Dunkeld Research Site.

Researchers:
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Background/Aim:
Becker Underwood is a world leader in the development, formulation, manufacture and marketing of a wide range of specialty bio-agronomic and related products for agriculture.

Becker Underwood is committed to continuing the development and manufacture of cutting edge field crop inoculants, biological pest management technologies and agricultural productivity tools. As part of this commitment systematic research is conducted to assess the efficacy and viability of a wide range of technologies to improve crop health and yields.

Plant Growth Promoting (PGP) traits to date have had limited use in agricultural crops in Australia.
The technical objective is to develop PGP traits that:

- Consistently improve crop yields
- Improve plant health through nutrient acquisition
- Are user friendly.
- Are commercially viable.
- Compatible with a range of pre-existing seed treatments.

Rainfall (mm):

Avg. Annual:	597.8mm, Hamilton Airport 1991-2009
Avg. G.S.R.:	466.5mm, Hamilton Airport 1991-2009
2009 Total:	562.4mm, Hamilton Airport 2009
2009 G.S.R.:	(April – November 20th)
	= 447.2mm#, Hamilton Airport; 41.6mm below average.

Trial Design:
The trial was a randomised design with 7 treatments and 4 replicates per treatment. The control was Jockey only treated seed while the other 6 treatments had Jockey and various experimental traits applied to the seed. While the experimental traits and fungicide were applied separately in this trial, they could be slurried together and applied in the one application.

Regime:

	Date	Product	Rate
Knockdown/IBS:	12-Jun	Roundup Pmax	1.5l/ha
	12-Jun	Striker	0.2l/ha
	12-Jun	Triflur	1.5l/ha
PSPE:	18-Jun	Dual Gold	0.25l/ha
	18-Jun	Diuron	0.5 l/ha
Fertilizer:	12-Jun	MAP	100kg/ha
Fungicides:	15-Sep	Prosaro 420SC	150ml/ha
	15-Sep	Hasten	1%

Soil Type: Sandy clay

Soil Nutrients:
N = 42.1mg/kg (0-10cm) + 13.6mg/kg (10-60cm)
P = 32mg/kg (Colwell, 0-60)
K = 0.28 Meq/100g (0-60cm)
S = 29.4mg/kg(0-60cm)
pH ($CaCl^2$) = 5.0 (0-60cm).

Tillage type:
This trial was seeded with the SFS cone seeder on 17.125 cm (6 ¾ inch) row spacing using 2.5cm knifepoints and Janke high V press wheels.

Sowing Date: 12th June 2009

Sowing Rate: 71kg/ha

Variety: Derrimut

Harvest Date: 6th January 2010

Seed Treatment:
Jockey *(FLUQUINCONAZOLE)* @ 3.0L per ton

Discussion/Conclusion:
As seen in Figure 2 there is a significant difference in the wheat yields of the seed treated with the experimental traits over the control treatment (Jockey as a standalone). On average the yield was increased by 1.12t/ha or 19.8% when an experimental trait was included. BUW-6, BUW-7 and BU-5 were the top three performing treatments respectively in terms of yield and also saw an improvement in the establishment – this early establishment advantage appears to have carried over into a greater return in t/ha.
The other parameter that saw a significant difference was the moisture content, which saw all the biological treatments having on average 0.5% lower moisture content, keeping the grain moisture below 12%.
Protein percent of all the treatments were within an acceptable range. Overall these results are very encouraging for the potential further development of naturally occurring traits to aid Australian farmers in boosting the yields of wheat crops. Further experiments will be conducted over ensuing seasons and various other locations to assess if any of these traits will be considered to be taken to commercial development stage within our Research and Devlopment pipeline.

Table 1: Establishment and Plant weights

Description	Plants/m²		% Establish		Shoot DM		Root DM	
Data Type	#		%		g		g	
Treatment								
BUW-2	109	a	68	a	18.0	a	10.4	a
BUW-3	118	a	74	a	17.3	a	8.7	a
BUW-4	115	a	72	a	17.8	a	11.1	a
BUW-5	119	a	75	a	13.9	a	6.7	a
BUW-6	117	a	73	a	20.9	a	9.2	a
BUW-7	127	a	80	a	14.1	a	7.2	a
Control	101	a	63	a	14.6	a	10.2	a

** Values followed by the same letter do not differ significantly**

Table 2: Grain Yield and Quality

Description	Yield		Protein		Moisture		Test wt		Screenings	
Data Type	t/ha		%		%		kg/hl		%	
Treatment										
BUW-2	6.62	a	12.2	a	11.6	b	74.7	a	7.5	a
BUW-3	6.66	a	11.8	a	11.5	b	74.7	a	8.5	a
BUW-4	6.72	a	11.9	a	11.5	b	74.9	a	7.3	a
BUW-5	6.91	a	11.6	a	11.6	b	75.5	a	5.0	a
BUW-6	6.96	a	11.9	a	11.5	b	75.1	a	7.0	a
BUW-7	6.76	a	11.8	a	11.5	b	75.1	a	6.3	a
Control	5.65	b	12.3	a	12.1	a	74.7	a	5.5	a

** Values followed by the same letter do not differ significantly**

Graph 1: Yield as a percent of the control (t/ha)