HART

BEAT

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

Hart | Spalding | Condowie
Kybunga | Farrell Flat | Pinery
Eudunda | Tarlee

Plus a special feature:
yield predictions for barley, canola, oats (grain & hay) at all 8 sites

HART
SA's premier cropping field site

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ISSUE 57
August 24, 2021

HART BEAT definitions

All sites have 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.

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.

The **French & Schultz** formula estimates the rainfall limited grain yield based on the growing season rainfall (GSR). It assumes evaporation of 110mm, includes stored water at sowing (30% of Jan to Mar rainfall) and a maximum grain yield potential of 20 kg/mm/ha.

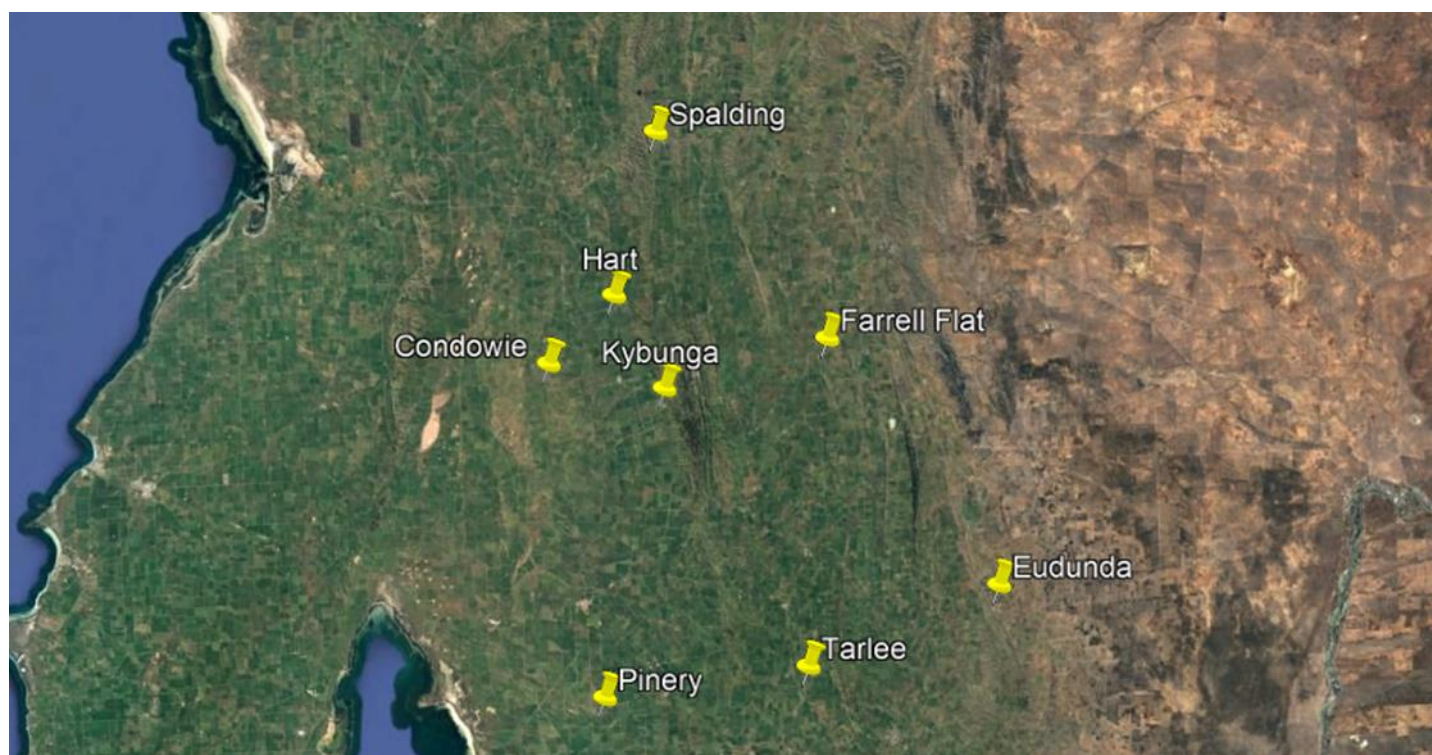Yield Potential = GSR (Apr-Oct) – Evaporation (110mm) * 20 kg/mm/ha.

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). For more information about APSIM or *Yield Prophet®* please visit or www.yieldprophet.com.au.

Rainfall and soil water characteristics for all sites

Site	Average annual rainfall (mm)	Soil type	PAWC (mm)	Soil sampling date	Profile depth (cm)	Pre-sowing nitrogen (kg/ha)
Hart	400	Sandy clay loam	206	April 7, 2021	150	61
Spalding	430	Red brown earth	143	April 9, 2021	150	64
Condowie	350	Sandy loam	115	April 7, 2021	150	65
Kybunga	428	Clay loam	262	April 7, 2021	120	69
Farrell Flat	474	Light clay loam	172	April 9, 2021	120	67
Pinery	374	Silty clay loam	79	April 9, 2021	150	60
Eudunda	445	Gravelly loam	96	April 9, 2021	100	63
Tarlee	474	Sandy loam	113	April 9, 2021	150	60

2021 site locations

GS11	GS12	GS13	GS14	GS15	GS16	GS30	GS31	GS32	GS37	GS39	GS45	GS55	GS65	GS75
emergence	2nd leaf	3rd leaf 1st tiller	4th leaf early tillering	5th leaf mid tillering	6th leaf late tillering	end of tillering	1st node	2nd node	flag leaf	flag leaf fully emerged	mid booting	mid head emergence	mid flowering	mid dough fill
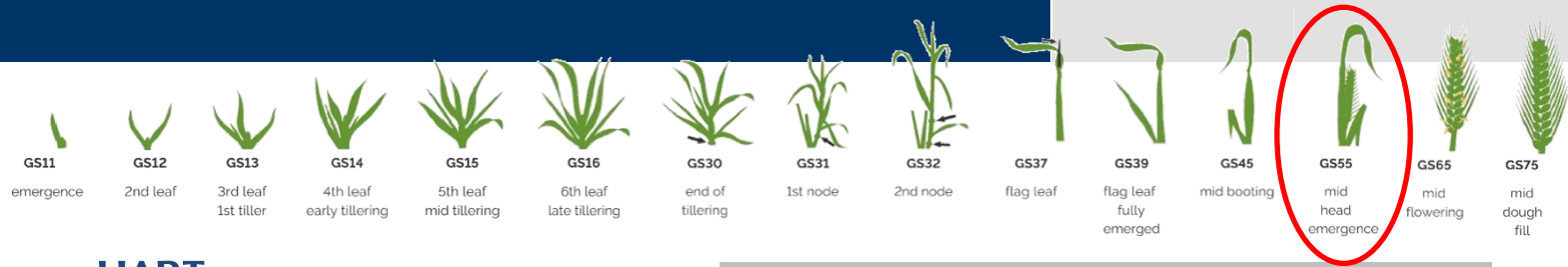
HART

