Hart

TRIAL REVIEW

- 2023 -

EARLY AND DRY SOWING

GLUFOSINATE TRIAL RESULTS

3. NITROGEN DECISIONS & N BANKING

4. LENTIL AGRONOMY
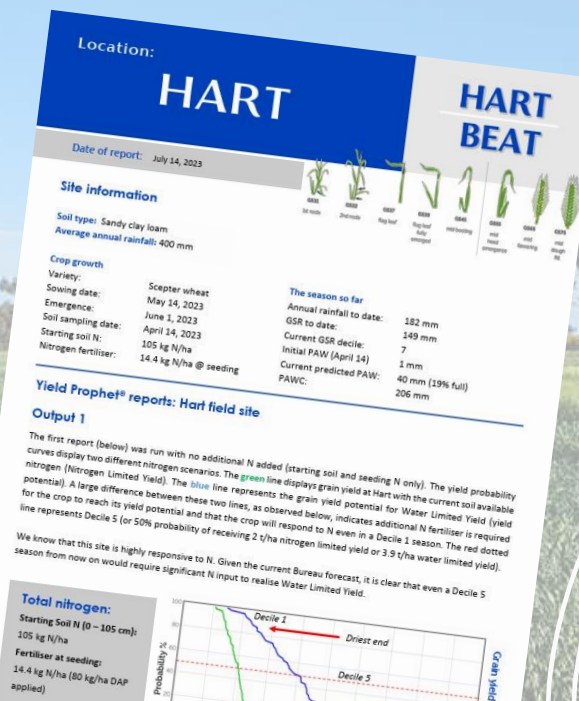
NITROGEN APPLICATION
-TACTICAL N DECISIONS-

RISKWI$E – NITROGEN THEME

- **New initiative to better understand risk and reward on farm:**

  - To acknowledge that a number of decisions come with a high level of uncertainty and therefore risk

  - Challenge decision making and account for various probabilities or futures (outcomes)
    - This accounts for seasonal outlooks – based on probability!!!
    - Leads to better informed decisions and <u>understand</u> potential outcomes

A SIMPLE FRAMEWORK FOR BETTER JUDGEMENTS

1. **Park your intuition**; don't just trust your gut

2. **Inform the form guide**; seek out further information; bureau forecasts, gross margin analysis etc.

3. **Accept cognitive limitations**; we may not be able to obtain all the comprehensive information due to limited capacity or biases

4. **Re-engage intuition** and make the decision; revisit your intuition, has your decision changed based on new information?
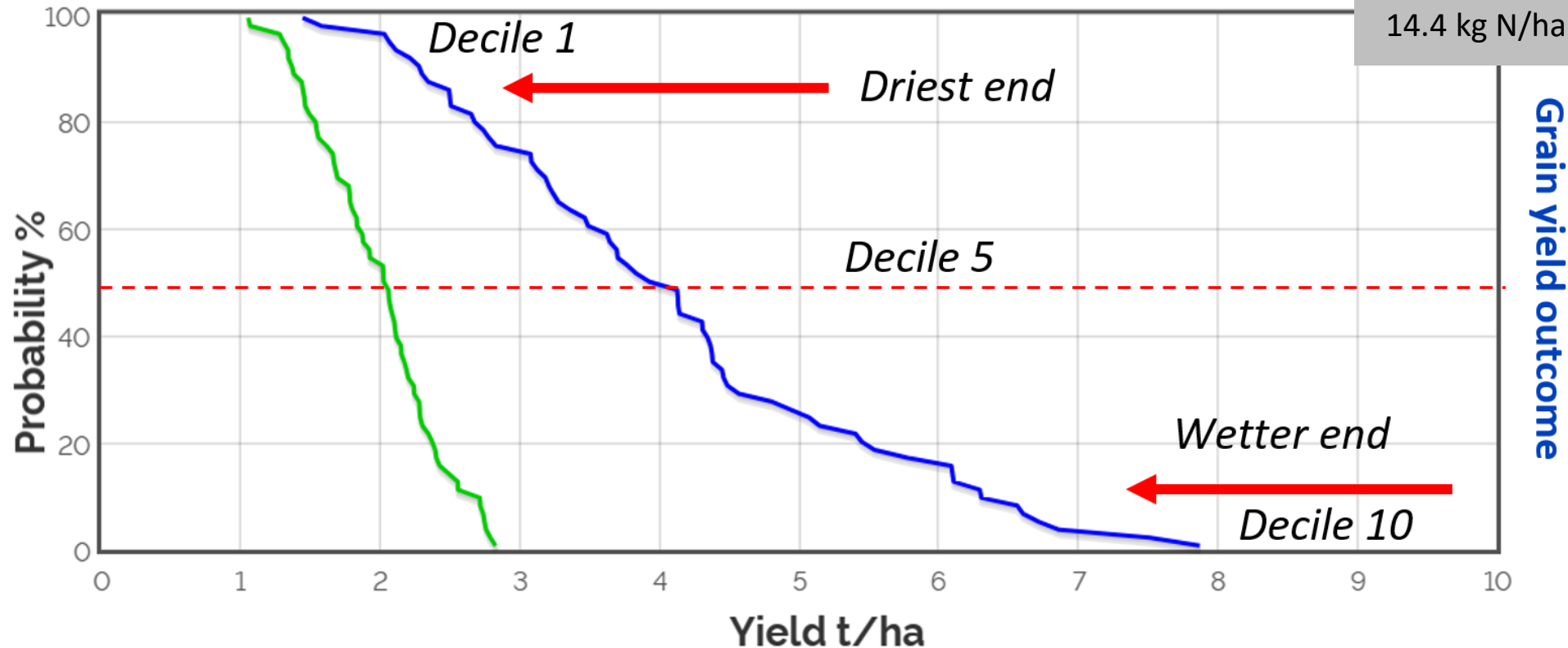
OUR STEPS FOR INFORMED N MANAGEMENT DECISIONS

