8a. SARDI Nitrogen Rate Trials

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KEY MESSAGES

- In 2015 treatments with increased rates of N did not result in an increased yield in Trojan wheat or Compass and Bass barley.
- Increased N treatments tended to have increased wheat and barley protein levels.
- Seasonal conditions impacted on trial results; they should be interpreted with caution and used in conjunction with additional soil nutrition information.
- Soil testing and responding to the results is an important component in maximizing yield and profitability of farming enterprises.

Summary of the SARDI Nutrition Trials

In 2015 the SARDI SE NVA team initiated two nitrogen (N) rate trials at Conmurra. The trials evaluated responses in wheat and barley to increasing N rates. Dry seasonal conditions and a short finish impacted on the trial yields and grain quality; as such results should be interpreted with caution and used in conjunction with additional soil nutrition information.

The trials were sown on 11 June and harvested 4 December. Trojan was used in the wheat trials at 225 seeds/m2 and Bass and Compass barley were the varieties used in the barley trials; both sown at 165 seeds/m2. Nitrogen treatments were applied at Growth Stage 31 on 1 September. Measurements taken at the trials included harvest index, yield and quality and soil samples post-harvest.

The wheat X N trial evaluated eight N rates and one NIL control (Table 1). Although increasing N did not result in increased yields, significant differences in physical grain quality were observed. Protein increased from 10.1 % with the NIL treatment to 12.8 % with 180 units of N kg/ha applied. This increase changed the receival grade for Trojan. The NIL and 10 units of N (kg/ha) treatments only met ASW1 grade, while all other treatments met maximum grade for Trojan, APW1.

The post-harvest residual N was measured at three treatments, NIL, 100 and 230 (Table 2). Due to a lack of rainfall following the N application and over the following months, the high levels of nitrogen (100 and 230) were not utilised fully by the crop resulting in high residual soil N levels.

The higher rates of N were targeting an 8+ tonne crop; something that was unachievable in the 2015 season with a growing season rainfall of only 346mm. This trial will be repeated again next year; hopefully to capture different seasonal conditions.

Table 1: *Wheat X Nitrogen trial results, harvest index DM (t/ha), yield (t/ha) and grain quality.*

Units of N (kg/ha) applied at Growth Stage 31	Harvest index DM (t/ha)	Yield (t/ha)	Test Weight (kg/hl)	Protein (%)	Screenings (%<2.0mm)
Nil	12.7	4.01	85	10.1	2.5
10	10.7	4.13	86	10.4	2.3
30	11.3	4.08	86	10.5	2.4
55	11.4	3.55	84	11.5	3.1
80	12.4	3.89	83	12.1	3.7
100	13.5	3.99	84	11.7	3.7
130	12.6	4.01	84	11.6	3.8
180	11.1	4.13	83	12.8	4.8
230	12.5	3.94	83	12.6	3.8
Site mean	**11.9**	**3.97**	**84.1**	**11.6**	**3.5**
Probability (P<0.05)	0.89	0.71	0.004	<.001	0.13
l.s.d	4.2	0.67	1.4	0.7	1.8

Table 2: *Wheat X Nitrogen trial residual N post-harvest (Ammonium Nitrogen mg/kg and Nitrate Nitrogen mg/kg).*

Units of N (kg/ha) applied at Growth Stage 31	Ammonium Nitrogen mg/kg		Nitrate Nitrogen mg/kg	
	0 – 10 cm	10 - 30 cm	0 – 10 cm	10 - 30 cm
NIL	3	2	9	8
100	22	36	58	45
230	22	7	69	29

The barley X N trial evaluated three N rates (Table 3) with two barley varieties. There were no significant interactions between variety and nitrogen and barley harvest index DM (t/ha) or yield (t/ha).

Bass maximum grade is malting and Compass is feed. High protein resulted in Bass not meeting malt receival standards; as such both varieties achieved F1. Grain protein varied significantly between varieties as did nitrogen rates, with Bass having increased protein % compared to Compass and increasing N tended to increase protein %.

Residual N post-harvest was measured from all treatments (Table 4). There did not appear to be any difference in residual N with increasing N rates.

Table 3: *Barley X Nitrogen trial results, harvest index DM (t/ha), yield (t/ha) and grain quality.*

Variety	Units of N (kg/ha) applied at Growth Stage 31	Harvest index DM (t/ha)	Yield t/ha	Protein (%)	Test Weight (kg/hl)	Retention (%>2.5mm)	Screenings (%<2.2mm)
Bass	30	14.9	3.4	13.6	70	92.5	1.2
Bass	80	13.6	2.43	15.3	69	83	3.4
Bass	180	10.9	3.43	15.1	70	87.1	2
Compass	30	14.8	3.3	13	68	88.2	2
Compass	80	13.9	3.36	13.4	69	88.9	2.1
Compass	180	13	3.23	14.4	67	83	3.9
Site mean		**13.5**	**3.19**	**14.1**	**69**	**87.1**	**2.5**
N Rate X Variety Probability (P<0.05)		ns	ns	0.076	ns	ns	ns
Variety Probability (P<0.05)		ns	ns	0.003	ns	ns	ns
Variety l.s.d		-	-	0.5	-	-	-
N rate Probability (P<0.05)		ns	ns	0.004	ns	ns	ns
N rate l.s.d		-	-	0.62	-	-	-

Table 4: *Barley X Nitrogen trial residual N post-harvest (Ammonium Nitrogen mg/kg and Nitrate Nitrogen mg/kg).*

	Units of N applied at	Ammonium Nitrogen		Nitrate Nitrogen mg/kg	
Variety	Growth Stage 31	0 – 10 cm	10 - 30 cm	0 – 10 cm	10 - 30 cm
Bass	30	3	<1	10	8
Bass	80	3	<1	22	14
Bass	180	4	2	18	9
Compass	30	5	<1	22	9
Compass	80	5	3	29	10
Compass	180	5	2	*	*

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