Soil type:	Sandy clay loam

Crop growth

Variety:	Scepter wheat
Sowing date:	May 1, 2021
Emergence:	May 19, 2021
Nitrogen fertiliser:	30 kg N/ha @ seeding
	+ 40 kg N/ha July 21

Date of report: August 24, 2021

The season so far

Annual rainfall to date:	226 mm
GSR to date:	189 mm
Current GSR decile:	5
Current predicted PAW:	47 mm (23% full)
PAWC:	206 mm

Yield Prophet® predictions
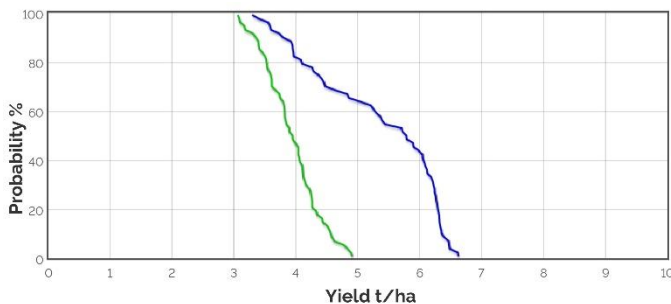
(*based on a 50% probability*)
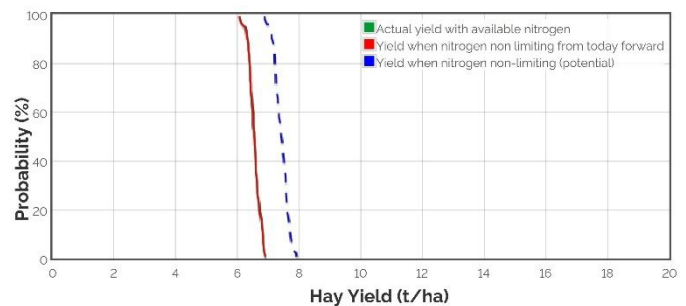
Wheat sown May 1:   **4.9 t/ha**

also see graphs below

Wheat sown May 20: **4.5 t/ha**

Grain yield outcome graph

Hay yield outcome graph

These graphs show the chance of reaching the corresponding yield given weather, soil conditions, agronomic inputs to date and historical climate data (100yrs) to simulate remainder of the season.

Yield probability curves (left graph) - display two different nitrogen scenarios. The green line displays the actual grain yield with the current soil available nitrogen. The blue line represents the grain yield potential with unlimited nitrogen (yield potential). A small difference between these two lines indicates the current soil N level is adequate for the crop to reach its yield potential. Conversely, a large difference between these two lines indicates additional N fertiliser is required for the crop to reach its yield potential.

French & Schultz predictions

This model assumes that there is 11 mm stored moisture, 110 mm of evaporation and Decile 5 rainfall (78 mm) for the remainder of the growing season.
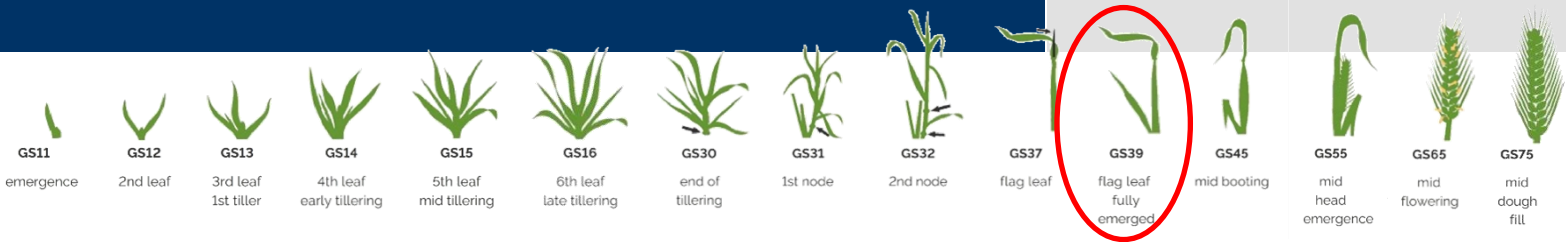
100% WUE	**3.4 t/ha**
80% WUE	**2.7 t/ha**

GS11	GS12	GS13	GS14	GS15	GS16	GS30	GS31	GS32	GS37	GS39	GS45	GS55	GS65	GS75
emergence	2nd leaf	3rd leaf 1st tiller	4th leaf early tillering	5th leaf mid tillering	6th leaf late tillering	end of tillering	1st node	2nd node	flag leaf	flag leaf fully emerged	mid booting	mid head emergence	mid flowering	mid dough fill

SPALDING

Soil type: Red brown earth

Date of report:	August 24, 2021

Crop growth

Variety:	Scepter wheat
Sowing date:	May 1, 2021
Emergence:	June 5, 2021
Nitrogen fertiliser:	40 kg N/ha @ seeding
	+ 40 kg N/ha July 21

