

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



ISSUE 65
July 14, 2023

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 dryer, in a decile 3 year 30% of previous years were dryer.

Disclaimer: *Yield Prophet*® information is used entirely at your own risk. You will accept all risks and responsibility for losses, damages, costs and other consequences of using *Yield Prophet*® information and reports. To the maximum extent permitted by law, APSRU and BCG excludes all responsibility and liability to any person arising directly or indirectly from using the information generated by *Yield Prophet*®.

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](#)®.

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.

Yield Prophet® Lite

A FREE online tool to predict yield potential and manage in-crop nitrogen

Don't have Yield Prophet®?

Yield Prophet® Lite is a free online tool for estimating potential yield values for your crop, taking into account various rainfall scenarios and application rates of nitrogen.

More info or download the App: <https://www.yieldprophet.com.au/yplite>

WHAT'S NEW?

This season you'll notice that Hart Beat looks a little different. **WHY?** We're taking you through our RiskWi\$e nitrogen decision making process, based on a risk-reward analysis. 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 brief information on seven other sites across the Mid-North.

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 simple 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

Generally, our nitrogen decisions are based on one future or probability, for example: a target yield in a particular environment of 3 t/ha. 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 the starting soil water and weather records for 2023 up to mid-July and shows the range of possible futures using all historic seasons. We also have a forecast from the Bureau of Meteorology.

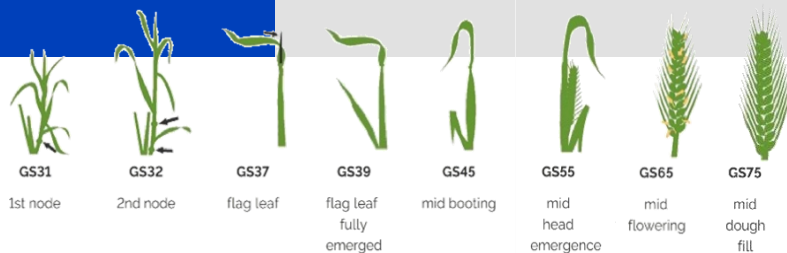
Compiled by Rebekah Allen; Hart Field-Site Group, Peter Hayman; SARDI and Barry Mudge; Barry Mudge Consulting

Location:

HART

HART BEAT

Date of report: July 14, 2023



Site information

Soil type: Sandy clay loam

Average annual rainfall: 400 mm

Crop growth

Variety: Scepter wheat
Sowing date: May 14, 2023
Emergence: June 1, 2023
Soil sampling date: April 14, 2023
Starting soil N: 105 kg N/ha
Nitrogen fertiliser: 14.4 kg N/ha @ seeding

The season so far

Annual rainfall to date: 182 mm
GSR to date: 149 mm
Current GSR decile: 7
Initial PAW (April 14): 1 mm
Current predicted PAW: 40 mm (19% full)
PAWC: 206 mm

Yield Prophet® reports: Hart field site

Output 1

The first report (below) was run with no additional 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 (Nitrogen Limited Yield). The **blue** line represents the grain yield potential for Water Limited Yield (yield potential). A large difference between these two lines, as observed below, indicates additional N fertiliser is required for the crop to reach its yield potential and that the crop will respond to N even in a Decile 1 season. The red dotted line represents Decile 5 (or 50% probability of receiving 2 t/ha nitrogen limited yield or 3.9 t/ha water limited yield).

We know that this site is highly responsive to N. Given the current Bureau forecast, it is clear that even a Decile 5 season from now on would require significant N input to realise Water Limited Yield.

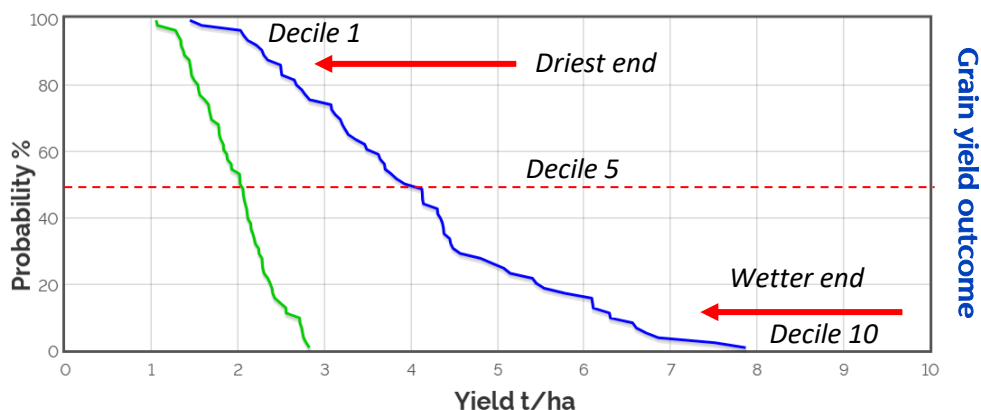
Total nitrogen:

Starting Soil N (0 – 105 cm):

105 kg N/ha

Fertiliser at seeding:

14.4 kg N/ha (80 kg/ha DAP applied)

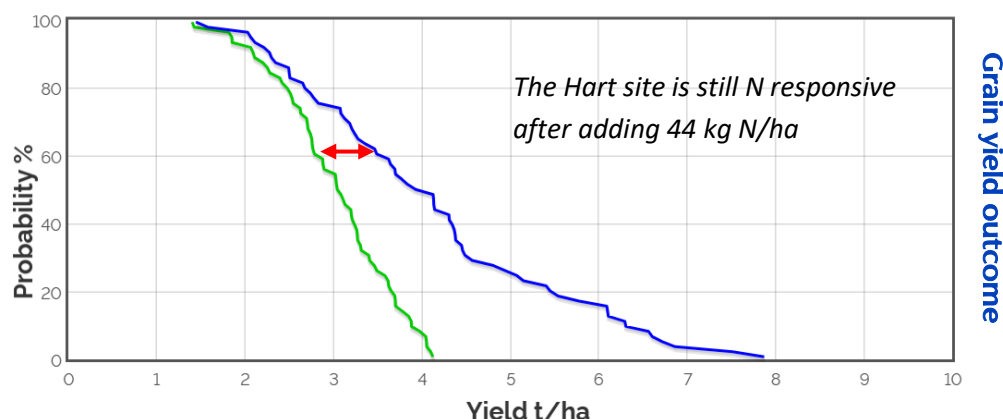


Output 2

As we know that N is required to improve our final yield, we applied 44 kg N/ha as a top dress application and ran Yield Prophet® again. In the graph below you can see that we have started to close the yield gap between nitrogen limited yield (NLY) and water limited yield (WLY).

