

Trial 5. HYC Wheat Nutrition (FAR VIC W22-05-1)

cv RGT Accroc

Key Points:

- In all cropping farming systems following faba beans, with 2.4% organic carbon content in the 0-10cm, there was no response to applied nitrogen (applied as 46% N prilled N).
- With 173kg N/ha in the soil 0 – 60cm measured on 30 May, the zero N treatment (only 10kg N/ha MAP applied) yielded 7.19 t/ha with a protein of 8.8% indicating the presence of 111kg N/ha in grain.
- If 75% of the N is assumed to be in the grain and 25% in the straw residue, then the total N uptake at harvest in zero N plots would be 148kg N/ha, indicating that the crop could have been grown with the N recorded in the soil shortly after sowing.
- If straw residue was returned to the paddock, the nitrogen balance would be minus approximately 111kg N/ha removed from the paddock in the grain.
- All N applications as urea applied as 2 or 3 split applications only served to increase protein but not yield.
- The higher rates of applied N grain yields were significantly lower as a result of increased crop lodging that above 160kg N/ha was significant.
- Where N application was applied as a 3-split approach, with 20% of the N applied at the flag leaf emergence GS37-39, lodging was significantly reduced and yield increased.
- At 160kg N/ha applied grain protein was significantly increased with a yield almost identical to the 0 N control. The N offtake in the grain increased to 137kg N/ha giving a positive N balance of 23kg N/ha if the straw was returned to the paddock.
- Test weight was significantly reduced as applied N was increased over 120kg N/ha.
- There was no significant difference in dry matter at harvest with treatments varying between 14.6 and 17.3 t/ha. There was also no significant difference in Harvest index with an average of 38.2%
- Pig manure and manure equivalent treatments did not increase yield but were associated with higher grain protein levels.

Treatments:

RGT Accroc red feed wheat was subjected to 10 nutrition treatments of varying nitrogen rates and manure. The 5 t/ha manure (pig manure) treatment was applied at sowing incorporated by sowing on top of 160kg N/ha applied as a two split, 50% at tillering and 50% at GS31. The manure applied was 20.5N, 50P, 95K and 29 S kg/ha based on dry matter content. The available soil N was measured on 30 May with 173kg N/ha in the 0-60cm profile. Note this was measured following a 100kg/ha MAP application. The trial site had a relatively good organic carbon content of 2.4% in the 0 – 10cm.

Table 1. Detailed treatment list, grain yield (t/ha) & % site Mean.

Trt.	Nitrogen rate	Phosphorus rate	Potassium rate	Sulphur rate	Yield	Mean
	kg N/ha	kg P/ha	kg P/ha	kg S/ha	(t/ha)	(%)
1	0 (MAP)	22	---	---	7.19 a	103.8
2	80N (40N + 40N)	22	---	---	7.11 abc	102.6
3	120N (60N + 60N)	22	---	---	7.17 a	103.5
4	160N (80N + 80N)	22	---	---	7.21 a	104.0
5	200N (100N + 100N)	22	---	---	6.68 bcd	96.4
6	240N (120N + 120N)	22	---	---	6.63 cd	95.7
7	280N (140N + 140N)	22	---	---	6.62 d	95.5
8	200N (80N + 80N + 40N)	22	---	---	7.14 ab	103.1
9	160N + Manure*	22	---	---	6.74 a-d	97.3
10	160N + P + K + S	72	95	29	6.81 a-d	98.2
Mean					6.93	100.0
LSD (p=0.05)					0.5	7.0
P Val					0.042	0.040

Note: All treatments received 100kg/ha MAP (10N: 22P) which is included in the treatment details.

*Manure applied at a rate of 5 t/ha, see nutrient breakdown in table 4.

Table 2. Influence of nitrogen rate on grain quality, protein (%), test weight (kg/HL) and screenings (%).

Trt.	Nitrogen rate	Phosphorus rate	Potassium rate	Sulphur rate	Protein	Test weight	Screenings
	kg N/ha	kg P/ha	kg P/ha	kg S/ha	(%)	(kg/HL)	(%)
1	0	22	---	---	8.8 e	76.4 a	1.2 d
2	80	22	---	---	9.7 de	75.3 ab	1.6 cd
3	120	22	---	---	10.1 cd	75.4 ab	1.8 cd
4	160	22	---	---	10.8 a-d	74.9 b	1.8 c
5	200	22	---	---	11.2 abc	73.3 cd	2.4 ab
6	240	22	---	---	11.5 ab	72.8 d	2.4 ab
7	280	22	---	---	11.8 a	73.0 cd	2.4 ab
8	200 (3 split)	22	---	---	10.4 bcd	74.4 bc	2.0 bc
9	160 + M	22	---	---	11.7 a	72.5 d	2.5 ab
10	160	72	95	29	11.4 ab	72.4 d	2.8 a
Mean					10.7	74.0	2.1
LSD (p=0.05)					1.2	1.5	0.5
P Val					<0.001	<0.001	<0.001

Table 3. Influence of nitrogen rate, manure and synthetic PKS on harvest dry matter (t/ha), harvest index (%) and thousand seed weight (g).