The season so far

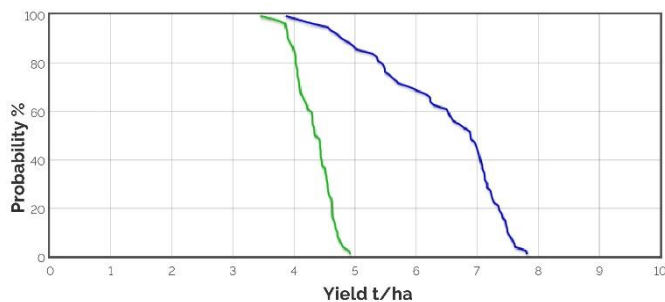| Annual rainfall to date:	288 mm
GSR to date:	258 mm
Current GSR decile:	8
Current predicted PAW:	100 mm (70% full)
PAWC:	143 mm

Yield Prophet® predictions

(*based on a 50% probability*)
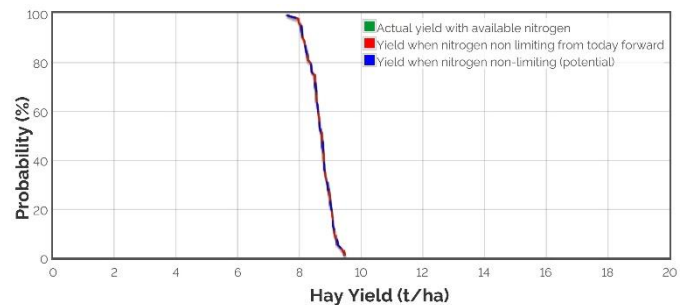
Wheat sown May 1: **5.6 t/ha**
also see graphs below
Wheat sown May 20: **5.6 t/ha**

Grain yield outcome graph

Hay yield outcome graph

These graphs show the chance of reaching the corresponding yield given weather, soil conditions and agronomic inputs to date, and historical climate data (100yrs) to simulate remainder of the season.

Yield probability curves (left graph) - display two different nitrogen scenarios. The green line displays the actual grain yield with the current soil available nitrogen. The blue line represents the grain yield potential with unlimited nitrogen (yield potential). A small difference between these two lines indicates the current soil N level is adequate for the crop to reach its yield potential. Conversely, a large difference between these two lines indicates additional N fertiliser is required for the crop to reach its yield potential.

French & Schultz predictions

This model assumes that there is 9 mm stored moisture, 110 mm of evaporation and Decile 5 rainfall (86 mm) for the remainder of the growing season.
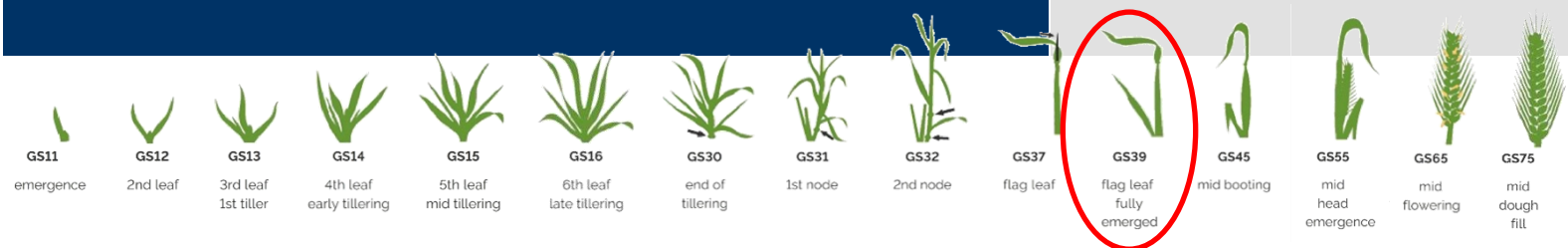
100% WUE	**4.9 t/ha**
80% WUE	**3.9 t/ha**

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GS11	GS12	GS13	GS14	GS15	GS16	GS30	GS31	GS32	GS37	GS39	GS45	GS55	GS65	GS75
emergence	2nd leaf	3rd leaf 1st tiller	4th leaf early tillering	5th leaf mid tillering	6th leaf late tillering	end of tillering	1st node	2nd node	flag leaf	flag leaf fully emerged	mid booting	mid head emergence	mid flowering	mid dough fill

CONDOWIE

Soil type: Sandy loam

Date of report: August 24, 2021

Crop growth

Variety:	Scepter wheat
Sowing date:	May 1, 2021
Emergence:	June 4, 2021
Nitrogen fertiliser:	30 kg N/ha @ seeding
	+ 40 kg N/ha July 21

The season so far

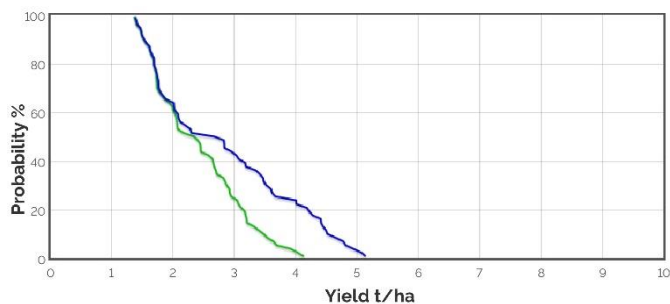|	
Annual rainfall to date:	189 mm
GSR to date:	163 mm
Current GSR decile:	6
Current predicted PAW:	16 mm (14% full)
PAWC:	115 mm

Yield Prophet® predictions

(*based on a 50% probability*)

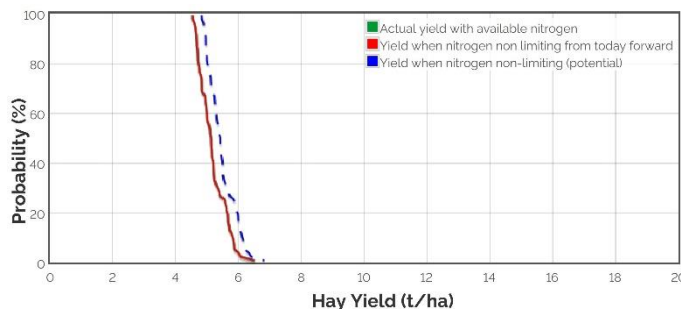Wheat sown May 1: **2.5 t/ha**

also see graphs below

Wheat sown May 20: **2.5 t/ha**

Grain yield outcome graph

Hay yield outcome graph

These graphs show the chance of reaching the corresponding yield given weather, soil conditions and agronomic inputs to date, and historical climate data (100yrs) to simulate remainder of the season.

