HART BEAT

4th October 2017

ISSUE 44

IN THIS ISSUE

NOTE – the response in grain yield to nitrogen fertiliser and soil water are not as consistent as previous years.

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

Spring Twilight Walk – 17th October 2017

Getting The Crop In – March 2018

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 15th 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.

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 10 May* (mm)	Pre-sowing soil nitrogen (kg/ha)
Hart	400	Sandy clay loam	206	150	92	90
Spalding	430	Red brown earth	143	150	57	90
Condowie	350	Sandy loam	115	150	40	90
Kybunga	428	Clay loam	262	120	89	88
Farrell Flat	474	Light clay loam	172	120	63	87
Pinery	374	Silty clay loam	79	150	43	90
Eudunda	445	Gravelly loam	96	100	0	90
Tarlee	474	Sandy loam	113	150	66	87

Note there were errors in the input of PAW values in the June 2 Hart Beat.

2017 site locations

SANDY CLAY LOAM

Crop growth

Variety: Mace wheat **Sowing date:** 1st May **Nitrogen fertiliser:** 40 kg N/ha at seeding + 20 kg N/ha July 17

The season so far

Annual rain to date:	252 mm		
GSR to date:	181 mm (26 mm since last report)	**GSR decile:**	2
Current predicted PAW:	13 mm (6 *% full*)	**PAWC:**	206 mm

Grain yield predictions (Yield Prophet)

Yield prophet estimate: *(Date of report 4/10/2017)*
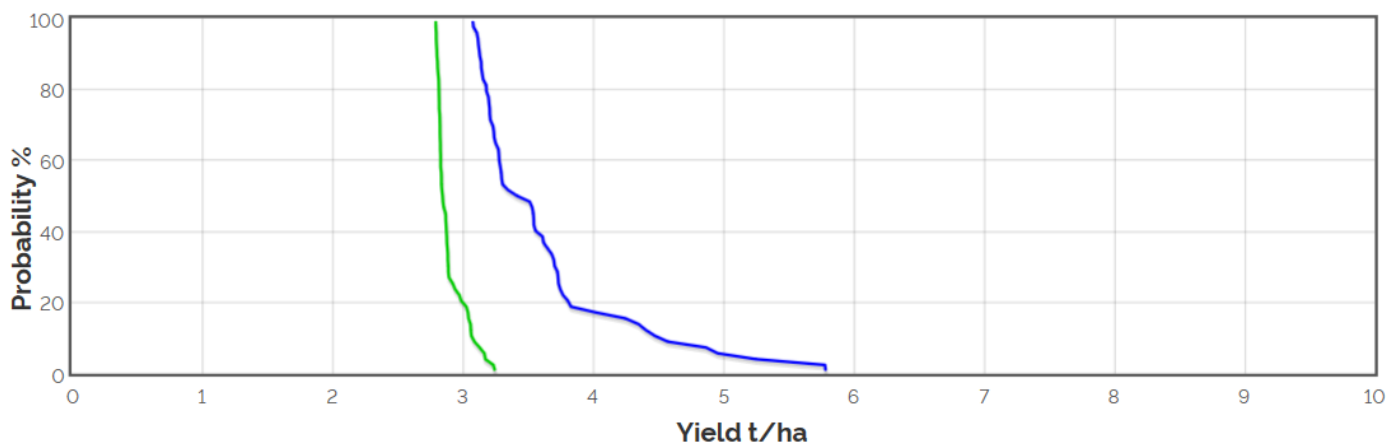
These estimates are based on a 50% probability

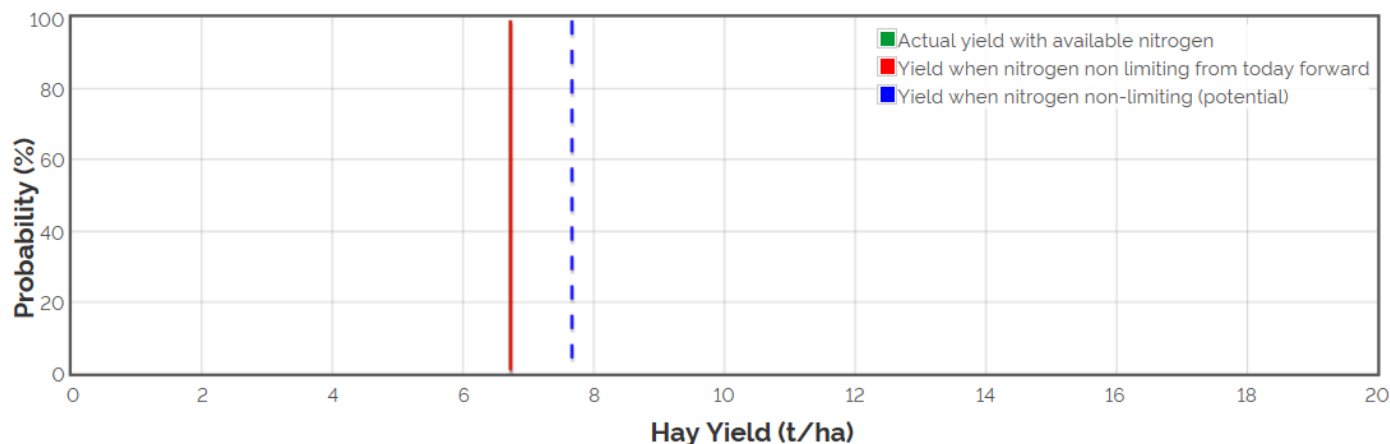| Yield t/ha	Sown 1st May (see graph)	Change Since Last Report	Sown 20th May	Change Since Last Report
Grain	3.1	- 1.2	2.8	- 1.2

