

NSW Innovation Groups

Hyper Yielding Crops

HYPER YIELDING CROPS (FAR2004-0025AX)



A national initiative striving to push crop yield boundaries in high yield potential grain growing environments.

- A GRDC Investment (over 4 years) – 2020 to 2024
- Applied research, development and extension project co-ordinated and led by Field Applied Research (FAR) Australia.
- Collaborating with the following project partners across the country:



Proposed Agenda:

Person	Topic	Time
Kate Coffey	Introduction and 'Around the grounds'	9.00
Jon Midwood + Kate Coffey	Ian and Tim Trevethan- Nitrogen trial, Accroc wheat	9.15
Jon Midwood + Kate Coffey	Damien Schneider- Fungicide trial, Trojan wheat	9.30
Jon Midwood + Kate Coffey	Daniel Moll- Nitrogen trial, HyTTec canola	9.45
Nick Poole	Lessons from HYC research centres	10.00
All	Ideas for Focus paddock trials 2021	10.30

Nitrogen trial Accroc wheat

Howlong

10/13/2016

Paddock Facts:

Previous crop – 2019 canola, 2018 barley

Soil type: Loam A horizon, with med Clay B horizon

Variety: Accroc – sown 23 March

Image © 2020 CNES / Airbus

Google Earth

2001

Imagery Date: 10/13/2016 lat -35.901949° lon 146.635504° elev 180 m eye alt 2.05 km

