Response of Potential and New Wheat and Barley Varieties to Nitrogen and Seed Rates

Aim: Improve returns to growers through a better understanding of nitrogen and seeding rates responses.

Research Officer: Christine Zaicou-Kunesch
Company: Department of Agriculture, WA.

Department of Agriculture
Government of Western Australia

Farmer: Anton Wilson, Liebe Main Trial Site
Location: Buntine-Marchagee road

Background: This study is one component of a state wide GRDC funded project 'Variety specific agronomy for wheat yield and quality in the Western Region'. It aims to assist growers with agronomic decisions for new varieties to improve performance and economic returns. Barley has been included in this trial at the request of the Liebe Group.

Trial Details:

Plot size and replication	1.44 x 20m; 2 replicates
Soil type	Sandplain with pH (CaCl2): 5.6; OC%: 0.64; P:40ppm
Sowing date	28th May 2004
Conditions at sowing	Top soil: drying, subsoil moist
Machinery	Small plot cone seeder, 180mm spacings, knifepoints and presswheels
Seeding rate	Seeding rate trial (ranged from 25kg to 100 kg/ha)
Fertiliser	180 kg/ha banded at seeding. Nitrogen treatments topdressed at seeding
Herbicides and Insecticides	28th May: 0.8 L/ha Trifluralin, 2.4 L/ha Spray Seed 24th June: 380g Achieve+1LSuper Charge /ha 9th July: 150mL Lontrel + 1L Jaguar /ha 13th August: 0.5L Tilt /ha; 19/8: 1.4L Broadside /ha
Paddock History	2003 = wheat, 2002 = wheat

Comments:
This was the third year of wheat and the low nitrogen treatments were particularly susceptible to leaf diseases. Grain yields were at least doubled at 120kg N/ha at seeding compared to the nil N treatment. There was a slight decline in grain protein at 30 kg/ha followed by increasing protein up to 120kg N/ha.

The targeted plant population of 50, 100 and 200 plants /m^2 corresponded to an established plant density of approximately 44, 74 and 140 plants/m^2. There was not a

significant interaction between seeding rate and varieties on grain yield of either crop. In essence, increasing seeding rate increased the yield of all the varieties and this tended to reduce small grain screenings. Screenings of wheat were a bigger problem with low seeding density (Table 1b). At the higher seed density (target 200 plants/m^2), screenings were reduced to less than 5% for all varieties except Carnamah.

Grain proteins were increased in both crops, but mainly at the higher N rates (60, 120 kg/ha). Smaller amounts of N (30 kg/ha) increased the yield so much that the grain protein percentages were actually reduced (diluted by the extra carbohydrate).

WAWHT2499 is a potential A.Hard variety that the Department of Agriculture anticipates launching in February 2005. It is considered a mid season wheat with good grains size but it has similar blackpoint levels to Westonia and susceptible to a low falling number like Brookton. Hence it is most applicable to the low rainfall areas.

Hamelin was released in 2003 with the intention that it will replace Stirling over time. It has a similar maturity, disease resistance profile, plant height and a slightly higher yield potential. WABAR2175 enters its third year of commercial malting and brewing trials in 2003. Results from previous years suggest that WABAR2175 has a grain plumpness similar to Hamelin and is generally higher yielding with an improved level of disease resistance. WABAR2175 is however a late spring maturity variety (ie like Baudin) and is not suited to low rainfall years and late sowing.

The results from this trial prove that given a mild finish to the season screenings levels in Baudin can be as good as Hamelin barley (and even Stirling). This result is not typical of what we would expect from this type of environment. The screening levels in the barley demonstration trial at Carlshausen's (Gavin Bignell) are more typical of what we would expect. Data collected over more seasons and more sites suggest that screening levels in Baudin are between 2 to 2.5 times those of Stirling and higher than Hamelin.

Table 1: Effect of nitrogen (0, 30, 60, 120 kg N/ha) and seed density (SD 50, 100 and 200 plants /m^2) on performance of barley (1A) and wheat (1B) varieties

Note: Gross income ($/ha) based on AWB and Grain Pool receival standards

1A: BARLEY	**N applied**	**Grain yield**			**Protein**			**Screenings**			
	(kg/ha)	**SD50**	**SD100**	**SD200**	**SD50**	**SD100**	**SD200**	**SD50**	**SD100**	**SD200**	**S**
Hamelin	**0**	0.89	0.97	1.44	11.8	11.3	12.0	9	7	8	
Hamelin	**30**	1.48	2.13	2.10	11.1	10.7	11.3	6	6	6	
Hamelin	**60**	1.81	2.38	2.39	11.7	10.2	10.8	6	7	6	
Hamelin	**120**	2.51	2.18	2.66	12.1	11.5	11.6	7	5	8	
Baudin	**0**	1.02	1.21	1.46	11.9	11.6	12.0	6	6	6	
Baudin	**30**	1.56	1.78	2.09	11.8	10.4	11.2	4	5	3	
Baudin	**60**	2.34	2.52	2.66	10.6	10.3	10.5	3	4	5	
Baudin	**120**	1.97	2.84	3.13	11.6	10.7	11.1	4	5	5	
WABAR 2175	**0**	1.00	1.19	1.10	11.5	10.9	11.2	5	5	6	
WABAR 2175	**30**	1.66	1.82	1.63	10.3	9.8	10.3	5	4	6	
WABAR 2175	**60**	2.12	2.48	2.68	10.2	9.8	10.0	3	5	5	