French & Schultz grain yield estimate:

100% WUE:	2.3 t/ha
80% WUE:	1.8 t/ha

This model assumes that there is 21 mm stored moisture, 110 mm of evaporation and Decile 5 rainfall (23 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.

- Actual yield with available nitrogen
- Yield when nitrogen non limiting from today forward
- Yield when nitrogen non-limiting (potential)

SPALDING

RED BROWN EARTH

Crop growth
Variety: Mace wheat   **Sowing date:** 1st May   **Nitrogen fertiliser:** 40 kg N/ha at seeding

The season so far
Annual rain to date: 280 mm
GSR to date: 211 mm (25 mm since last report)   **GSR decile:** 3
Current predicted PAW: 14 mm (10 *% full*)   **PAWC:** 143 mm

Grain yield predictions (Yield Prophet)

Yield prophet estimate: *(Date of report 4/10/2017)*

These estimates are based on a 50% probability
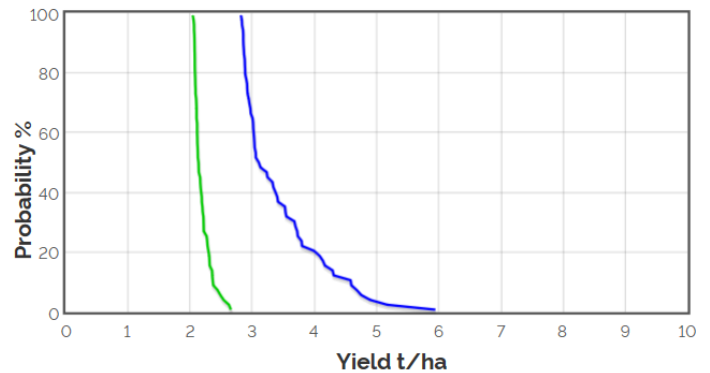
Yield t/ha	Sown 1st May *(see graph)*	Change Since Last Report	Sown 20th May	Change Since Last Report
Grain	2.6	- 1.1	2.3	- 1.4

French & Schultz grain yield estimate:

100% WUE:	2.9 t/ha
80% WUE:	2.3 t/ha

This model assumes that there is 21 mm stored moisture, 110 mm of evaporation and Decile 5 rainfall (24 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: Mace wheat   **Sowing date:** 1st May   **Nitrogen fertiliser:** 40 kg N/ha at seeding

The season so far
Annual rain to date: 263 mm
GSR to date: 184 mm (14 mm since last report)   **GSR decile:** 3
Current predicted PAW: 5 mm (4 *% full*)   **PAWC:** 115 mm

Grain yield predictions (Yield Prophet)

Yield prophet estimate: *(Date of report 4/10/2017)*
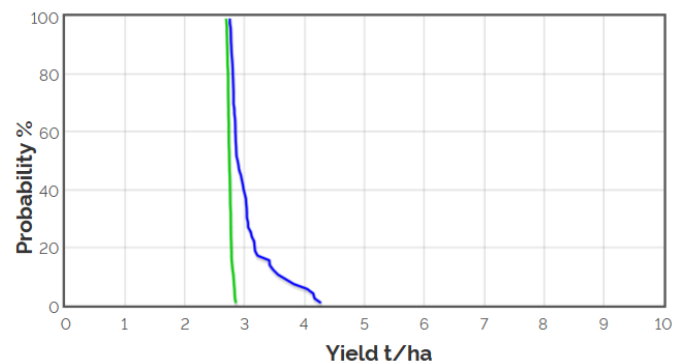
These estimates are based on a 50% probability

Yield t/ha	Sown 1st May *(see graph)*	Change Since Last Report	Sown 20th May	Change Since Last Report
Grain	2.8	- 1.1	2.1	- 1.0

French & Schultz grain yield estimate:

100% WUE:	2.4 t/ha
80% WUE:	1.9 t/ha

This model assumes that there is 24 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.