10/13/2016

100kg/ha Urea @ GS30

Zero N @ GS30

100kg/ha Urea @ GS30

200kg/ha Urea @ GS30

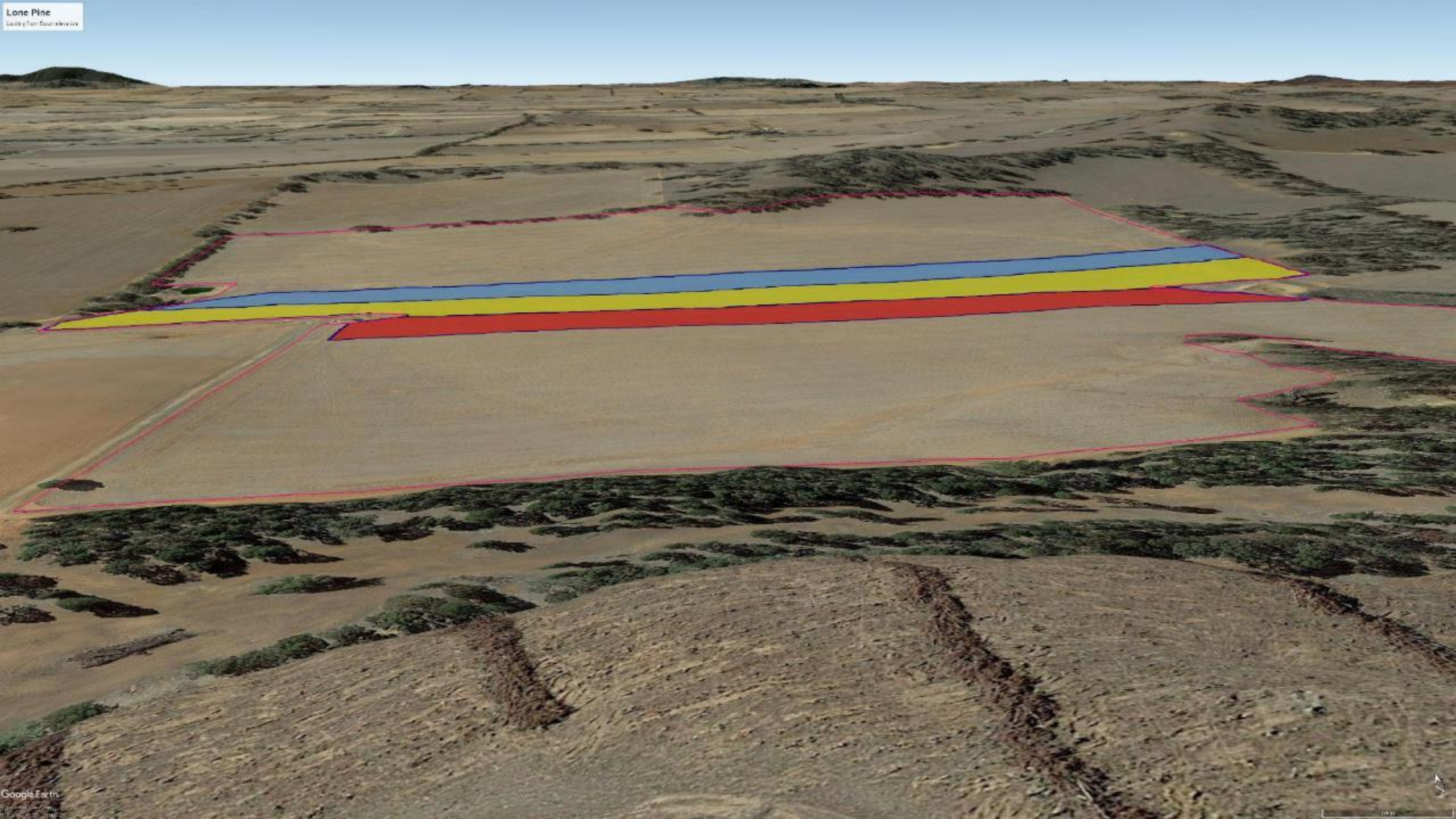
Zero N @ GS30

100kg/ha Urea @ GS30