1. What is our yield spread – how responsive are we?

Total nitrogen:

Starting Soil N (0 – 105 cm): 105 kg N/ha

Fertiliser at seeding:
14.4 kg N/ha (80 kg/ha DAP applied)
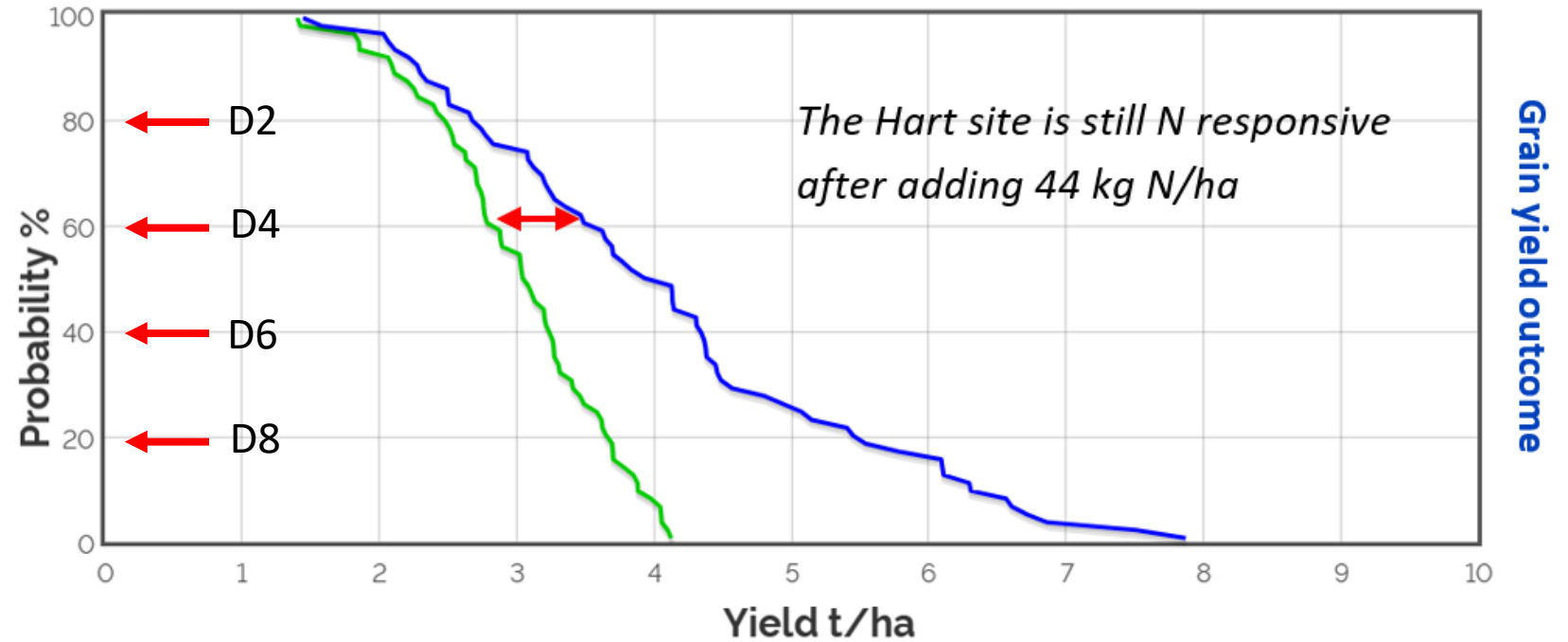
OUR STEPS FOR INFORMED N MANAGEMENT DECISIONS

