HART

BEAT

Yield Prophet® simulations for 8 sites across the Mid-North of SA

Feature site:

HART

Additional site information for:

SPALDING | CONDOWIE

KYBUNGA | FARRELL FLAT | PINERY

EUDUNDA | TARLEE

HART
SA's premier cropping field site

ROCKY RIVER AG

CNH CAPITAL CASE IH Flexi-coil SETTING THE STANDARD

Incorporating RiskWi$e Balancing risk and reward for on-farm N decision making

MINIMISE RISK & MAXIMISE REWARD in 2025

ISSUE 67
July 10, 2025

DEFINITIONS

HART BEAT

HART BEAT definitions

The Hart field site has been characterised for plant available water capacity (PAWC) and bulk density to determine how much of the measured water and nitrogen is available to the crop during the season.

Plant available water capacity (PAWC) – is the difference between the drained upper limit of the soil and the lower extraction limit of a crop over the depth of rooting. It is the maximum water available to a crop from a particular soil type.

Plant available water (PAW) – is the amount of water contained in the soil at a given time minus the crop lower limit.

Growing season rainfall (GSR) – is rainfall for the period between and including April to October.

Decile – is a measure of seasonal rainfall on a scale of 1 to 9. In a Decile 7 year, 70% of previous years were drier, in a Decile 3 year 30% of previous years were drier.

Yield Prophet® is an internet-based service which uses the APSIM wheat prediction model.

The model relies on accurate soil, crop, historical climate data and up to date local weather

information to predict plant growth rates and final hay or grain yields. These are critical measurements specific to the site being analysed and may not fit closely to individual situations. Instead, the predictions will give a realistic guide to seasonal prospects based on a site with similar rainfall and / or soil type.

Using climate data for the current season, *Yield Prophet®* simulates the soil water, nitrogen processes and crop growth in the paddock. *Yield Prophet®* calculates the amount of water and nitrogen available to the crop as well as the water and nitrogen demand of the crop.

Important Notice: *Yield Prophet®* does not generate recommendations or advice, it is only a guide and must be combined with local paddock and district knowledge. APSIM does not take into account weed competition, pest/disease pressure, pesticide / herbicide damage, farmer error, or extreme events (such as extreme weather, flood and fire). Click on these links for more information about APSIM or *Yield Prophet®*.

HART BEAT 2025

HART BEAT

A look at HART BEAT in 2025

This season we're again taking you through our RiskWi$e nitrogen decision making process, based on a risk-reward analysis. Similar to previous seasons, Yield Prophet® outputs for the Hart site this year are not just simulations – we're using actual data and important climate information (links included), then explained how we've pulled this together to make informed N decisions. **So, this document provides a real-life example of a nitrogen decision – and that's the rate we'll apply to Hart's wheat variety trial, meaning we can also reflect on that decision at the end of the season.** We've also included some information on seven other sites across the Mid North, so you can see predicted yield outcomes across a range of season deciles.

What is RiskWi$e?

RiskWi$e is a 5-year national investment from GRDC that will support the on-farm decision making strategies of Australian grain growers, by assisting them to better understand risk and provide risk management tools to maximise returns. Some key aspects include:

1. Understanding risk and reward
    a. Identifying the known and unknown components of risk.
    b. Tools to help assess and balance upside reward and downside risk.
2. Challenging grower decision-making to account for various probabilities or futures and seasonal outlooks when making decisions.

Through this project, growers and advisors will receive support to quantify the probability of various outcomes, then use that information to make risk vs reward assessments. This can be applied across a range of management decisions in the context of your own farming operations.

Background

In the past, our nitrogen decisions have been based on one future, for example: a target yield of 3 t/ha in a particular environment. This target is helpful because we can use the 40 kg N per tonne of wheat rule, to calculate that we need 120kg N. If we know how much N is currently available to the crop, we know how much extra to add. But we also know that if we are unlikely to hit this target, we are going to either under-fertilise and regret being too cautious or over-fertilise and regret being too optimistic. An alternative approach is to look at a range of possible outcomes so that we can better understand the downside risk and upside reward, using all the information available to us at that point in time. **By knowing the downside risk and upside reward of our decision, we can be more comfortable in weighing up the benefits of our decision and understand the risks.**

When it comes to harvest, we will know whether our decision was lucky or unlucky, but in July we can only know that we have made a wise or unwise decision.

Yield Prophet® uses our starting soil water and weather records for 2025 up to July 10 and shows the range of possible futures using all historic seasons. We have also used a forecast from the Bureau of Meteorology.

Review: 2024 nitrogen decisions

Season conditions & outlook

Like many areas across the Mid North and South Australian regions more broadly, Hart experienced dry conditions in 2024, achieving growing season rainfall of only 176 mm (300 mm average), with 48 mm of this falling in October. Starting conditions were dry with a late May break, receiving 16.2 mm across a three-day period, however 87 mm summer rainfall (Dec – Feb) was favourable for stored soil moisture. At the time nitrogen (N) decisions were being made in July, the long term BOM forecast (August – October) showed that we had a 52% chance of receiving above average rainfall for the season. This indicated an almost 50:50 swing either way. At this time the Bureau also indicated a La Niña watch, and when similar criteria were met in the past, the La Niña eventuated 50% of the time.

Decision tools:

Deep soil N and water test results, Yield Prophet®, Bureau climate outlook (3-month forecast), and the fast graphs for slow thinking spreadsheet were used to generate some quick graphs & economics.

How did the tools used stack up?

In July, Yield Prophet® initially predicted wheat grain yields ranging from 0-6.4 t/ha across season decile outcomes. Based on the conditions and outlook information above, enough N was added at Hart to meet a Decile 5 yield outcome (60 kg N). Overall, Decile 2 GSR conditions significantly reduced yield potential at Hart, achieving only 0.56 t/ha wheat grain yield (Scepter). This season outcome was not favourable, contributing to low crop yields. However, given an almost a 50:50 swing for the season to go either way, the chance of falling into below average rainfall deciles (48%) was still likely.

N decisions: how have we performed?

It can be challenging to match crop N demand when it is unknown what the season will present in each given year. By looking at our starting soil conditions, yield spread, and the season forecast we can make informed decisions. Although these decisions can be good at the time, we can still have unlucky outcomes. See below how our decisions have stacked up:

Table 1. Summary of N decisions across three seasons at Hart.

	2023	**2024**	**2025 (to date)**
Predicted yield	1.5 – 7.9 t/ha	0.9 – 6.4 t/ha	1.0 – 3.4 t/ha
*Chance of exceeding average rainfall (BOM)	22%	52%	76%
Applied N (kg N/ha)	74 kg	60 kg	30 kg
GSR decile required (to match applied N)	4 (3.5 t/ha)	4 (2.7 t/ha)	5-6 (3-3.5 t/ha)
Actual GSR decile	4	2	
Actual yield (t/ha)	4.06	0.56	

**Three month forecast outlook (July-September or August-October)*

A model of predicted and actual yields at Hart over twelve years (2012-2024) shows that there is a moderate to strong correlation between Yield Prophet® predictions and observed yields.