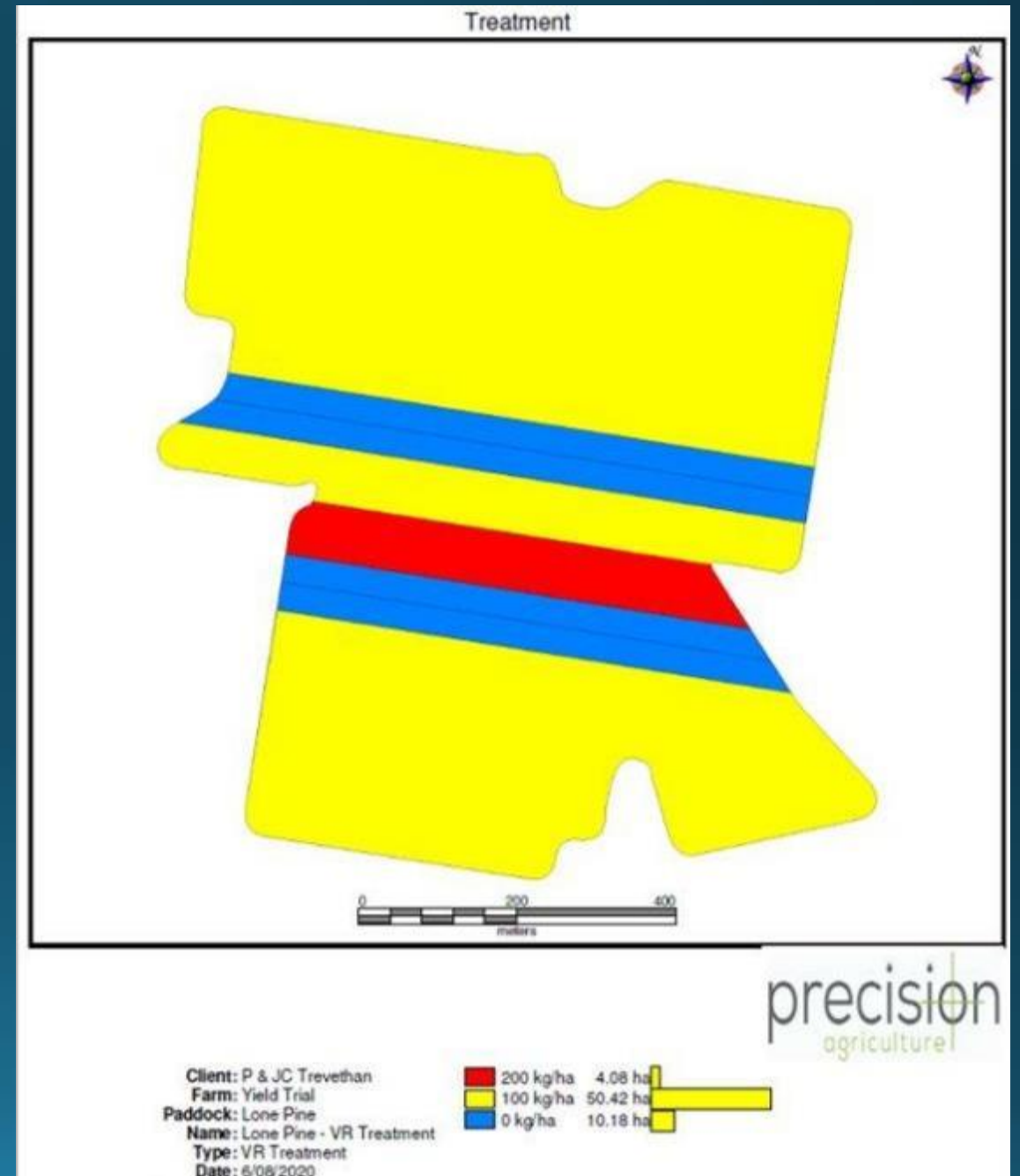
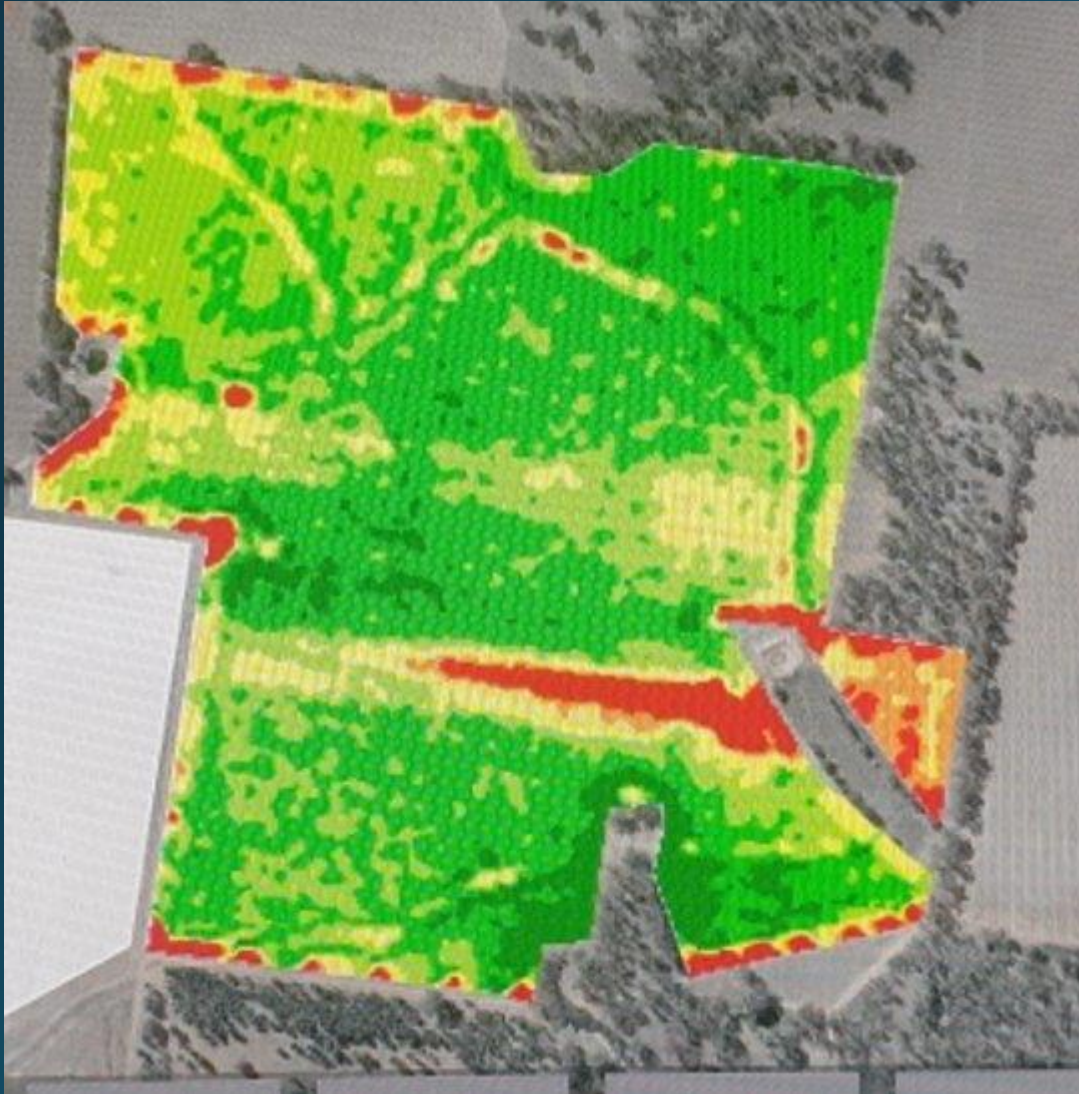
Image © 2020 CNES / Airbus

Google Earth

Imagery Date: 10/13/2016 lat -35.902193° lon 146.645427° elev 191 m eye alt 2.05 km

