HART BEAT

8th September 2014

ISSUE 30

Hart Field Site Group Inc

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CARING FOR OUR COUNTRY

THIS ISSUE

(click on headings to be directed straight to each section)

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

Hart Field Day - 16th September 2014
Spring Twilight Walk - 21st October 2014

Nitrogen management and yield dynamics of canola

Canola has a high nitrogen (N) requirement and how to manage N in environments with varying rainfall can be a challenge. Research by PhD student Amrit Riar has been investigating how different N management strategies effect canola growth, grain yield and water use efficiency (WUE).

Field trial work has been undertaken over the last two years at Tarlee, Roseworthy and Hart. Five different N application combinations were investigated: three N rates (0, 100 and 200 kg/ha) applied either after emergence or equally as a triple split at rosette, green bud appearance and first flower growth stages.

Grain yield and oil content

Application of N increased average grain yield by 14% at Tarlee and 30% at Roseworthy (Table 1) in 2013. However, there was no significant difference between adding 100 kg N/ha or 200 kg N/ha. This was in contrast to earlier trial work in 2011 and 2012 where grain yield increases were observed when more N was applied (2013 GRDC adviser updates).

Nitrogen applied as a single application after emergence or as the triple split did not influence final grain yield (Table 1). Similarly total dry matter between the N treatments was not significantly different for N rate or timing.

Application of N decreased the oil content at both sites. For the Tarlee site a reduction in oil content was influenced by the timing of application (Table 1). A spilt application of 100 kg N/ha produced the highest oil content along with the nil N.

Crop water use

The amount of N applied did not influence crop water use. The average WUE at Roseworthy was 7.4 kg/ha/mm and slightly higher at Tarlee 8.0 kg/ha/mm. Interestingly, at both sites the 200 kg N/ha treatments dried the soil profile more compared to the nil N treatment. Also the root depth that water could be accessed was 20-40 cm deeper compared to the nil N treatment.

Table 1. Grain yield, total dry matter, harvest index and oil content of canola as affected by N treatments at Roseworthy and Tarlee, in 2013.

	Grain yield (t/ha)		**Total dry matter (t/ha)**		**Oil content (%)**	
N Treatments	Roseworthy	Tarlee	Roseworthy	Tarlee	Roseworthy	Tarlee
0	1.3^{b}	2.4^{b}	5.6^{b}	8.6	44.7^{a}	44.8^{a}
100, single	1.7^{a}	2.8^{a}	8.0^{a}	10.3	42.5^{b}	43.9^{c}
100, 3 split	1.7^{a}	2.5^{a}	7.5^{a}	10.3	42.0^{b}	44.4^{ab}
200, single	2.1^{a}	2.8^{a}	8.3^{a}	10.8	42.2^{b}	44.1^{bc}
200, 3 split	1.0^{a}	2.7^{a}	8.8^{a}	9.5	41.9^{b}	43.7^{c}
LSD (P≤0.05)	0.45	0.33	1.9	NS	0.89	0.46

*LSD = least significant difference for timing x N

For full trial results see the 2013 Hart Trial Results book.

Download your free copy from the Hart website: 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.