Total nitrogen:

Soil N = 105 kg N/ha
Seeding = 14.4 kg N/ha
+ 44 kg N/ha top-dressed

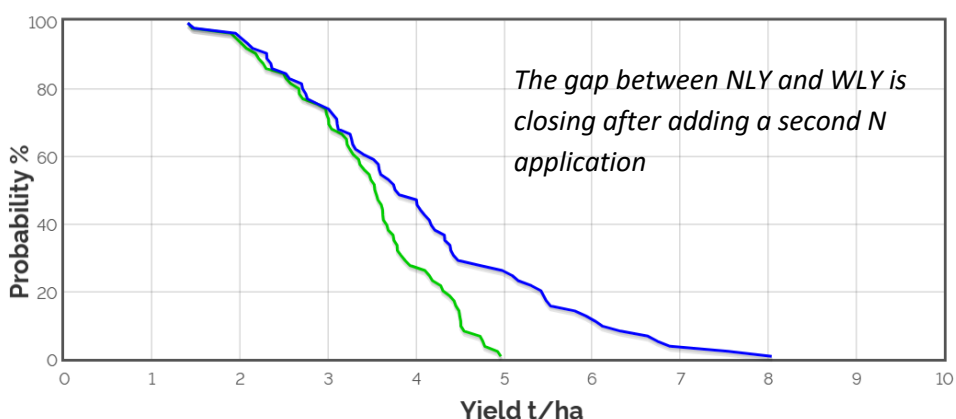


Output 3

There is still a large gap between N limited and water limited yield, so we ran Yield Prophet® a third time with an additional 30 kg N/ha (72 kg N/ha in total). Note that outputs 1, 2 and 3 have the same blue line (water limited yield) showing the wide yield range of 1.5 t/ha to over 7 t/ha depending on how the season finishes. Adding extra nitrogen has moved the green line (N limited yield) closer to the water limited yield, but there is still a gap.

Total nitrogen:

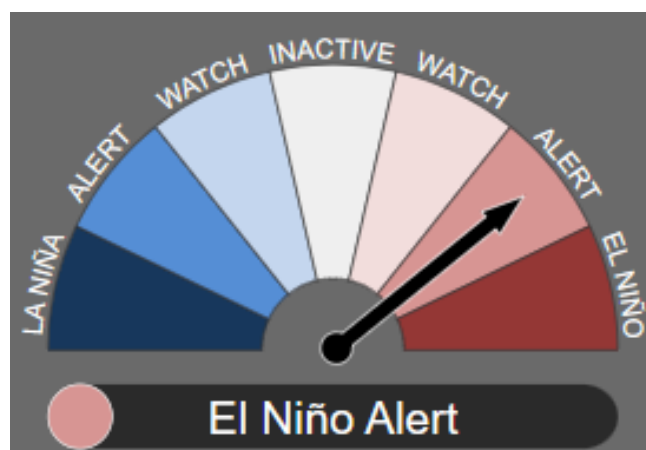
Soil N = 105 kg N/ha
Seeding = 14.4 kg N/ha
+ 74 N/ha top-dressed



WHAT'S NEXT: Consider the climate outlook

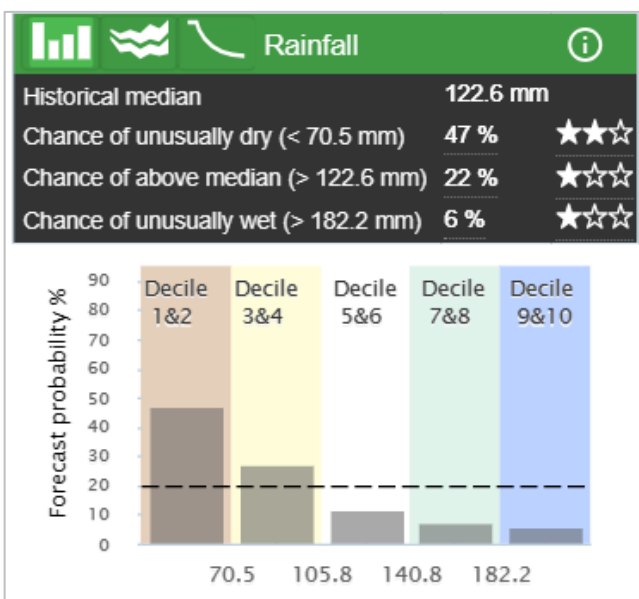
ENSO Outlook – The alert system for El Niño–Southern Oscillation

The Bureau have indicated an alert for El Niño developing this season. **What does this mean?** There is a 70% chance that El Niño will develop, based on past alert criteria, signalling a higher chance of warm and dry conditions this spring.