KYBUNGA

CLAY LOAM

Crop growth
Variety: Mace wheat   **Sowing date:** 1st May   **Nitrogen fertiliser:** 40 kg N/ha at seeding + 40 kg N/ha July 17

The season so far
Annual rain to date: 333 mm
GSR to date: 225 mm (30 mm since last report)   **GSR decile:** 3
Current predicted PAW: 39 mm (15 *% full*)   **PAWC:** 262 mm

Grain yield predictions (Yield Prophet)

Yield prophet estimate: *(Date of report 5/10/2017)*
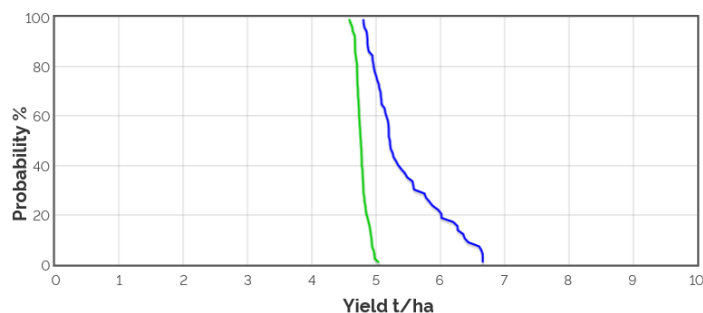
These estimates are based on a 50% probability

Yield t/ha	Sown 1st May *(see graph)*	Change Since Last Report	Sown 20th May	Change Since Last Report
Grain	4.9	-0.5	3.8	- 1.9

French & Schultz grain yield estimate:

100% WUE:	3.6 t/ha
80% WUE:	2.8 t/ha

This model assumes that there is 35 mm stored moisture, 110 mm of evaporation and Decile 5 rainfall (30 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: Mace wheat   **Sowing date:** 1st May   **Nitrogen fertiliser:** 40 kg N/ha at seeding + 40 kg N/ha July 17

The season so far
Annual rain to date: 329 mm
GSR to date: 246 mm (35 mm since last report)   **GSR decile:** 3
Current predicted PAW: 40 mm (23 *% full*)   **PAWC:** 172 mm

Grain yield predictions (Yield Prophet)

Yield prophet estimate: *(Date of report 4/10/2017)*

These estimates are based on a 50% probability

Yield t/ha	Sown 1st May *(see graph)*	Change Since Last Report	Sown 20th May	Change Since Last Report
Grain	4.4	- 1.2	3.4	- 1.8

French & Schultz grain yield estimate:

100% WUE:	3.8 t/ha
80% WUE:	3.1 t/ha

This model assumes that there is 25 mm stored moisture, 110 mm of evaporation and Decile 5 rainfall (30 mm) for the rest of the season.

Grain yield outcome graph
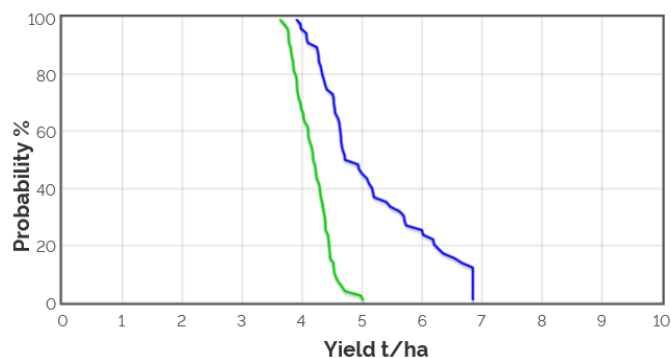
This graph shows the chance of reaching the corresponding yield given weather, soil conditions and agronomic inputs to date, and historical climate data (100yrs) to simulate remainder of the season.

PINERY

SILTY CLAY LOAM

Crop growth
Variety: Mace wheat   **Sowing date:** 1st May   **Nitrogen fertiliser:** 40 kg N/ha at seeding + 20 kg N/ha July 17

The season so far
Annual rain to date: 313 mm
GSR to date: 193 mm (23 mm since last report)   **GSR decile:** 2
Current predicted PAW: 19 mm (24 *% full*)   **PAWC:** 79 mm

Grain yield predictions (Yield Prophet)

Yield prophet estimate: *(Date of report 4/10/2017)*

These estimates are based on a 50% probability

Yield t/ha	Sown 1st May *(see graph)*	Change Since Last Report	Sown 20th May	Change Since Last Report
Grain	3.8	- 0.4	2.9	- 1.5

French & Schultz grain yield estimate:

100% WUE:	2.9 t/ha
80% WUE:	2.3 t/ha

This model assumes that there is 36 mm stored moisture, 110 mm of evaporation and Decile 5 rainfall (25 mm) for the rest of the season.

