

# HART BEAT

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## HART BEAT

### Yield Prophet® simulations for 8 sites across the mid-north of SA

The Yield Prophet® simulations featured are not a crystal ball, but provide a realistic prediction of the available soil water and nitrogen status of your crop



## HART EVENTS

Getting The Crop In – March 11, 2020

Winter Walk – July 21, 2020

HART FIELD DAY – September 15, 2020

Spring Twilight Walk – October 20, 2020

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- Eudunda
- Tarlee

[www.hartfieldsite.org.au](http://www.hartfieldsite.org.au)

# Definitions

## Hart Beat definitions

Each 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.

**Drained upper limit (DUL)** – is the amount of water that a saturated soil holds after it has drained.

**Crop lower limit (CLL)** – is the amount of water remaining in the soil after crop senescence.

**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.

**Bulk density (BD)** – is a measure of the weight of dry soil per unit volume of soil.

**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 probability curves** - display two different nitrogen scenarios for each site. 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.

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.

**Yield Prophet®** has been very accurate throughout Australia, over the past 5 seasons. At the Hart field site the **Yield Prophet®** prediction on the 15<sup>th</sup> September, using an average finish, has been only 16% above the final grain yield, averaged over the past 4 years, making wheat growth models such as APSIM highly valuable.

**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 and nitrogen processes in the paddock, and crop growth. **Yield Prophet®** calculates the amount of water and nitrogen available to the crop and the water and nitrogen demand of the crop.

**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). For more information about APSIM or *Yield Prophet®* please visit [www.hartfieldsite.org.au](http://www.hartfieldsite.org.au)

# Site information

## Rainfall and soil water characteristics for all sites

Site	Average annual rainfall (mm)	Soil type	Plant Available Water Capacity (mm)	Soil Profile Depth (cm)	Plant Available Water at 15 March (mm)	Pre-sowing soil nitrogen (kg/ha)
Hart	400	Sandy clay loam	206	150	0	67
Spalding	430	Red brown earth	143	150	0	63
Condowie	350	Sandy loam	115	150	0	65
Kybunga	428	Clay loam	262	120	0	64
Farrell Flat	474	Light clay loam	172	120	0	71
Pinery	374	Silty clay loam	112	150	0	70
Eudunda	445	Gravelly loam	96	100	0	63
Tarlee	474	Sandy loam	113	150	0	67

## 2019 site locations



## SANDY CLAY LOAM

### Crop growth

**Variety:** Scepter wheat    **Sowing date:** 1st May    **Nitrogen fertiliser:** 30 kg N/ha at seeding +  
**Emergence date:** 19<sup>th</sup> May    20 kg N/ha on 18th July

### The season so far

**Annual rain to date:** 172 mm  
**GSR to date:** 161 mm (35 mm since last report)    **GSR decile:** 1  
**Current predicted PAW:** 6 mm (3 % full)    **PAWC:** 206 mm

### Grain yield predictions (Yield Prophet)

**Yield prophet estimate:** (Date of report 14/10/2019)

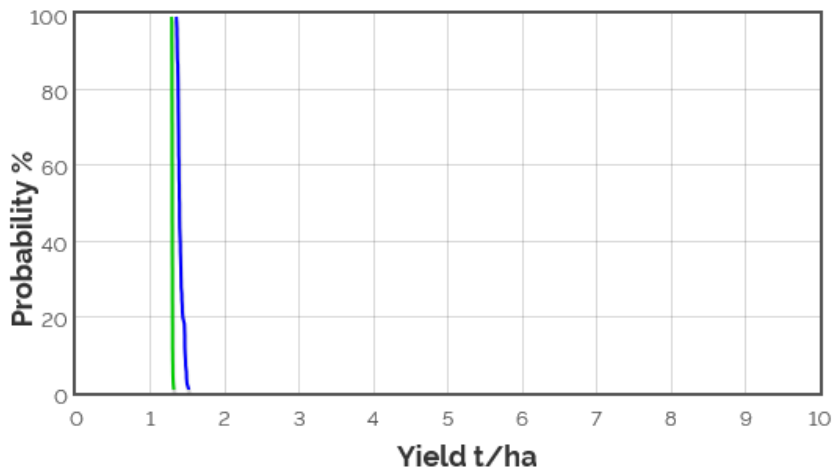
*These estimates are based on a 50% probability*