Sourced from Bureau of Meteorology
[ENSO Outlook – an alert system for the El Niño–Southern Oscillation \(bom.gov.au\)](#)

August – October outlook



We can also find short and long-term climate information indicating the likelihood of above average rainfall (across the next 1 week – 3 months). 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 47% chance that August – October rainfall will fall into a Decile 1 or 2 category and a 27% chance of Decile 3-4 at Hart. **Combined, this information tells us that the likelihood of receiving above median (average) rainfall from August - October is low (22%).**

Sourced from Bureau of Meteorology

[Rainfall - The chance of above median for August to October - Climate Outlooks \(bom.gov.au\)](#)

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

Yield Prophet® Output 2

There is not a lot of upside benefit to applying N if Decile 2 occurs from now on. From Decile 3 and above, there is the potential still 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 WLY and NLY at Decile 5 is around 0.9 t/ha. Based on the rule of thumb of 40 kg/Ha on N required per tonne of wheat produced, this gap could be covered by adding 36 kg of N. There is an upside to applying N while still remaining conservative. We are confident that if we get below Decile 2 rainfall conditions, we'll see a portion of N carry over into 2024. The upside of adding an additional 44 kg N/ha is not worthwhile due to a high chance of a below average rainfall year and alert for El Niño.

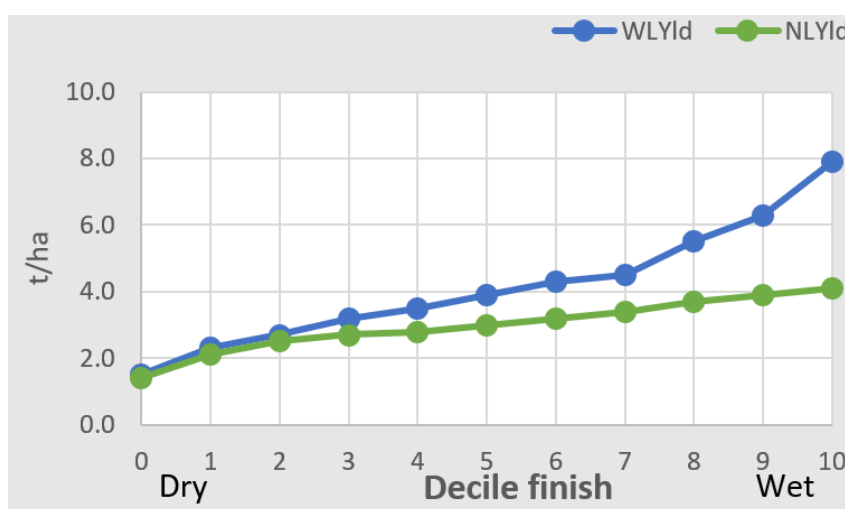


Figure 1 (left). Yield x decile graph for adding an additional 44kg N/ha to Output 2. Graph sourced from Peter Hayman's 'Fast Graphs For Slow Thinking' spreadsheet.

Watch Peter Hayman & Barry Mudge for more information here:

<https://youtu.be/G8nUHXOLR90>

Table 1 (bottom). N required across a range of decile seasons (derived from Yield Prophet output and graphed above).

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
Yield difference (t/ha)	0.1	0.2	0.2	0.5	0.7	0.9	1.1	1.1	1.8	2.4	3.8
N requirement (kg N/ha)	4	8	8	20	28	36	44	44	72	96	152

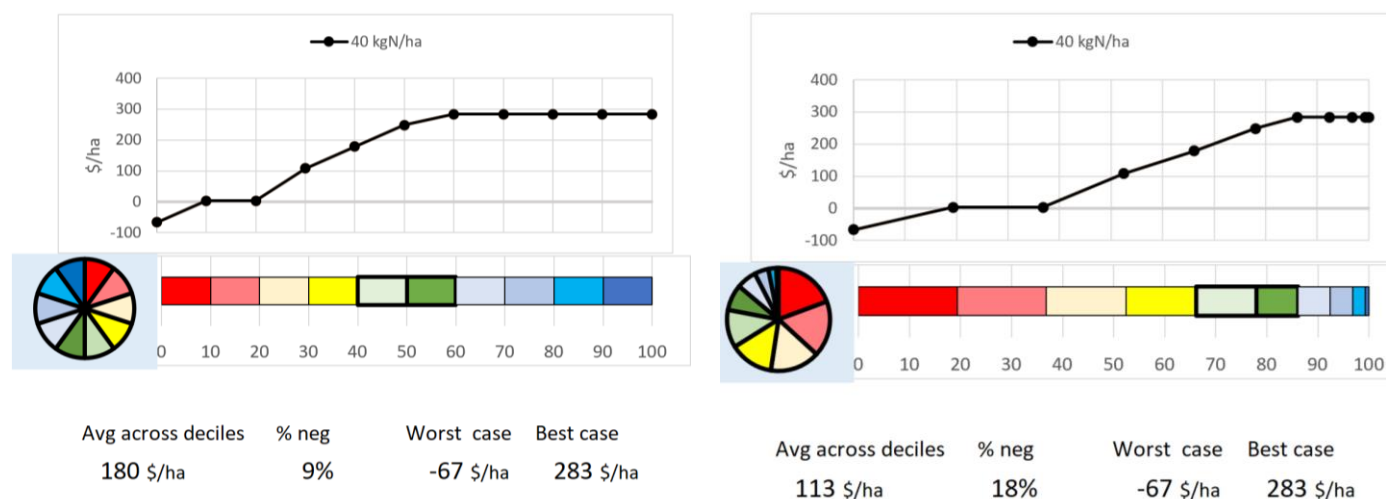


Figure 2 (left). Example of economic appraisal of applying an additional 40 kg N (87 kg/Ha of Urea) based on the yield information for each Decile contained in Figure 1 (wheat price of \$350/tonne, urea at \$650/tonne and application cost of \$10/ha). Any point above the "0" line is a profitable outcome.

Figure 3 (right) is the same economic analysis but based on a 22% chance of exceeding above average rainfall this season. Graphed using the 'Fast Graphs For Slow Thinking' spreadsheet by Peter Hayman.

On the basis of the data shown above, applying additional N to this crop is profitable across virtually all seasons except for Decile 1. A forecast showing an increased likelihood of dryness in spring would have limited influence on the decision to apply N. 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. Also note that the above appraisal does not allow any value on un-used N which may be carried over in the event of a dry spring. This could further reduce the quite small downside risk. A farmer would have to be very **risk averse** to not add N in this situation.

