

3.4 CEREAL NUTRITION TRIALS

3.4.1 EFFECT OF NITROGEN TIMING AND APPLICATION METHOD ON WHITE WHEAT YIELD AND PROTEIN IN HIGH RAINFALL ENVIRONMENTS

Researcher:

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Methods & soil data:

Trials were sown at a seeding rate to achieve a plant population of 180/m² using a basal starter fertiliser to supply 25 kgP/ha, 7 kgS/ha, 1 kg Cu/ha & 1 kgZn/ha. Soil parameters are indicated in the table below. The main variety in the trials was Chara with Bowerbird assessed with selected treatments.

Introduction:

A series of trials commenced in 1999 in high rainfall zones of southern Australia has consistently shown that it is possible to grow high protein (AH grade) white wheat in these areas where tactical nitrogen management is adopted. This approach depends upon establishing a canopy during the vegetative phase that the environment is capable of supporting. As the crop moves into the reproductive phase, nitrogen is then tactically applied in response to environmental and market conditions as the crop progresses towards flowering.

Lake Bolac				Gnarwarre			
Sow date	25/05/02	OC%	2.95	Sow date	24/05/02	OC%	2.6
Sample date	1/05/02	P Olsen	5.5	Sample date	30/06/02	P Olsen	15.7
pH(w)	6.1	Cu DTPA	0.7	pH(w)	6.0	Cu DTPA	1.3
N kg/ha 0-60 cm	258	Zn DTPA	0.55	N kg/ha 0-60 cm	199	Zn DTPA	1.4



Photo 3: Charlie Walker talking about nutrition trial at Lake Bolac

Results & Discussion:**Table 27: Yield, Protein and Grain N Recovery at Lake Bolac**

Nitrogen rate, application method & timing	Chara			Bowerbird		
	Yield kg/ha	Protein % 11% mb	N recovery %	Yield kg/ha	Protein % 11% mb	N recovery %
Control	3579	13.40		2327	14.05	
50mr	3535	13.95	4.80%	2184	14.43	-4.20%
50ib	3572	13.89	5.60%	2137	14.29	-7.40%
50db	3482	13.99	3.00%	2353	14.30	3.40%
50 dc30	3865	13.69	16.20%	2600	14.34	16.00%
50 dc41	3428	14.37	4.20%	2255	14.41	-0.80%
50 dc65	3274	14.31	-4.00%			
100mr	3688	13.52	3.30%			
50mr:50 dc41	4036	13.79	13.50%			
50 dc30:50 dc41	3285	14.42	-1.10%			
50 dc30:50 dc65	4044	14.25	16.70%	2491	14.14	4.50%
150mr	3787	13.97	5.73%			
50mr:50 dc30:50 dc41	3759	14.35	6.87%			

At Lake Bolac, beds were pulled up in an old pasture paddock that was not winter cleaned the prior year. The paddock was also limed prior to bedding. In a commercial paddock this is not recommended practice. In order to avert the build up of root disease it is recommended to remove grasses the year prior to cropping and sow Canola as a break crop in the first year of the rotation. It is not recommended to apply lime in the same year as wheat as this is likely to promote Take-all.

Being an old pasture paddock, profile N levels were very high prior to sowing, which combined

with the inevitable root disease left a situation where nitrogen application would not normally be recommended. Despite this, the dry season and very poor nitrogen recovery in grain, the typical expectation of best grain N recovery was again achieved by holding off N application until the fully tillered stage. It is believed that the high proteins achieved in grain were most likely a function of moisture limitations, not only due to the dry season but also the combination of moderate root disease present which affected rooting depth and hence moisture extraction. The other issue driving high protein was high concentration of N in the surface soil.

Table 28: Yield, Protein and Grain N Recovery at Gnawarre

Nitrogen rate, application method & timing	Chara			Bowerbird		
	Yield kg/ha	Protein % 11% mb	N recovery %	Yield kg/ha	Protein % 11% mb	N recovery %
control	4659	12.46		3457	9.88	
50mrB	5558	12.36	37.00%	3743	10.62	19.40%
50ibs	5698	12.05	35.80%	3536	10.74	13.20%
50db	5255	12.25	22.00%	3517	10.95	14.40%
50 dc30	5860	12.04	42.60%	3584	10.57	10.80%
50 dc41	4862	10.94	-16.40%	3431	11.66	20.80%
50 dc65	4597	11.20	-21.40%			
100mrB	5279	11.73	6.50%			
50mrB:50 dc41	5910	11.70	19.50%			
50 dc30:50 dc41	5798	11.52	15.60%	3607	12.63	19.50%
50 dc30:50 dc65	5325	11.70	7.80%			
150mrB	5308	11.95	6.40%			
50mrB:50 dc30:50 dc41	6180	11.84	18.00%			

At Gnawarre, the situation was similar to Lake Bolac, although the plots were not limed, profile N levels were significantly lower, there was no evidence of root disease, and deep profile moisture supply was significantly higher.

Again the stand out performer in terms of grain N recovery was topdressing at the fully tillered stage. Topdressing later gave poor results unlike

previous years and this can be attributed to poor recovery of N where surface soil is dry and significant rain does not occur in the week following application. At sowing applications also gave acceptable results. Surprisingly, the control treatment gave the highest protein implicating the importance of additional N in the system when trying to harvest moisture from deep in the profile.

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