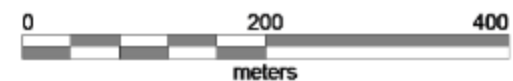
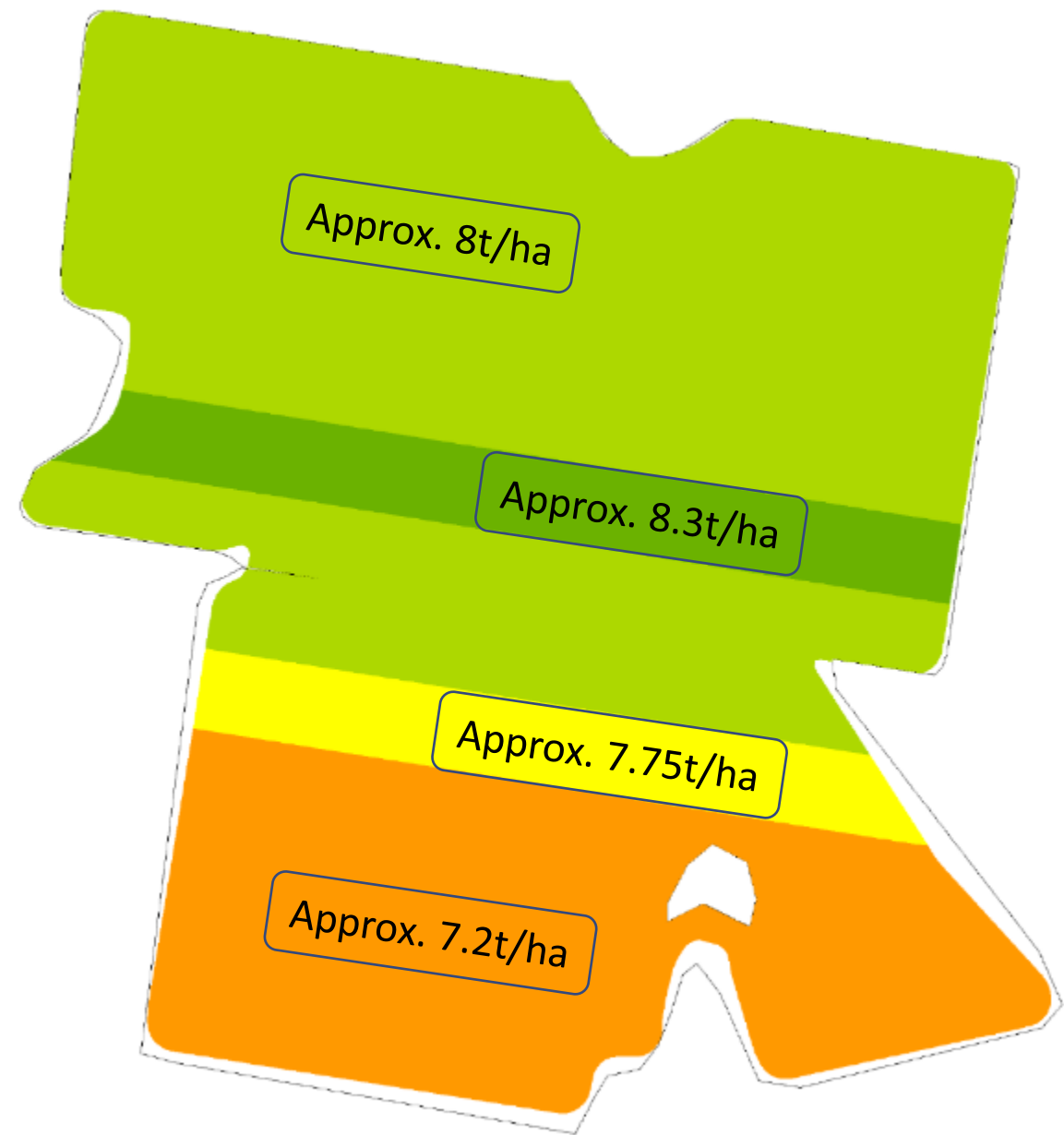