When we include a forecast of only 22% chance of exceeding the median, we increase the chance of the drier deciles and decrease the chance of wetter deciles. The worst case and best case scenarios don't change, but the average across deciles reduces from \$180/ha to \$113/ha and the chance of a negative partial budget is 18%. A **risk neutral** farmer might still add N in this situation.

Yield Prophet® Output 3

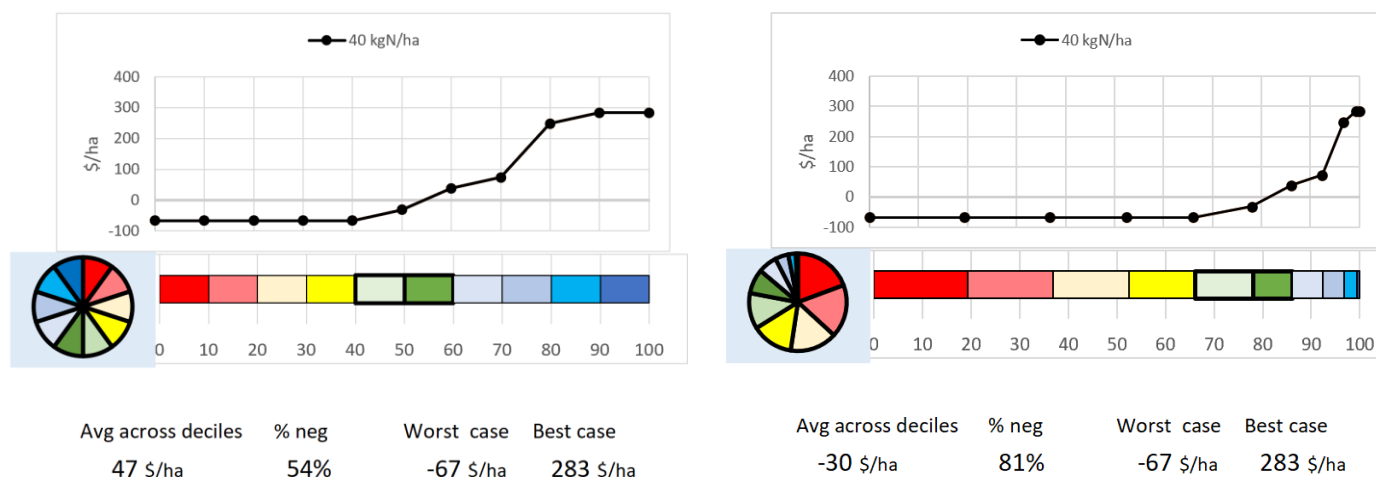


Figure 4 (left). Example of economic appraisal of applying 40 kg N (87 kg/Ha of Urea) based on the yield information for each decile contained in Output 3 (wheat price of \$350/tonne, urea at \$650/tonne and application cost of \$10/ha).

Figure 5 (right). This is the same economic analysis but based on a 22% chance of exceeding above average rainfall this season. Graphed using the 'Fast Graphs For Slow Thinking' spreadsheet by Peter Hayman.

When averaged across all deciles, the partial budget is \$47/ha (Figure 1) and there is a 54% chance of a negative partial budget. The shape of the upside and downside economic analysis reflects the response to N from Decile 5 onwards. A risk neutral farmer might still add N in this situation because the **upside** happens half the time.

In Figure 5, the forecast of 22% chance of below average rainfall reduces the average grow margin outcome from \$47/ha to -\$30/ha. Although there is still an upside, there is only profit 20% of the time and this upside wedge doesn't compensate the **downside**. Only a risk seeking farmer who wants to gamble would add 40 kg N under these assumptions.

Summary of N application at Hart

By taking into account Yield Prophet® Output 2, an economic analysis and the Bureau forecast for Hart with a 22% chance of above average rainfall for August - October, we have remained conservative (or risk adverse...) with our N decision strategy in 2023.

Nitrogen application 1

'A no brainer', 44kg N/ha (95 kg urea/ha) was applied to a very response site across all decile ranges.

Nitrogen application 2

A follow up application of 30 kg N/ha (60 kg urea/ha) was applied. This decision was based on an increased chance of drier deciles this season (78%) and increased likelihood of a negative partial gross margin with increased N inputs. We are comfortable that we will meet our yield potential up until Decile 4 seasonal conditions. No further N applications were made.

In total, we applied 74 kg N/ha (160 kg urea/ha) to our wheat variety trial at Hart which, based on \$1.40/kg equals \$225/ha in urea inputs. We'll share our reflections on this decision as we progress throughout the growing season.

For more information on the 'Fast Graphs For Slow Thinking' spreadsheet, watch Peter Hayman and Barry Mudge here: <https://youtu.be/G8nUHXOLR90> or contact our R&E Manager, Bek.

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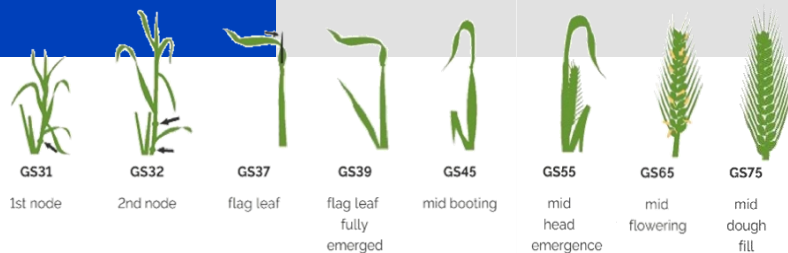
Location: SPALDING