Yield probability curves (left graph) - display two different nitrogen scenarios. The green line displays the actual grain yield with the current soil available nitrogen. The blue line represents the grain yield potential with unlimited nitrogen (yield potential). A small difference between these two lines indicates the current soil N level is adequate for the crop to reach its yield potential. Conversely, a large difference between these two lines indicates additional N fertiliser is required for the crop to reach its yield potential.

French & Schultz predictions

This model assumes that there is 8 mm stored moisture, 110 mm of evaporation and Decile 5 rainfall (66 mm) for the remainder of the growing season.
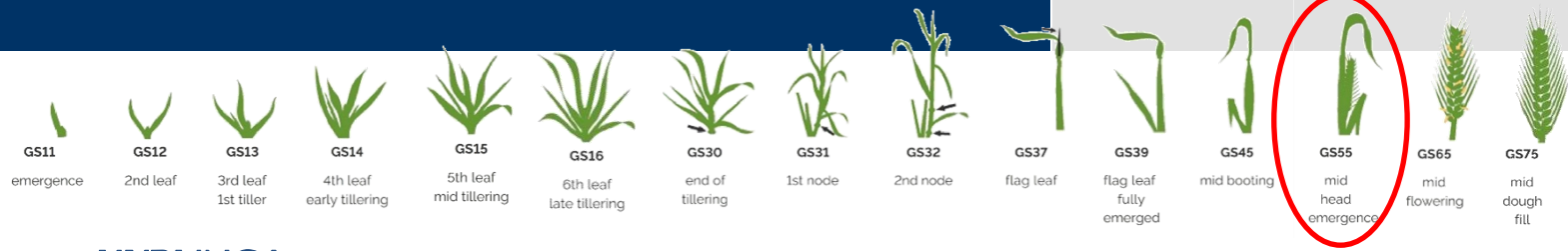
100% WUE **2.5 t/ha**

80% WUE **2.0 t/ha**

GS11 emergence | GS12 2nd leaf | GS13 3rd leaf 1st tiller | GS14 4th leaf early tillering | GS15 5th leaf mid tillering | GS16 6th leaf late tillering | GS30 end of tillering | GS31 1st node | GS32 2nd node | GS37 flag leaf | GS39 flag leaf fully emerged | GS45 mid booting | GS55 mid head emergence | GS65 mid flowering | GS75 mid dough fill

KYBUNGA

Soil type:	Clay loam

Date of report:	August 24, 2021

Crop growth

Variety:	Scepter wheat
Sowing date:	May 1, 2021
Emergence:	May 11, 2021
Nitrogen fertiliser:	30 kg N/ha @ seeding
	+ 40 kg N/ha July 21

The season so far

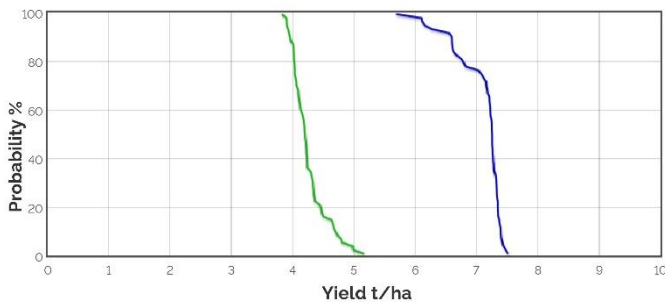|	
Annual rainfall to date:	277 mm
GSR to date:	243 mm
Current GSR decile:	6
Current predicted PAW:	88 mm (34% full)
PAWC:	262 mm

Yield Prophet® predictions

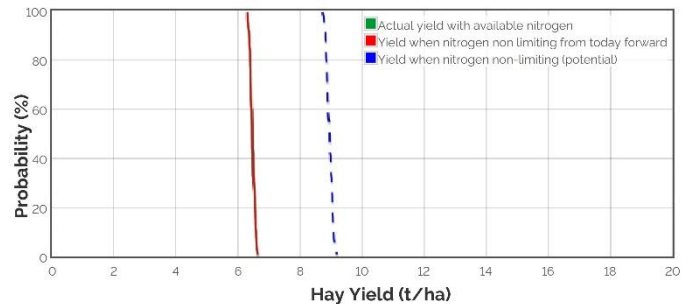(*based on a 50% probability*)

Wheat sown May 1:   **5.8 t/ha**

also see graphs below

Wheat sown May 20: **5.5 t/ha**

Grain yield outcome graph

Hay yield outcome graph

These graphs show the chance of reaching the corresponding yield given weather, soil conditions and agronomic inputs to date, and historical climate data (100yrs) to simulate remainder of the season.

Yield probability curves (left graph) - display two different nitrogen scenarios. The green line displays the actual grain yield with the current soil available nitrogen. The blue line represents the grain yield potential with unlimited nitrogen (yield potential). A small difference between these two lines indicates the current soil N level is adequate for the crop to reach its yield potential. Conversely, a large difference between these two lines indicates additional N fertiliser is required for the crop to reach its yield potential.
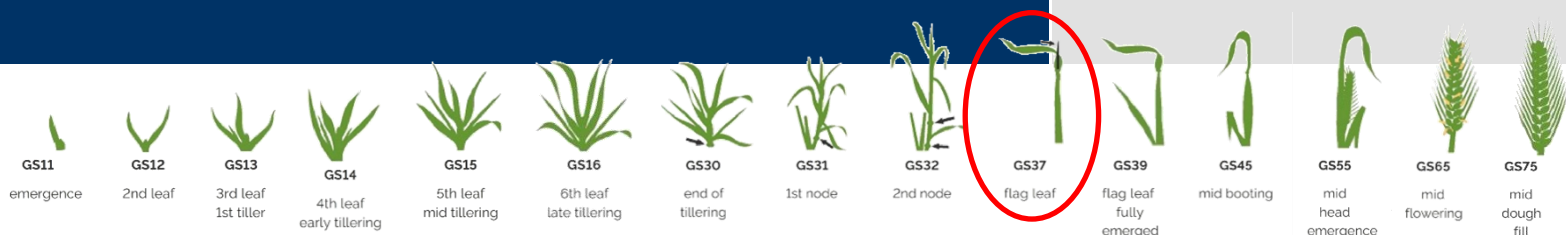
French & Schultz predictions

This model assumes that there is 10 mm stored moisture, 110 mm of evaporation and Decile 5 rainfall (109 mm) for the remainder of the growing season.