Yield t/ha	Sown 1 <sup>st</sup> May (see graph)	Change since July report	Sown 20 <sup>th</sup> May	Change since July report
Grain	1.4	-2.2	1.2	-2.2

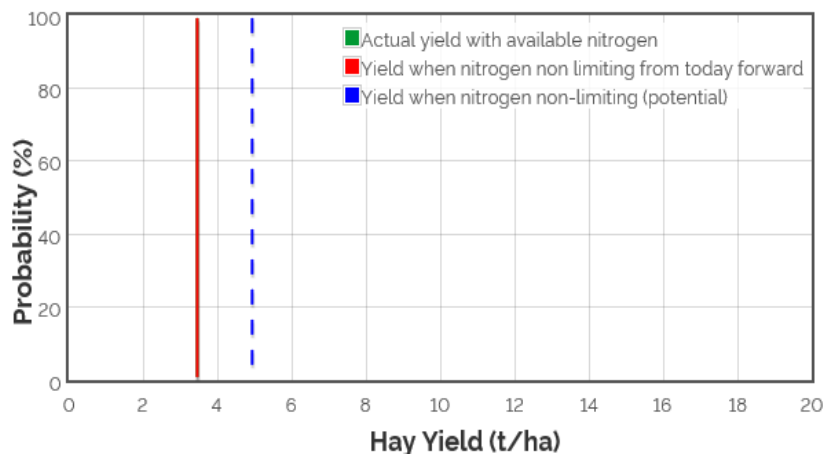
### French & Schultz grain yield estimate:

<b>100% WUE:</b>	<b>1.4 t/ha</b>
<b>80% WUE:</b>	<b>1.1 t/ha</b>

*This model assumes that there is 3 mm stored moisture, 110 mm of evaporation and Decile 5 rainfall (15 mm) for the rest of the season.*



The graphs above and below 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.



# SPALDING

## RED BROWN EARTH

### Crop growth

Variety: Scepter wheat    Sowing date: 1st May    Nitrogen fertiliser: 30 kg N/ha at seeding +  
Emergence date: 13<sup>th</sup> May    40 kg N/ha on 18th July

### The season so far

Annual rain to date: 265 mm  
GSR to date: 243 mm (80 mm since last report)  
Current predicted PAW: 13 mm (9 % full)

GSR decile: 3  
PAWC: 143 mm

### Grain yield predictions (Yield Prophet)

Yield prophet estimate: (Date of report 11/10/2019)

These estimates are based on a 50% probability

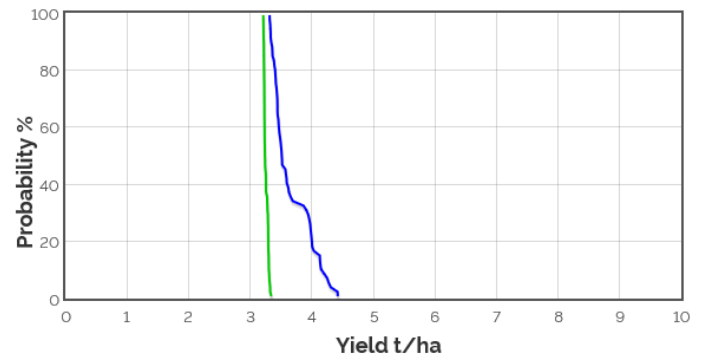
Yield t/ha	Sown 1 <sup>st</sup> May (see graph)	Change since July report	Sown 20 <sup>th</sup> May	Change since July report
Grain	3.4	-1.0	2.7	-1.2

### French & Schultz grain yield estimate:

100% WUE:	3.1 t/ha
80% WUE:	2.5 t/ha

This model assumes that there is 7 mm stored moisture, 110 mm of evaporation and Decile 5 rainfall (18 mm) for the rest of the season.

### Grain yield outcome graph



This graph shows 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.

