Nitrogen response of eight wheat varieties – Merriwa 2015

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Introduction

Nitrogen (N) is the nutrient wheat needs in greatest quantity for growth, development and yield. In recent seasons in Central West NSW there has been a significant trend towards above average yields and very low grain protein levels, with greater than 30% of grain receivals meeting ASW or lower specifications. Protein levels of <10.5% in a prime hard variety usually indicates that insufficient N levels have not only limited grain protein concentrations but also yield. Soil testing for N levels before sowing remains an important budgeting tool. It is the most useful indicator in that season if additional applied N is needed to maximise yield and grain protein levels. Consideration must also be given to starting soil water and target yield. This trial aimed to determine the effect of N application on the yield and grain quality of eight popular bread wheat varieties at Merriwa in central NSW in 2015.

Key findings

There was a significant response in yield and grain protein across increasing rates of applied nitrogen (N) in all varieties.

Yield averaged across varieties rose from 2.88 t/ha with no applied N, to 4.06 t/ha with 160 kg/ha of applied N.

Grain protein levels across varieties increased from 9.0% (nil applied N) to 12.2% with 160 kg/ha of applied N.

Screening levels were not significantly affected by increasing N application rates in any variety and averaged close to 6% across varieties and N rates.

Site details

Location:	**Merriwa**
Co-operator:	**Ray Inder, "Farley"**
Soil type:	**Black basalt**
2014 crop:	**Canola**
2013 crop:	**Barley**
Sowing date:	**9 June 2015**
Starting moisture:	**315 mm rainfall January to end May; conditions very wet at sowing**
In-crop rainfall:	**288 mm**
Fertiliser:	**95 kg/ha Granulock Supreme Z Extra at sowing**
Fungicide:	**2.5 L/t flutriafol (500 g/L; Sapphire) fungicide on fertiliser; prothioconazole (210 g/L) + tebuconazole (210 g/L) applied at 300 mL/ha on 14 September and 7 October**
Starting N:	**90 kg N/ha (0–60 cm)**
Harvest date:	**9 Dec 2015**

Treatments

Variety	Dart(ф), EGA Gregory(ф), Kiora(ф), Lancer(ф), Spitfire(ф), Sunmate(ф), Suntop(ф) and Viking(ф)
Nitrogen (N)	0, 20, 40, 80, 160 kg N/ha at sowing, and 40+40 (40 kg N/ha applied at both sowing and GS31).

Nitrogen applied as urea, pre-drilled immediately prior to sowing, with exception of the 40 + 40 treatment which had 40 kg N/ha pre-drilled at sowing and 40 kg N/ha top dressed at GS 31.

Results

Table 1. *Effect of various nitrogen treatments on the yield, grain protein, screening levels and grain nitrogen yield (GNY) of eight bread wheat varieties – Merriwa 2015*

Variety	N treatment	Yield (t/ha)	Protein (%)	Screenings (%)	GNY (kg N/ha)
Dart	0	2.9	9.1	5.7	46.1
	20	3.3	9.6	5.9	54.8
	40	3.5	10.2	5.9	63.6
	40+40	3.9	11.3	6.0	77.7
	80	3.9	11.2	5.8	77.1
	160	4.1	12.2	6.0	87.7
EGA Gregory	0	2.8	8.7	6.6	43.3
	20	3.2	9.3	6.8	51.7
	40	3.5	9.9	6.8	60.2
	40+40	3.9	11.0	6.9	74.0
	80	3.9	10.9	6.6	73.3
	160	4.0	11.9	6.8	83.7
Kiora	0	2.9	9.3	6.6	47.4
	20	3.3	9.8	6.9	56.3
	40	3.5	10.5	6.8	65.2
	40+40	3.9	11.5	6.9	79.5
	80	3.9	11.5	6.7	78.9
	160	4.1	12.5	6.9	89.5
Lancer	0	2.7	9.8	4.3	45.8
	20	3.0	10.4	4.5	54.8
	40	3.3	11.0	4.5	63.6
	40+40	3.7	12.1	4.6	77.9
	80	3.7	12.0	4.4	77.3
	160	3.8	13.0	4.6	87.6
Spitfire	0	2.7	9.5	7.2	45.5
	20	3.1	10.0	7.5	54.3
	40	3.4	10.6	7.4	63.1
	40+40	3.8	11.7	7.5	77.3
	80	3.8	11.6	7.3	76.6
	160	3.9	12.6	7.5	87.0
Sunmate	0	2.9	8.6	7.0	43.5
	20	3.3	9.1	7.3	51.9
	40	3.5	9.8	7.2	60.4
	40+40	3.9	10.8	7.3	74.3
	80	3.9	10.7	7.1	73.6
	160	4.1	11.7	7.3	84.0
Suntop	0	3.2	8.6	4.8	47.8
	20	3.5	9.1	5.0	56.4
	40	3.8	9.8	5.0	65.3
	40+40	4.2	10.8	5.1	79.6
	80	4.2	10.7	4.8	78.9
	160	4.4	11.7	5.0	89.9
Viking	0	2.9	8.6	5.4	42.7
	20	3.2	9.1	5.7	51.1
	40	3.5	9.7	5.6	59.5
	40+40	3.9	10.8	5.7	73.3
	80	3.9	10.7	5.5	72.6
	160	4.0	11.7	5.7	83.0
	LSD (P=0.05)	0.05	0.11	0.38	

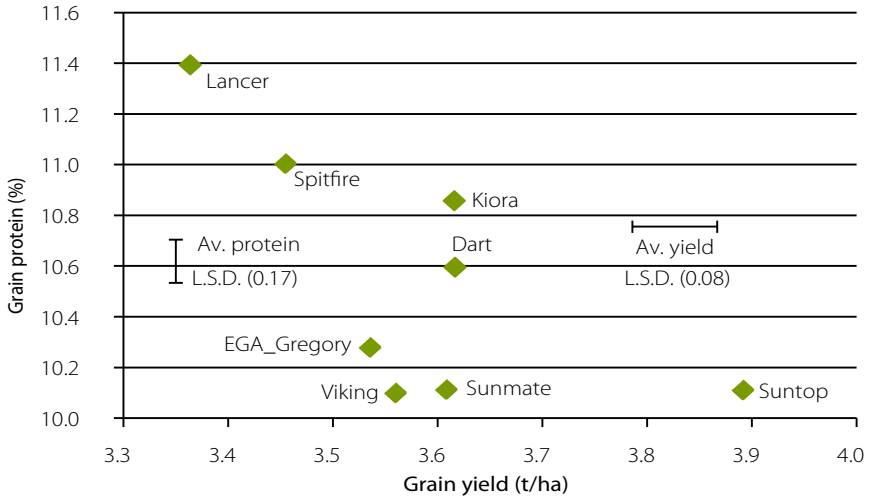

Figure 1. *Protein dilution relationship of eight bread wheat varieties across nitrogen rates – Merriwa 2015*

Summary

There was a strong positive yield and grain quality response to applied N in all varieties at all rates. At the highest rate of applied N (160 kg N/ha), both yield and protein appeared to still be rising at this site in 2015. The protein levels (8.6% to 13.0%) indicate that N could have still been in short supply to meet higher yield potential levels in some varieties (e.g. EGA Gregory, Sunmate, Suntop and Viking). Dart, Kiora, Lancer and Spitfire all achieved grain protein levels above 10% with only 40 kg N/ha applied at sowing. Screenings levels were very stable across N rates in all varieties indicating timely rainfall during grain filling. Grain nitrogen calculations show that at the highest rate of applied N (160 kg N/ha), N was still being taken up by all varieties at this site in 2015.

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