4.8 CAN THE LESSONS LEARNT IN GROWING PRIME HARD WHEAT IN SOUTHERN NSW BE EXTENDED TO THE HIGH RAINFALL GRAIN REGIONS OF SOUTHERN VICTORIA?

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Introduction:
Prime hard (PH) and Australian hard (AH) grade wheat has been grown in high rainfall areas of southern NSW in recent years, while field trials in southern Victoria have shown that similar grades may be achievable in this area. Potential benefits for growers pursuing high protein wheat in southern Australia include: (i) traditionally Victorian wheat yields have been limited through nitrogen deficiency as evidenced by the low protein wheat delivered to silos - once grain is below a threshold protein (<10.5 – 11.5%), yield will be reduced. (ii) Historically, higher protein grades of wheat have attracted a price premium translating to better returns. (iii) With a strong pasture history, residual soil nitrogen levels tend to be high - this is of benefit to growers who incur large start up costs with the transition to cropping - it is thought that the initial years of cropping will not require high rates of nitrogenous fertilizers despite high yield potential.

Management Schedule:

	Gnarwarre	**Glenthompson**
Previous Crop	Canola 2000	Canola 2000
Soil sample date	20/04/01	03/05/01
Pre-plant herbicide & date	**Pre-sow** (1/05/01) Roundup 1.2 l/ha + Goal CT 70 ml/100l **Post-sow/pre-em** (24/05/01) Logran 35 g/ha + Dual gold 250 ml/ha	**Pre-sow** (25/05/00) Roundup 1.0 l/ha + Stomp 1.25 l/ha + LI700 400 ml/100l **Post-sow/pre-em** (27/05/00) Logran 35 g/ha + Dual gold 250 ml/ha
Sowing date	24/05/01	25/05/01
Basal Fert/Rate	Trifos (triple super) 150 kg/ha	Trifos (triple super) 150 kg/ha
Emerge count	180 plants/m^2	200 plants/m^2
Post-em Herbicide	Topik 200 ml/ha @ DC23	Achieve 410 g/ha + LVE MCPA 500 ml/ha + Dimethoate 80ml/ha + Supercharge 900ml/100L
Foliar Fertilizers	$CuSO_4$ + Triad Fungicide 1 l/ha @ DC39	
Topdress dates: DC15:31:41:65	18/07/01 07/08/01 21/09/01 15/10/01	18/07/01 14/08/01 24/09/01 22/10/01
DM cuts - DC31 & maturity	07/08/01 & 02/01/02	14/08/01 & 31/12/01
Harvest	04/01/02	05/01/02

Design and Treatments:
Each site was designed to assess rate x split x timing of nitrogen application as per the design above. The design was randomised block with three replicates. At both sites the benchmark variety was Chara. Chara was compared to H45 at Gnarwarre while at Glenthompson, Kukri was the comparison variety.

0 N	50 N	100 N	150 N
Control*	MRB* IBS* DC15 DC31 DC41 DC65	MRB* IBS* 50 MRB:50 DC31 50 MRB:50 DC41 50 MRB:50 DC65 50 DC31:50 DC65*	MRB IBS 50 MRB:50 DC31:50 DC65

* = treatment was applied to comparison variety

MRB = mid-row banded
IBS = broadcast & incorporated by sowing
DC15 = 5-leaf stage
DC31 = fully tillered
DC41 = boot stage
DC65 = flowering

Soil Measurements:
Each replicate was shallow (0 - 10 cm) & deep (10 - 60 cm) sampled prior to sowing. 12 shallow cores & 3 deep cores were taken from each replicate. Samples were analysed for texture, pH (water & $CaCl_2$), OC%, ammonium & nitrate nitrogen, Olsen P, exchangeable cations (Ca, Mg, K, Na & Al), EC_{se}, Cu, Zn, Mn, Fe & B.

Plant Measurements:
Emergence counts were taken approximately 3 - 4 weeks after sowing. Tiller counts were taken at DC31 on selected plots (0, 50, 100, 150 kgN/ha) across both varieties.

Application of Nitrogen Treatments:
Planting N treatments were applied as urea on 444 mm row spacings using a disk opener. Top dress N treatments were applied as ammonium nitrate (Nitram®) spread by hand.

Dry Matter Cuts:
Dry matter cuts were taken from selected plots at DC31 & maturity to determine dry matter accumulation & nutrient uptake.

Yield, Protein & Quality Data:
Yield was measured at each site by harvesting the inner six of the eight rows sown in each plot. Grain protein was determined using the near infrared spectrometry (NIR) for total nitrogen determination. Grain quality attributes are to be assessed on selected samples based on grain protein.

Results & Discussion:

Soil Data:
Sites were typical of the area with intermediate – high profile inorganic nitrogen at sowing following good autumn rain. Of particular note is the large increase in pH down the profile and high exchangeable sodium levels in the subsoil at Glenthompson. This is a major factor in contributing to poor internal drainage. At Gnarwarre, the crop was diagnosed as mildly copper deficient from DC31 – a foliar application of copper was made at DC41.