# CONDOWIE

## SANDY LOAM

### Crop growth

Variety: Scepter wheat    Sowing date: 1st May    Nitrogen fertiliser: 30 kg N/ha at seeding +  
Emergence date: 19<sup>th</sup> May    20 kg N/ha on 18th July

### The season so far

Annual rain to date: 183 mm  
GSR to date: 177 mm (41 mm since last report)  
Current predicted PAW: 1 mm (1 % full)

GSR decile: 2  
PAWC: 115 mm

### Grain yield predictions (Yield Prophet)

Yield prophet estimate: (Date of report 14/10/2019)

These estimates are based on a 50% probability

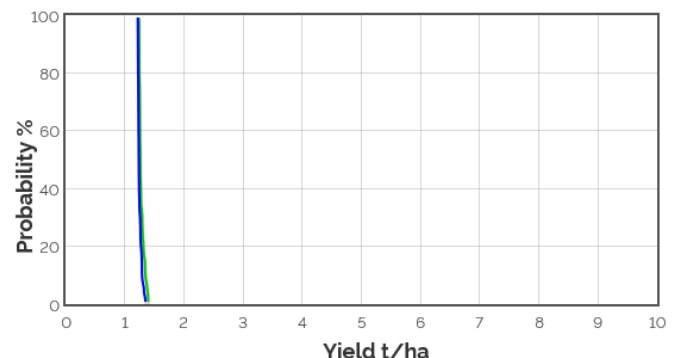
Yield t/ha	Sown 1 <sup>st</sup> May (see graph)	Change since July report	Sown 20 <sup>th</sup> May	Change since July report
Grain	1.3	-1.2	1.1	-1.2

### French & Schultz grain yield estimate:

100% WUE:	1.6 t/ha
80% WUE:	1.3 t/ha

This model assumes that there is 2 mm stored moisture, 110 mm of evaporation and Decile 5 rainfall (13 mm) for the rest of the season.

### Grain yield outcome graph



This graph shows 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.

# KYBUNGA

## CLAY LOAM

### Crop growth

Variety: Scepter wheat    Sowing date: 1st May    Nitrogen fertiliser: 30 kg N/ha at seeding + 40 kg N/ha on 18th July  
Emergence date: 20<sup>th</sup> May

### The season so far

Annual rain to date: 252 mm  
GSR to date: 242 mm (58 mm since last report)  
Current predicted PAWC: 5 mm (2 % full)

GSR decile: 3  
PAWC: 262 mm

### Grain yield predictions (Yield Prophet)

Yield prophet estimate: (Date of report 14/10/2019)

These estimates are based on a 50% probability

Yield t/ha	Sown 1 <sup>st</sup> May (see graph)	Change since July report	Sown 20 <sup>th</sup> May	Change since July report
Grain	2.1	-1.8	1.8	-1.8

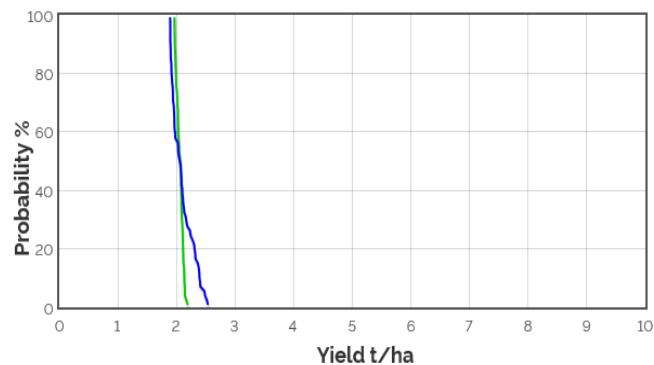
### French & Schultz grain yield estimate:

100% WUE: 3.1 t/ha

80% WUE: 2.5 t/ha

This model assumes that there is 3 mm stored moisture, 110 mm of evaporation and Decile 5 rainfall (20 mm) for the rest of the season.

### Grain yield outcome graph



This graph shows 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.

