# HART BEAT

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### **ISSUE 43**





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- <u>Condowie</u>
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- Farrell Flat
- Pinery
- <u>Eudunda</u>
- <u>Tarlee</u>

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



# HART BEAT

### Yield Prophet<sup>®</sup> simulations for 8 sites across the mid-north of SA

The Yield Prophet<sup>®</sup> 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

HART FIELD DAY – 19<sup>th</sup> September 2017 Spring Twilight Walk – 17<sup>th</sup> October 2017 Getting The Crop In – March 2018

# 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**<sup>®</sup> has been very accurate throughout Australia, over the past 5 seasons. At the Hart field site the <u>Yield Prophet</u><sup>®</sup> 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*<sup>®</sup> 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*<sup>®</sup> simulates the soil water and nitrogen processes in the paddock, and crop growth. *Yield Prophet*<sup>®</sup> calculates the amount of water and nitrogen available to the crop and the water and nitrogen demand of the crop.

**Disclaimer:** *Yield Prophet*<sup>®</sup> 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*<sup>®</sup> 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*<sup>®</sup>.

**Important Notice:** *Yield Prophet*<sup>®</sup> 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*<sup>®</sup> please visit or www.yieldprophet.com.au.

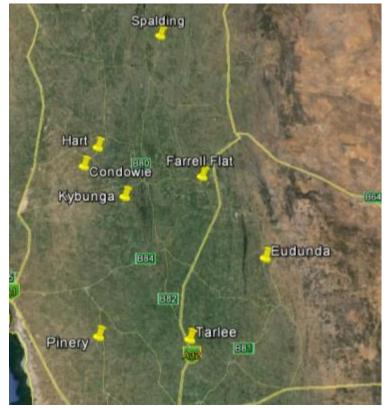
# Site information

### 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 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:

**GSR decile:** 

PAWC:

40 kg N/ha at seeding + 20 kg N/ha July 17

The season so far	
Annual rain to date:	227 mm
GSR to date:	155 mm (50 mm since last report)
Current predicted PAW:	58 mm (28 <i>% full)</i>

#### **Grain yield predictions (Yield Prophet)**

Yield prophet estimate: (Date of report 22/08/2017) These estimates are based on a 50% probability

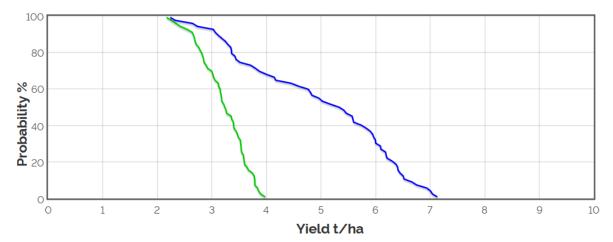
Yield t/ha	Sown 1 <sup>st</sup> May (see graph)	Change Since Last Report	Sown 20 <sup>th</sup> May	Change Since Last Report
Grain	4.3	0.0	4.0	- 0.3

#### French & Schultz grain yield estimate:

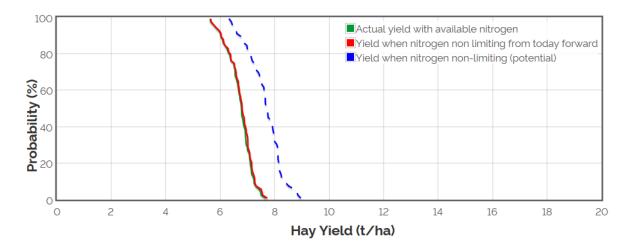
3 206 mm

100% WUE:	3.0 t/ha						
80% WUE:	2.4 t/ha						
This model assumes that there is 21 mm stored moisture,							

110 mm of evaporation and Decile 5 rainfall (83 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: Mace wheat

Sowing date: 1st May

Nitrogen fertiliser: 40 kg

**GSR decile:** 

PAWC:

40 kg N/ha at seeding

The season so farAnnual rain to date:254 mmGSR to date:186 mm (71 mm since last report)Current predicted PAW:68 mm (48 % full)

### Grain yield predictions (Yield Prophet)

Yield prophet estimate: (Date of report 22/08/2017)

These estimates are based on a 50% probability

Yield t/ha	Sown 1 <sup>st</sup> May (see graph)	Change Since Last Report	Sown 20 <sup>th</sup> May	Change Since Last Report
Grain	3.7	+ 0.1	3.7	+ 0.5

#### French & Schultz grain yield estimate:

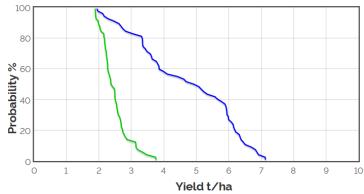
100% WUE:				3.8 t/ha						
	80% W	/UE:					3.0 t/	/ha		

This model assumes that there is 21 mm stored moisture, 110 mm of evaporation and Decile 5 rainfall (93 mm) for the rest of the season.