2. Consider Yield prophet – Initial N applied

Total nitrogen:
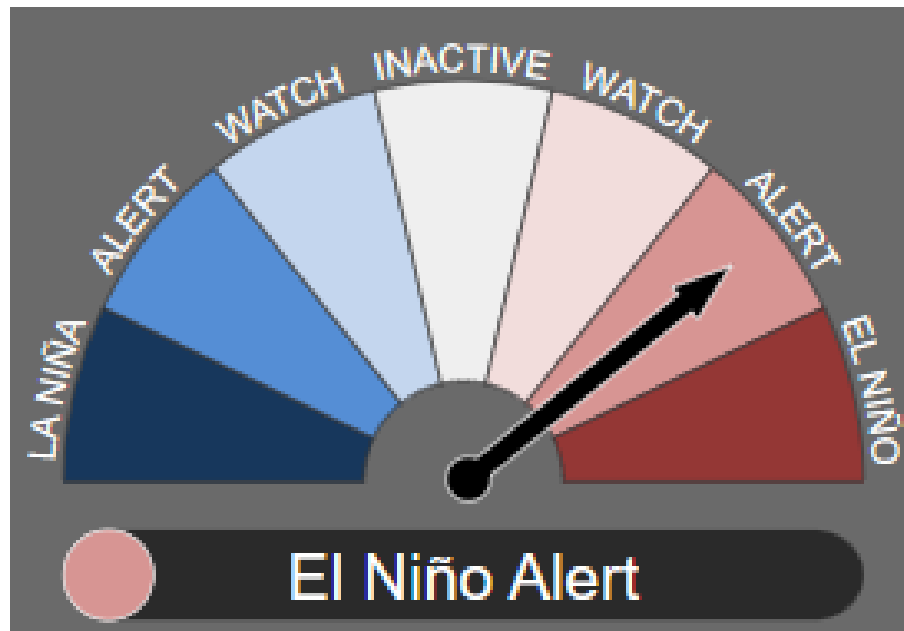
Soil N = 105 kg N/ha

Seeding = 14.4 kg N/ha

+ 44 kg N/ha <u>top-dressed</u>

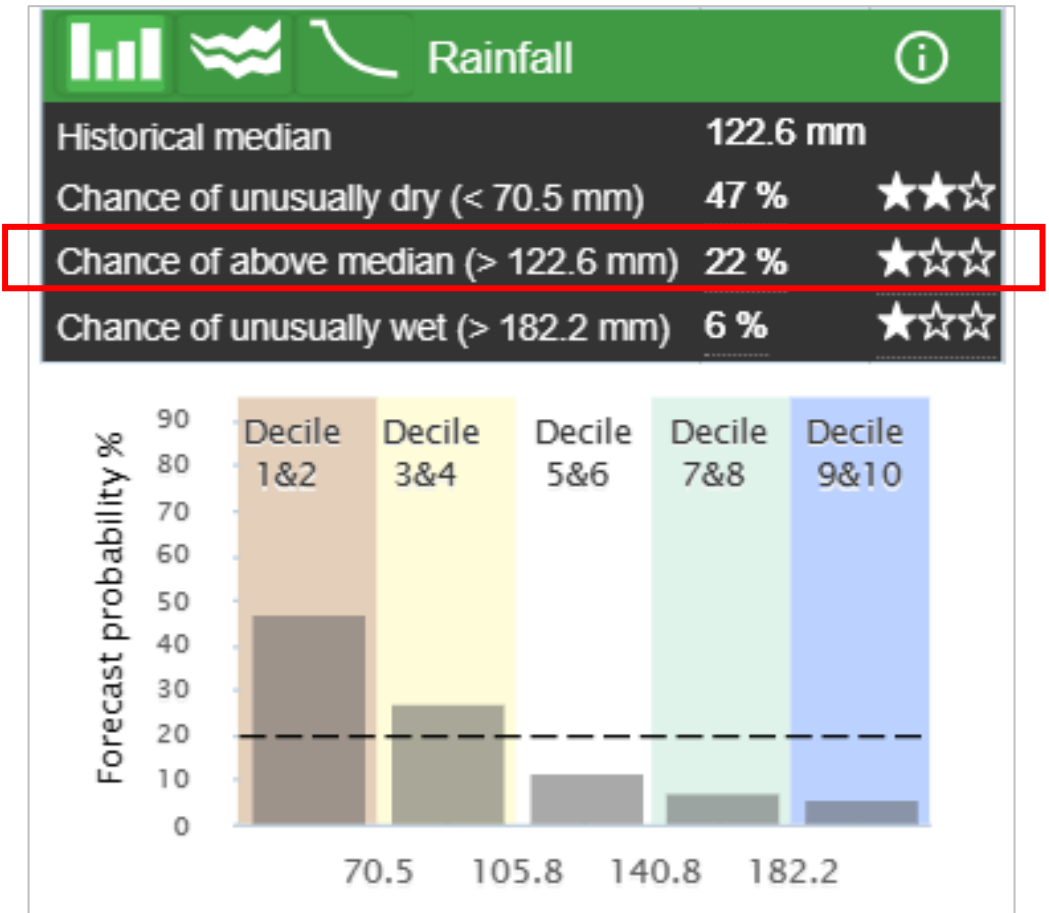*The Hart site is still N responsive after adding 44 kg N/ha*

OUR STEPS FOR INFORMED N MANAGEMENT DECISIONS

3. Consider the season outlook

70% chance El Niño would develop, based on past alert criteria, signalling a higher chance of warm and dry conditions over spring.

El Niño Alert

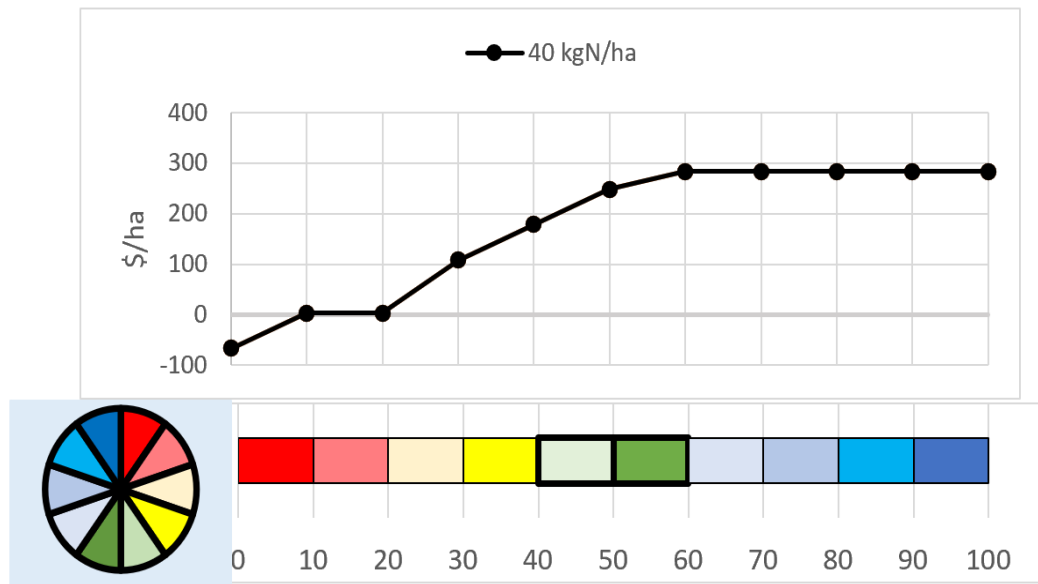**August – October outlook**

Rainfall		
Historical median	122.6 mm	
Chance of unusually dry (< 70.5 mm)	47 %	★★☆
Chance of above median (> 122.6 mm)	22 %	★☆☆
Chance of unusually wet (> 182.2 mm)	6 %	★☆☆

