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Nitrogen response of eight wheat varieties and two sowing times – Trangie 2015

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Key findings

There was a decline in yield with all rates of applied nitrogen (N), which was likely to be associated with high levels of residual soil N at the site.

Grain protein increased with all rates of applied N in all varieties, most likely due to decreased grain size.

Sowing time had the greatest influence on yield, with the earlier sowing time yielding close to 1 t/ha better than the later sowing time for each variety.

Introduction

Nitrogen (N) is the nutrient wheat most needs 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 more than 30% of grain receivals meeting ASW or lower specifications. Protein levels of <10.5% in a prime hard variety usually indicate 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 within that season if additional applied N is needed to maximise yield and grain protein levels, along with starting soil water and target yield. This trial aimed to determine the effect of N application and sowing time on the yield and grain quality of eight popular bread wheat varieties at Trangie in central NSW in 2015.

Site details

Location:	**Trangie Agricultural Research Centre**
Soil type:	**Red loam**
2014 crop:	**Field peas**
2013 crop:	**Barley**
Sowing dates:	**TOS 1: 1 May 2015; TOS 2: 13 May 2015**
Starting moisture:	**Very wet; 186 mm rainfall January–April**
In-crop rainfall:	**172 mm May–September**
Fertiliser:	**80 kg/ha Trifos at sowing**
Fungicide:	**Prothioconazole (210 g/L) + tebuconazole (210 g/L) at 300 mL/ha at GS32 and GS39**
Starting N:	**233 kg N/ha (0–120 cm)**
Harvest date:	**TOS 1: 20 November 2015; TOS 2: 29 November 2015**

Treatments

Variety	Dart$^{(b)}$, EGA Gregory$^{(b)}$, Kiora$^{(b)}$, Lancer$^{(b)}$, Spitfire$^{(b)}$, Sunmate$^{(b)}$, Suntop$^{(b)}$ and Viking$^{(b)}$
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 was applied as urea pre-drilled immediately before sowing excepting the 40 + 40 treatment, which had 40 kg N/ha pre-drilled at sowing and 40 kg N/ha top-dressed at GS31 to take advantage of suitable topdressing rain.

Results

Nitrogen treatment

Protein levels significantly increased with increasing N application rates across all varieties (Figure 1). However, grain yield significantly declined with increasing rates of nitrogen application in all varieties. There was no significant difference in yield between nitrogen applied as a split treatment of 40 + 40 (sowing: GS31) or 80 kg N/ha at sowing. There was a linear relationship between nitrogen application rate and the level of screenings (%), which increased as the N rate increased (data not shown). There was no difference in screening levels between the 40 + 40 split N treatment and 80 kg N/ha at sowing except for Dart, Kiora and Suntop, which had significantly higher screenings with the 80 kg N/ha at sowing application (data not shown).

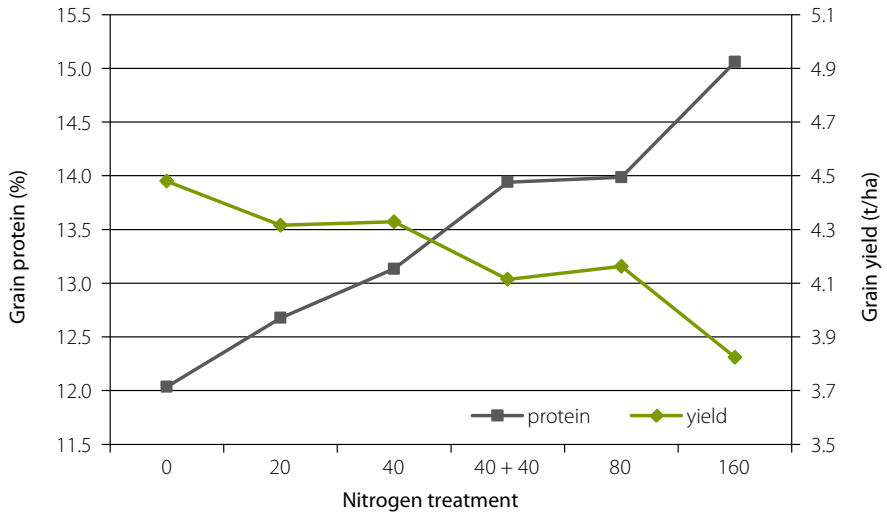

Figure 1. *Effect of nitrogen (N) rate across sowing times and varieties – Trangie 2015*
LSD yield = 0.1 t/ha; LSD protein = 0.2%

Time of sowing

Sowing time had a significant effect on grain protein, yield and screening levels (screenings data not shown) achieved by all varieties at Trangie in 2015 (Figure 2). A two-week delay in sowing from early May to mid-May reduced yield by 1.0 t/ha, increased protein by 1.4% and increased screenings by 5.8% when averaged across the eight wheat varieties. All varieties were significantly higher yielding for TOS 1 than TOS 2, but conversely there were higher grain protein levels with TOS 2 than TOS 1 (Figure 2).

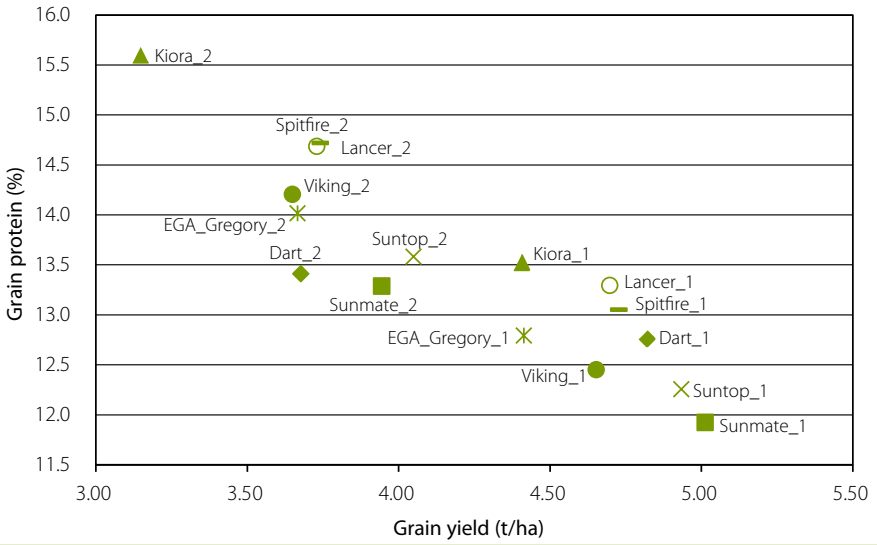

Figure 2. *Effect of sowing time on yield and grain protein levels (adjusted for nitrogen rates) of eight bread wheat varieties – Trangie 2015*
LSD yield = 0.14 t/ha; protein = 0.37%
Number after variety name indicates sowing date where 1 = TOS 1 (1 May 2015) and 2 = TOS 2 (13 May 2015)

Summary

This trial site had a high starting soil N level of 233 kg N/ha (0–120 cm) which probably contributed to declining yield with increasing rates of N application. However, protein levels still increased with increasing rates of N application, but this was most likely due to decreased grain size. Most varieties yielded almost 1 t/ha higher with TOS 1 compared with TOS 2. Sunmate and Suntop generally performed similarly at both sowing times. They were the highest yielding varieties at each sowing date, but also had lower protein achievement. Lancer and Spitfire also performed similarly at the two sowing dates and were generally lower yielding than Sunmate or Suntop at each sowing time, but obtained higher grain protein levels.

Acknowledgements

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