100% WUE	**5.1 t/ha**
80% WUE	**4.0 t/ha**

GS11	GS12	GS13	GS14	GS15	GS16	GS30	GS31	GS32	GS37	GS39	GS45	GS55	GS65	GS75
emergence	2nd leaf	3rd leaf 1st tiller	4th leaf early tillering	5th leaf mid tillering	6th leaf late tillering	end of tillering	1st node	2nd node	flag leaf	flag leaf fully emerged	mid booting	mid head emergence	mid flowering	mid dough fill

FARRELL FLAT

Soil type: Light clay loam

Crop growth

Variety:	Scepter wheat
Sowing date:	May 1, 2021
Emergence:	June 6, 2021
Nitrogen fertiliser:	30 kg N/ha @ seeding
	+ 40 kg N/ha July 21

Date of report: August 24, 2021

The season so far

Annual rainfall to date:	293 mm
GSR to date:	267 mm
Current GSR decile:	7
Current predicted PAW:	130 mm (76% full)
PAWC:	172 mm

Yield Prophet® predictions
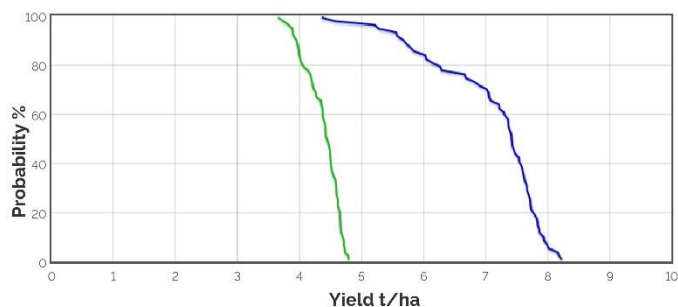
(*based on a 50% probability*)
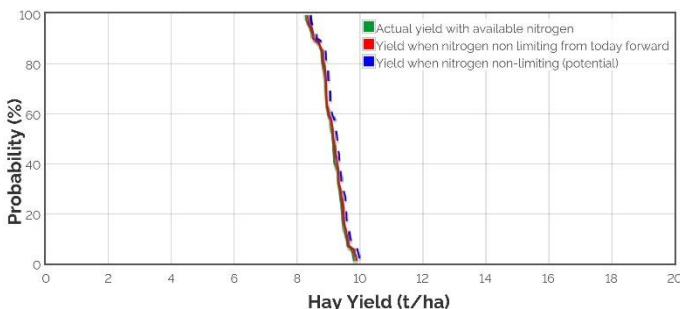
Wheat sown May 1: **5.9 t/ha**

also see graphs below

Wheat sown May 20: **5.9 t/ha**

Grain yield outcome graph

Hay yield outcome graph

These graphs show the chance of reaching the corresponding yield given weather, soil conditions and agronomic inputs to date, and historical climate data (100yrs) to simulate remainder of the season.

Yield probability curves (left graph) - display two different nitrogen scenarios. The green line displays the actual grain yield with the current soil available nitrogen. The blue line represents the grain yield potential with unlimited nitrogen (yield potential). A small difference between these two lines indicates the current soil N level is adequate for the crop to reach its yield potential. Conversely, a large difference between these two lines indicates additional N fertiliser is required for the crop to reach its yield potential.

French & Schultz predictions

This model assumes that there is 8 mm stored moisture, 110 mm of evaporation and Decile 5 rainfall (103 mm) for the remainder of the growing season.
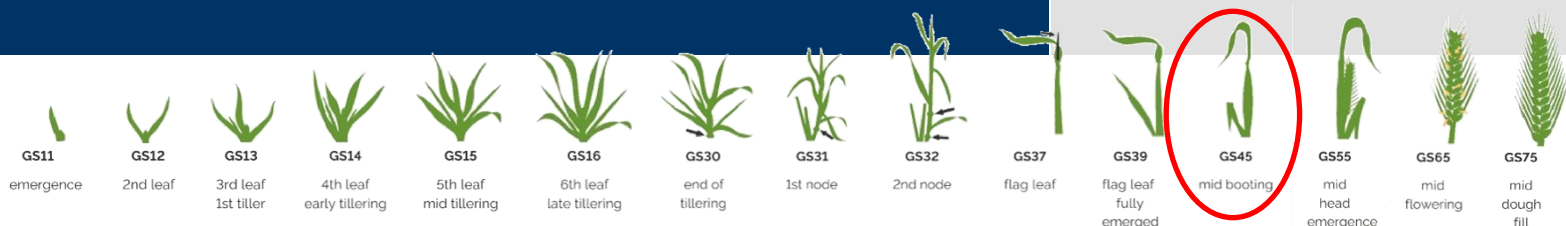
100% WUE **5.4 t/ha**

80% WUE **4.3 t/ha**

GS11	GS12	GS13	GS14	GS15	GS16	GS30	GS31	GS32	GS37	GS39	GS45	GS55	GS65	GS75
emergence	2nd leaf	3rd leaf 1st tiller	4th leaf early tillering	5th leaf mid tillering	6th leaf late tillering	end of tillering	1st node	2nd node	flag leaf	flag leaf fully emerged	mid booting	mid head emergence	mid flowering	mid dough fill

PINERY

Soil type: Silty clay loam

Date of report: August 24, 2021

Crop growth

Variety: Scepter wheat
Sowing date: May 1, 2021
Emergence: June 4, 2021
Nitrogen fertiliser: 40 kg N/ha @ seeding
+ 40 kg N/ha July 21