HART BEAT

Date of report: July 20, 2023

Soil type: Red brown earth

Average annual rainfall: 430 mm



Simulation assumptions

Crop growth

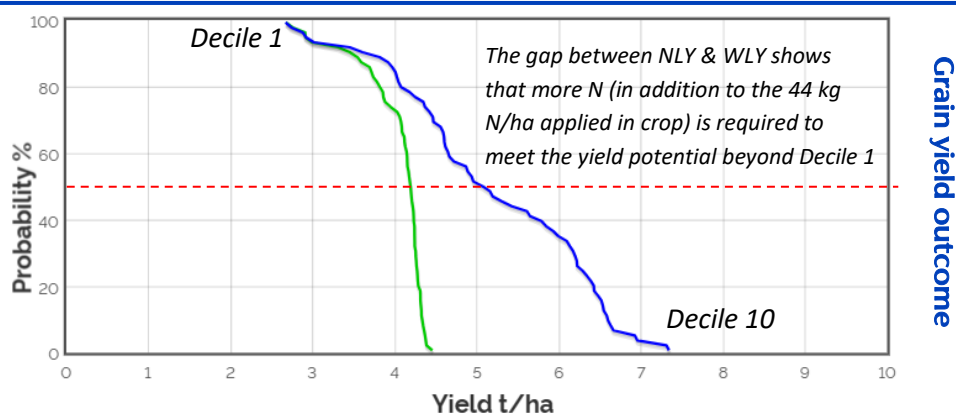
Variety: Scepter wheat
Sowing date: May 1, 2023
Estimated starting N: 115 kg N/ha
Nitrogen fertiliser: 14.4 kg N @ seeding
+ 44 kg N/ha

The season so far

GSR to date: 167 mm
Estimated GSR decile to date: 6
Current predicted PAW: 69 mm (48% full)
PAWC: 143 mm

Yield Prophet® prediction

Based on 115 kg N/ha
starting soil N
+ 44 kg N/ha applied in crop



The **green** line in the graph above shows the predicted grain yield at Kybunga for Nitrogen Limited Yield (NLY). The **blue** line represents the grain yield potential for Water Limited Yield (WLY). 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, however starting soil available nitrogen and water was estimated. The red dotted line represents Decile 5 (or 50% probability of receiving 4.2 t/ha nitrogen limited yield or 5.1 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
WLY (t/ha)	2.7	3.6	4.1	4.5	4.7	5.1	5.7	6.2	6.4	6.6	7.3
NLY (t/ha)	2.7	3.5	3.8	4.1	4.1	4.2	4.2	4.3	4.3	4.3	4.5
Yield difference (t/ha)	0	0.1	0.3	0.4	0.6	0.9	1.5	1.9	2.1	2.3	2.8
Additional N requirement (kg N/ha)	0	4	12	16	24	36	60	76	84	92	112

Location: CONDOWIE

HART BEAT

Date of report: July 20, 2023

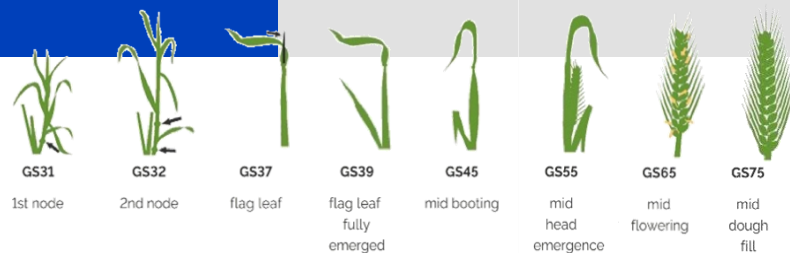
Soil type: Sandy loam

Average annual rainfall: 350 mm

Simulation assumptions

Crop growth

Variety: Scepter wheat
Sowing date: May 1, 2023
Estimated starting N: 122 kg N/ha
Nitrogen fertiliser: 14.4 kg N/ha @ seeding
+ 30 kg N/ha

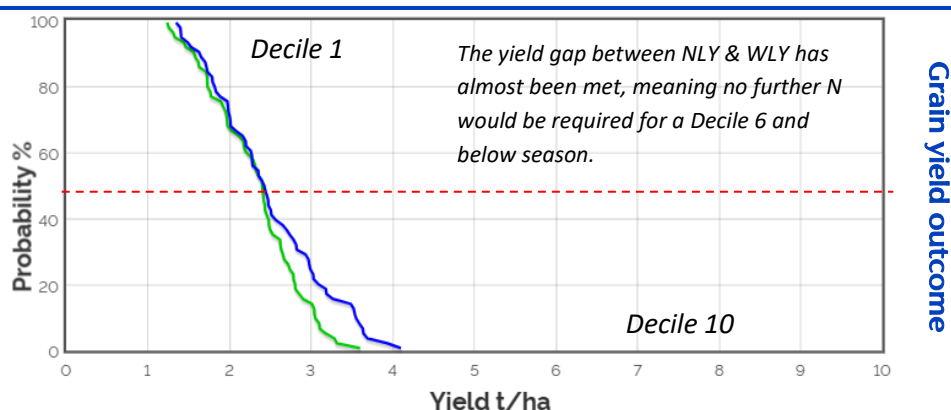


The season so far

GSR to date: 140 mm
Estimated GSR decile to date: 7
Current predicted PAW: 23 mm (20% full)
PAWC: 115 mm

Yield Prophet® prediction

Based on 122 kg N/ha
starting soil 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 (NLY). The **blue** line represents the grain yield potential for Water Limited Yield (WLY). 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, however starting soil available nitrogen and water was estimated. The red dotted line represents Decile 5 (or 50% probability of receiving 2.4 t/ha wheat grain 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
WLY (t/ha)	1.4	1.6	1.8	2	2.3	2.4	2.5	2.9	3.1	3.6	4.1
NLY (t/ha)	1.2	1.6	1.7	2	2.2	2.4	2.5	2.6	2.8	3.1	3.6
Yield difference (t/ha)	0.2	0	0.1	0	0.1	0	0	0.3	0.3	0.5	0.5
Additional N requirement (kg N/ha)	8	0	4	0	4	0	0	12	12	20	20

