Tactical wheat agronomy for the west – nitrogen timing, Ballidu 2015 Trial Report 2015

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Key Messages

- The mean site yield was 1.4 t/ha and there was no difference in yield of Mace and Hydra wheats
- The site was responsive to added nitrogen with the nil N treatment producing 1.0 t/ha and the highest N treatments (total 70N) producing 1.6 t/ha. The timing of nitrogen applied (all prior to Zd30) did not influence yield.
- Grain protein did not exceed 9.8% with applied nitrogen. While the protein response was statistically significant, it was unlikely to be economically worthwhile.

Introduction

Nitrogen (N) management is a key variable in wheat management and optimising this can dramatically improve profitability. Many growers are weighing up different N application options, for instance, retaining some of the N inputs until after establishment for risk management or for increasing seeding program efficiency. This study aimed to revisit tactical nitrogen applications with the varieties Mace and Hydra at 4 low rainfall sites (Ballidu, Merredin, Lake Grace and Ogilvie) and Mace and Trojan at 3 medium-high rainfall sites (Broomehill, Cunderdin, Mingenew). The results of the Ballidu trial are presented here.

Aim

Determine the value of nitrogen rates and timing on production of grain and grain quality for profitable wheat systems

Trial details

Property	East Ballidu
Soil type	Yellow sandy loam pH ($CaCl_2$): 0-10 cm: 5.6; 10-20 cm: 4.7; 20-30 cm: 4.5
Crop	Wheat varieties: Mace and Hydra
Paddock rotation	2012 pasture, 2013 wheat, 2014 canola
Treatments	See table 1 below
Plot size and replicates	10 m x 1.78 m x 3 replications
Sowing date	26/5/2015
Seeding rate	Target 120 plants/m^2
Fertiliser (kg/ha)	80kg/ha Super CMZ drilled at seeding plus N treatments (see Table 1)

Property	East Ballidu
Rainfall	243mm

Table 1: Nitrogen treatments applied to wheat agronomy trial at East Ballidu

Total N (kg/ha)	N tr	N(kg/ha) @Seeding	N(kg/ha) (Zd 21) (26 June)	N(kg/ha) (Zd 31) (9 Jul)
0	0N	0	0	0
10	10N	10	0	0
30	30N	30	0	0
30	10N 20N	10	20	0
30	10N 0N 20N	10	0	20
50	10N 40N	10	40	0
50	10N 0N 40N	10	0	40
50	10N 20N 20N	10	20	20
70	10N 20N 40N	10	20	40
70	10N 40N 20N	10	40	20
70	30N 20N 20N	30	20	20
NVT	As per NVT	23	0	

Site information

The trial was located near the wheat NVT Ballidu location (south side of Liebe group 2015 site), which was a yellow sandy loam. Soil test phosphorus (P) and potassium (K) were marginal at this site (Table 2).

Climate

The 2015 season had 71 mm summer rainfall in February and March. There was adequate soil moist to establish the crop in late May with follow up rains in mid-June (Table 3). The season finished sharply with a very dry September and October. There were typically extended dry intervals without rainfall recorded broken by several rainy days, thus while monthly rainfall recorded at East Kondut seem reasonable, the crop experienced intermittent stress. Canopy temperatures recorded at the nearby wheat NVT show a -1.0°C frost on the 2nd September which may have affected yields, but high temperatures were more prevalent during grain-filling with: 6 days > 30°C and 1 day > 35°C in September and 21 days > 30°C of which 16 days were > 35°C and 4 days >40°C in October.

Results

Grain yield and protein.

The mean yield of the site was 1.4 t/ha, with no difference between Mace and Hydra. There was a significant difference (F prob. = <0.001) between N treatments, with no significant interaction between variety and N treatment, therefore results presented in Figure 1 for N treatments are the means of both Mace and Hydra. The trial site was N responsive (not the case with some other 2015 trials) with the nil N treatment producing 1.0 t/ha and the highest N treatments (total 70N) producing 1.6 t/ha (Figure 1). Treatments receiving 30N either at sowing or splitting the

applications were not significantly different (all ~1.4 t/ha). The same occurred for 50N (~1.5 t/ha) and 70N (1.6 t/ha). The NVT treatment received 23N upfront only and yields were significantly different to both 10N and 30N upfront.