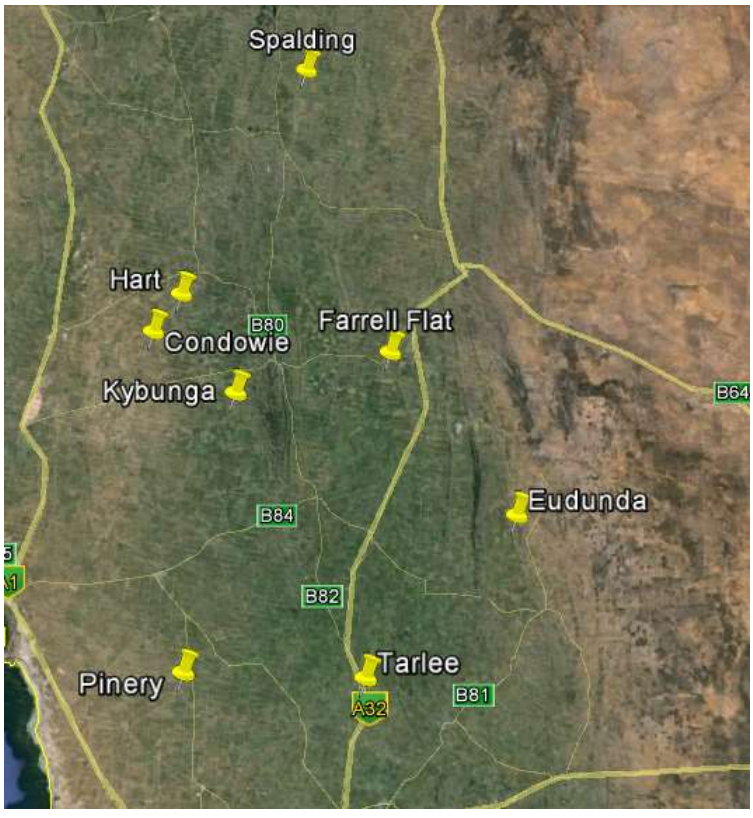
Yield Prophet® has been very accurate throughout Australia, over the past 5 seasons. At the Hart field site the *Yield Prophet*® prediction on the 15th September, using an average finish, has been only 16% above the final grain yield, averaged over the past 4 years, making wheat growth models such as 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 water soil characteristics for all sites

Site	Average annual rainfall (mm)	Soil type	Pre-sowing soil nitrogen (0-90cm) (kg/ha)	Plant Available Water Capacity (mm)
Hart	400	Sandy clay loam	94	206
Spalding	430	Red brown earth	108	143
Condowie	350	Sandy loam	64	115
Kybunga	428	Friable clay loam	89	262
Farrell Flat	474	Red clay loam over clay	97	172
Pinery	374	Silty clay loam over clay	98	79
Eudunda	445	Loam over clay loam	86	96
Tarlee	474	Sandy loam over clay on rock	174	113

2014 site locations



HART

SANDY CLAY LOAM

The season so far

Annual rain to date: 384 mm *(10 mm since last report)*
GSR to date: 272 mm
GSR decile: 7
Current predicted PAW: 100 mm (49% full)
PAWC: 206 mm

Crop growth

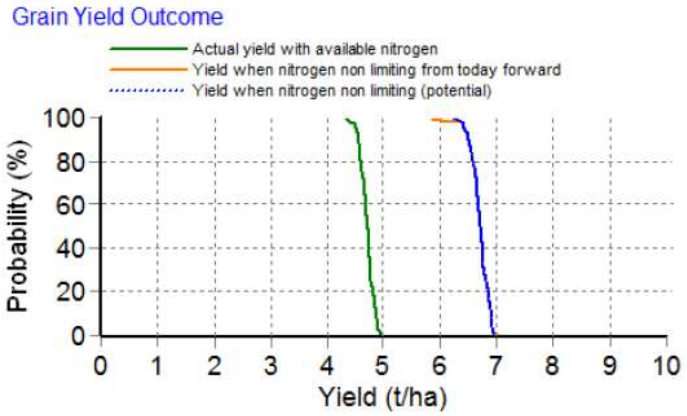
Variety: Mace wheat **Sowing date:** 1st May
Nitrogen fertiliser: 30 kg N/ha + 46 kg N/ha