Location: KYBUNGA

HART BEAT

Date of report: July 19, 2023

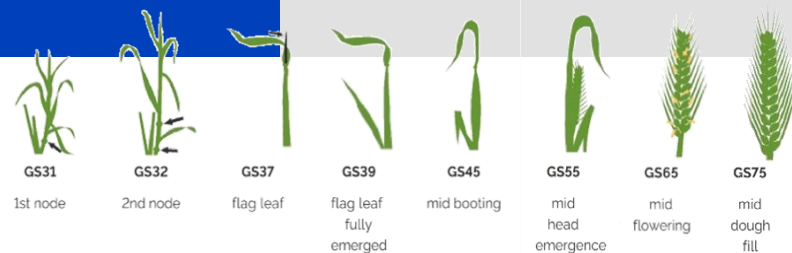
Soil type: Clay loam

Average annual rainfall: 428 mm

Simulation assumptions

Crop growth

Variety: Scepter wheat
Sowing date: May 1, 2023
Estimated starting N: 112 kg N/ha
Nitrogen fertiliser: 14.4 kg N/ha @ seeding
+44 kg N/ha

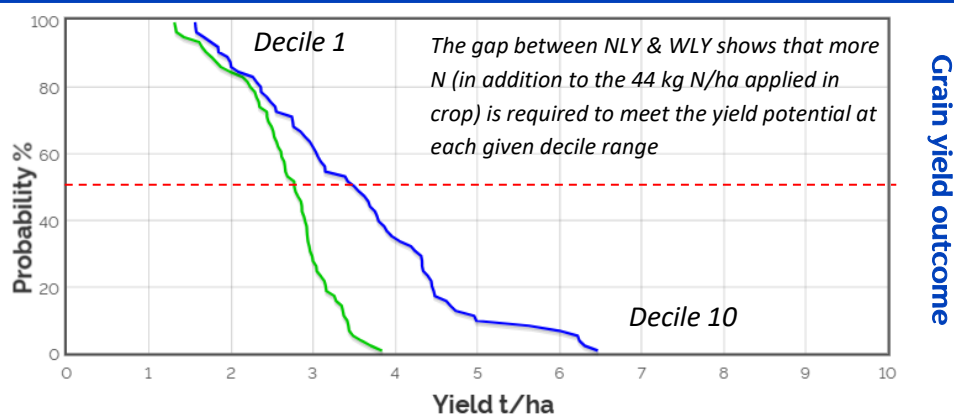


The season so far

GSR to date: 149 mm
Estimated GSR decile to date: 6
Current predicted PAW: 24 mm (9% full)
PAWC: 262 mm

Yield Prophet® prediction

Based on 112 kg N/ha
starting soil N
+ 44 kg N/ha applied in crop



The **green** line in the graph above shows the predicted grain yield at Kybunga for Nitrogen Limited Yield (NLY). The **blue** line represents the grain yield potential for Water Limited Yield (WLY). 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, however starting soil available nitrogen and water was estimated. The red dotted line represents Decile 5 (or 50% probability of receiving 2.8 t/ha nitrogen limited yield or 3.5 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
WLY (t/ha)	1.6	1.9	2.4	2.7	3	3.5	3.8	4.3	4.4	5	6.5
NLY (t/ha)	1.3	1.7	2.2	2.4	2.6	2.8	2.9	3	3.2	3.4	3.8
Yield difference (t/ha)	0.3	0.2	0.2	0.3	0.4	0.7	0.9	1.3	1.2	1.6	2.7
Additional N requirement (kg N/ha)	12	8	8	12	16	28	36	52	48	64	108

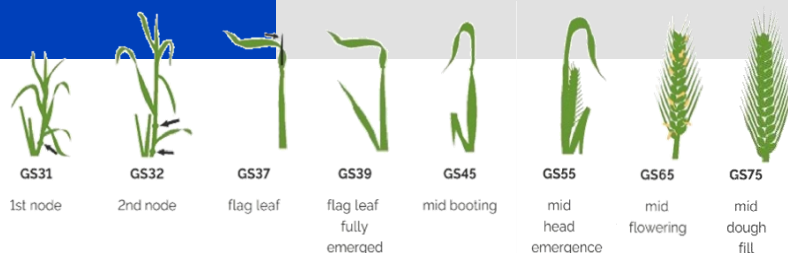
Location: FARRELL FLAT

HART BEAT

Date of report: July 20, 2023

Soil type: Light clay loam

Average annual rainfall: 474 mm



Simulation assumptions

Crop growth

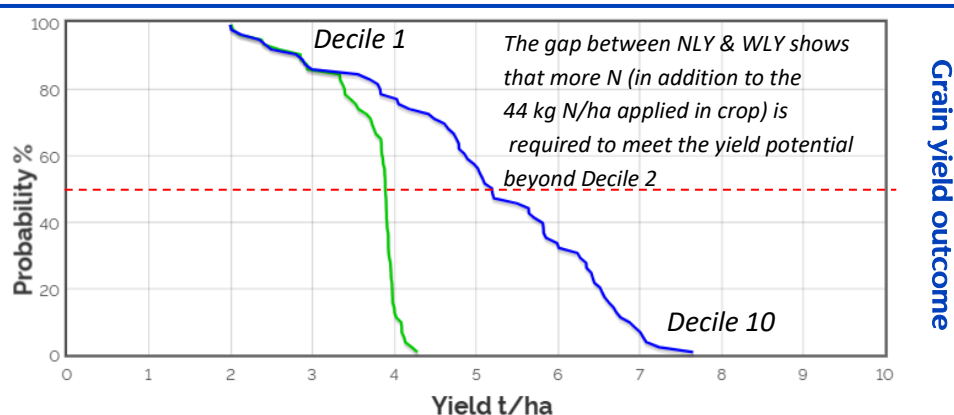
Variety: Scepter wheat
Sowing date: May 1, 2023
Estimated starting N: 119 kg N/ha
Nitrogen fertiliser: 14.4 kg N/ha @ seeding
+ 44 kg N/ha

