

## Nutrition for ameliorated non-wetting soils

Mingenew Irwin Group

<b>Location:</b>	Midlands rd, Irwin
<b>Soil Type:</b>	Pale deep sand
<b>Average Rainfall:</b>	401mm
<b>2018 Total:</b>	330mm
<b>2018 GSR (Apr-Oct):</b>	295mm
<b>PADDOCK HISTORY</b>	
<b>2015:</b>	Wheat
<b>2016:</b>	Lupin
<b>2017:</b>	Wheat
<b>Plot Size:</b>	1.8m x 20m
<b>Sowing Date:</b>	23 <sup>rd</sup> May 2018
<b>Seeding Rate:</b>	100kg/ha Gunyidi Lupins
<b>Seeding Machinery:</b>	Cone seeder, knife points and press wheels

### Key Messages:

- Low potash treatments were easily observed in the lupin rotation (2018). They had less vigour and plant biomass and yielded significantly less than the other treatments.
- The low potash treatments were also low yielding in the 2017 wheat phase.

**Aim:** To determine what is the best way to apply nutrients on non-wetting soils after amelioration in the Geraldton port zone (GRDC RCSN project)

### How was it done?

2018 was the second year of research at this site and no new nutrition treatments were applied. In Table 1 below, the fertiliser applied in 2018 is listed. All fertiliser in 2018 was banded at seeding and the rates used maintained consistency with the year 1 treatments.

Apart from the compound fertiliser applied at seeding, there was no additional nitrogen applied to the treatments in 2018. The extra nitrogen (High N) was applied to the wheat crop in 2017.

To define the treatments, the following references apply:

Standard N (70 units), High N (100 units), Very High N (130 units)

Standard K (11 units), High K (25 units), Very High K (99 units)

Year 1 (2017)

Table 1. List of treatments – Treatment name, applications for year 1 & 2 in summary column

Trt no.	Treatment	Summary	IBS Kg/h	Banded L/ha	2018 Lupins Banded kg/ha	P	K
1	Std N, No K	Nil K			85 Agstar Extra	12	0
2	Std N, Std K	11K Banded (yr 1&2)			100 K-Till Extra	12	11
3	Liquid K	Liquid K (yr 1&2)		117 Flexi NK	85 Agstar Extra	12	11
4	Std N, High K	25K banded (yr 1&2)			100 K-Till Extra/28 MOP	12	25
5	No N, High K	No N, 25K (Yr1&2)			62 Big Phos/51 MOP	12	25
6	High N, High K	25K (yr 1)			62 Big Phos	12	25
7	Very high N, High K	TD Super Potash	132 super Phos/50 MOP			12	25
8	Very high N, no K	11K Banded (yr 2)			85 Agstar Extra	12	11
9	Very high K	99 K (yr 1)			85 Agstar Extra	12	99

**Results:**

Table 2. Tissue test results

No	Trt	Summary	P	K	Total N
1	Std N, No K	Nil K	0.35	0.70	4.55
2	Std N, Std K	11K Banded (yr 1&2)	0.33	0.80	4.55
3	Liquid K	Liquid K (yr 1&2)	0.36	0.65	4.35
4	Std N, High K	25K banded (yr 1&2)	0.30	0.85	3.97
5	No N, High K	No N, 25K (Yr1&2)	0.28	0.82	3.77
6	High N, High K	25K (yr 1)	0.30	0.76	4.04
7	Very high N, High K	TD Super Potash	0.33	1.06	4.24
8	Very high N, no K	11K Banded (yr 2)	0.34	0.74	4.63
9	Very high K	99 K (yr 1)	0.30	1.31	4.02

Table 3. Yield and quality data

No	Trt	Summary	Plants/m <sup>2</sup> (10-12 leaf)	Yield t/ha	Protein %	Returns \$/ha
1	Std N, No K	Nil K	62	0.99	30.7	LUP1 – 327
2	Std N, Std K	11K Banded (yr 1&2)	35	1.21	30.8	LUP1 – 399
3	Liquid K	Liquid K (yr 1&2)	56	0.72	31.0	LUP1 – 238
4	Std N, High K	25K banded (yr 1&2)	27	1.43	30.8	LUP1 – 472
5	No N, High K	No N, 25K (Yr1&2)	50	1.50	30.8	LUP1 – 495
6	High N, High K	25K (yr 1)	42	1.30	30.8	LUP1 – 429
7	Very high N, High K	TD Super Potash	39	1.47	31.0	LUP1 – 485
8	Very high N, no K	11K Banded (yr 2)	48	0.90	31.0	LUP1 – 297
9	Very high K	99 K (yr 1)	44	1.59	30.8	LUP1 - 525
	LSD 5%			0.16		
	CV %			8.8		

**Summary of Results:**

There was a visual difference and significant yield difference between the high potassium treatments (Table 3 - Treatments 4,5,6,7,9) and all other treatments during the season. The site was more responsive to potassium than nitrogen (Table 3 - treatment 5,8). If potassium was not applied, then the crop yield was significantly lower yielding regardless of the available nitrogen.

The liquid potassium treatment yielded significantly lower than all other treatments. Treatment 8 had no potassium applied in year 1 but had potassium banded in yr 2 and this treatment still yielded significantly higher than Treatment 3 that had received liquid potassium in both 2017 and 2018.

**Photos:**

Figure 1. Low potassium treatment on the right. High Potassium treatment on the left.

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