

Nitrogen Management on Upper Eyre Peninsula

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RESEARCH

Searching for Answers



Location:

Mudamuckla
Peter Kuhlmann

Rainfall

Av. Annual: 290 mm
Av. GSR: 216 mm
2010 Total: 347 mm
2010 GSR: 275 mm

Yield

Potential: 3.3 t/ha (W)
Actual: 2.3 t/ha

Paddock History

2009: Wheat

Soil Type

Grey calcareous sandy loam

Soil Test

Colwell P, Mineral N

Plot size

9 m x 4 reps

Location:

Minnipa Agricultural Centre

Rainfall

Av. Annual: 325 mm
Av. GSR: 242 mm
2010 Total: 410 mm
2010 GSR: 346 mm

Yield

Potential: 4.7 t/ha (W)
Actual: 2.6 t/ha (55 kg/ha DAP + 20 units N as urea upfront) (W)

Paddock History

2009: Wheat

2008: Wheat

Soil Type

Red sandy clay loam

Plot size

9 m x 4 reps

Yield Limiting Factors

Mice damage resulting in a late resowing

Key messages

- At Minnipa the late sown (resown due to mice damage) wheat gave a yield response to 20 units of up-front N, but not to N applied in-crop in 2010.
- At Mudamuckla there was no response to applied N above base rates on soil with adequate N content in 2010.

Why do the trial?

Applications of nitrogen fertiliser to wheat crops on upper Eyre Peninsula have been restricted because of concern that increased growth early in the season may reduce grain fill and cause haying off as the increased water use by the crop depletes soil moisture reserves. After an above average growing season in 2009, in some areas of upper Eyre Peninsula, many farmers had concerns about cereal on cereal crops being N limited and were therefore questioning when the best time to apply extra N was.

Previous research has shown that grain yield is not increased by late applications of nitrogen under dry, low yielding environments (EPFS 2002, pp104-105), as this method relies on the nitrogen being leached into the root zone for plant uptake and high levels of nitrogen are lost to volatilisation.

This trial was set up to compare up front applications of N with a split application of N, as well as the efficiency of foliar N compared to granular N.

How was it done?

Trials were established at Minnipa (10 June), Mudamuckla (2 June) and Wharminda (27 May). Due to mice damage the trial at Minnipa was sprayed out and resown on 2 July.

There were 9 treatments applied (Table 1) with Wyalkatchem wheat sown at 60 kg/ha. Measurements taken during the year included; mineral N (0-60 cm), plant establishment, dry matter at early tillering, anthesis and at maturity, grain yield and quality. All plots received standard weed management

What happened?

Soil tests taken before seeding indicated that the mineral N level (0-60 cm) was 79 kg/ha at the Minnipa site, 155 kg/ha at the Mudamuckla site and 66 kg/ha at Wharminda site. Plant establishment densities at each site were similar irrespective of treatment. Minnipa dry matter assessments of treatments at early tillering measured between 1.2-1.6 t/ha, anthesis 4.1-5.9 t/ha and maturity 6.5-8.3 t/ha. At Mudamuckla dry matter assessments of treatments at early tillering measured 0.7-0.9 t/ha, anthesis 5.1-6.1 t/ha and maturity 7.2-8.8 t/ha, however there were no statistical differences between treatments. At Wharminda no meaningful results were gained from this trial due to a high level of Brome grass.

At Minnipa the in-crop N was applied at Zadocks growth stage (GS) 36, at the time of the first available rain events following GS 31, to limit loss due to volatilisation. There was a general yield response to 20 units of N applied as urea up front compared to all other treatments. Yields were also similar or higher in response to N application up front or in crop compared to the nil N and base N DAP treatments. Grain protein and screening percentages were similar across all treatments.

At Mudamuckla there was no response to N applied in terms of grain yield or protein, but N applied generally resulted in higher screening percentages compared to the nil N treatment.

Location:

Wharminda
Ed Hunt
Wharminda / Arno Bay Ag Bureau

Rainfall

Av. Annual: 322 mm
Av. GSR: 222 mm
2009 Total: 479 mm
2009 GSR: 349 mm

Yield

Potential: 5.3 t/ha (W)
Actual: n/a

Paddock History

2009: Wheat
2008: Pasture
2007: Pasture

Yield Limiting Factors

Brome Grass

What does this mean?

At Minnipa the in-season application of N was not able to be done until 12 October when the crop was at GS 36, which is later than the recommended application time. This factor, in conjunction with the later sowing time which resulted in the crop having a shorter growing season, resulted in no response to N applied in-crop in 2010.

Gross margins benefited from applying extra N at Minnipa with an extra 0.2 – 0.4 t/ha grossing

\$60 - \$120/ha (APW @ \$300/t) at a cost of approximately \$10-20/ha for product.

Soil tests taken at Mudamuckla indicated that the amount of mineral N was sufficient for crop production without the application of extra N, this proved to be the case with no yield response to applying extra N.

Acknowledgements

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Table 1 Wheat grain yield (t/ha), protein (%) and screenings (%) at Minnipa and Mudamuckla in 2010

Treatment	Minnipa			Mudamuckla		
	Yield (t/ha)	Protein (%)	Screenings (%)	Yield (t/ha)	Protein (%)	Screenings (%)
55 kg/ha DAP + 10 units N as urea GS 31*	2.3	11.4	1.9	2.2	10.1	2.2
55 kg/ha DAP + 20 units N as urea GS 31*	2.3	11.4	1.8	2.2	10.3	2.9
55 kg/ha DAP	2.2	11.3	1.6	2.3	10.0	2.5
55 kg/ha DAP + 10 units N as UAN GS 31*	2.3	11.3	1.7	2.3	10.2	2.5
55 kg/ha DAP + 10 units N as urea up-front	2.4	11.4	1.9	2.1	10.0	3.1
55 kg/ha DAP + 10 units N as urea up-front + units UAN GS 31*	2.4	11.4	2.0	2.1	10.2	2.9
55 kg/ha DAP + 20 units N as UAN GS 31*	2.4	11.3	1.6	2.2	10.4	2.8
55 kg/ha DAP + 20 units N as urea up-front	2.6	11.4	1.8	2.0	10.2	3.1
triple super 11 units P	2.2	11.4	1.8	2.3	10.1	2.1
LSD ($P \leq 0.05$)	0.2	NS	NS	NS	NS	0.6

* Not applied until GS 36