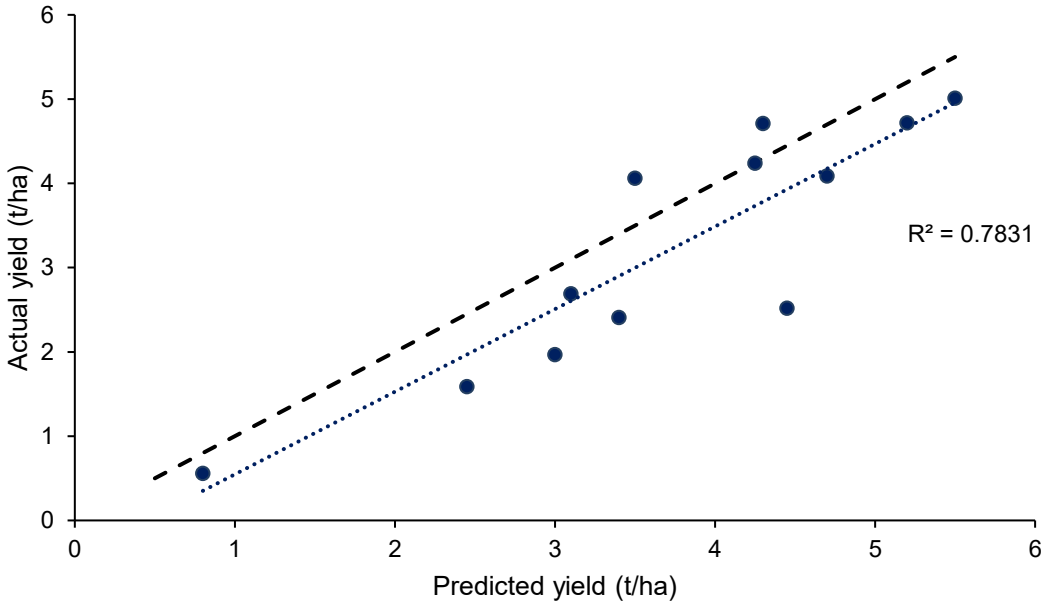


Figure 1. The relationship between Yield Prophet® grain yield predictions and actual yield at Hart across twelve seasons (2012-2024). Predicted yields shown have been generated from July or August simulations. Yields from 2021 are not included in this data set, due to significant grain losses prior to harvest. The dashed black trendline is the 1:1 line, crossing through point 0.

Hart's top tips for growers:

1. **Soil test**: it is important to understand your baseline N, to budget your fertiliser well and ensure you're not mining available soil organic N from the system. There may be years we need to replace what we've taken from the system, if under-fertilising has occurred.
2. Consider looking at your estimated nitrogen and water limited **yield potential** across a range of season deciles to understand the range of outcomes in a given season. This is a really great and quick tool to see how much N you will require to close the yield gap.
   Step 1: get your soil N data and divide by 40. This becomes your nitrogen limited yield (for example: 80 kg N/ha / 40 = 2 t/ha wheat grain yield).
   Step 2: estimate your grain yield across different deciles, this becomes your water limited yield (example only: Decile 1 = 1.0 t/ha, Decile 5 = 3.5 t/ha, Decile 7 = 6 t/ha).
   Step 3: determine the difference between these two numbers in each decile range and multiply by 40 (this is how much N you require to meet yield your gap) …. Easy!
3. **Reflect** on your N decision and learn from this for the consecutive season.

Useful information links:

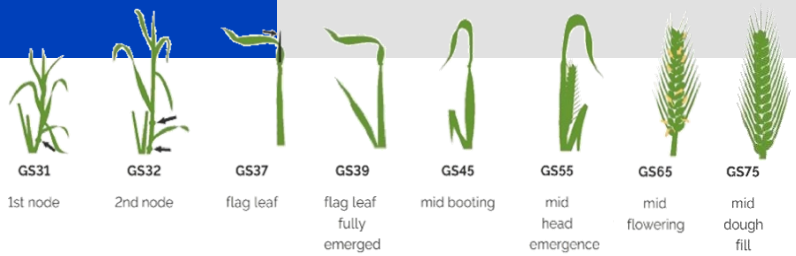
1. BOM three-month outlook: Rainfall - Totals that have a 75% chance of occurring for July to September - Climate Outlooks
2. Southern Hemisphere monitoring: http://www.bom.gov.au/climate/enso/?ninoIndex=nino3.4&index=nino34&period=weekly
3. Understanding the IOD: http://www.bom.gov.au/climate/about/australian-climate-influences.shtml?bookmark=iod

Location:

HART

HART BEAT

Date of report: July 10, 2025



Site information

Soil type: Sandy clay loam
Average annual rainfall: 400 mm

Crop growth

Variety:	Scepter wheat
Sowing date:	May 23, 2025
Emergence:	June 18, 2025
Soil sampling date:	April 4, 2025
Starting soil N:	120.4 kg N/ha
Seeding fertiliser:	8 kg N/ha

The season so far

Annual rainfall to date:	93.2 mm
GSR to date:	86.4 mm
Current GSR decile:	1
Initial PAW (April 4)	0 mm
Current predicted PAW:	44 mm (21% full)
PAWC:	206 mm

Yield Prophet® report: Hart field site

Output 1: What is our yield spread?

The first report (below) was run on July 10 with no additional nitrogen (N) added (starting soil and seeding N only). The yield probability curves display two different nitrogen scenarios. The **green** line displays grain yield at Hart with the current soil available nitrogen, or Nitrogen-limited yield (PY_N). The **blue** line represents the grain yield potential for water-limited yield potential (PY_w). A difference between these two lines, as observed below, indicates additional N fertiliser is required for the crop to reach its yield potential if growing season rainfall exceeds Decile 2. The red dotted line represents Decile 5 (or 50% probability of receiving 2.4 t/ha nitrogen-limited yield or 3.0 t/ha water-limited yield).

You may notice a discrepancy between actual soil N measured of 120.4 kg N/ha (~3 t/ha crop) and lowest recorded yield on the graph (1 t/ha). This is because soil N was measured at 0 – 135 cm and the Yield Prophet model assumes not all this N is available to the crop at depth, particularly in a dry season. Available N within the top 60 cm was approximately 85 kg/ha, equivalent to 2.1 t/ha. The below graph shows a yield gap beyond ~2 t/ha which is consistent with N availability to the predicted maximum 60 cm rooting depth this season.

Total nitrogen:

Starting Soil N (0 – 135 cm):
120.4 kg N/ha
Fertiliser at seeding:
8 kg N/ha
(80 kg/ha MAP applied)

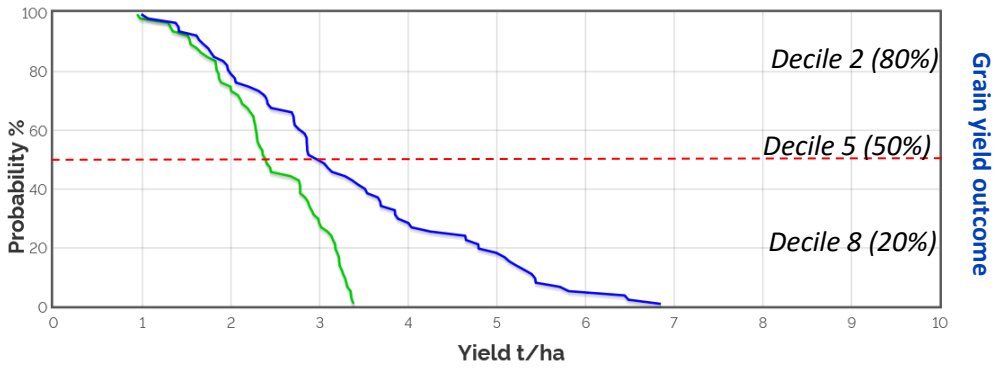


Table 2. N required across all season decile outcomes (adapted from Yield Prophet Output 1 shown above).