Grain & hay yield predictions

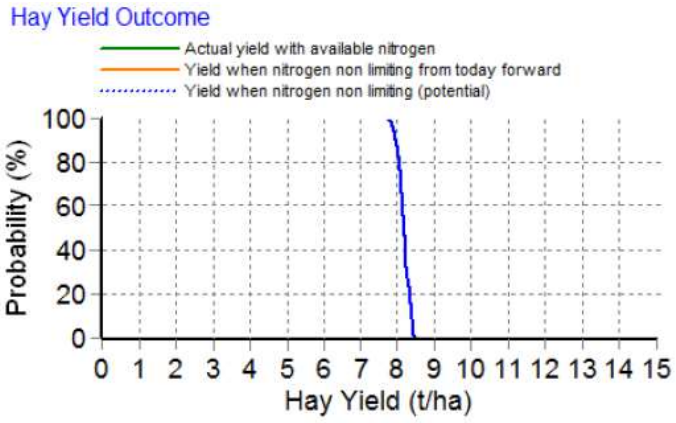
Yield prophet estimate: (Date of report 08/09/2014)
These estimates are based on a 50% probability

Yield t/ha	Sown 1st May (see graph)	Change since last report	Sown 20th May	Change since last report
Grain	5.6	+0.1	5.4	-0.6

French & Schultz grain yield estimate:
100% WUE: 5.1 t/ha, 80% WUE: 4.1 t/ha
This model assumes that there is 33 mm stored moisture, 110 mm of evaporation and decile 5 (62 mm) rainfall for the rest of the season.



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



SPALDING

RED BROWN EARTH

The season so far

Annual rain to date: 366 mm *(7 mm since last report)*
GSR to date: 285 mm
GSR decile: 7
Current predicted PAW: 57 mm (40% full)
PAWC: 143 mm

Grain yield predictions

Yield prophet estimate: (Date of report 08/09/2014)
These estimates are based on a 50% probability

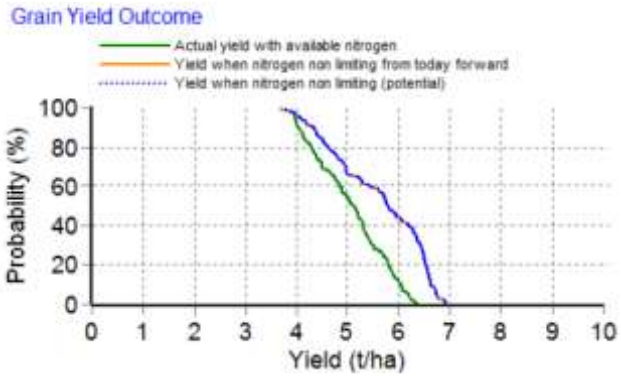
Yield t/ha	Sown 1st May (see graph)	Change since last report	Sown 20th May	Change since last report
Grain	5.4	-0.7	4.1	-1.2

French & Schultz grain yield estimate:
100% WUE: 5.7 t/ha, 80% WUE: 4.5 t/ha

This model assumes that there is 25 mm stored moisture, 110 mm of evaporation and decile 5 (85 mm) rainfall for the rest of the season.

Crop growth

Variety: Mace wheat **Sowing date:** 1st May
Nitrogen fertiliser: 30 kg N/ha + 46 kg N/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.

CONDOWIE

SANDY LOAM

The season so far

Annual rain to date: 349 mm *(6 mm since last report)*
GSR to date: 245 mm
GSR decile: 7
Current predicted PAW: 63 mm (55% full)
PAWC: 115 mm

Grain yield predictions

Yield prophet estimate: (Date of report 08/09/2014)
These estimates are based on a 50% probability

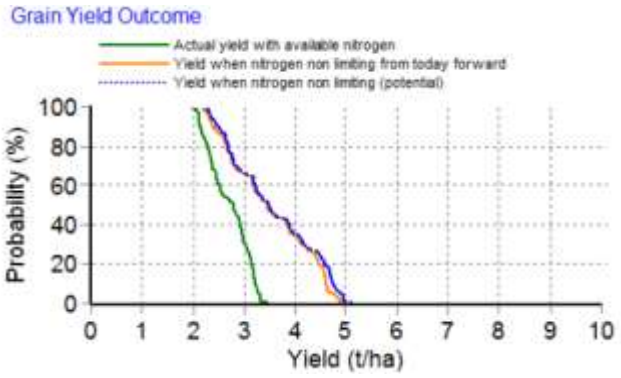
Yield t/ha	Sown 1st May (see graph)	Change since last report	Sown 20th May	Change since last report
Grain	3.1	-0.9	2.3	-0.8

French & Schultz grain yield estimate:
100% WUE: 4.3 t/ha, 80% WUE: 3.5 t/ha

This model assumes that there is 31 mm stored moisture, 110 mm of evaporation and decile 5 (50 mm) rainfall for the rest of the season.