OUR STEPS FOR INFORMED N MANAGEMENT DECISIONS

4. Simple economics analysis (profit x decile) – 44kg N/ha already applied

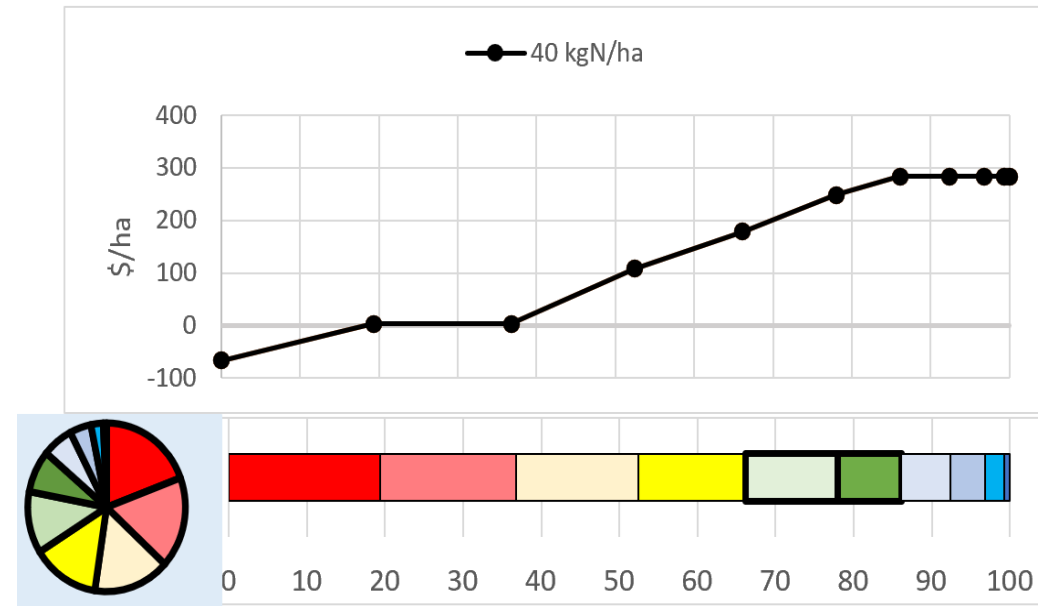|	Avg across deciles	% neg	Worst case	Best case
Left	180 $/ha	9%	-67 $/ha	283 $/ha
Right	113 $/ha	18%	-67 $/ha	283 $/ha

Source: Fast graphs for slow thinking spreadsheet (Peter Hayman 2023).

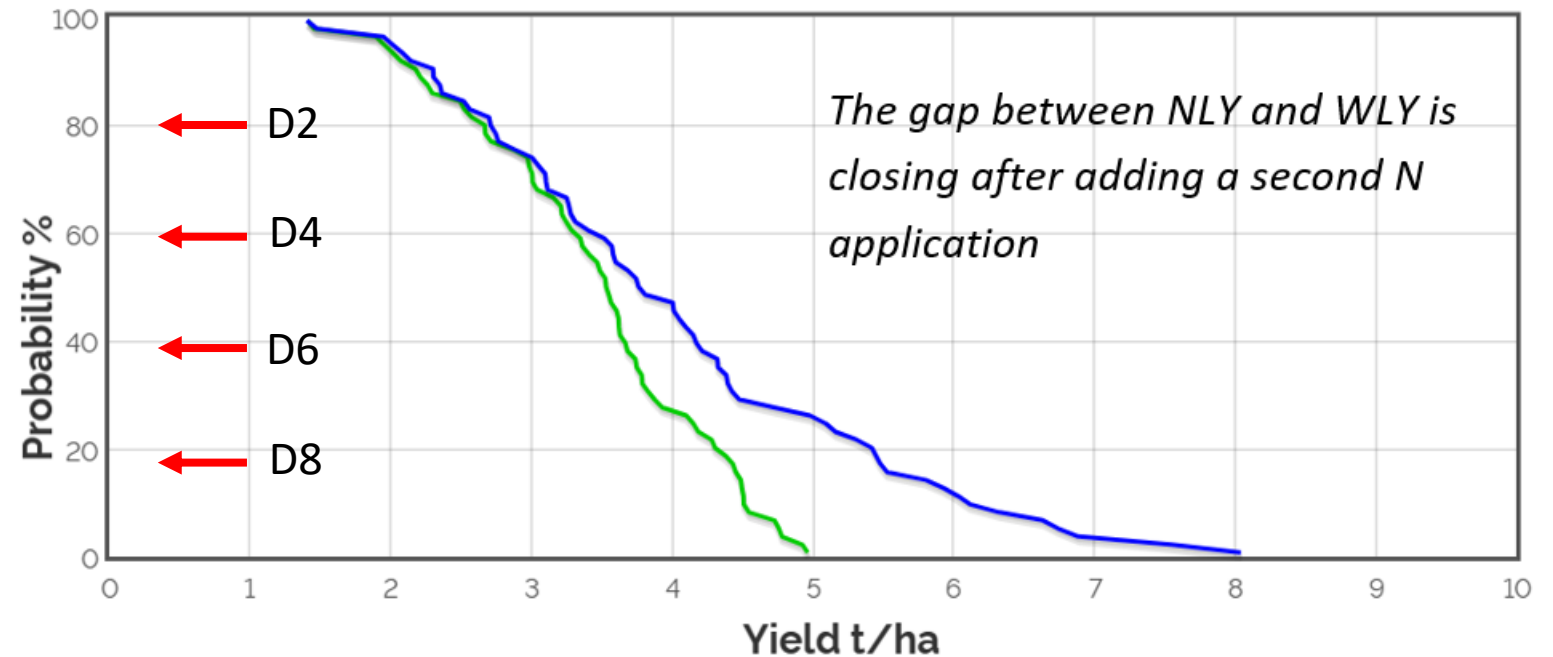# OUR STEPS FOR INFORMED N MANAGEMENT DECISIONS

5. Consider Yield prophet – based on season outlook, will we add more N?

Total nitrogen:

Soil N = 105 kg N/ha

Seeding = 14.4 kg N/ha

+ 74 N/ha top-dressed

D2

D4

D6

D8

The gap between NLY and WLY is closing after adding a second N application

SEASON OUTCOME...