Protein responses were somewhat normal in that the protein increased with increasing N after yield had plateaued but protein was still quite low as has occurred in much of central wheatbelt in 2015. Even applying 70 N did not achieve the 10% required to meet APW classification. While the protein response was statistically significant, it was unlikely to be economically worthwhile, especially with the low premium for protein in recent times. Some growers have asked whether the large rainfall events leached the N but the yield and protein responses were different between rates but not timing, suggesting this may not have been a major contributor. Screenings and grain weights are not available at time of print.

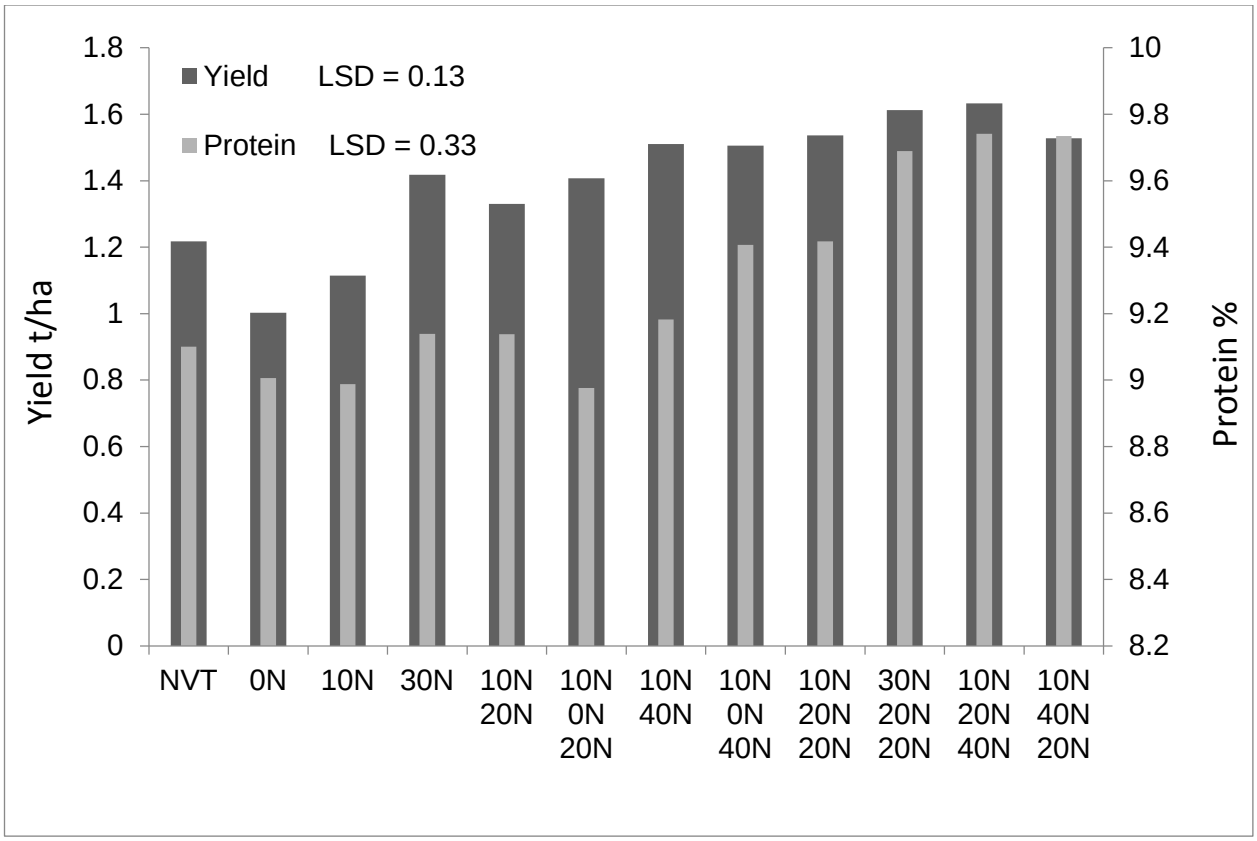

Figure 1: Grain yield (t/ha) and grain protein (%) of both Mace and Hydra wheat in response to 12 different N treatments (as per table 3).

Comments

Of the six tactical N trials in 2015, Ballidu was the most N responsive; however, it was also the lowest yielding site (mean 1.4 t/ha). The intermittent dry spells, particularly early in the growing season limited tiller survival and this likely constrained N responsiveness. The effect of timing was much lower importance in this trial than N rate. However, all applications were before first node appearance (Zadok 31) which is considered a key development stage for yield response to applied N. Future studies in the project will seek to clarify potential cut-off times for N applications.

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Important disclaimer