Grain yield outcome graph
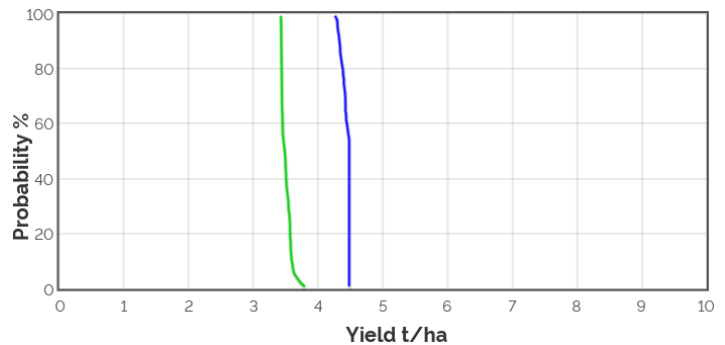
This graph shows the chance of reaching the corresponding yield given weather, soil conditions and agronomic inputs to date, and historical climate data (100yrs) to simulate remainder of the season.

EUDUNDA

GRAVELLY LOAM

Crop growth
Variety: Mace wheat   **Sowing date:** 1st May   **Nitrogen fertiliser:** 40 kg N/ha at seeding

The season so far
Annual rain to date: 329 mm
GSR to date: 237 mm (30 mm since last report)   **GSR decile:** 3
Current predicted PAW: 18 mm (19 *% full*)   **PAWC:** 96 mm

Grain yield predictions (Yield Prophet)

Yield prophet estimate: *(Date of report 4/10/2017)*
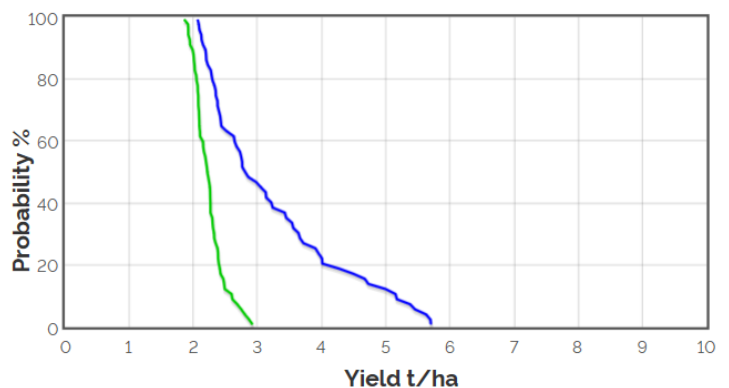
These estimates are based on a 50% probability

Yield t/ha	Sown 1st May *(see graph)*	Change Since Last Report	Sown 20th May	Change Since Last Report
Grain	2.5	- 1.1	2.7	- 1.3

French & Schultz grain yield estimate:

100% WUE:	3.6 t/ha
80% WUE:	2.9 t/ha

This model assumes that there is 28 mm stored moisture, 110 mm of evaporation and Decile 5 rainfall (25 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.

SANDY LOAM

Crop growth
Variety: Mace wheat   **Sowing date:** 1st May   **Nitrogen fertiliser:** 40 kg N/ha at seeding + 20 kg N/ha July 17

The season so far
Annual rain to date: 331 mm
GSR to date: 237 mm (37 mm since last report)   **GSR decile:** 2
Current predicted PAW: 43 mm (38 *% full*)   **PAWC:** 113 mm

Grain yield predictions (Yield Prophet)
Yield prophet estimate: *(Date of report 4/10/2017)*

These estimates are based on a 50% probability

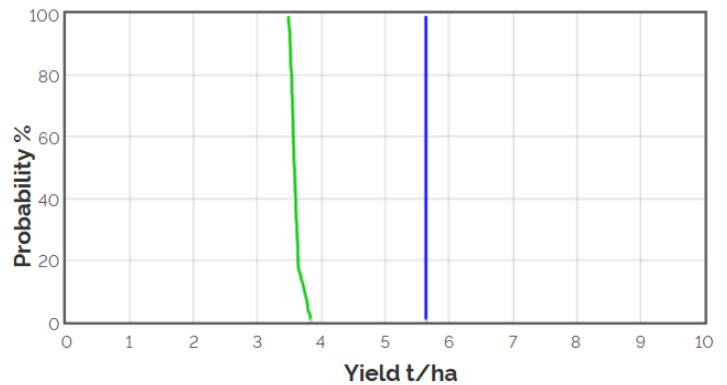| Yield t/ha	Sown 1st May *(see graph)*	Change Since Last Report	Sown 20th May	Change Since Last Report
Grain	4.6	- 0.1	4.8	- 0.7

French & Schultz grain yield estimate:

100% WUE:	3.3 t/ha
80% WUE:	2.7 t/ha

This model assumes that there is 28 mm stored moisture, 110 mm of evaporation and Decile 5 rainfall (11 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.

Hart Field Day 2017