Crop growth

Variety: Mace wheat **Sowing date:** 1st May
Nitrogen fertiliser: 30 kg N/ha + 46 kg N/ha



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

KYBUNGA

CLAY LOAM

The season so far

Annual rain to date: 402 mm *(15.5 mm since last report)*
GSR to date: 308 mm
GSR decile: 8
Current predicted PAW: 99 mm (38% full)
PAWC: 262 mm

Grain yield predictions

Yield prophet estimate: (Date of report 10/09/2014)
These estimates are based on a 50% probability

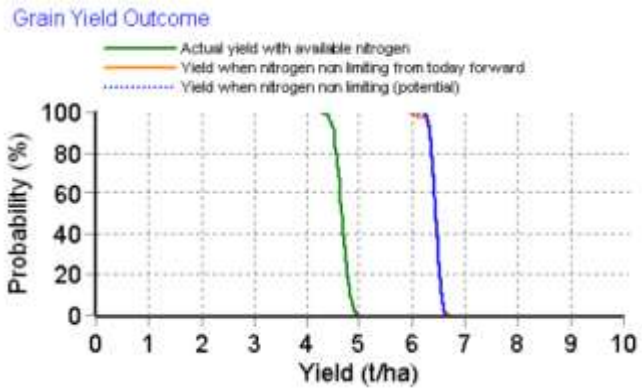
Yield t/ha	Sown 1st May (see graph)	Change since last report	Sown 20th May	Change since last report
Grain	5.5	+0.1	5.4	-0.6

French & Schultz grain yield estimate:
100% WUE: 6.2 t/ha, 80% WUE: 4.9 t/ha

This model assumes that there is 28 mm stored moisture, 110 mm of evaporation and decile 5 (82 mm) rainfall for the rest of the season.

Crop growth

Variety: Mace wheat **Sowing date:** 1st May
Nitrogen fertiliser: 30 kg N/ha + 46 kg N/ha



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

FARRELL FLAT

LIGHT CLAY LOAM

The season so far

Annual rain to date: 469 mm *(5 mm since last report)*
GSR to date: 374 mm
GSR decile: 8
Current predicted PAW: 104 mm (60% full)
PAWC: 172 mm

Grain yield predictions

Yield prophet estimate: (Date of report 08/09/2014)
These estimates are based on a 50% probability

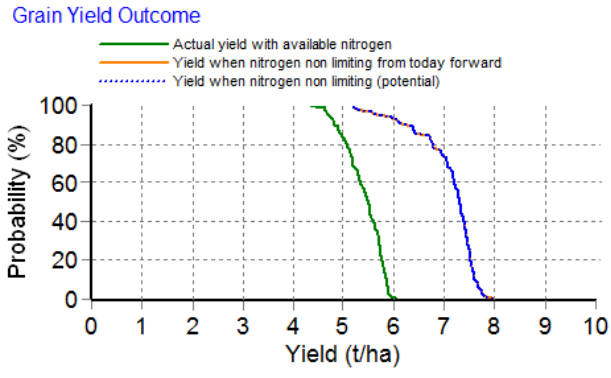
Yield t/ha	Sown 1st May (see graph)	Change since last report	Sown 20th May	Change since last report
Grain	6.4	0.0	5.8	-0.6

French & Schultz grain yield estimate:
100% WUE: 7.8 t/ha, 80% WUE: 6.4 t/ha

This model assumes that there is 29 mm stored moisture, 110 mm of evaporation and decile 5 (98 mm) rainfall for the rest of the season.