The season so far

Annual rainfall to date: 230 mm
GSR to date: 195 mm
Current GSR decile: 5
Current predicted PAW: 38 mm (48% full)
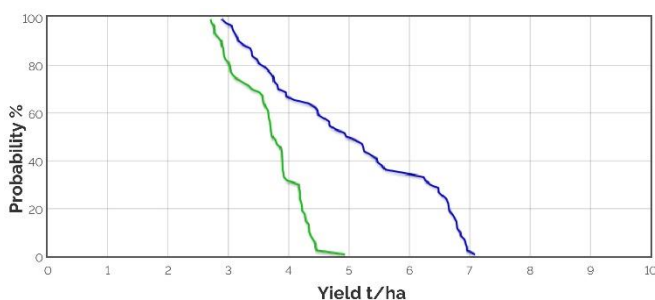PAWC: 79 mm

Yield Prophet® predictions

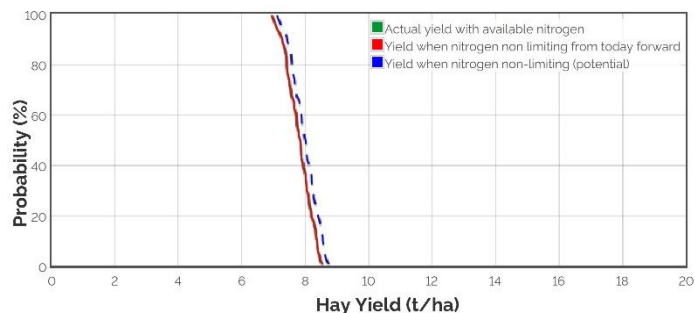(*based on a 50% probability*)

Wheat sown May 1: **4.4 t/ha**
also see graphs below
Wheat sown May 20: **4.4 t/ha**

Grain yield outcome graph

Hay yield outcome graph

These graphs show the chance of reaching the corresponding yield given weather, soil conditions and agronomic inputs to date, and historical climate data (100yrs) to simulate remainder of the season.

Yield probability curves (left graph) - display two different nitrogen scenarios. The green line displays the actual grain yield with the current soil available nitrogen. The blue line represents the grain yield potential with unlimited nitrogen (yield potential). A small difference between these two lines indicates the current soil N level is adequate for the crop to reach its yield potential. Conversely, a large difference between these two lines indicates additional N fertiliser is required for the crop to reach its yield potential.

French & Schultz predictions

This model assumes that there is 11 mm stored moisture, 110 mm of evaporation and Decile 5 rainfall (86 mm) for the remainder of the growing season.
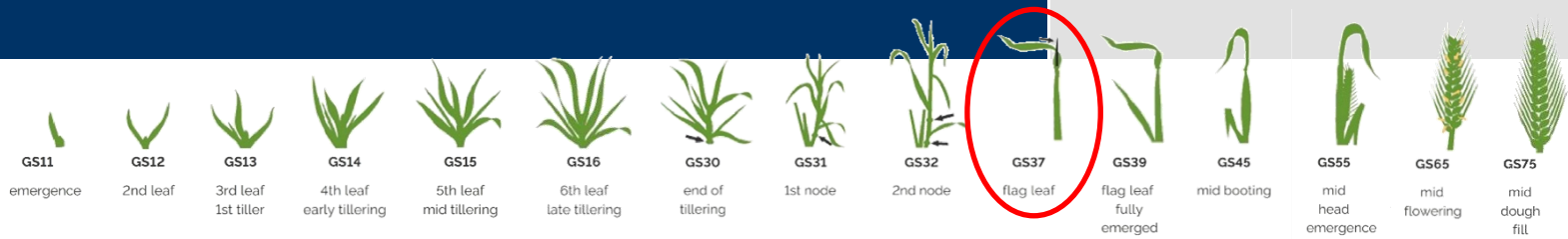
100% WUE   **3.6 t/ha**

80% WUE   **2.9 t/ha**

GS11	GS12	GS13	GS14	GS15	GS16	GS30	GS31	GS32	GS37	GS39	GS45	GS55	GS65	GS75
emergence	2nd leaf	3rd leaf 1st tiller	4th leaf early tillering	5th leaf mid tillering	6th leaf late tillering	end of tillering	1st node	2nd node	flag leaf	flag leaf fully emerged	mid booting	mid head emergence	mid flowering	mid dough fill

EUDUNDA

Soil type: Gravelly loam

Date of report: August 24, 2021

Crop growth

Variety:	Scepter wheat	Annual rainfall to date:	250 mm
Sowing date:	May 1, 2021	GSR to date:	210 mm
Emergence:	June 21, 2021	Current GSR decile:	5
Nitrogen fertiliser:	30 kg N/ha @ seeding	Current predicted PAW:	50mm (52% full)
	+ 40 kg N/ha July 21	PAWC:	96 mm

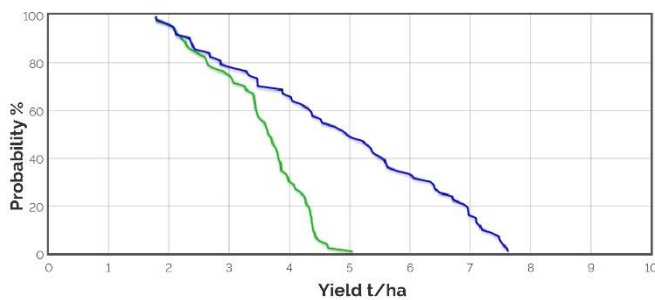**The season so far**

Yield Prophet® predictions

(*based on a 50% probability*)

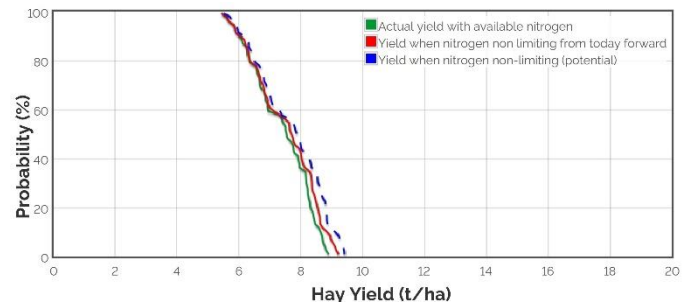Wheat sown May 1:   **4.3 t/ha**

also see graphs below

Wheat sown May 20: **4.3 t/ha**

Grain yield outcome graph

Hay yield outcome graph

These graphs show the chance of reaching the corresponding yield given weather, soil conditions and agronomic inputs to date, and historical climate data (100yrs) to simulate remainder of the season.