### Grain yield outcome graph

143 mm

4



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.

historical climate data (100yrs) to simulate remainder of the season.

# **CONDOWIE**

							SAN	DY L	OAI	М
Crop grow Variety:	<b>/th</b> Mace wheat	Sowing da	ate: 1st I	May Nitro	ogen fertilise	<b>r:</b> 40 kg N/h	a at seeding			
The seaso Annual rain GSR to date Current pre	to date:	249 mm 170 mm 47 mm (4	•	e last report)	GSR decile PAWC:	:: 5 115 mm				
Grain yield	d prediction	s (Yield Proj	ohet)		Grain yie	eld outcome	graph			
Yield proph	et estimate:	(Date oj	f report 22/0	08/2017)	100					
These estima	tes are based o	n a 50% probab	ility			2				
Yield t/ha	Sown 1 <sup>st</sup> May (see graph)	Change Since Last Report	Sown 20 <sup>th</sup> May	Change Since Last Report	80 60 04 0 20 20	Z				
Grain	3.9	+ 1.3	3.1	+ 0.6	opa					
French & Sc	hultz grain vi	eld estimate:	2	:	<b>ā</b> 20		$\lambda$			
	)% WUE:		3.1 t/ha	1	0 1	2 3	4 5 6		8	9 10
80	% WUE:		2.4 t/ha		<b>V</b> 1	2 0	Yield t/ha		0	5 10
		ere is 24 mm sto infall (69 mm) fo	,	,	5 1	ows the chance o r, soil conditions	, ,	•	5,	

# **KYBUNGA**

**Crop growth** 

## **CLAY LOAM**

Variety:	Mace wheat	Sowing d	l <b>ate:</b> 1st	May Nit	rogen fer	tiliser:	40 kg N/ł	na at seedi	ng + 40 kg N/	ha July 17
Annual rai GSR to da	<b>son so far</b> in to date: te: redicted PAW:			ce last report	GSR PAV	decile: VC:	5 262 mr	n		
Grain yie	Id prediction	ns (Yield Pro	phet)		Grai	n yield	outcome	graph		
Yield prop	het estimate:	(Date o	of report 23,	/08/2017)	100					
These estim	nates are based	on a 50% probal	bility						$\mathbf{X}$	
Yield t/ha	Sown 1 <sup>st</sup> May (see graph)	Change Since Last Report	Sown 20 <sup>th</sup> May	Change Since Last Report	00 00 00 00 00 00 00 00 00 00 00 00 00					
Grain	5.4	+ 0.6	5.7	+ 1.1						
		vield estimate:			<b>د</b> 20					
10	00% WUE:		4.1 t/h	а	0	1	2 3	4 5	6 7	8 9
8	0% WUE:		3.3 t/h	a				Yield	t/ha	

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**

This model assumes that there is 35 mm stored moisture, 110 mm of

evaporation and Decile 5 rainfall (89 mm) for the rest of the season.

#### Crop growth 40 kg N/ha at seeding + 40 kg N/ha July 17 Variety: Mace wheat Sowing date: Nitrogen fertiliser: 1st May The season so far Annual rain to date: 294 mm GSR to date: 211 mm (100 mm since last report) **GSR decile:** 4 **Current predicted PAW:** 99 mm (58 % full) PAWC: 172 mm Grain yield predictions (Yield Prophet) Grain yield outcome graph Yield prophet estimate: (Date of report 22/08/2017) 100 These estimates are based on a 50% probability 80 Sown Change Change Yield 1<sup>st</sup> May Sown 8 60 Since Last Since Last Probability 20<sup>th</sup> Mav t/ha (see Report Report graph) 40 Grain 5.6 + 0.9 5.2 + 0.7 20 French & Schultz grain yield estimate: 100% WUE: 4.7 t/ha 0 2 3 5 6 8 9 4 7 10 80% WUE: 3.8 t/ha Yield t/ha This model assumes that there is 25 mm stored moisture, 110 mm of This graph shows the chance of reaching the corresponding yield given

evaporation and Decile 5 rainfall (109 mm) for the rest of the season.

