

Rates and time of nitrogen for wheat protein and yield – West River

Summary of results

- ◆ In good seasonal conditions on a nitrogen responsive site, both sowing and tillering applications of nitrogen as CAN provided good yield and protein improvements leading to a good return on nitrogen fertiliser investment.
- ◆ Late applications of nitrogen as CAN were more efficient in achieving both yield and protein increases at this site than sowing applications.

Site Information	
Group	Ravensthorpe Agricultural Initiative Network
Trial location	West River, 18 km W from Ravensthorpe
Farmer	Rod and Tracey Ebert
Soil Type	loamy gravel
Organic Carbon	0.94% OC
Available N ppm	8 nitrate 3 ammonium
Actual annual rainfall	474 mm
Ave annual	420 mm
Growing Season	279 mm(May-Oct)
Rainfall (GSR)	decile 7 season
Ave GSR	263 mm
Yield Potential (t/ha)	4.7 t/ha
Yield Actual (t/ha)	1.6 - 2.8 t/ha
Paddock History	
2002	pasture 80% legume, low yield
2001	barley
2000	wheat
Seeding Date	16 May 2003
Variety	Yitpi
& Sowing Rate	65 kg/ha
Base Fertiliser	MAP 60 kg/ha

Aim

This trial aimed to investigate the response of wheat protein and yield to rates of nitrogen fertiliser applied at sowing or at late tillering.

Design

Seeder width plots 200metres long were marked out in a section of paddock across previous workings. A recommended rate of nitrogen was chosen from the Nitrogen Calculator based on paddock details and a target yield of 3 t/ha with 10.5% protein. 50 kg/ha of nitrogen was the recommended rate, other rates described response curves. The fertiliser was applied as CAN through an air seeder in a randomised block design with three replicates.

What happened

The trial area was sown and managed as part of the whole paddock. The treatment rates of fertiliser were applied immediately before sowing or on 30th July 10 weeks after sowing. 19mm of rain fell 2 days after the tillering application. The highest rate of CAN applied at sowing, 370 kg/ha needed two passes of the airseeder causing surface soil compaction in wet conditions which made wheeling strips of poor growth in those plots. The rates of fertiliser were evident during spring as greener and denser plots.

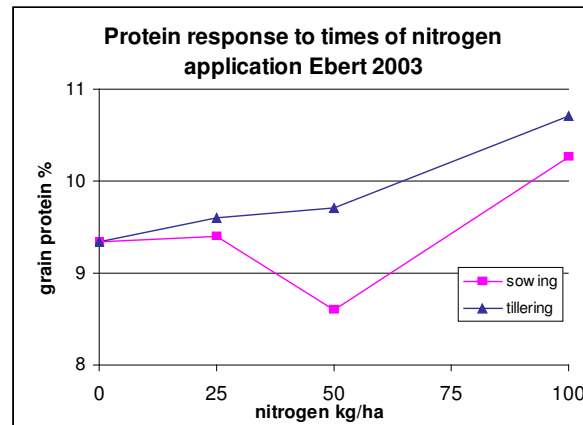
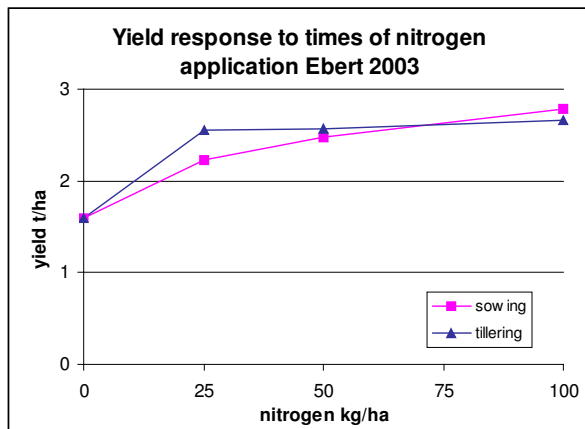
Tiller counts and heads counts showed responses to increasing nitrogen rates from the sowing application of nitrogen but no differences between rates of N above nil for the tillering application. There were lower head numbers for each rate of fertiliser applied at tillering compared to sowing application.

Table 1: results of crop response to sowing and late tillering applications of nitrogen as CAN.

treatment	Extra nitrogen kg/ha	tillers /sqm. 2/9/03	heads /sqm.	yield t/ha	protein %	nitrogen efficiency	return to fertiliser over nil
Nil	0	386	202	1.60	9.3		
93kg/ha CAN sowing	25	526	314	2.23	9.4	42%	\$68
185kg/ha CAN sowing	50	604	398	2.48	8.6	23%	\$44
370kg/ha CAN sowing	100	640	479	2.78	10.3	24%	\$77
93kg/ha CAN tillering	25	512	393	2.55	9.6	67%	\$123
185kg/ha CAN tillering	50	478	369	2.57	9.7	35%	\$94
370kg/ha CAN tillering	100	563	398	2.66	10.7	24%	\$60
lsd 5%		75	51	0.136	1.9 (ns)		

Grain yield increased with increasing rates of nitrogen, the highest yield was achieved with 100 kgN/ha at sowing, similar to being applied at tillering. The lower rate of 25 kgN/ha increased yield more at tillering than at sowing.

Protein was generally increased with increasing rates of nitrogen, except variation within treatments meant the results are not significant. The tillering applications gave higher protein than sowing applications for a given rate of nitrogen. Nitrogen uptake to grain efficiency was greater for applications at tillering giving higher returns than sowing applications except for the highest rate of 100 kgN/ha where sowing application was more profitable than tillering.



Even at these lower than target yields, the results show that more nitrogen was required than indicated by the Nitrogen Calculator for target protein. The limited yield response to rates above 50 kg/ha indicate that nitrogen limited yield potential was probably reached, even though this was lower than the rainfall limited potential.