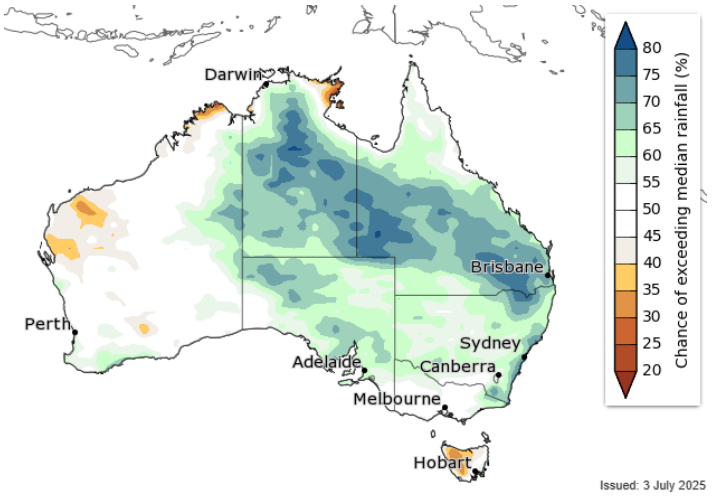
Equivalent decile finish	0	1	2	3	4	5	6	7	8	9	10
PY_N (t/ha)	1.0	1.5	1.8	2.1	2.3	2.4	2.8	3.0	3.2	3.3	3.4
PY_w (t/ha)	1.0	1.7	2.0	2.4	2.8	3.0	3.5	3.9	4.8	5.4	6.9
Yield difference (t/ha)	*0*	*0.2*	*0.2*	*0.3*	*0.5*	*0.6*	*0.7*	*0.9*	*1.6*	*2.1*	*3.5*
N requirement (kg N/ha)	**0**	**8**	**8**	**12**	**20**	**24**	**28**	**36**	**64**	**84**	**140**

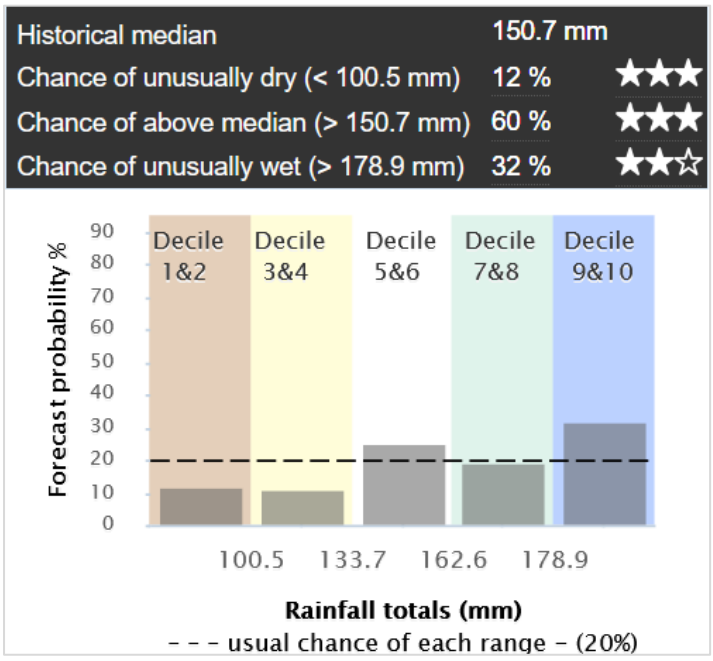
Decile 2 rainfall in 2024 resulted in high background N at the Hart field site in 2025. Despite being typically highly responsive to N at all decile ranges, high background N means that there are only small benefits of additional N, unless growing season rainfall exceeds Decile 3 this year. In higher rainfall years, responsive sites may receive what we call the 'no brainer' application. This means there is a significant production and financial benefit to applying N and provides flexibility to apply N before a rain event before future top-up decisions need to be made.

WHAT'S NEXT: Seek more information & consider the climate outlook

ENSO Outlook

The Bureau have predicted a neutral ENSO phase (neither El Niño or La Niña) until at least the end of August, with a high chance of lasting until the end of the year. **What does this mean?** A Neutral ENSO phase generally leads to a higher chance of close to average climatic conditions (rainfall and temperature). Despite neutral ENSO conditions, extreme events including droughts and floods may still occur.





July- September outlook

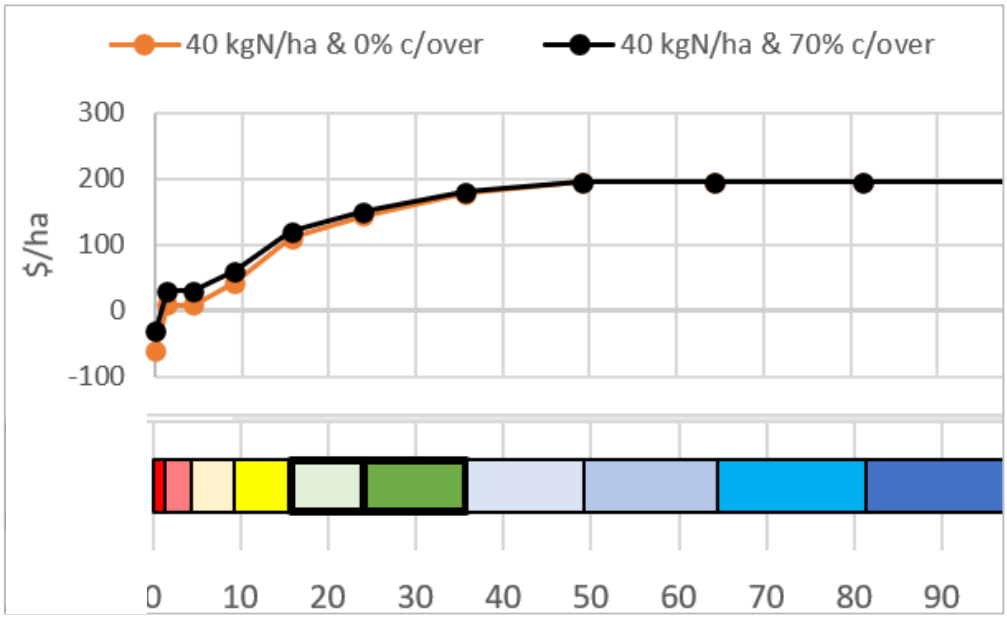
We can also find short and longer-term (National BOM map showing chance of exceeding average rainfall above) climate information indicating the likelihood of above average rainfall, in this case a 3-month forecast (left). The shaded area in each bar indicates the likelihood of each of the five rainfall bands occurring. The forecast likelihood can be compared to the usual chance (20%) shown by the dashed line. In this case, we have a 23% chance that July - September rainfall will fall into a Decile 1 – 4 category, and 51% chance of falling into Decile 7 – 10. **Combined, this information tells us that the likelihood of recieving above median (average) rainfall from July - September is 76% which is slightly higher than the long term odds.**

Sourced from Bureau of Meteorology:
http://www.bom.gov.au/climate/outlooks/#/rainfall/median/seasonal/0

NEXT UP: We combine Yield Prophet® output, the bureau forecast & economics

How much N: What do the economics tells us?

The below graph is an example of the economic appraisal of applying an additional 30 kg N (65 kg/ha of urea) with a 76% chance of exceeding above average rainfall. This is based on the yield information for each decile provided in Output 2 (wheat price of $340/tonne, urea at $765/tonne and application cost of $10/ha). Any point above the "0" line is a profitable outcome. The orange line shows an additional 30kg N/ha with no value on carry over N and the black line an additional 30 kg N/ha accounting for 70% carry over on any un-used N (on average, carry over N has shown to be between 60-80%).



	Long term average		% neg	Worst case	
No carryover N	292	$/ha	1%	-60	$/ha
70% carryover N	281	$/ha	1%	-30	$/ha

On the basis of the data shown above, applying additional N to this crop is profitable across virtually all seasons except for Decile 1 based on our current season forecast. Accepting of course that there may be other issues which could affect the crop yield (other than spring rainfall) such as frost or heat spikes.