Yield probability curves (left graph) - display two different nitrogen scenarios. The green line displays the actual grain yield with the current soil available nitrogen. The blue line represents the grain yield potential with unlimited nitrogen (yield potential). A small difference between these two lines indicates the current soil N level is adequate for the crop to reach its yield potential. Conversely, a large difference between these two lines indicates additional N fertiliser is required for the crop to reach its yield potential.

French & Schultz predictions

This model assumes that there is 12 mm stored moisture, 110 mm of evaporation and Decile 5 rainfall (100 mm) for the remainder of the growing season.
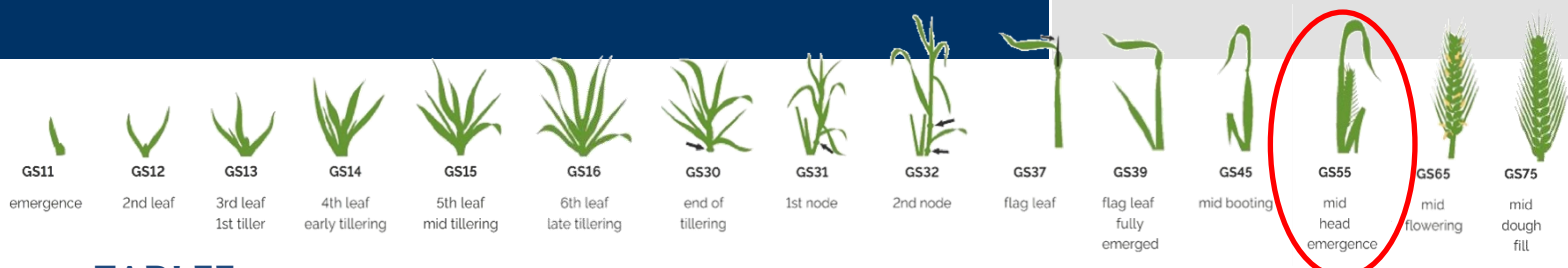
100% WUE   **4.2 t/ha**

80% WUE   **3.4 t/ha**

GS11	GS12	GS13	GS14	GS15	GS16	GS30	GS31	GS32	GS37	GS39	GS45	GS55	GS65	GS75
emergence	2nd leaf	3rd leaf 1st tiller	4th leaf early tillering	5th leaf mid tillering	6th leaf late tillering	end of tillering	1st node	2nd node	flag leaf	flag leaf fully emerged	mid booting	mid head emergence	mid flowering	mid dough fill

TARLEE

Soil type: Sandy loam

Crop growth

Variety: Scepter wheat
Sowing date: May 1, 2021
Emergence: May 11, 2021
Nitrogen fertiliser: 40 kg N/ha @ seeding
     + 40 kg N/ha July 21

Date of report: **August 24, 2021**

The season so far

Annual rainfall to date: 273 mm
GSR to date: 228 mm
Current GSR decile: 5
Current predicted PAW: 97 mm (86% full)
PAWC: 113 mm
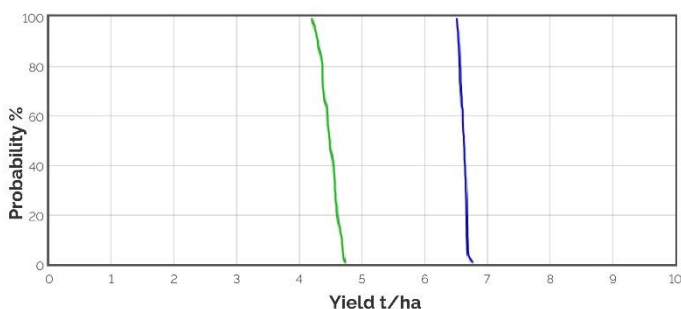
Yield Prophet® predictions

(*based on a 50% probability*)
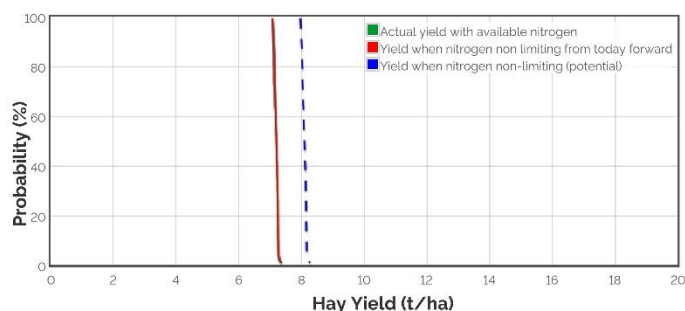
Wheat sown May 1:   **5.6 t/ha**
also see graphs below
Wheat sown May 20:   **5.4 t/ha**

Grain yield outcome graph

Hay yield outcome graph

These graphs show the chance of reaching the corresponding yield given weather, soil conditions and agronomic inputs to date, and historical climate data (100yrs) to simulate remainder of the season.

Yield probability curves (left graph) - display two different nitrogen scenarios. The green line displays the actual grain yield with the current soil available nitrogen. The blue line represents the grain yield potential with unlimited nitrogen (yield potential). A small difference between these two lines indicates the current soil N level is adequate for the crop to reach its yield potential. Conversely, a large difference between these two lines indicates additional N fertiliser is required for the crop to reach its yield potential.

French & Schultz predictions

This model assumes that there is 14 mm stored moisture, 110 mm of evaporation and Decile 5 rainfall (110 mm) for the remainder of the growing season.

100% WUE   **4.8 t/ha**

80% WUE   **3.9 t/ha**

As a **special feature** for our 57th issue of Hart Beat, we have included Yield Prophet® simulations for additional grain and hay crops common to the Mid-North region. These include Pioneer 44Y90CL canola, Compass barley, Williams oats (milling) and Mulgara oats for hay.

