Scepter, Mace and Ninja wheat response to top up nitrogen at Binnu (Grower demonstration).

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Key messages

The test strips provided knowledge on how in-crop applications of nitrogen influenced yield and grain protein and potential allocations of crop inputs across the paddock.

Within a paddock, allocating resources to production zone will influence economic returns.

Paddock selection and rotation influenced grain protein of Scepter and Mace wheat. If faced with a season like last year growers might choose not to apply more N to wheat after lupins but wheat on canola might need more to get the protein window.

Aims

Assess how top-up applications of nitrogen as test strips across the paddock zones influence yield and protein of Scepter, Mace and Ninja Wheat.

Method

Paddock details

Scepter wheat was sown on to paddock WEP22 and Mace and Ninja wheat were sown onto the east and west locations of WEP20 (respectively) (Figure 1).

Paddock number: WEP 20

- Pdk History – 2016 Canola, 2015 wheat, 2014 wheat
- Seeding Date – 25/5/2017 Germination wasn't fantastic
- Fert @ seeding – 90 kg SOA pre seed, 45 kg DAP extra, 25 kg potash deep banded below the seed
- Flexi N application – 10/8/17 flexi n rate was 50% of applied rate

Paddock number: WEP 22

- Pdk History – 2016 Lupins, 2015 Wheat, 2014 Wheat
- Seeding Date – 19/5/17 – this would have come up approx. 5 days later (rained that night)
- Fert @ seeding – 70kg of macro star extra, 25kg of Potash deep banded below the seed
- Flexi N application – 10/8/17 – Flexi N rate was 50% of applied rate

Treatment details

Post emergent nitrogen applications on 10th August using Flexi N applied through a boom sprayer as whole strips in each paddock (Figure 1). Nitrogen rates of nil, 10 and 20kg/ha were applied with a 50:50 mix of Flexi N:Water.

Zones

For WEP 20 (Mace and Ninja): Red (1) = weak sand; Green (2) = good sand; Blue (3)= red loam; Brown (4) = gravelly loam to shallow gravel and Yellow (5) = clay loam has high clay content (Figure 1)

For WEP 22 (Sceptre): Red (1) = weak sand; Green (2) = good sand and Blue (3) = good loam sand over clay base

Measurements

Paddock zones were defined through grower experience, soil sampling, and EM38. Yield and protein monitors were used to collect information at harvest. Using geographic information systems (GIS) the yield or protein average for each test strip and selected subsets were calculated.

Results

Influence of soil type on yield and protein

Ninja yields increased by 0.25t/ha to 2.43t/ha on the good sand subset zone of WEP20 when nitrogen rates increased from 10 to 20kg/ha (Figure 2). Yields of Ninja sown on the good loam subset zone of WEP20 were not influenced by nitrogen application and the yields were on average 0.46t/ha lower on the sandplain.

Ninja's grain protein at each nitrogen rate, ranged between 9.8 and 10.4% on the good sand (Figure 2) and met the criteria for delivery into Australian noodle segregation. Protein was higher on the good loam zone and increased with added nitrogen. The protein levels also met the criteria for delivery into Australian noodle segregation.