### LIGHT CLAY LOAM

weather, soil conditions and agronomic inputs to date, and historical climate data (100yrs) to simulate remainder of the season.

# PINERY

### SILTY CLAY LOAM

40 kg N/ha at seeding + 20 kg N/ha July 17

#### Crop growth

Variety: Mace wheat

The season so farAnnual rain to date:290 mmGSR to date:170 mm (87 mm since last report)Current predicted PAW:69 mm (87 % full)

Sowing date:

1st May

#### Grain yield predictions (Yield Prophet)

**Yield prophet estimate:** (*Date of report 22/08/2017*)

These estimates are based on a 50% probability

Yield t/ha	Sown 1 <sup>st</sup> May (see graph)	Change Since Last Report	Sown 20 <sup>th</sup> May	Change Since Last Report
Grain	4.2	+ 0.4	4.4	+ 0.9

#### French & Schultz grain yield estimate:

100% WUE:					3.4 t/ha					
	80% V	VUE:			2.7 t/h	a				
						-				

This model assumes that there is 36 mm stored moisture, 110 mm of evaporation and Decile 5 rainfall (72 mm) for the rest of the season.

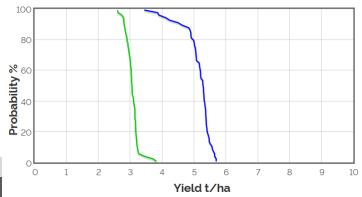
### **PAWC:** 79 mm

**GSR decile:** 

Nitrogen fertiliser:

### Grain yield outcome graph

3



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.

climate data (100yrs) to simulate remainder of the season.

# EUDUNDA

							GF	RAVE	LLY	' LC	λ	Л	
Crop gr Variety:	owth Mace whea	at Sowing	date: 1s	st May Ni	trogen ferti	iliser:		ha at seedi				-	
The sea Annual r GSR to d Current p	,	<b>R decile:</b> WC: 9	4 6 mm										
Grain yi	ield prediction	ons (Yield Pr	ophet)		Grain	ı yield o	outcome	graph					
Yield pro	phet estimate	e: (Date	of report 22	2/08/2017)	100								
These esti	imates are base	d on a 50% prob	ability			N							
Yield t/ha	Sown 1 <sup>st</sup> May (see graph)	Change Since Last Report	Sown 20 <sup>th</sup> May	Change Since Last Report	00 09 09 09 09 05 09			$\overline{\}$					
Grain	3.6	+ 0.8	4.0	+ 0.9	ado da								
	Schultz grain	yield estimate	e: 4.6 t/	ha									
	80% WUE:		4.6 t/		0	1 2	3	4 5 <b>Yield</b>	6 <b>+ /h</b> a	7	8	9	10
This mode	el assumes that	there is 28 mm s rainfall (103 mn	tored moistu	re, 110 mm of				of reaching gronomic in	the corre			-	



### **SANDY LOAM**

#### **Crop growth**

Variety: Mace wheat Sowing date: 1st May Nitrogen fertiliser: The season so far Annual rain to date: 294 mm GSR to date: 200 mm (113 mm since last report) **Current predicted PAW:** 91 mm (81 % full) PAWC:

#### Grain yield predictions (Yield Prophet)

Yield prophet estimate: (Date of report 22/08/2017)

These estimates are based on a 50% probability

Yield t/ha	Sown 1 <sup>st</sup> May (see graph)	Change Since Last Report	Sown 20 <sup>th</sup> May	Change Since Last Report
Grain	4.7	+ 0.2	5.5	+ 0.6

#### French & Schultz grain yield estimate:

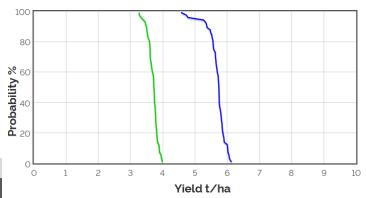
100% WUE:	4.7 t/ha
80% WUE:	3.7 t/ha
<b>T</b> I: II II II I	

This model assumes that there is 28 mm stored moisture, 110 mm of evaporation and Decile 5 rainfall (115 mm) for the rest of the season.

### 40 kg N/ha at seeding + 20 kg N/ha July 17

**GSR decile:** 3 113 mm

#### 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.

# **Insect ID at Hart**



Participants in our 'Been Farming Long' workshop series took a closer look at insects last week during Workshop 3 – Insect ID