	Nitrogen rate	Phosphorus rate	Potassium rate	Sulphur rate	Harvest Dry Matter	Harvest Index
Trt.	kg N/ha	kg P/ha	kg P/ha	kg S/ha	(t/ha)	%
1	0	22	---	---	15.8 -	40.4 -
2	80	22	---	---	16.6 -	37.5 -
3	120	22	---	---	18.6 -	33.8 -
4	160	22	---	---	17.3 -	37.8 -
5	200	22	---	---	14.6 -	40.4 -
6	240	22	---	---	15.1 -	39.8 -
7	280	22	---	---	15.9 -	36.6 -
8	200	22	---	---	15.5 -	41.3 -
9	160 + M	22	---	---	15.3 -	38.9 -
10	160	72	95	29	16.9 -	35.5 -
Mean					16.2	38.2
LSD (p=0.05)					ns	ns
P Val					0.3616	0.5811

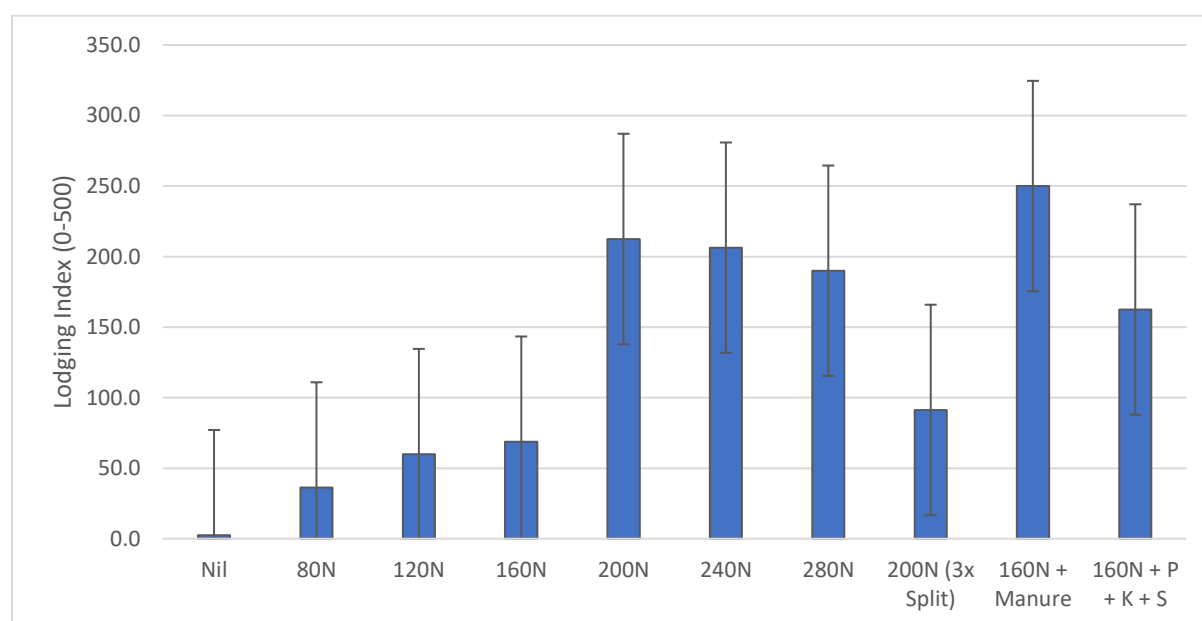


Figure 1. Influence of nitrogen rate on crop lodging, assessed at crop maturity (GS99) on January 6, 2023.

Table 4. Details of the management levels.

Sowing date:		28 April			
Plant population:		180 seeds/m²			
Basal fertiliser:		100 kg/ha MAP			
5 tons manure (dry matter)		N	P	K	S
		20.5	50	95	29
Nitrogen:	30-June	First Split Application			
	16-Aug	Second Split Application			
	26 Sept	+40kg N/ha (trt 8)			
Fungicide:	GS31	Prosaro 300ml/ha			
	GS39	Radial 840ml/ha			

Table 5. Site soil test details

	Level Found
ECEC	1.4 dS/m
Organic Carbon W&B*	2.4%
pH 1:5 water	5.7pH
Total Mineral N**	172.7kg soil mineral N/ha
Colwell Phosphorus	110 ppm
Available Potassium	180 ppm
KCI Sulfur	14 ppm

**Walkley & Black assess the organic carbon % by oxidising carbon using chromic acid in the presence of sulphuric acid.*

***Mineral N 0-60cm, all other results 0-10cm depth sampled 30/5/2022*