# FARRELL FLAT

## LIGHT CLAY LOAM

### Crop growth

Variety: Scepter wheat    Sowing date: 1st May    Nitrogen fertiliser: 30 kg N/ha at seeding + 40 kg N/ha on 18th July  
Emergence date: 14<sup>th</sup> May

### The season so far

Annual rain to date: 244 mm  
GSR to date: 234 mm (67 mm since last report)  
Current predicted PAWC: 10 mm (6% full)

GSR decile: 2  
PAWC: 172 mm

### Grain yield predictions (Yield Prophet)

Yield prophet estimate: (Date of report 14/10/2019)

These estimates are based on a 50% probability

Yield t/ha	Sown 1 <sup>st</sup> May (see graph)	Change since July report	Sown 20 <sup>th</sup> May	Change since July report
Grain	2.6	-2.1	2.1	-2.2

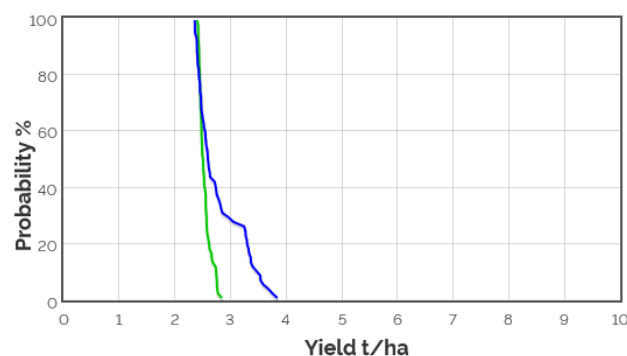
### French & Schultz grain yield estimate:

100% WUE: 2.9 t/ha

80% WUE: 2.3 t/ha

This model assumes that there is 3 mm stored moisture, 110 mm of evaporation and Decile 5 rainfall (18 mm) for the rest of the season.

### Grain yield outcome graph



This graph shows 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.

## SILTY CLAY LOAM

### Crop growth

Variety: Scepter wheat    Sowing date: 1st May    Nitrogen fertiliser: 30 kg N/ha at seeding + 20 kg N/ha on 18<sup>th</sup> July  
 Emergence date: 18<sup>th</sup> May

### The season so far

Annual rain to date: 207 mm  
 GSR to date: 199 mm (63 mm since last report)  
 Current predicted PAW: 3 mm (3 % full)

GSR decile: 2  
 PAWC: 112 mm

### Grain yield predictions (Yield Prophet)

Yield prophet estimate: (Date of report 14/10/2019)

These estimates are based on a 50% probability

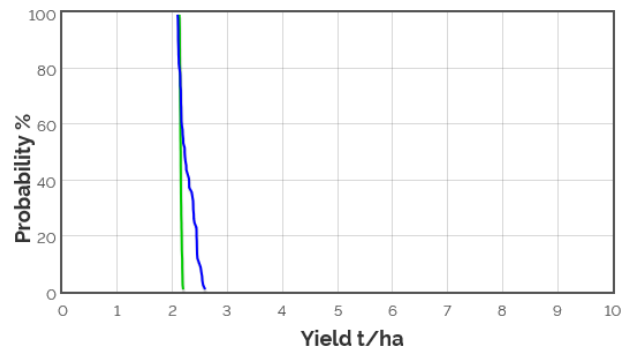
Yield t/ha	Sown 1 <sup>st</sup> May (see graph)	Change since July report	Sown 20 <sup>th</sup> May	Change since July report
Grain	2.2	-1.7	1.9	-1.7

### French & Schultz grain yield estimate:

100% WUE:	2.2 t/ha
80% WUE:	1.7 t/ha

This model assumes that there is 3 mm stored moisture, 110 mm of evaporation and Decile 5 rainfall (16 mm) for the rest of the season.

### Grain yield outcome graph



This graph shows 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.