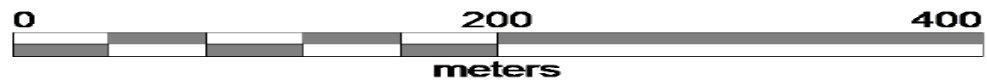
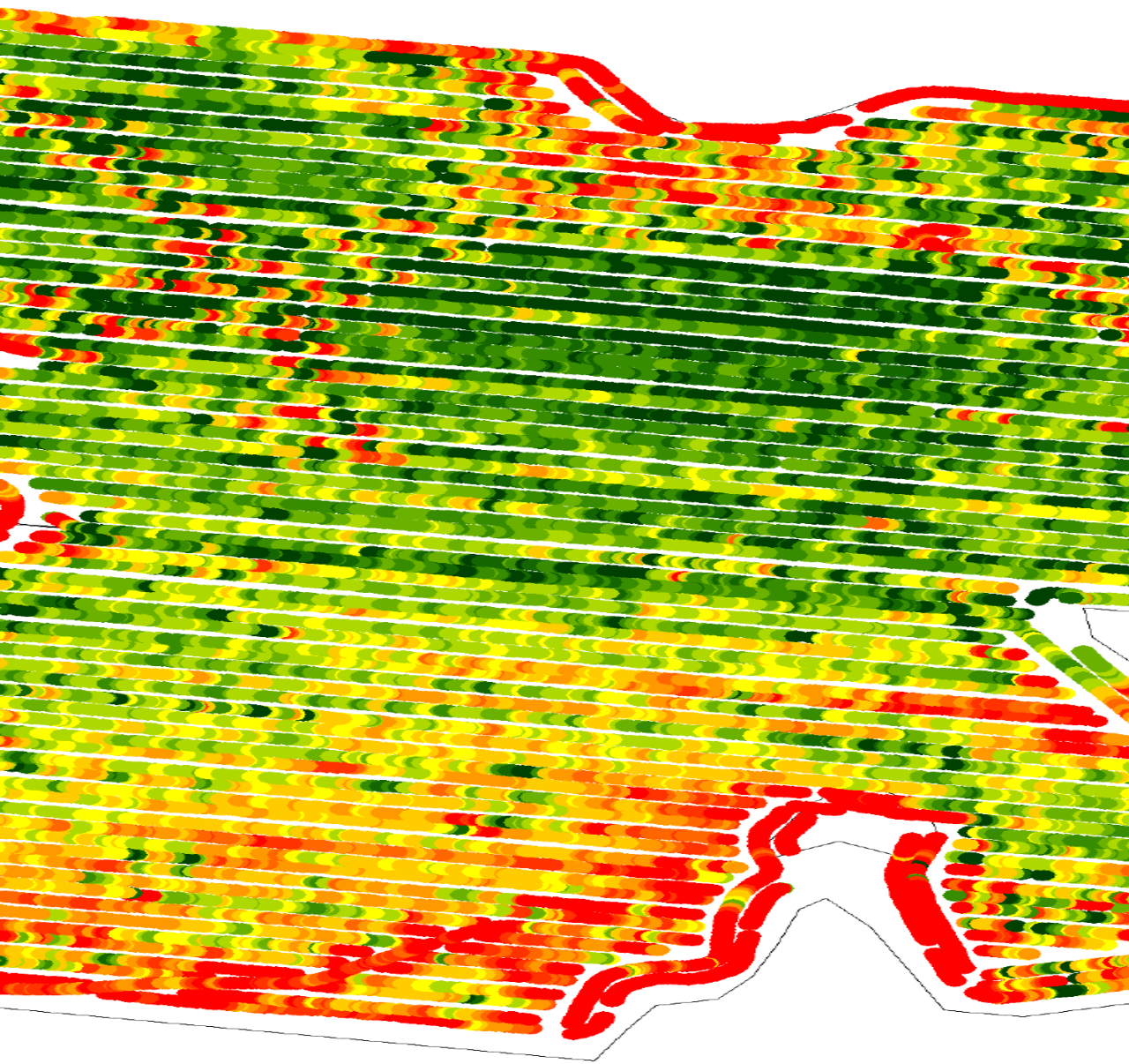