- **N applied** = 74 kg N/ha (~4.8 t/ha crop based on 40 kg/1 tonne @ 11.5% rule)

- **GSR** = 236 mm (Decile 4)

- **Annual rainfall =** 355 mm (Decile 4)

Measurement	Actual (Scepter wheat)	Predicted (July)
Yield (t/ha)	4.06	1.5 – 8.0 t/ha
Protein (%)	10.1	
Test weight (kg/hL)	86.9	Grade = ASW1
Screenings (%)	5.0	

TOP TIPS FOR N MANANGEMENT

- Estimating your yield spread across decile outcomes can be useful to guide decision making

Equivalent decile finish	0	1	2	3	4	5	6	7	8	9	10
WLY (t/ha)	1.5	2.3	2.7	3.2	3.5	3.9	4.3	4.5	5.5	6.3	7.9
NLY (t/ha)	1.4	2.1	2.5	2.7	2.8	3.0	3.2	3.4	3.7	3.9	4.1

- Utilise BOM forecasting tools & resources to assist N management decisions – follow up resources to come!

- Consider economics ($/ha)

NITROGEN BANKING
- RESULTS FROM TWO YEARS -

WHAT IS N BANKING?

- A strategy to simplify a management decision in areas with low environmental losses

- Ensure adequate N is applied to maintain levels that achieve water-limited yield potential in most seasons

  - If set correctly – soil organic N would not be mined
  - Moves cost of N into seasons <u>following</u> a high production year

TRIAL DETAILS

Aims:

- To compare productivity (yield, protein), profitability (gross margin) and sustainability (N losses, soil organic matter) of different N management systems
- Evaluate N bank approach locally across two soil types in Mid-North region

- Two locations
  - **Kybunga –** Led by Hart
    - Clay loam soil type
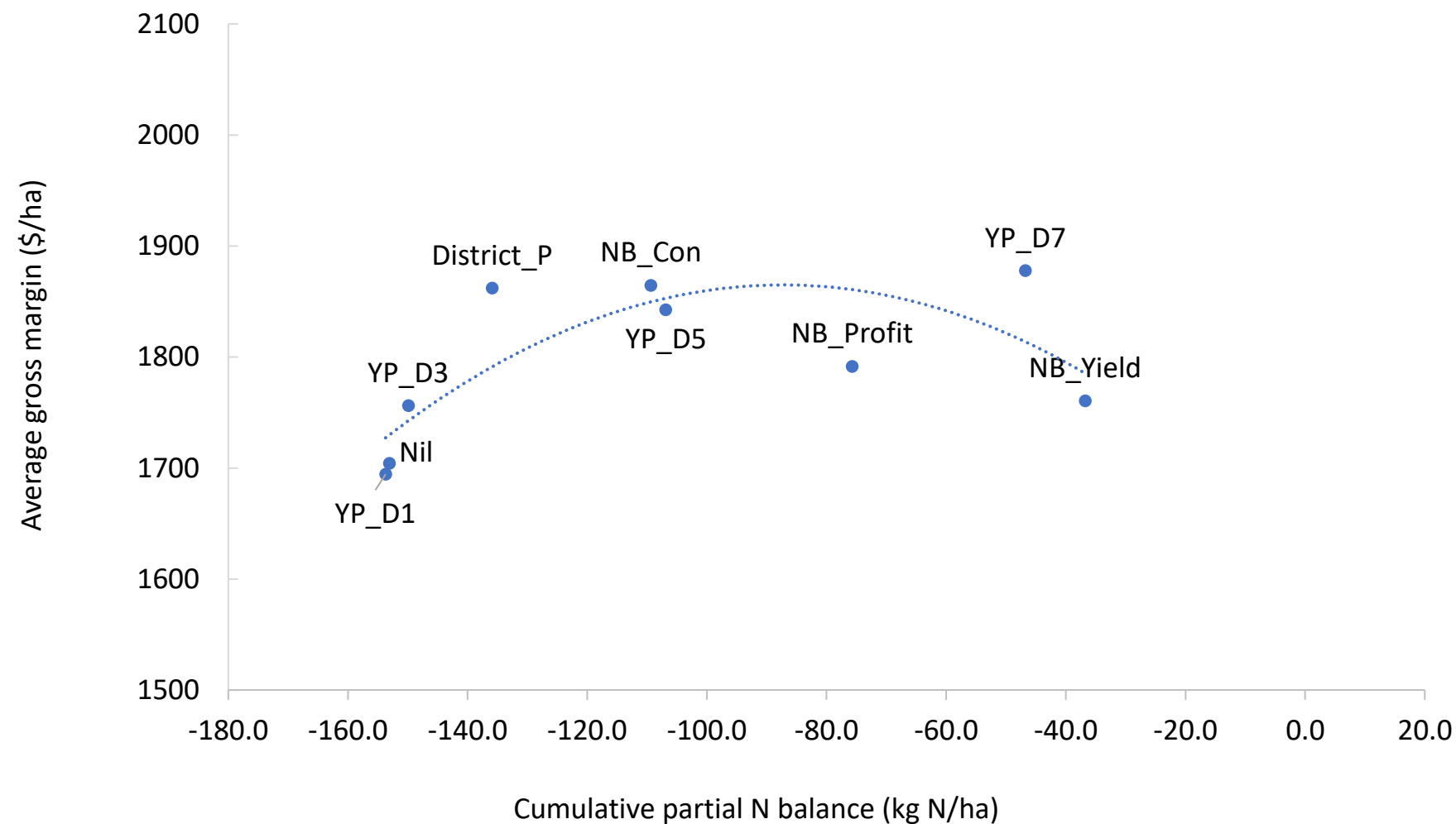 - **Bute –** Led by NSS & Trengove Consulting
    - Sand over sandy loam