Given that we'd expect a high proportion of any un-used N to carry over, a higher rate of 30 kg N/ha could be a more favourable decision to capture an upside if we do receive an above average growing season from here on. When the above graph was simulated with 20 kg N/ha applied in-crop there was no significant financial benefit, with a worst-case scenario of -$24 (see below).

	Long term average		% neg	Worst case	
No carryover N	246	$/ha	1%	-43	$/ha
70% carryover N	232	$/ha	1%	-24	$/ha

Yield Prophet® (based on Output 1)

There is not a lot of upside benefit to applying N if Decile 1 occurs from now on. From Decile 3 and above, there is still the potential for significant yield to be left in the paddock due to insufficient N. In the absence of a forecast, there is seen to be considerable upside in applying N if a wetter than average spring eventuates. The difference between PY_W and PY_N at Decile 5 is around 0.6 t/ha. Based on the rule of thumb of 40 kg/Ha N required per tonne of wheat produced, this gap could be covered by adding 24 kg of N (Table 1). There is an upside to applying this amount of N while still remaining relatively conservative.

We are confident that if we get below average rainfall conditions, we'll see a portion of N carry over into 2026. The upside of adding an additional 30 kg N/ha is worthwhile, while remaining conservative due to a higher chance of above average rainfall across the next three months.

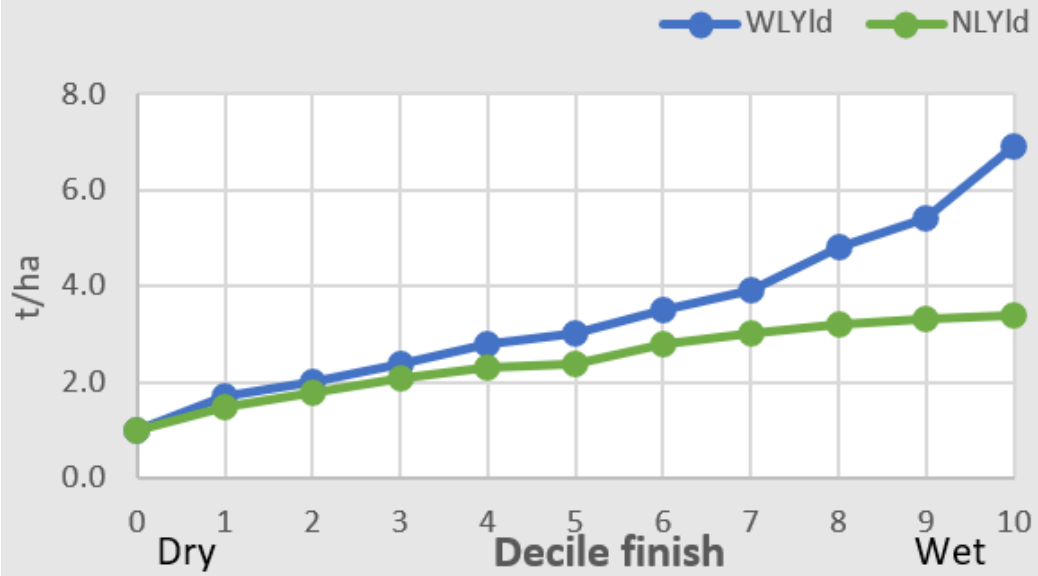


Figure 1. Yield x decile graph for adding an additional 30kg N/ha to Output 1. Graph source adapted from Yield Prophet® output 1 with Peter Hayman's 'Fast Graphs For Slow Thinking' spreadsheet.

Output 2: Nitrogen application

As we know that N is required to improve our final yield, **we plan to apply 30 kg N/ha (65 kg urea) as a top dress application to Scepter wheat**.

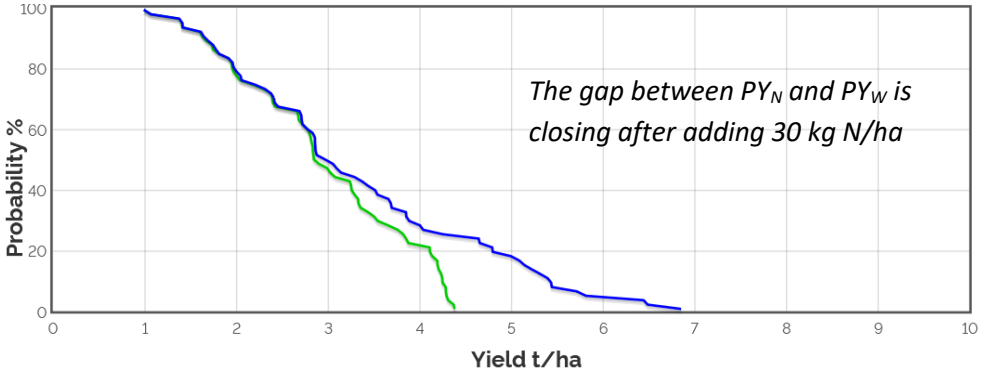
The below output was modelled on July 10 after a 23 mm rain event. There is still a slight gap between nitrogen and water-limited yield from Decile 6 onwards. Note that Outputs 1 and 2 have a similar blue line showing a wide yield range of 1 t/ha to 6.9 t/ha depending on how the season finishes. Adding extra nitrogen has moved the green line (YP_N) closer to the water-limited yield. You can see that by adding an additional 30 kg N/ha at Hart, we closed the yield gap between YP_W and YP_N compared to Output 1.

Total nitrogen:

Soil N = 120.4 kg N/ha

Seeding = 8 kg N/ha

+ 30 kg N/ha top dressed



Summary of N application at Hart

High starting N at Hart in 2025 (120 kg N/ha) resulting from dry conditions in 2024 impacted N application this season. This shows the importance in assessing N requirements prior to any in-crop application.

After taking into account Yield Prophet® Output 1 which included starting soil N and seeding fertiliser, we considered the Bureau forecast which predicted 76% chance of exceeding median rainfall for the next three months. Despite the current dry conditions, we wanted to ensure that our N decisions considered the chance of exceeding Decile 3 rainfall which is where our current N availability would begin limiting yield potential.

We then conducted a quick economic analysis of multiple decisions to decide if we should apply 30 kg N to close the yield gap to Decile 5-6, or if we wanted to take a more conservative approach and apply only 20 kg N which would cover N requirements up to Decile 4. The economic analysis showed minimal downside of applying 30 kg N/ha compared to 20 kg N/ha.

In total, only one in-season application of 30 kg N/ha will be applied, and we are confident that this will meet N requirements appropriately. Although the Bureau is predicting a 51% chance of Decile 7-10 rainfall for July- September, we decided to take a somewhat conservative approach considering the dry and late start to the season reducing crop yield potential. Based on a urea price of $765 per tonne ($0.76/kg), our top dress inputs this season equal $23/ha.

We'll share our reflections on this decision and an update on how the season and yield potential across the 8 locations is tracking in our next edition of HART BEAT in August.

For more information, or to get a copy of the 'Fast Graphs for Slow Thinking' spreadsheet, please contact our Research & Extension Manager, Bek.

