

Nitrogen sources and time of application. - Cascade

Summary of results

- ◆ There was little difference in crop yield from the range of nitrogen fertiliser products tested or timing of their application. Grain protein was increased by all applications of post sowing nitrogen. Protein was generally highest with CAN. It was also higher for booting applications. Of the nitrogen treatments, Flexi-N appeared to result in lowest grain protein. These results should be treated cautiously as the treatments were unreplicated.

Site Information	
Group	No formal group
Location of trial	Cascade, 110 km NE from Esperance
Farmer	Manfred and Viola Barz
Soil Type	grey loam over clay
Organic Carbon	0.9 - 1.2% OC
Available N ppm	not measured
Actual annual rainfall	462 mm (Jan – Nov)
Ave annual	350 mm
Growing Season	316 mm
Rainfall (GSR)	(May–Oct)
Ave GSR	250 mm
Yield Potential (t/ha)	4.5 t/ha
Yield Actual (t/ha)	3.3 to 3.6 t/ha
Paddock History	
2002	wheat
2001	canola
2000	wheat
Seeding Date	2 June 2003
Variety	Carnamah
& Sowing Rate	72 kg/ha
Base Fertiliser	Agstar Extra Plus 50 kg/ha (13.9% N)

Aim

Evaluate timing and combinations of timing strategies for post sowing N application. To compare Flexi-N, urea and CAN as alternative nitrogen sources for post sowing applications of N.

Design

The trial had a total of 13 treatments which precluded replication at the scale of the plots, which were 13m wide. A control plot of Flexi-N at early tillering, (Z2.2) was included in every fourth plot to assess site variability. A rate of 50 kg/ha of nitrogen was selected from the Nitrogen Calculator using a yield estimate of 3 t/ha with 11% protein. The plots ran the full length of the paddock in an up and back tramline system but only one 250 m section was harvested for the yield results.

The Flexi-N was applied with one side of a boomspray in total volumes made up to 100 or 400L/ha with water to reduce the effect of leaf burning from the liquid N compared to solid fertilisers. The urea and CAN were applied from the sides of the plots with a European design spreader delivering fertiliser to one side. This avoided any crop damage complications from multiple traffic passes at differing growth stages.

What happened

The fertilisers were applied under good conditions as it was an above average growing season, about decile 7 or 8. The early tillering (Z 2.2) timing, was applied on 26 July, 54 days after sowing; stem elongation, Z 3.1, on 6 August, 64 days after sowing; and booting (Z 4.9) on 6 September, 95 days after sowing. All applications were made on moist soil with at least 7.5mm rain recorded within a week of each application.

There were few visible differences between plots during the growing season. Tiller counts on 1 September and head counts after flowering showed no response to fertiliser compared to nil plots. All nitrogen plots yielded better than the nil plots. The average yield of the

nitrogen treatment plots was 3.65 t/ha with 11.5% protein compared to 3.27 t/ha at 10.2% protein for the nil plots. For a fertiliser and application cost of about \$47 to \$83/ha, an extra \$-2 to \$96/ha was generated in the trial. An adjacent demonstration area aiming to reach maximum yields received an extra 117 kg/ha of nitrogen as both CAN and Flexi-N fertilisers generating a yield of 4.1 t/ha and 12.6% protein (up to 13% was delivered on some loads).

With no replication, statistical analysis is not possible. Yields and protein have been adjusted according to adjacent control plots. All sources and times of application appear to give similar yields. Average protein level for nitrogen treatments is 1.3% higher than the nil plots with CAN giving the highest level for all times of application. Flexi-N produced lowest protein at all application times.

Table 1: Wheat yield response (kg/ha) to nitrogen sources and times of application.

	Urea	Flexi-N	CAN	average for timing
no extra N		3307		
tillering Z 2.2	3398	3651	3791	3721
stem elongation Z 3.1	3712	3722	3773	3748
booting Z 49	3528	3418	3653	3535
all 3 times	3498	3629	3916	3773
average for products	3534	3605	3783	3643

Table 2: Wheat protein % from times and sources of post sowing nitrogen application.

	Urea	Flexi-N	CAN	average for timing
no extra N		9.9		
tillering Z 2.2	11.6	11.1	11.7	11.4
stem elongation Z 3.1	11.1	10.9	11.7	11.3
booting Z 49	12.1	11.4	12.7	12.0
all 3 times	12.0	11.1	12.5	11.8
average for product	11.7	11.1	12.1	11.5

Table 3: Net return to fertiliser compared to no post sowing application.

	Urea	Flexi-N	CAN	average for timing
no extra N		0.0		
tillering Z 2.2	9.7	28.8	55.6	42.2
stem elongation Z 3.1	50.5	36.8	52.3	44.6
booting Z 49	50.1	-10.4	63.4	26.5
all 3 times	63.1	17.9	126.5	72.2
average for product	43.3	18.2	74.5	41.2

Returns to post sowing fertiliser varied markedly between treatments. The lowest return was the booting Flexi-N application and the highest return was from the split CAN application. Despite the additional cost of multiple applications, the combination of yield and high protein generated the highest return to fertiliser for this plot.