N MANAGEMENT TREATMENTS

Treatment	Description
Control	No N applied (Nil)
District Practice	Generally based on National Average of 45 kg N/ha
N bank Conservative	Optimal profit minus 25 kg N/ha **(160kg N)**
N bank Profit Optimum	Based on the relationship between optimal N bank and rainfall **(185kg N)**
N bank Yield Optimum	Optimal profit plus 25 kg N/ha **(210 kg N)**
*YP BoM	Based on BoM season outlook at time of application (generally a three-month outlook)
YP Decile 1	Yield with lowest yielding season finish on record (decile 1, severe drought)
YP Decile 2-3	Yield with lower yielding quartile season finish (decile 2-3, moderate drought)
YP Decile 5	Yield with median season finish (decile 5, 50%, average season)
YP Decile 7-8	Yield with higher yielding quartile season finish (decile 7-8, favourable season)

Treatment	Applied N fertiliser (kg N/ha)	Grain yield (t/ha)	Protein (%)	Screenings (%)	Retention (%)	Test weight (kg/hL)	Grain N removal (kg N/ha)	Partial N balance (kg N/ha)	Cumulative partial N balance (kg N/ha)	Average partial gross margin* $/ha
Control	0	4.36a	7.9a	3.8a	96.3f	70.5ef	60.4a	-60.4	-153.1	1,704
District Practice	46	4.98c	9.6d	9.7b	89.1d	69.6de	83.5d	-37.4	-135.9	1,862
N Bank Conservative	68	5.24d	9.9d	10.0b	88.0d	69.1cd	90.6e	-22.5	-109.4	1,865
N Bank Optimum Profit	93	5.08cd	11.3e	17.2cd	81.1b	68.3bc	100.8f	-7.6	-75.7	1,792
N Bank Optimum Yield	118	4.99c	12.1f	18.4d	79.4b	67.8ab	105.3g	12.7	-36.8	1,760
YP BoM	144	5.01c	12.9g	22.6e	75.7a	67.3a	113.1h	30.7		
YP Decile 1	0	4.37a	8.1ab	4.8a	95.2ef	70.7f	62.3a	-62.1	-153.7	1,694
YP Decile 3	12	4.61b	8.4bc	6.2a	93.6e	70.2ef	67.5b	-55.5	-149.9	1,756
YP Decile 5	34	5.07cd	8.8c	5.8a	93.4e	70.6ef	77.7c	-43.8	-106.9	1,842
YP Decile 7	76	5.13cd	11.1e	14.1c	83.6c	68.2ab	99.0f	-23.1	-46.7	1,878
Malt 1 receival standards			9 – 12	7.0	>70	>65				
BAR 1 receival standards			NA	15	NA	>62.5				
P value		<0.001	<0.001	<0.001	<0.001	<0.001	<0.001			

KYBUNGA – TWO YEARS OF RESULTS

KEY MESSAGES

- Slow down and think about a range of futures – it can be challenging but an Excel spreadsheet becomes a powerful tool to use!

- Yield prophet, BoM forecast and simple economics, allows us to visually identify a risk-reward analysis for our nitrogen inputs to make informed management decisions.

- High input N management systems across two seasons are showing a recency bias with a more neutral partial N balance. A number of treatments are profitable, however mining soil organic N.

N Budgeting and Climate Risk

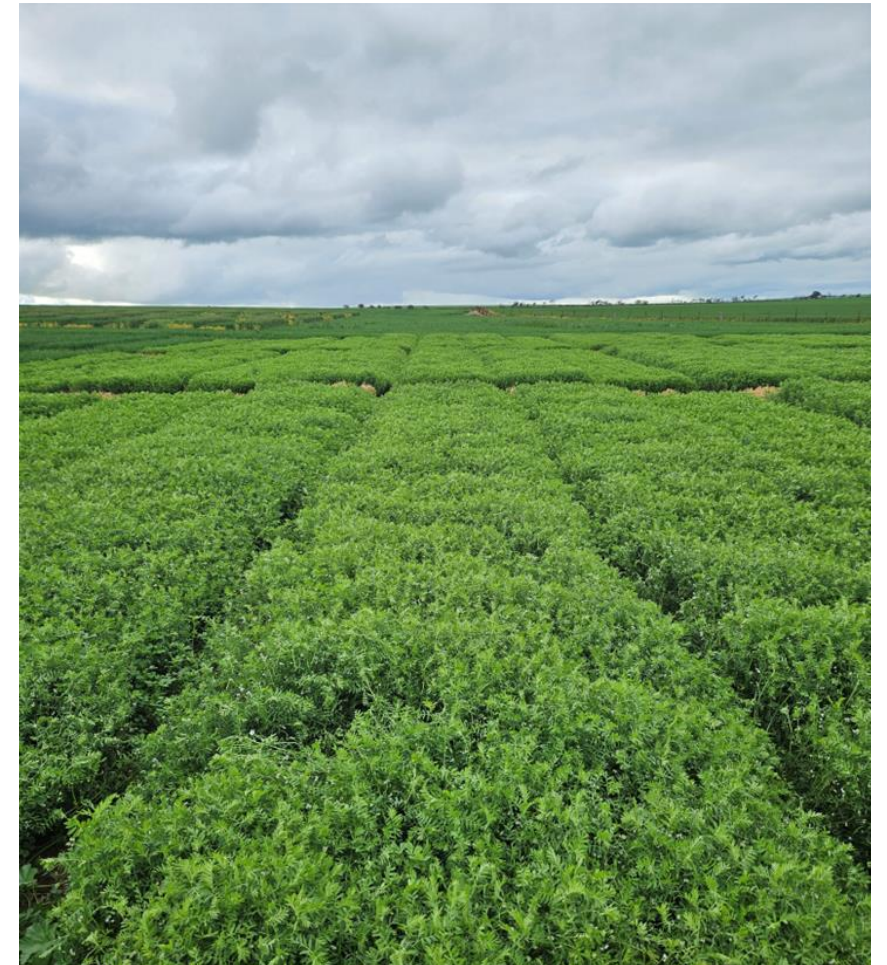- **Lentil pod shatter**

- **Lentil dry sowing**

LENTIL POD SHATTER

- Two-year trial investigating pod shatter and lentil losses

Variety	Maturity	Pod shatter resistance
PBA Blitz	Early	MR
PBA Highland XT	Early – mid	MR
PBA Kelpie XT	Early – mid	R
PBA Jumbo2	Mid	R