## GRAVELLY LOAM

### Crop growth

Variety: Scepter wheat    Sowing date: 1st May    Nitrogen fertiliser: 30 kg N/ha at seeding + 20 kg N/ha on 18<sup>th</sup> July  
 Emergence date: 15<sup>th</sup> May

### The season so far

Annual rain to date: 205 mm  
 GSR to date: 191 mm (59 mm since last report)  
 Current predicted PAW: 1 mm (1 % full)

GSR decile: 1  
 PAWC: 96 mm

### Grain yield predictions (Yield Prophet)

Yield prophet estimate: (Date of report 14/10/2019)

These estimates are based on a 50% probability

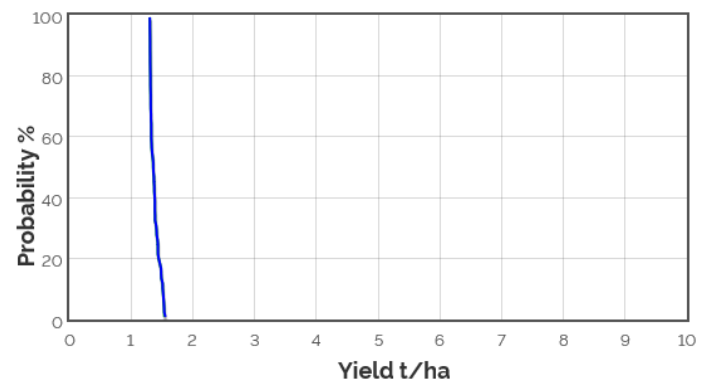
Yield t/ha	Sown 1 <sup>st</sup> May (see graph)	Change since July report	Sown 20 <sup>th</sup> May	Change since July report
Grain	1.4	-1.9	1.1	-2.0

### French & Schultz grain yield estimate:

100% WUE:	2.1 t/ha
80% WUE:	1.6 t/ha

This model assumes that there is 4 mm stored moisture, 110 mm of evaporation and Decile 5 rainfall (17 mm) for the rest of the season.

### Grain yield outcome graph



This graph shows 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.

### Crop growth

Variety: Scepter wheat    Sowing date: 1st May    Nitrogen fertiliser: 30 kg N/ha at seeding + 20 kg N/ha on 18th July  
 Emergence date: 14<sup>th</sup> May

### The season so far

Annual rain to date: 222 mm    GSR decile: 1  
 GSR to date: 214 mm (66 mm since last report)    PAWC: 113 mm  
 Current predicted PAW: 3 mm (3% full)

### Grain yield predictions (Yield Prophet)

Yield prophet estimate: (Date of report 14/10/2019)

These estimates are based on a 50% probability

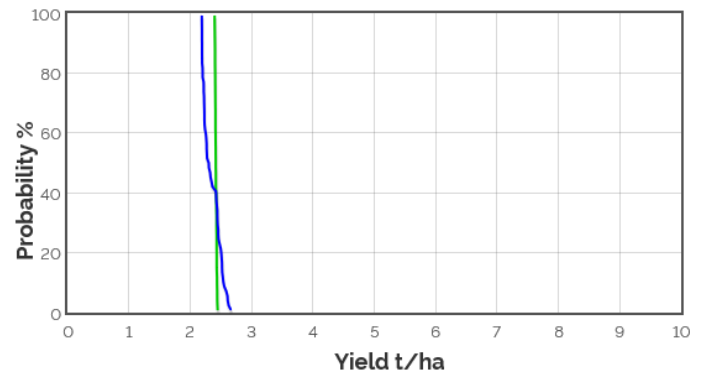
Yield t/ha	Sown 1 <sup>st</sup> May (see graph)	Change since July report	Sown 20 <sup>th</sup> May	Change since July report
Grain	2.4	-2.1	1.8	-2.2

### French & Schultz grain yield estimate:

100% WUE:	2.5 t/ha
80% WUE:	2.0 t/ha

This model assumes that there is 3 mm stored moisture, 110 mm of evaporation and Decile 5 rainfall (21 mm) for the rest of the season.

### Grain yield outcome graph



This graph shows 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.

## The Hart Team



Photo (L-R): Deb Purvis, Jade Rose, Matt Dare, Rob Dall, Sandy Kimber, Simon Honner, Andre Sabeeney, Ryan Wood, Damien Sommerville, Peter Baker, Sarah Noack, Alex Thomas.

Absent: Leigh Fuller & Justin Wundke