Rebekah Allen | Research & Extension Manager | Hart Field-Site Group
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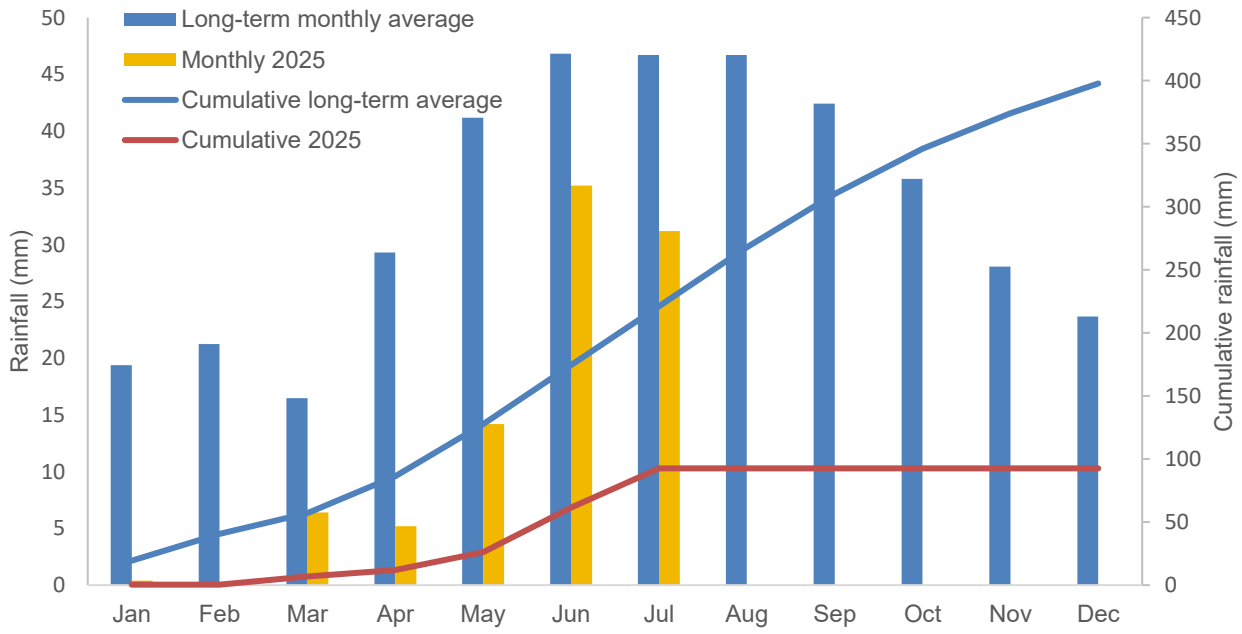
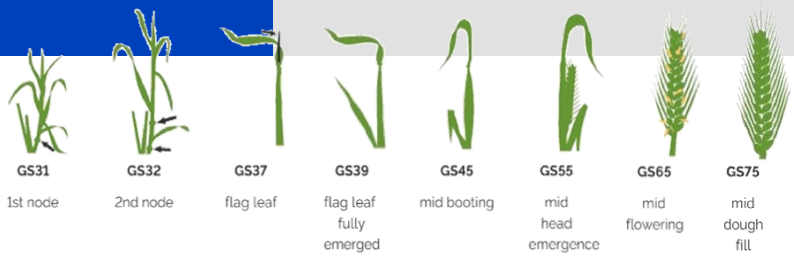


Hart rainfall graph for the 2025 season and long term average. Lines are displayed to present cumulative rainfall for long term average (blue) and 2025 (orange). Current season rainfall data sourced from Mid North Mesonet https://mesonet.com.au/.

Location:

SPALDING

HART BEAT



Date of report: July 9, 2025

Soil type: Red brown earth
Average annual rainfall: 430 mm

Simulation assumptions

Crop growth

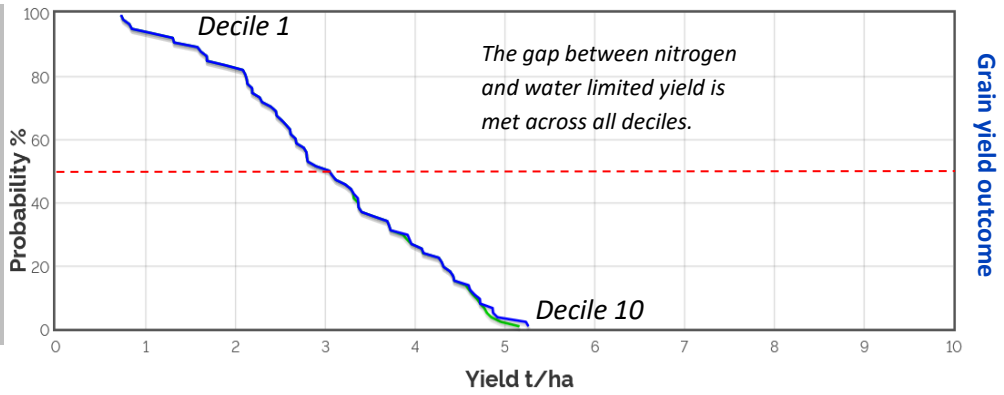
Variety:	Scepter wheat
Sowing date:	May 1, 2025
Measured starting N:	241 kg N/ha
Nitrogen fertiliser:	20 kg N @ seeding

The season so far

GSR to date:	95 mm
Estimated GSR decile to date:	2
Initial PAW (April 7):	0 mm
Current predicted PAW:	32 mm (22% full)
PAWC:	143 mm

Yield Prophet® prediction

Based on 261 kg N/ha starting soil & seeding N. No in crop N applied.



The **green** line in the graph above shows the predicted grain yield at Spalding for nitrogen-limited yield (PY_N). The **blue** line represents the grain yield potential for water-limited yield (PY_W). No difference between these two lines indicates the current soil N level is adequate for the crop to reach its yield potential. A large difference between these two lines, indicates additional N fertiliser is required for the crop to reach its yield potential. Site characterisation data from APSoil for Spalding has been used, and starting soil available nitrogen and water was measured. The red dotted line represents Decile 5 (or 50% probability of receiving 3.0 t/ha wheat grain yield – refer to below table).

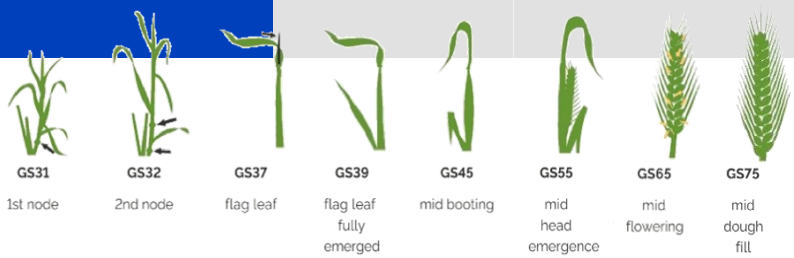
Based on the data from graph above, this table shows the amount of additional N required to meet the yield gap between the nitrogen and water-limited yield gap across a range of decile seasons.

Equivalent decile finish	**0**	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**
PY_N (t/ha)	0.7	1.4	2.1	2.4	2.7	3.0	3.4	3.8	4.3	4.7	5.2
PY_w (t/ha)	0.7	1.4	2.1	2.4	2.7	3.0	3.4	3.8	4.3	4.7	5.3
Yield difference (t/ha)	0	0	0	0	0	0	0	0	0	0	0.1
Additional N requirement (kg N/ha)	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**4**

Location:

CONDOWIE

HART BEAT



Date of report: July 9, 2025

Soil type: Sandy loam
Average annual rainfall: 350 mm

Simulation assumptions

Crop growth

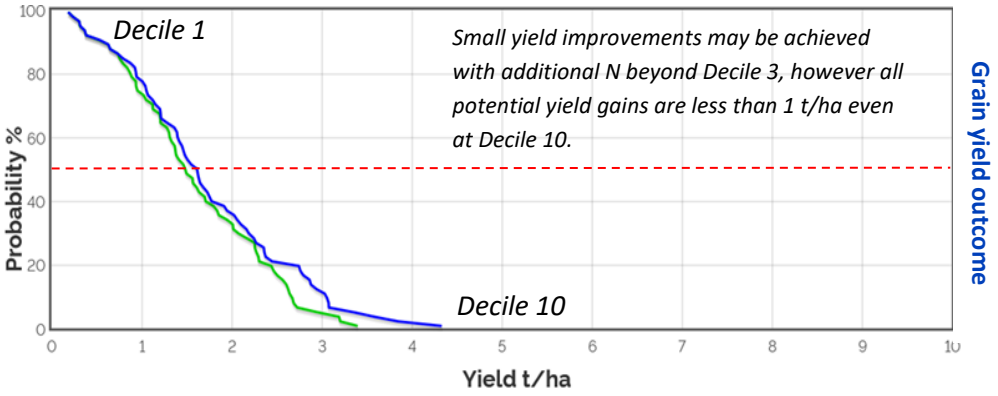
Variety:	Scepter wheat
Sowing date:	May 1, 2025
Measured starting N:	97 kg N/ha
Nitrogen fertiliser:	20 kg N/ha @ seeding + 30 kg N/ha