- Two times of harvest (standard and late)

- Enviroshield @ two timings

	Treatment	Yield (t/ha)	% Yield loss from pod shatter
2022	PBA Blitz	3.57[a]	2.2[b]
	PBA Highland XT	3.76[a]	0.3[a]
	PBA Kelpie XT	3.73[a]	1.8[b]
	PBA Jumbo2	4.41[b]	0.5[a]
	P value	**P < 0.001**	**P < 0.001**
	Standard harvest	3.77	0.6
	Late harvest	3.96	1.7
	P value	**NS**	**P < 0.001**
2023	PBA Blitz	2.06	2.7
	PBA Highland XT	1.85	2.3
	PBA Kelpie XT	1.83	1.9
	PBA Jumbo2	1.94	0.4
	P value	**NS**	**NS**
	Standard harvest	2.13	1.0
	Late harvest	1.71	2.7
	P value	**P = 0.003**	**NS**

PRE- HARVEST WEATHER CONDITIONS

Year	Weather conditions	TOH 1	TOH 2
	Average daily maximum temperature (°C)	22.5	22.9
2022	Days with wind gusts > 50 km/h	1 of 7	7 of 15
	Average wind speed (km/h)	17.1	20.5
	Average daily maximum temperature (°C)	23.7	28.9
2023	Days with wind gusts > 50 km/h	1 of 7	2 of 13
	Average wind speed (km/h)	22.4	22.6