WABAR 2175	**120**	2.45	2.81	2.84	11.2	10.4	11.1	3	7	6	S

1B: WHEAT	N applied	Grain yield			Protein			Screenings			Gros
	(kg/ha)	SD50	SD100	SD200	SD50	SD100	SD200	SD50	SD100	SD200	SD50
Carnamah	**0**	0.73	1.24	1.33	10.6	10.2	9.8	9.8	7.5	7.2	$136
Carnamah	**30**	1.52	1.93	1.69	9.8	9.4	9.7	7.6	7.3	6.3	$283
Carnamah	**60**	2.15	2.28	2.28	10.2	9.6	9.8	3.8	3.8	3.9	$420
Carnamah	**120**	2.37	2.47	2.57	10.3	10.4	10.5	4.7	3.5	3.6	$473
GBA Ruby	**0**	1.04	1.20	1.51	10.6	10.9	10.1	6.2	5.5	4.8	$199
GBA Ruby	**30**	1.65	1.84	1.93	10.7	10.5	10.5	4.9	4.3	2.8	$415
GBA Ruby	**60**	1.70	2.05	2.20	10.1	10.2	10.3	4.9	2.8	1.8	$325
GBA Ruby	**120**	1.91	2.45	2.60	10.6	10.1	10.7	4.0	4.6	1.8	$374
GBA Shenton	**0**	0.95	1.33	1.47	10.2	10.0	10.0	6.3	6.1	4.6	$185
GBA Shenton	**30**	1.59	1.80	1.71	9.8	9.7	9.9	6.6	4.8	3.8	$299
GBA Shenton	**60**	2.08	2.13	2.05	9.7	9.7	10.0	4.6	3.1	2.7	$407
GBA Shenton	**120**	2.08	2.52	2.50	10.4	10.2	10.2	3.1	2.8	1.7	$423
WAWHT 2499	**0**	0.82	1.16	1.08	10.2	9.9	10.3	9.4	7.1	4.9	$151
WAWHT 2499	**30**	1.39	1.71	1.65	9.6	9.7	9.8	7.8	5.6	4.4	$255
WAWHT 2499	**60**	1.74	1.95	2.11	9.7	9.7	9.7	6.1	4.6	3.7	$335
WAWHT 2499	**120**	1.99	2.23	2.40	10.1	10.2	10.2	5.0	3.7	3.1	$392
GBA Eagle Rock	**0**	0.56	0.74	0.88	11.2	11.4	11.1	5.6	4.1	3.1	$112
GBA Eagle Rock	**30**	0.86	1.46	1.43	11.3	10.6	10.8	3.9	2.9	2.8	$175
GBA Eagle Rock	**60**	1.31	1.56	1.77	11.0	10.9	11.0	3.4	2.8	2.2	$267
GBA Eagle Rock	**120**	1.79	1.89	2.39	11.5	11.4	11.6	2.8	2.6	1.6	$375
Wyalkatchem	**0**	1.18	1.21	1.47	10.3	10.7	10.4	3.5	3.5	2.5	$238
Wyalkatchem	**30**	1.59	1.29	1.80	10.6	10.7	10.4	3.4	2.7	2.6	$321
Wyalkatchem	**60**	2.20	2.11	2.70	10.0	10.5	10.2	1.6	2.2	2.2	$450
Wyalkatchem	**120**	2.47	2.70	2.53	10.6	10.7	10.9	1.6	1.6	0.8	$516
		Sig	LSD					Sig	LSD		
Variety		<.001	0.145		<.001	0.26		<.001	0.30		
Nrate		<.001	0.096		<.001	0.17		<.001	0.20		
SRate		<.001	0.084		0.003	0.15		<.001	0.17		
Variety.Nrate		0.044	0.289		0.040	0.51		<.001	0.59		
Variety.Srate								<.001	0.5153		

.

Summary:

- With three continuous wheat years, all the varieties were very responsive to 120 kg/ha of nitrogen.
- Increasing seed density is a good management tool for weeds in wheat. At this site, yields increased with increasing seed density without a reduction in grain quality.
- Baudin is a late maturity variety and screening levels experienced in this trial are lower than what would normally be expected. If you do purchase Baudin seed, aim to sow it in early May and plan for mildew and net blotch foliar control.
- If you are a Better Farm IQ grower the incentives for delivering Shochu are enough to probably not warrant switching to Hamelin or even trialling Baudin as an early sown variety. The Grain Pool is currently evaluation Hamelin and Baudin for the Shochu market.

Technically reviewed by: Dr Wal Anderson and Blakely Paynter

Acknowledgements: GRDC for financial support, Melanie Kupsch and Anne Smith for technical support, Department of Agriculture- Wongan Hills Research Support Unit for seeding and harvesting trial.