The season so far

GSR to date:	57.1 mm
Estimated GSR decile to date:	1
Initial PAW (April 4):	2 mm
Current predicted PAW:	20 mm (17% full)
PAWC:	115 mm

Yield Prophet® prediction

Based on 117 kg N/ha starting soil & seeding N + 30 kg N/ha applied in crop



The **green** line in the graph above shows the predicted grain yield at Condowie for nitrogen-limited yield (PY_N). The **blue** line represents the grain yield potential for water-limited yield (PY_W). No difference between these two lines indicates the current soil N level is adequate for the crop to reach its yield potential. A large difference between these two lines, indicates additional N fertiliser is required for the crop to reach its yield potential. Site characterisation data from APSoil for Condowie has been used, and starting soil available nitrogen and water was measured. The red dotted line represents Decile 5 (or 50% probability of receiving 1.5 t/ha nitrogen-limited yield or 1.6 t/ha water-limited yield–– refer to below table).

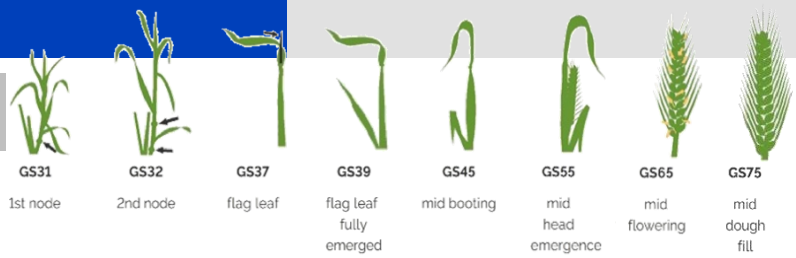
Based on the data from graph above, this table shows the amount of additional N required to meet the yield gap between the nitrogen and water-limited yield gap across a range of decile seasons.

Equivalent decile finish	**0**	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**
PY_N (t/ha)	0.2	0.6	0.9	1.1	1.3	1.5	1.7	2.1	2.4	2.7	3.4
PY_w (t/ha)	0.2	0.6	0.9	1.2	1.4	1.6	1.8	2.2	2.7	3.1	4.3
Yield difference (t/ha)	*0*	*0*	*0*	*0.1*	*0.1*	*0.1*	*0.1*	*0.1*	*0.3*	*0.4*	*0.9*
Additional N requirement (kg N/ha)	**0**	**0**	**0**	**4**	**4**	**4**	**4**	**4**	**12**	**16**	**36**

Location:

KYBUNGA

HART BEAT



Date of report: July 9, 2025

Soil type: Clay loam

Average annual rainfall: 428 mm

Simulation assumptions

Crop growth

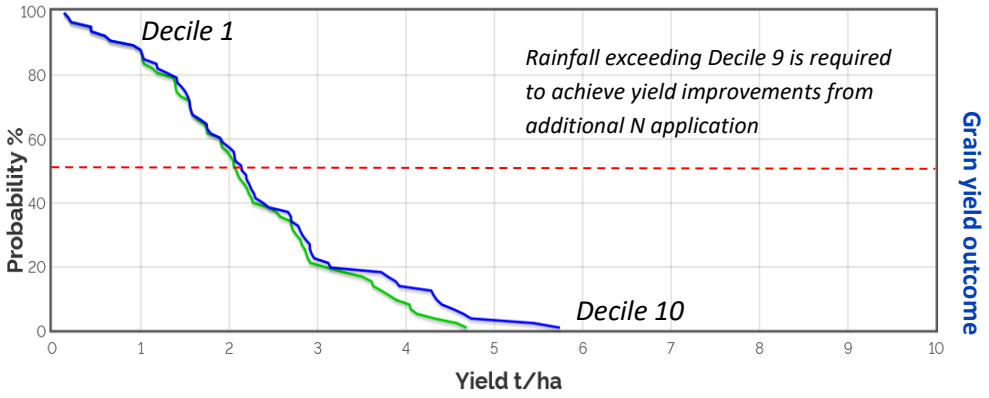
Variety:	Scepter wheat
Sowing date:	May 1, 2025
Measured starting N:	164 kg N/ha
Nitrogen fertiliser:	20 kg N/ha @ seeding
	+ 30 kg N/ha

The season so far

GSR to date:	49 mm
Estimated GSR decile to date:	1
Initial PAW (April 4):	0 mm
Current predicted PAW:	12 mm (5% full)
PAWC:	262 mm

Yield Prophet® prediction

Based on 184 kg N/ha starting soil & seeding N + 30 kg N/ha applied in crop



The **green** line in the graph above shows the predicted grain yield at Kybunga for nitrogen-limited yield (PY_N). The **blue** line represents the grain yield potential for water-limited yield (PY_W). No difference between these two lines indicates the current soil N level is adequate for the crop to reach its yield potential. A large difference between these two lines, indicates additional N fertiliser is required for the crop to reach its yield potential. Site characterisation data from APSoil for Kybunga has been used, and starting soil available nitrogen and water was measured. The red dotted line represents Decile 5 (or 50% probability of receiving 2.1 t/ha wheat grain yield – refer to below table).

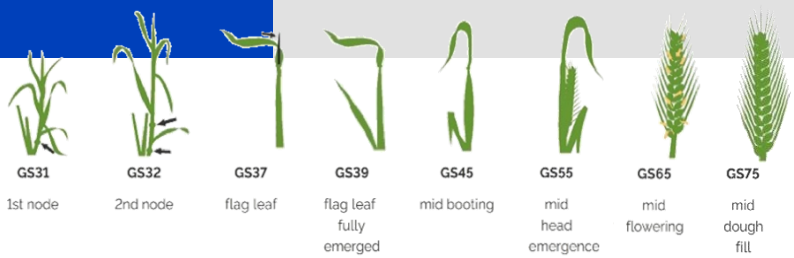
Based on the data from graph above, this table shows the amount of additional N required to meet the yield gap between the nitrogen and water-limited yield gap across a range of decile seasons.