2022 POD SHATTER RESULTS
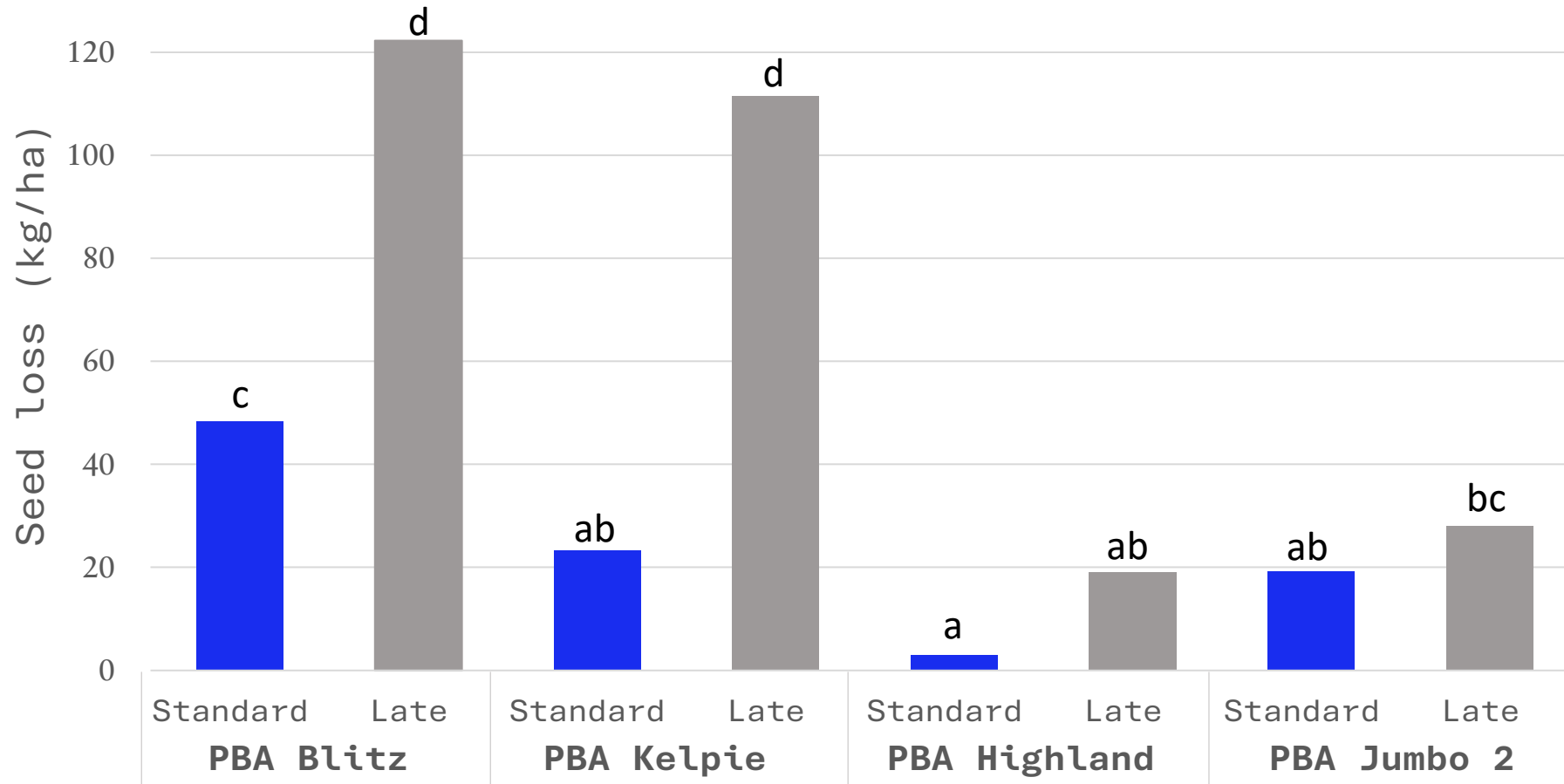
2023 POD DROP RESULTS

Treatment	Yield t/ha	% Yield loss from pod drop	Pod drop kg/ha
PBA Blitz	2.06	9.82[b]	179.4[b]
PBA Highland XT	1.85	15.69[c]	279.7[c]
PBA Kelpie XT	1.83	19.9[c]	361.5[d]
PBA Jumbo2	1.94	4.78[a]	89.2[a]
P value	**NS**	**P < 0.001**	**P < 0.001**
Standard harvest	2.13	9.58	192.6
Late harvest	1.71	15.52	262.3
P value	**P = 0.003**	**P =0.002**	**P= 0.018**

KEY MESSAGES

- In 2022, pod shatter was affected by variety selection and time of harvest (TOH) as a result of windy conditions

- In 2023 conditions between TOH 1 and TOH 2 were mild and there were no noticeable differences in pod shatter, however pod drop was higher with delayed harvest (pod drop not measured in 2022)

- Variety selection influenced pod shatter in 2022 and pod drop in 2023

- EnviroShield® application at green pod or desiccation had no effect on seed loss or final grain yield (t/ha)

LENTIL DRY SOWING

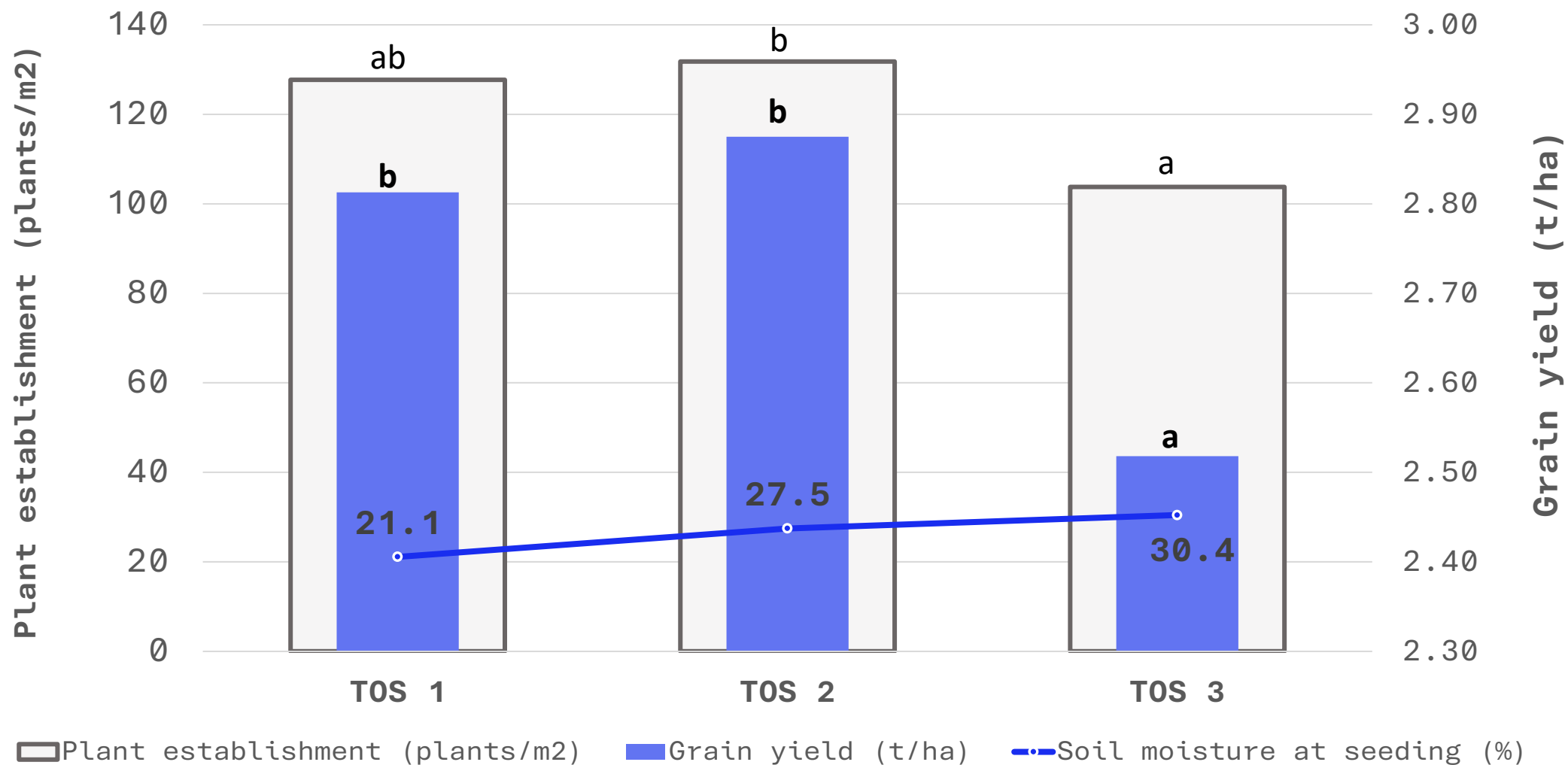**Thunder lentils**

TOS 1: April 27
TOS 2: June 2
TOS 3: June 20

Sowing rate – 120, 150, 180 plants/m^2

KEY MESSAGES

- TOS influenced establishment (plants/m^2), with reduced plant numbers observed at later sowing times (TOS 3)

- TOS 1 and TOS 2 achieved similar yields, however TOS 3 resulted in an approximate 13% yield reduction

- Increasing seed densities above 120 plants/m^2 (standard) did not improve lentil grain yield (t/ha).

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THANK YOU

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