	Gnarwarre	Glenthompson
Texture	Medium Clay	Light Clay
pH (water)	5.5 surface – 7.6 (30 – 60 cm)	5.1 surface – 7.8 (30 – 60 cm)
OC %	2.2	
Mineralised Nitrogen (kgN/ha)	80	80
Inorganic (kgN/ha 0–60 cm)	166.7	155.0
P Colwell	35.7	25.3
Al %	0.2	4.2
Na %	3.5	7.4% surface – 25% (30 – 60 cm)
Zn	0.2	0.5

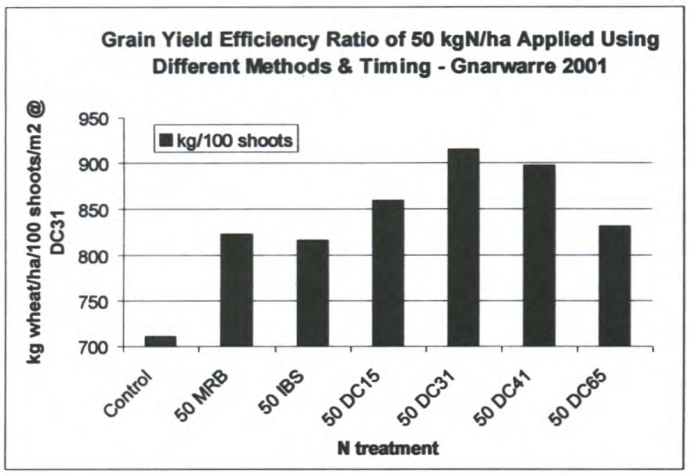
Grain Yield (& Protein):
At the time of writing, grain protein results were not available. Initial yield data does reinforce the significant effects that timing & method of nitrogen application can have on production outcomes:

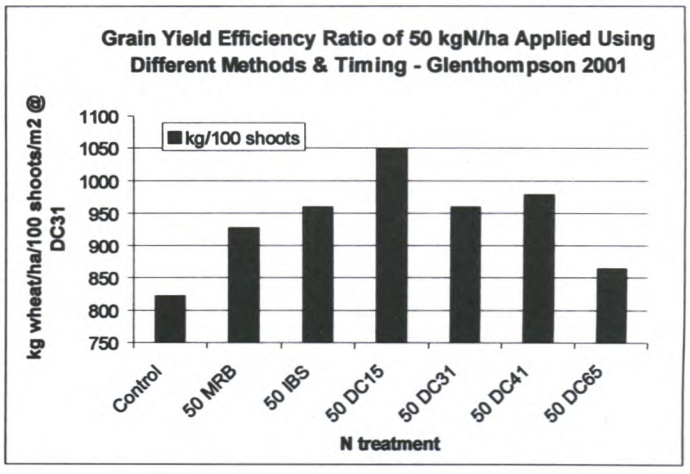
Nitrogen Treatment	Gnarwarre		Glenthompson	
	Chara	H45	Chara	Kukri
Control	4861	5558	4102	2927
50 MRB	5420	6024	5470	3342
50 IBS	5411	5412	4828	3762
50 DC15	5878		5238	
50 DC31	6257		4786	
50 DC41	6137		4881	
50 DC65	5686		4314	
100 MRB	5607	5844	4891	3440
100 IBS	5995	5748	5100	3792
50 MRB:50 DC31	6158		5252	
50 MRB:50 DC41	5718		4898	
50 MRB:50 DC65	5924		4963	
50 DC31:50 DC65	6082	6036	5097	4079
150 MRB	6121		5404	
150 IBS	5338		5538	
50 MRB:50 DC31:50 DC65	5824		5334	
F pr	0.138		<0.001	
Lsd	800.5		505.7	
CV%	8.4		6.7	

- At Gnarwarre on beds with reasonable drainage best results from applying 50 kgN/ha were from topdressing between fully tillered & boot stage.
- Conversely at Glenthompson on the flat, yield data suggests that best results came from mid-row banding urea at planting. This may be a function of the poor drainage & continued water logging at this site which may have favoured loss mechanisms for broadcast nitrogen.

Getting the Best Performance From Your Canopy:

One of the noted measures of crop response to nitrogen developed in recent years has been the use of canopy measurement. Given that canopy density varies significantly across soil types, varieties and in response to other stimuli such as plant density, it is interesting to attempt to standardise density and consider yield response to the various nitrogen options. This has been done by considering wheat yield from 100 shoots (at DC31) derived from the various nitrogen treatments at 50 kgN/ha:





At Gnarwarre, there was a clear trend for application from fully tillered to boot stage to provide the best yield from a given canopy. This is consistent with results from previous years. At Glenthompson, the trend is not as clear, while earlier topdressing looks more promising. This may be explained by the water logged conditions where early topdressing helped the crop through some early damage. These observations will be confirmed once grain proteins are analysed.

Conclusion:

A full report will be written when protein & quality analyses are complete.