Equivalent decile finish	**0**	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**
PY_N (t/ha)	0.1	0.8	1.2	1.6	1.9	2.1	2.3	2.8	3.1	3.9	4.7
PY_w (t/ha)	0.1	0.8	1.3	1.6	1.9	2.1	2.4	2.8	3.1	4.3	5.7
Yield difference (t/ha)	*0*	*0*	*0.1*	*0*	*0*	*0*	*0.1*	*0*	*0*	*0.4*	*1*
Additional N requirement (kg N/ha)	**0**	**0**	**4**	**0**	**0**	**0**	**4**	**0**	**0**	**16**	**40**

Location:

FARRELL FLAT

HART BEAT



Date of report: July 9, 2025

Soil type: Light clay loam
Average annual rainfall: 474 mm

Simulation assumptions

Crop growth

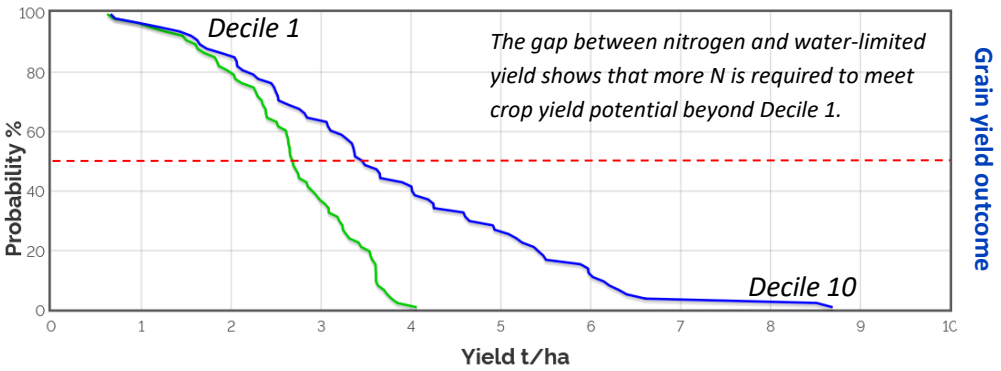
Variety:	Scepter wheat
Sowing date:	May 1, 2025
Measured starting N:	97 kg N/ha
Nitrogen fertiliser:	20 kg N/ha @ seeding + 30 kg N/ha

The season so far

GSR to date:	82.8 mm
Estimated GSR decile to date:	1
Initial PAW (April 7):	0 mm
Current predicted PAW:	35 mm (20% full)
PAWC:	172 mm

Yield Prophet® prediction

Based on 117 kg N/ha starting soil & seeding N + 30 kg N/ha applied in crop



The **green** line in the graph above shows the predicted grain yield at Farrell Flat for nitrogen-limited yield (PY_N). The **blue** line represents the grain yield potential for water-limited yield (PY_W). No difference between these two lines indicates the current soil N level is adequate for the crop to reach its yield potential. A large difference between these two lines, indicates additional N fertiliser is required for the crop to reach its yield potential. Site characterisation data from APSoil for Farrell Flat has been used, and starting soil available nitrogen and water was measured. The red dotted line represents Decile 5 (or 50% probability of receiving 2.7 t/ha nitrogen-limited yield or 3.5 t/ha water-limited yield– refer to below table).

Based on the data from graph above, this table shows the amount of additional N required to meet the yield gap between the nitrogen and water-limited yield gap across a range of decile seasons.

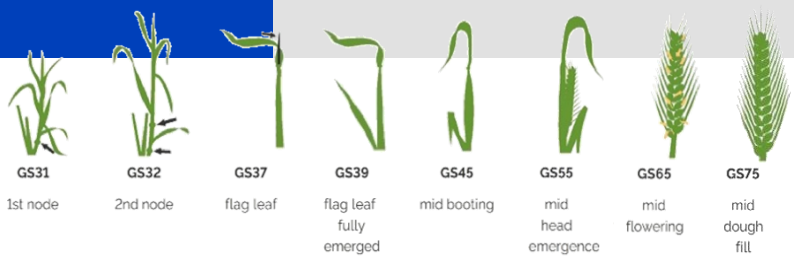
Equivalent decile finish	**0**	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**
PY_N (t/ha)	0.6	1.5	2.0	2.3	2.6	2.7	2.9	3.2	3.5	3.6	4.1
PY_w (t/ha)	0.7	1.6	2.2	2.6	3.1	3.5	4.0	4.6	5.4	6.1	8.7
Yield difference (t/ha)	*0.1*	*0.1*	*0.2*	*0.3*	*0.5*	*0.8*	*1.1*	*1.4*	*1.9*	*2.5*	*4.6*
Additional N requirement (kg N/ha)	**4**	**4**	**8**	**12**	**20**	**32**	**44**	**56**	**76**	**100**	**184**

Location:

PINERY

HART BEAT

Date of report: July 9,2025



Soil type: Silty clay loam
Average annual rainfall: 374 mm

Simulation assumptions

Crop growth

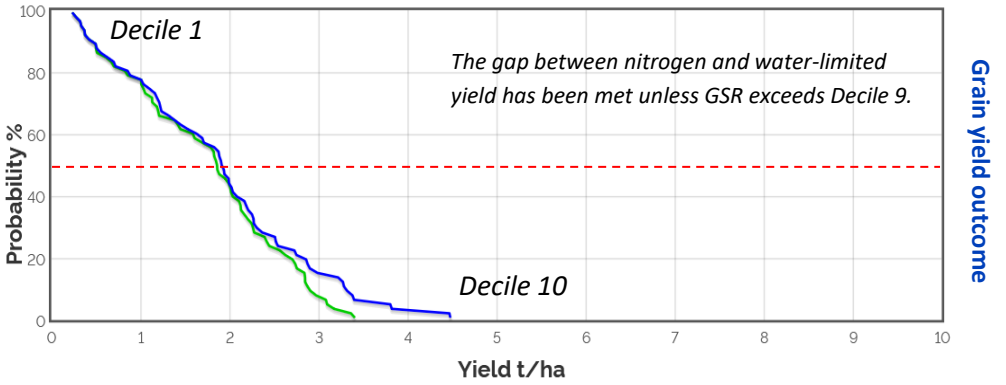
Variety:	Scepter wheat
Sowing date:	May 1, 2025
Measured starting N:	155 kg N/ha
Nitrogen fertiliser:	20 kg N/ha @ seeding + 30 kg N/ha

The season so far

GSR to date:	61 mm
Estimated GSR decile to date:	1
Initial PAW (April 7):	0 mm
Current predicted PAW:	12 mm (15% full)
PAWC:	79 mm

Yield Prophet® prediction

Based on 175 kg N/ha starting soil & seeding N + 30 kg N/ha applied in crop



The **green** line in the graph above shows the predicted grain yield at Pinery for nitrogen-limited yield (PY_N). The **blue** line represents the grain yield potential for water-limited yield (PY_W). No difference between these two lines indicates the current soil N level is adequate for the crop to reach its yield potential. A large difference between these two lines, indicates additional N fertiliser is required for the crop to reach its yield potential. Site characterisation data from APSoil for Pinery has been used, and starting soil available nitrogen and water was measured. The red dotted line represents Decile 5 (or 50% probability of receiving 1.9 t/ha wheat grain yield – refer to below table).

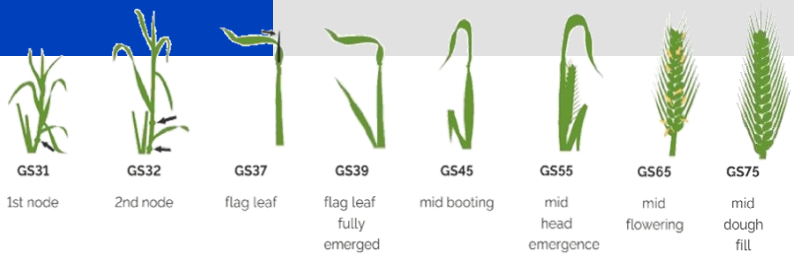
Based on the data from graph above, this table shows the amount of additional N required to meet the yield gap between the nitrogen and water-limited yield gap across a range of decile seasons.