Treatments vs NDVI (30 August 2020)



Deep N soil test (Aug 2020)	Available N (kg N/ha)
0 – 30cm	13.3
30 - 60cm	11.7
Total N (0 – 60cm)	25

Treatment	Urea @ GS23 (kg/ha)	Urea @ GS30 (kg/ha)	Urea @ GS32 (kg/ha)	Total Urea applied and (N/ha)	Target Yield (t/ha)
Treatment 1	150	0	150	300 (138 N)	5.3
Treatment 2	150	200	150	500 (230 N)	7.6
Paddock rate	150	100	150	400 (184 N)	6.5



Treatment results summary

Measurement type	Stage	Treatment 1 (Nil Urea @ GS30)	Paddock Treatment (100 Urea @ GS30)	Treatment 2 (200 Urea @ GS30)
Dry Matter (T DM/ha)	GS65	8.36	10.44	12.67
Dry Matter (T DM/ha)	At Harvest	16.09	18.03	18.38
Yield (t/ha)	At Harvest	8.55 a	8.10 b	8.05 b
Protein (%)	Post Harvest	8.30	10.10	11.80
Screenings (%)	Post Harvest	1.08	1.38	2.17
Test weight (kg/hL)	Post Harvest	76.60	74.80	72.80

Take Home Messages

- There were clear differences between the northern and southern parts of the paddock, based on the old fence line. The differences could be paddock history, soil type or past management or all of the above.
- In the northern half of the paddock, there was a negative yield response to extra 100kg/ha urea (46kg N/ha) at GS30 in the strip trial. Yield decreased by 0.45t/ha and gross margin loss was \$147/ha.
- On the southern half of the paddock, the addition of 200kg/ha urea (92kgN/ha) at GS30 produced an extra 0.55t/ha, compared to the Nil urea at GS30 strip to the south. This gave break even situation.
- By looking at the grain protein (N content of the grain) of the highest yielding strip it was only 8.3! With different N timings maybe the highest yielding treatment could have been even higher?

Fungicide trial Trojan wheat

Culcairn



Control Nth - Cogito 0.125

Cogito 0.125, Prosaro 0.15, Radial 0.84

Cogito 0.125, Prosaro 0.15, Opus 0.5

Cogito 0.125, Nil, Radial 0.84

Control - Cogito 0.125

Paddock Facts:

Previous crop – 2019 canola, 2018 wheat

Soil type: Sandy Clay loam A horizon, with med Clay B horizon

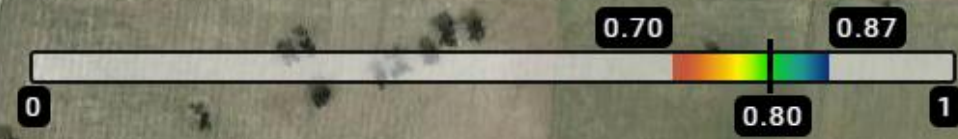
Variety: Trojan – sown 15 May

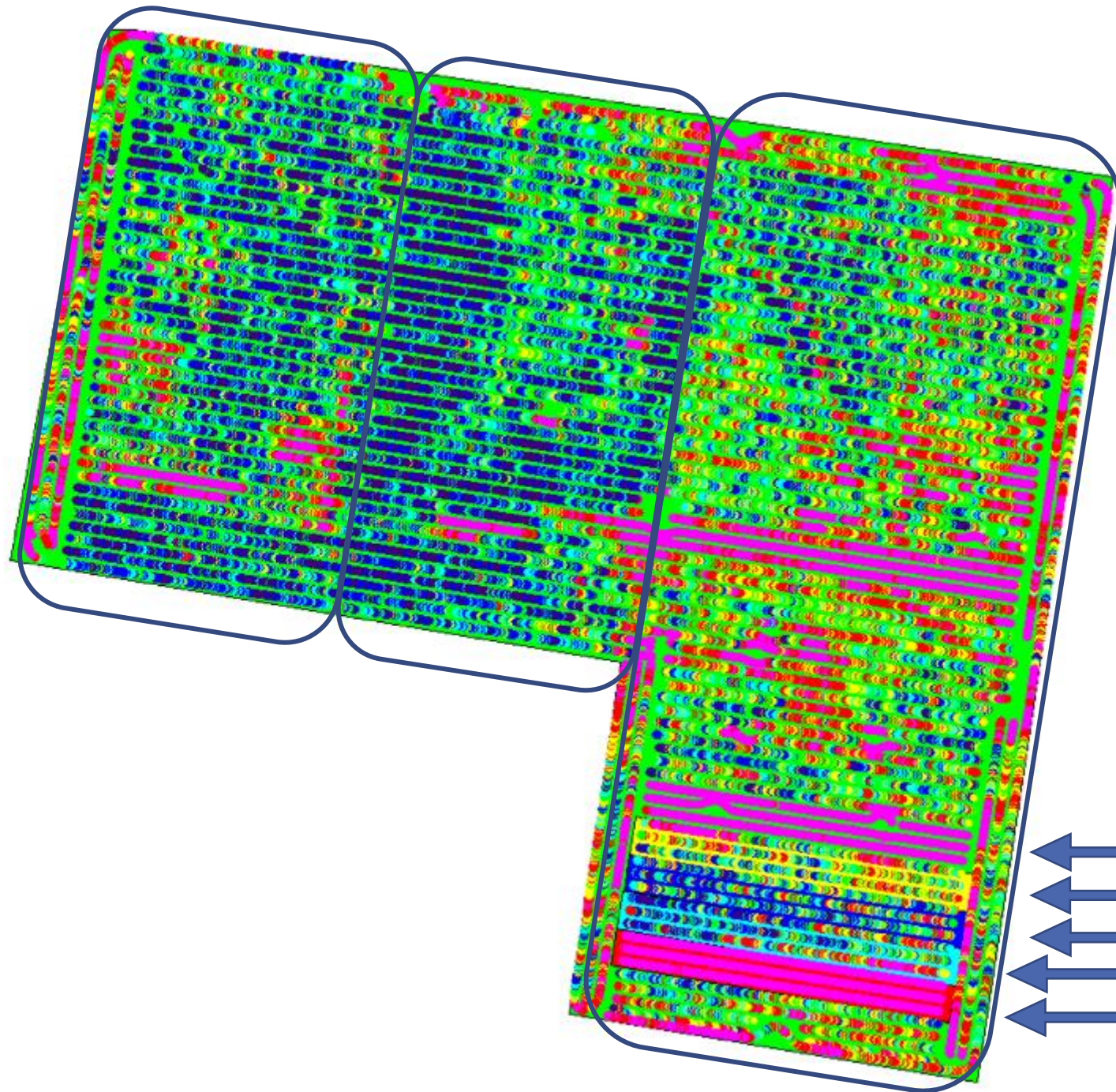


Treatment	Fungicide timing		
	GS30	GS32	GS39
Control	Cogito 0.125 l/ha	-	
Treatment 1	Cogito 0.125 l/ha	-	Radial 0.84 l/ha
Treatment 2	Cogito 0.125 l/ha	Prosaro 0.15 l/ha	Opus 0.5 l/ha
Treatment 3	Cogito 0.125 l/ha	Prosaro 0.15 l/ha	Radial 0.84 l/ha
Paddock rate	Cogito 0.125 l/ha	Prosaro 0.15 l/ha	Radial 0.6 l/ha



NDVI from 30 August 2020





- Control 3 – 4 t/ha
- Treatment 3: 7.1 t/ha
- Treatment 2: 7.67 t/ha
- Treatment 1: 7.42 t/ha
- Control 3 – 4 t/ha

Treatment results summary

Measurement type	Stage	Control	Treatment 1	Treatment 2	Treatment 3
Yield (t/ha)	At Harvest	4.11 d	7.42 b	7.67 a	7.09 c
Protein (%)	Post Harvest	12.70	11.90	11.80	12.00
Screenings (%)	Post Harvest	4.13	1.92	2.47	2.21
Test weight (kg/hL)	Post Harvest	63.80	75.20	75.00	73.40

Take Home Messages

- Based on this trial, if Stripe rust was left uncontrolled, the yield losses were up to 4.0t/ha.
- Cogito at GS 30, Prosaro at GS 32 and Opus at GS39 gave the highest, significant ($p < 0.05$), yield of 7.67t/ha. The additional gross margin from the application of fungicide was: \$800/ha.
- If farmers continue to grow susceptible varieties such as Trojan and Bennett, adding flutriafol on the fertilizer gives the grower significant improvement in levels of control. Fungicides will still be required at GS 32 and GS 39.

Nitrogen trial HyTTec canola

Gerogery

Paddock Facts:

Previous crop – 2019 oats, 2018 canola

Soil type: Sandy loam A horizon, with
med Clay B horizon

Variety: HyTTec – sown 17 April

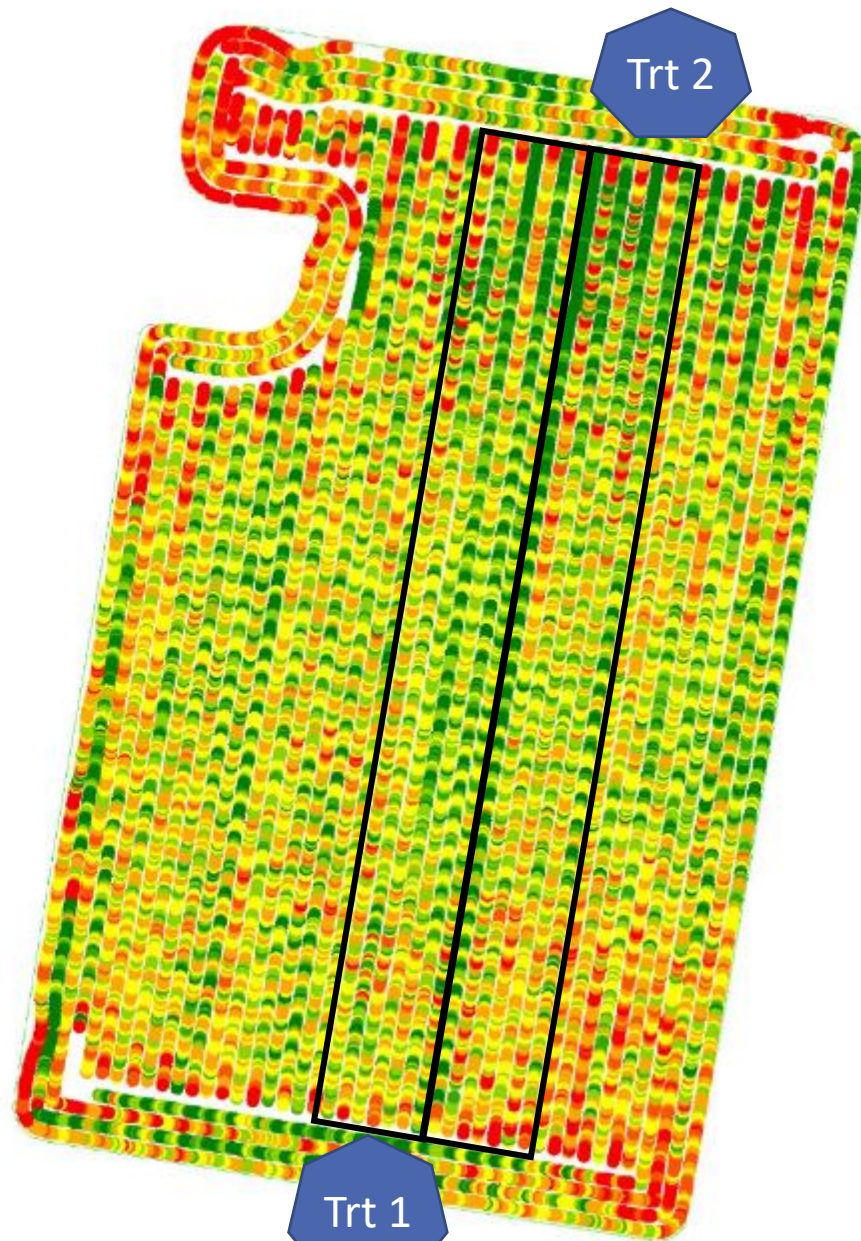
Google Earth

Imagery Date: 4/7/2019 lat -35.903231° lon 146.943584° elev 226 m eye alt 1.45 km



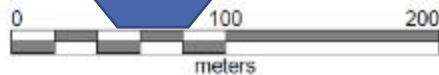
Treatment	Yield target (t/ha) (Aug 2020)	Actual yield (t/ha)
Paddock rate strip	2.50	2.73 b
Treatment 1	2.95	2.86 a
Treatment 2	3.40	2.87 a

Treatment	GranAm @ sowing (kg/ha)	Urea 10 June (kg/ha)	Urea 9 July (kg/ha)	Urea 1 Aug (kg/ha)	Total N applied (kg N/ha)
Paddock rate	80	100	80	0	100
Treatment 1	80	100	80	80	136
Treatment 2	80	100	80	160	173



Trt 2

Trt 1



Treatment results summary

Measurement type	Stage	Control (paddock rate)	Treatment 1	Treatment 2
Dry Matter (T DM/ha)	GS69	6.1	6.1	6.1
Yield (t/ha)	At Harvest	2.73 b	2.86 a	2.87 a
Dry Matter (T DM/ha)	At Harvest	12.86	9.63	15.18
Oil (%)	Post Harvest	42.7	42.8	42.1
Screenings (%)	Post Harvest	0.82	1.00	1.11
Test weight (kg/hL)	Post Harvest	69.80	66.60	66.80

Take Home Messages

- Based on this trial, the additional 80 kg/ha of urea at yellow bud gave a significant ($p=0.005$) yield advantage over the paddock strategy. The gross margin of the additional applied nitrogen was \$29/ha.
- Increasing the rate of urea at yellow bud to 160 kg/ha urea didn't increase yield significantly
- To optimize yield, you should aim for a target flowering dry matter of 5t/ha. The trial reached this optimum amount of dry matter at flowering. Hybrids offer the potential for higher and more resilient yields over the open pollinated varieties.