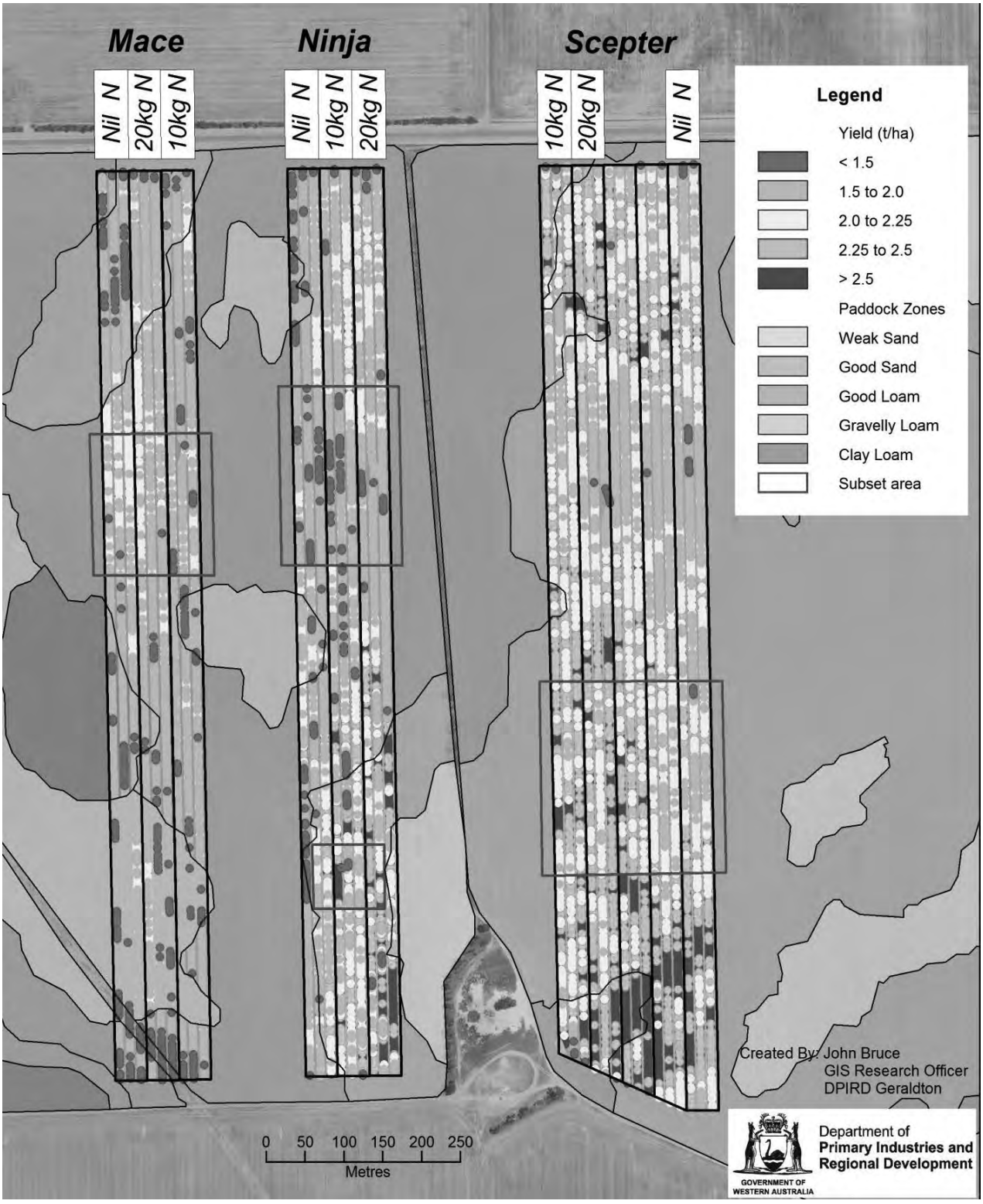

Figure 1 Graphical representation of paddock zones, nitrogen test strips and subset zones in two paddocks (WEP20-(L) and WEP22-(R)

Influence of rotation and soil type on yield and protein

Variety choice, rotation and soil type are factors which influenced grain yield and quality. Scepter grown on lupin stubble in the good sand subset zone was 0.35t/ha higher yielding than Mace which was sown on canola stubble in the good loam subset zone (Figure 3). Top-up nitrogen applied to Mace did not influence grain yields which averaged 2t/ha. In contrast Scepter yields were 0.2t/ha higher with 20kg/ha of top-up nitrogen compared to the nil treatment.

The protein of Scepter sown on lupin stubble in the good sand subset was 1% higher than Mace sown on canola stubble in the good loam at both the nil and 10kg/ha nitrogen treatments (Figure 3). Scepter was suitable for delivery into the AH2 segregation with 10 and 20 kg/ha of top-up nitrogen. Mace sown on canola stubble was only suitable for delivery in to the AH2 classification with the application of 20kg/ha of nitrogen which increased protein to 11.5%.

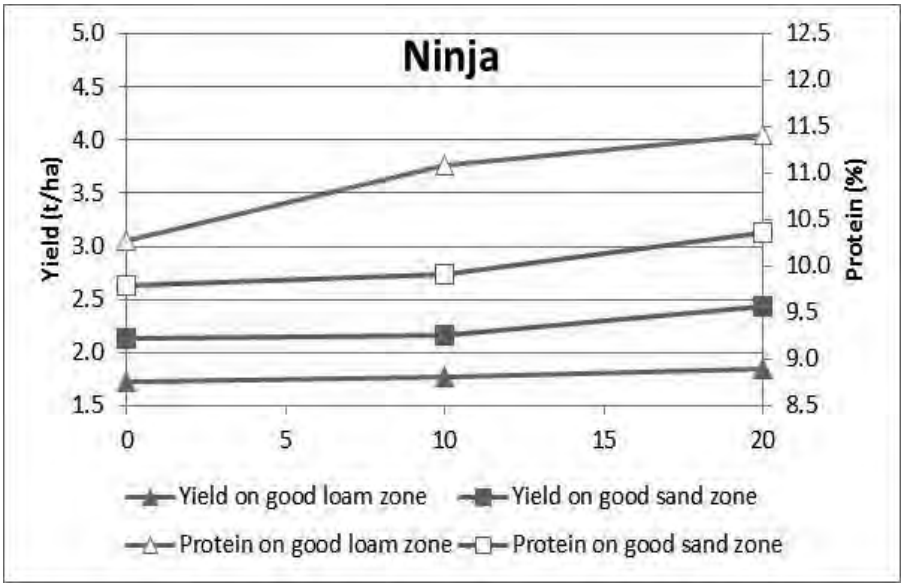

Figure 2 Grain yield and protein response in subsets of Ninja wheat sown in two zones (good loam and good sand) at Binnu