The season so far

GSR to date: 181 mm
Estimated GSR decile to date: 6
Current predicted PAW: 51 mm (30% full)
PAWC: 172 mm

Yield Prophet® prediction

Based on 119 kg N/ha
starting soil N
+ 44 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 (NLY). The **blue** line represents the grain yield potential for Water Limited Yield (WLY). 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 APSol for Farrell Flat has been used, however starting soil available nitrogen and water was estimated. The red dotted line represents Decile 5 (or 50% probability of receiving 3.9 t/ha nitrogen limited yield or 5.2 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
WLY (t/ha)	2	2.9	3.8	4.6	4.9	5.2	5.8	6.2	6.5	6.9	7.7
NLY (t/ha)	2	2.8	3.4	3.7	3.9	3.9	3.9	3.9	4	4.1	4.3
Yield difference (t/ha)	0	0.1	0.4	0.9	1	1.3	1.9	2.3	2.5	2.8	3.4
Additional N requirement (kg N/ha)	0	4	16	36	40	52	76	92	100	112	136

Location: PINERY

HART BEAT

Date of report: July 20, 2023

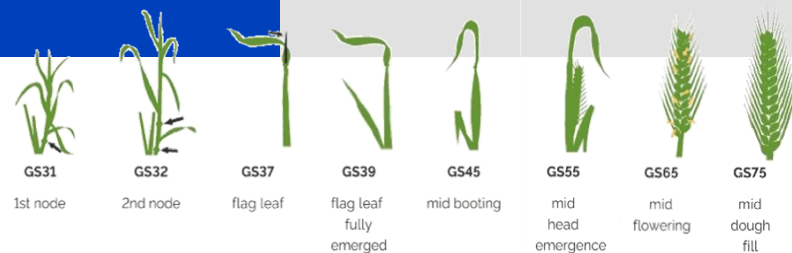
Soil type: Silty clay loam

Average annual rainfall: 374 mm

Simulation assumptions

Crop growth

Variety: Scepter wheat
Sowing date: May 1, 2023
Estimated starting N: 116 kg N/ha
Nitrogen fertiliser: 14.4 kg N/ha @ seeding
+ 44 kg N/ha

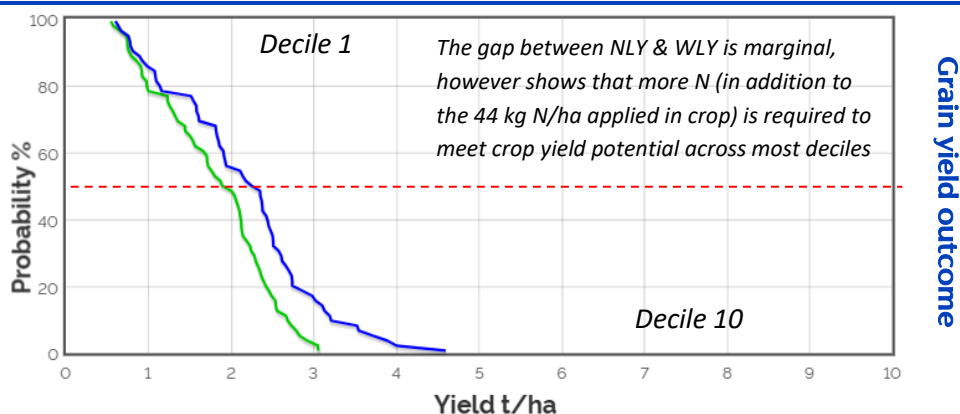


The season so far

GSR to date: 125 mm
Estimated GSR decile to date: 5
Current predicted PAW: 9 mm (11% full)
PAWC: 79 mm

Yield Prophet® prediction

Based on 116 kg N/ha
starting soil N
+ 44 kg N/ha applied in crop



The **green** line in the graph above shows the predicted grain yield at Pinery for Nitrogen Limited Yield (NLY). The **blue** line represents the grain yield potential for Water Limited Yield (WLY). 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 APSol for Pinery has been used, however starting soil available nitrogen and water was estimated. The red dotted line represents Decile 5 (or 50% probability of receiving 1.9 t/ha nitrogen limited yield or 2.2 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
WLY (t/ha)	0.6	0.8	1.1	1.6	1.9	2.2	2.4	2.6	2.8	3.2	4.5
NLY (t/ha)	0.5	0.8	1	1.3	1.7	1.9	2.1	2.3	2.4	2.7	3.1
Yield difference (t/ha)	0.1	0	0.1	0.3	0.2	0.3	0.3	0.3	0.4	0.5	1.4
Additional N requirement (kg N/ha)	4	0	4	12	8	12	12	12	16	20	56

Location: EUDUNDA

HART BEAT

Date of report: July 20, 2023

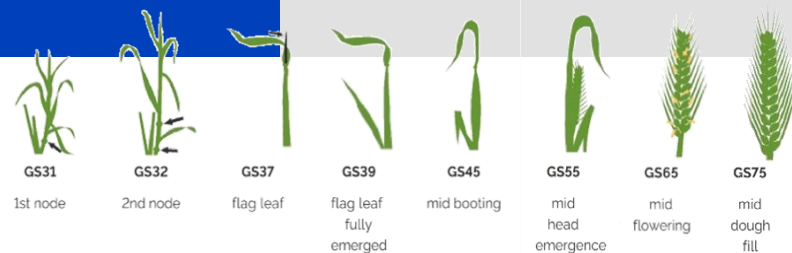
Soil type: Gravelly loam

Average annual rainfall: 445 mm

Simulation assumptions

Crop growth

Variety: Scepter wheat
Sowing date: May 1, 2023
Estimated starting N: 72 kg N/ha
Nitrogen fertiliser: 14.4 kg N/ha @ seeding
+ 44 kg N/ha