Equivalent decile finish	**0**	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**
PY_N (t/ha)	0.2	0.5	0.8	1.1	1.6	1.9	2.0	2.3	2.7	2.9	3.4
PY_w (t/ha)	0.2	0.5	0.9	1.2	1.6	1.9	2.1	2.3	2.7	3.3	4.5
Yield difference (t/ha)	*0*	*0*	*0.1*	*0.1*	*0*	*0*	*0.1*	*0*	*0*	*0.4*	*0.9*
Additional N requirement (kg N/ha)	**0**	**0**	**4**	**4**	**0**	**0**	**4**	**0**	**0**	**16**	**36**

Location:

EUDUNDA

HART BEAT



Date of report: July 9, 2025

Soil type: Gravelly loam
Average annual rainfall: 445 mm

Simulation assumptions

Crop growth

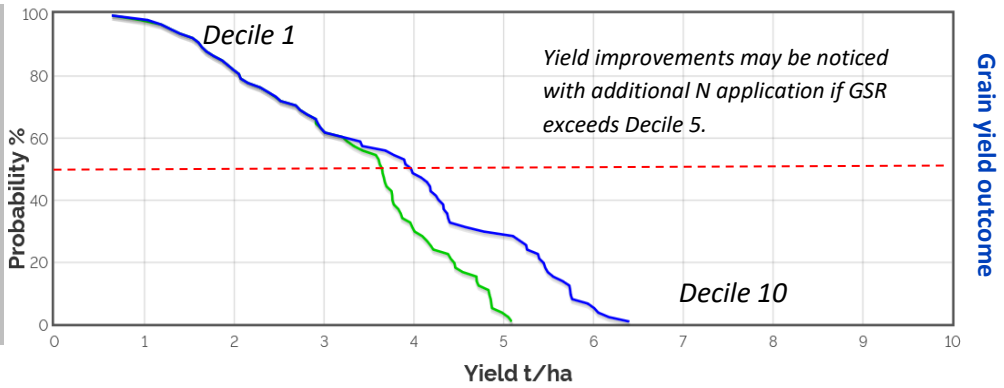
Variety:	Scepter wheat
Sowing date:	May 1, 2025
Measured starting N:	125 kg N/ha
Nitrogen fertiliser:	20 kg N/ha @ seeding + 30 kg N/ha

The season so far

GSR to date:	67 mm
Estimated GSR decile to date:	1
Initial PAW (April 7):	0 mm
Current predicted PAW:	15 mm (16% full)
PAWC:	96 mm

Yield Prophet® prediction

Based on 145 kg N/ha starting soil & seeding N + 30 kg N/ha applied in crop



The **green** line in the graph above shows the predicted grain yield at Eudunda for nitrogen-limited yield (PY_N). The **blue** line represents the grain yield potential for water-limited yield (PY_W). No difference between these two lines indicates the current soil N level is adequate for the crop to reach its yield potential. A large difference between these two lines, indicates additional N fertiliser is required for the crop to reach its yield potential. Site characterisation data from APSoil for Eudunda has been used, and starting soil available nitrogen and water was measured. The red dotted line represents Decile 5 (or 50% probability of receiving 3.7 t/ha nitrogen-limited yield or 4.0 t/ha water-limited yield– refer to below table).

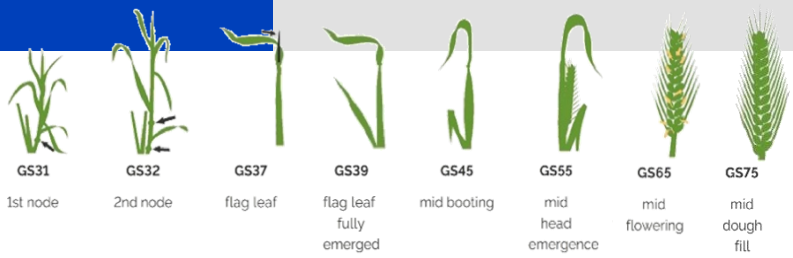
Based on the data from graph above, this table shows the amount of additional N required to meet the yield gap between the nitrogen and water-limited yield gap across a range of decile seasons.

Equivalent decile finish	**0**	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**
PY_N (t/ha)	0.7	1.6	2.1	2.7	3.2	3.7	3.8	4.0	4.4	4.8	5.1
PY_w (t/ha)	0.7	1.6	2.1	2.7	3.2	4.0	4.3	4.7	5.4	5.8	6.4
Yield difference (t/ha)	*0*	*0*	*0*	*0*	*0*	*0.3*	*0.5*	*0.7*	*1.0*	*1.0*	*1.3*
Additional N requirement (kg N/ha)	**0**	**0**	**0**	**0**	**0**	**12**	**20**	**28**	**40**	**40**	**52**

Location:

TARLEE

HART BEAT



Date of report: July 9, 2025

Soil type: Sandy loam
Average annual rainfall: 428 mm

Simulation assumptions

Crop growth

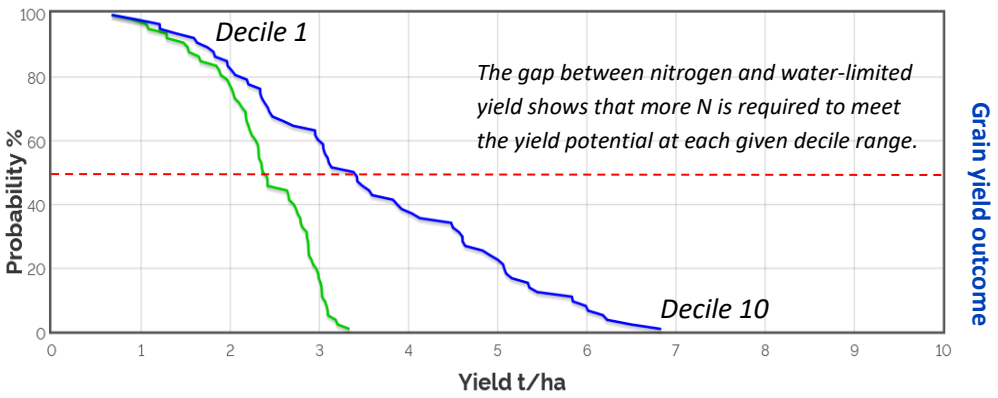
Variety:	Scepter wheat
Sowing date:	May 1, 2025
Measured starting N:	58 kg N/ha
Nitrogen fertiliser:	20 kg N/ha @ seeding + 40 kg N/ha

The season so far

GSR to date:	89 mm
Estimated GSR decile to date:	1
Initial PAW (April 7):	7 mm
Current predicted PAW:	36 mm (32% full)
PAWC:	113 mm

Yield Prophet® prediction

Based on 87 kg N/ha starting soil & seeding N
+ 40 kg N/ha applied in crop



The **green** line in the graph above shows the predicted grain yield at Tarlee for nitrogen-limited yield (PY_N). The **blue** line represents the grain yield potential for water-limited yield (PY_W). No difference between these two lines indicates the current soil N level is adequate for the crop to reach its yield potential. A large difference between these two lines, indicates additional N fertiliser is required for the crop to reach its yield potential. Site characterisation data from APSoil for Tarlee has been used, and starting soil available nitrogen and water was measured. The red dotted line represents Decile 5 (or 50% probability of receiving 2.4 t/ha nitrogen-limited yield or 3.4 t/ha water-limited yield).

Based on the data from graph above, this table shows the amount of additional N required to meet the yield gap between the nitrogen and water-limited yield gap across a range of decile seasons.

Equivalent decile finish	**0**	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**
PY_N (t/ha)	0.7	1.5	1.9	2.1	2.3	2.4	2.7	2.9	3.0	3.1	3.3
PY_w (t/ha)	0.7	1.7	2.1	2.4	3.0	3.4	3.9	4.6	5.1	5.8	6.8
Yield difference (t/ha)	*0*	*0.2*	*0.2*	*0.3*	*0.7*	*1.0*	*1.2*	*1.7*	*2.1*	*2.7*	*3.5*
Additional N requirement (kg N/ha)	**0**	**8**	**8**	**12**	**28**	**40**	**48**	**68**	**84**	**108**	**140**