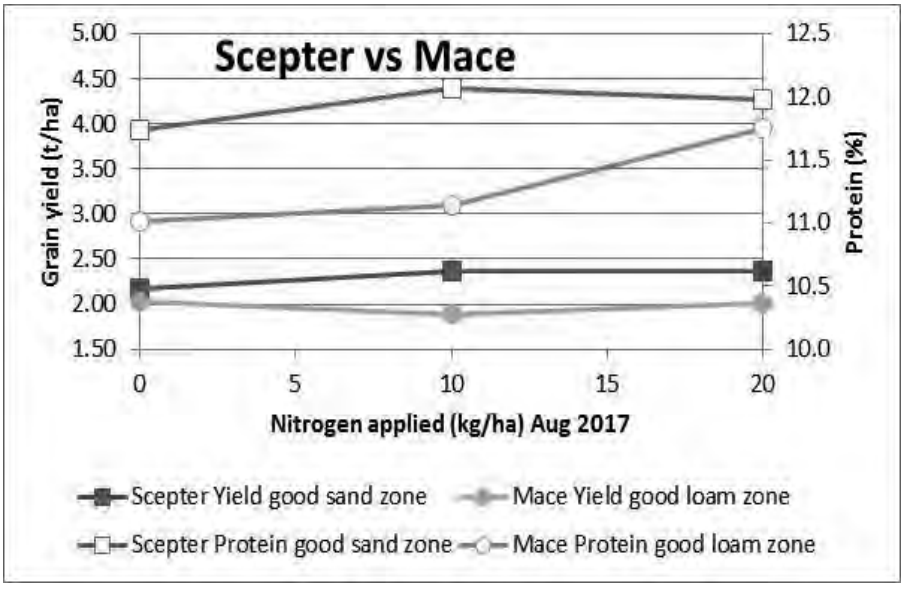

Figure 3 Grain yield and protein response to top-up nitrogen in selected subsets of Scepter sown on lupins in the good sand zone, and Mace wheats sown on canola in the good loam zone at Binnu.

Economics

Ninja yields were responsive to added nitrogen when sown on the good sand zone, hence the top up application of 20kg/ha of nitrogen accounted for the added cost of treatment compared to Ninja sown on the good loam. Scepter sown on the good sand following lupins had a larger gross margin than Mace sown on the good loam on canola stubble. The rotation and soil type will have influenced this response but Scepter also has a higher potential yield than Mace (www.nvtonline.com.au).

Table 1: Wheat yields and protein yields of Scepter, Mace and Ninja on zone within paddocks at Binnu. Note: data captured through yield and protein monitors and test strips were not replicated

Rate N applied	Wheat t/ha	Protein	grade	Farm Gate Price (pre levies and EPR) $/t	Fixed cost $/ha	N cost/ha (inc. application cost)	Gross margins $/ha
Scepter	**WEP22**	**Good sand**					
0	2.16	11.7	AH	227	130	0	360
10	2.37	12.1	AH	227	130	16.3	392
20	2.36	12.0	AH	227	130	29.1	376
Mace	**WEP20**	**Good loam**					
0	2.03	11.0	APW	217	130	0	310
10	1.89	11.1	APW	217	130	16.3	263
20	2.01	11.8	AH	227	130	29.1	296
Ninja	**WEP20**	**Good loam**					
0	1.72	10.3	ANW1	266	130	0	329
10	1.77	11.1	ANW1	266	130	16.3	325
20	1.85	11.4	ANW1	266	130	29.1	335
Ninja	**WEP20**	**Good sand**					
0	2.13	9.8	ANW1	266	130	0	437
10	2.17	9.9	ANW1	266	130	16.3	431
20	2.43	10.4	ANW1	266	130	29.1	489
Ninja	**WEP20**	**Whole paddock**					
0	1.80	10.2	ANW1	266	130	0	350
10	1.88	10.7	ANW1	266	130	16.3	355
20	1.97	11.2	ANW1	266	130	29.1	365

Conclusion

The test strips provided knowledge on how in-crop applications of nitrogen influenced yield and grain protein and potential allocations of resources across the paddock.

Within a paddock, allocating resources to production zone will influence economic returns. For example 20kg/ha of added nitrogen did increase yield, protein and gross margins on the good sand subset for Ninja. However the in-crop application was not required on the loam because economic returns and yield did not improve and grain protein was within standards for delivery to the noodle segregations.

Paddock selection and rotation influenced grain protein of Scepter and Mace wheat. If faced with a season like last year growers might choose not to apply more N to wheat after lupins but wheat on canola might need more to get the protein window.

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