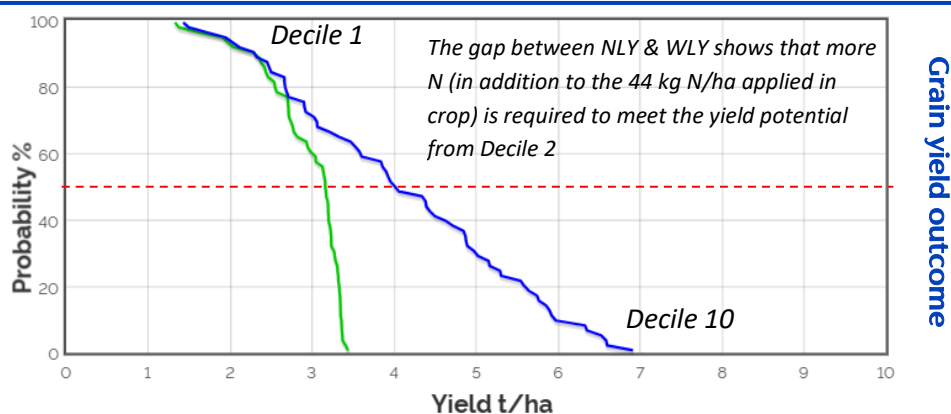


The season so far

GSR to date: 146 mm
Estimated GSR decile to date: 5
Current predicted PAW: 29 mm (30% full)
PAWC: 96 mm

Yield Prophet® prediction

Based on 72 kg N/ha starting
soil N
+ 44 kg N/ha applied in crop



The **green** line in the graph above shows the predicted grain yield at Eudunda for Nitrogen Limited Yield (NLY). The **blue** line represents the grain yield potential for Water Limited Yield (WLY). 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, however starting soil available nitrogen and water was estimated. The red dotted line represents Decile 5 (or 50% probability of receiving 3.2 t/ha nitrogen limited yield or 4.0 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
WLY (t/ha)	1.4	2.3	2.7	3	3.6	4	4.5	5	5.6	6	6.9
NLY (t/ha)	1.3	2.3	2.5	2.7	3	3.2	3.2	3.3	3.3	3.4	3.4
Yield difference (t/ha)	0.1	0	0.2	0.3	0.6	0.8	1.3	1.7	2.3	2.6	3.5
Additional N requirement (kg N/ha)	4	0	8	12	24	32	52	68	92	104	140

Location: TARLEE

HART BEAT

Date of report: July 20, 2023

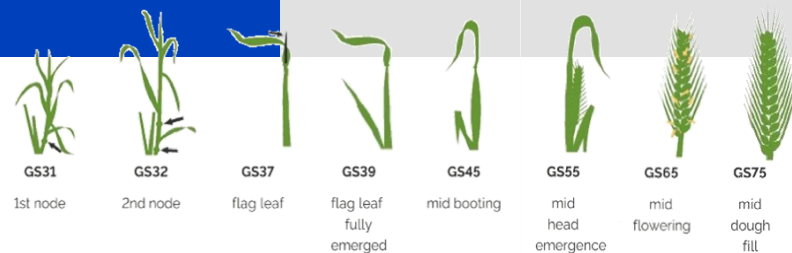
Soil type: Sandy loam

Average annual rainfall: 428 mm

Simulation assumptions

Crop growth

Variety: Scepter wheat
Sowing date: May 1, 2023
Estimated starting N: 102 kg N/ha
Nitrogen fertiliser: 14.4 kg N/ha @ seeding
+ 44 kg N/ha

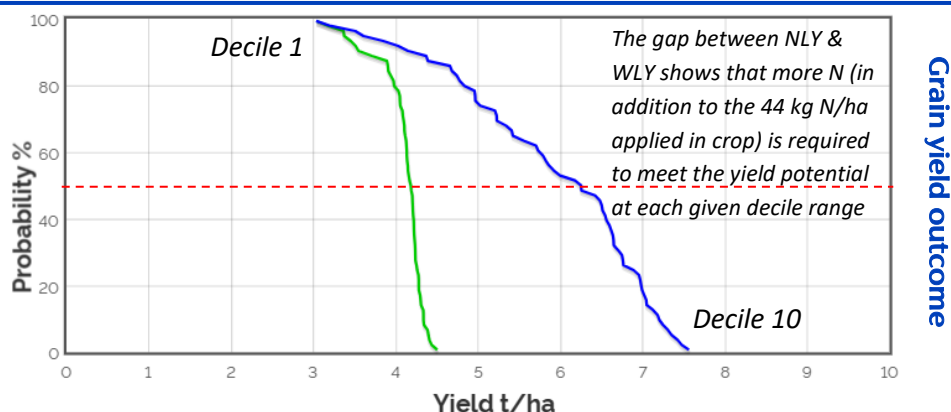


The season so far

GSR to date: 183 mm
Estimated GSR decile to date: 6
Current predicted PAW: 90 mm (79% full)
PAWC: 113 mm

Yield Prophet® prediction

Based on 102 kg N/ha
starting soil N
+ 44 kg N/ha applied in crop



The **green** line in the graph above shows the predicted grain yield at Tarlee for Nitrogen Limited Yield (NLY). The **blue** line represents the grain yield potential for Water Limited Yield (WLY). 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, however starting soil available nitrogen and water was estimated. The red dotted line represents Decile 5 (or 50% probability of receiving 4.2 t/ha nitrogen limited yield or 6.3 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
WLY (t/ha)	3.2	4.2	4.8	5.2	5.7	6.3	6.6	6.7	7	7.2	7.5
NLY (t/ha)	3.2	3.6	4	4.1	4.1	4.2	4.2	4.2	4.3	4.3	4.5
Yield difference (t/ha)	0	0.6	0.8	1.1	1.6	2.1	2.4	2.5	2.7	2.9	3
Additional N requirement (kg N/ha)	0	24	32	44	64	84	96	100	108	116	120