All simulations assume a sowing date of May 1. In-season nitrogen fertiliser applications are equal to that applied to the Hart Beat wheat simulations for each site (Figures 1 & 2). Pre-seeding N averaged 64 kg/ha across the eight sites; range = 60 – 69 kg/ha.
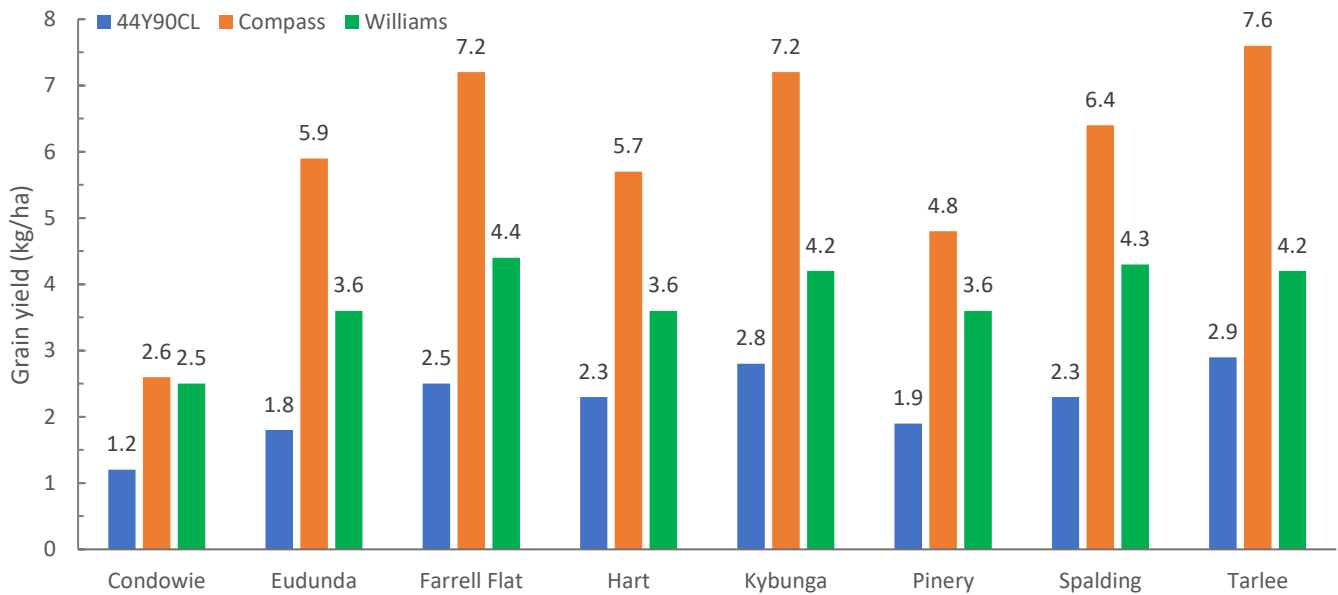

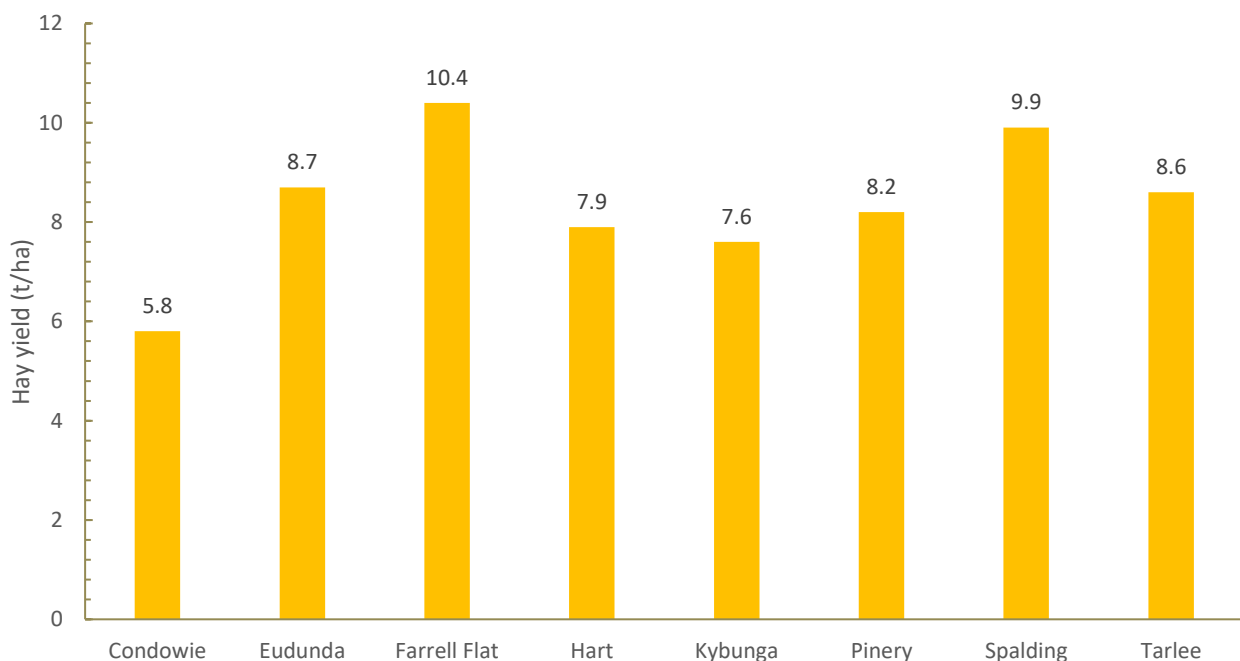Figure 1. Predicted grain yields for 44Y90 CL canola, Compass barley and Williams oats at each site (t/ha).

Figure 2. Predicted hay yields for Mulgara across the eight Mid-North Yield Prophet® locations.

HART BEAT

Use this link for program details, tickets and more:

https://www.hartfieldsite.org.au/pages/events/hart-field-day.php

Contact us

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