Crop growth

Variety: Mace wheat **Sowing date:** 1st May
Nitrogen fertiliser: 30 kg N/ha + 46 kg N/ha



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

PINERY

SILTY CLAY LOAM

The season so far

Annual rain to date: 306 mm *(10 mm since last report)*
GSR to date: 216 mm
GSR decile: 9
Current predicted PAW: 23 mm (29% full)
PAWC: 79 mm

Grain yield predictions

Yield prophet estimate: (Date of report 08/09/2014)
These estimates are based on a 50% probability

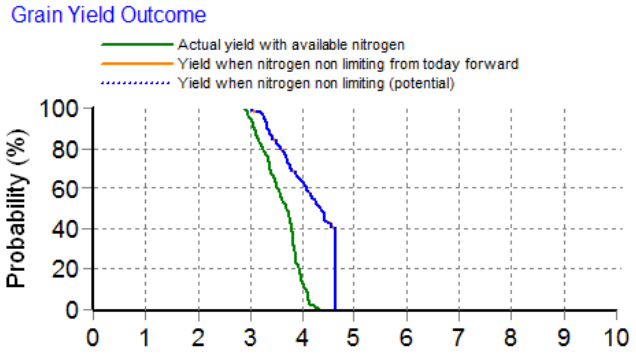
Yield t/ha	Sown 1st May (see graph)	Change since last report	Sown 20th May	Change since last report
Grain	4.0	-0.4	2.9	-0.7

French & Schultz grain yield estimate:
100% WUE: 4.2 t/ha, 80% WUE: 3.3 t/ha

This model assumes that there is 27 mm stored moisture, 110 mm of evaporation and decile 5 (75 mm) rainfall for the rest of the season.

Crop growth

Variety: Mace wheat **Sowing date:** 1st May
Nitrogen fertiliser: 30 kg N/ha + 46 kg N/ha



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

EUDUNDA

GRAVELLY LOAM

The season so far

Annual rain to date: 456 mm *(10 mm since last report)*
GSR to date: 342 mm
GSR decile: 8
Current predicted PAW: 53 mm (55% full)
PAWC: 96 mm

Grain yield predictions

Yield prophet estimate: (Date of report 08/09/2014)
These estimates are based on a 50% probability

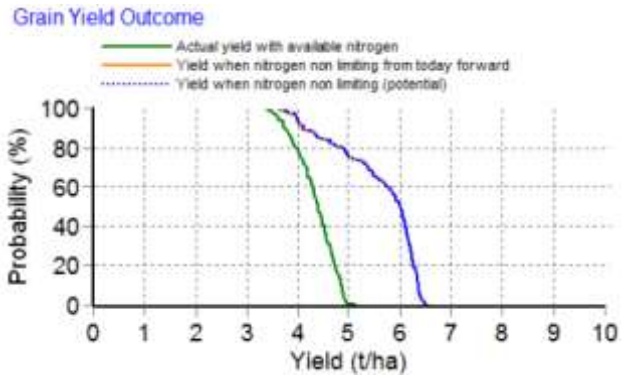
Yield t/ha	Sown 1st May (see graph)	Change since last report	Sown 20th May	Change since last report
Grain	5.2	-0.1	4.9	+0.1

French & Schultz grain yield estimate:
100% WUE: 5.1 t/ha, 80% WUE: 4.1 t/ha

This model assumes that there is 34 mm stored moisture, 110 mm of evaporation and decile 5 (62 mm) rainfall for the rest of the season.

Crop growth

Variety: Mace wheat **Sowing date:** 1st May
Nitrogen fertiliser: 30 kg N/ha + 46 kg N/ha



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

TARLEE

SANDY LOAM

MID NORTH
HIGH RAINFALL ZONE

The season so far

Annual rain to date: 400 mm *(18 mm since last report)*
GSR to date: 310 mm
GSR decile: 7
Current predicted PAW: 60 mm (53% full)
PAWC: 113 mm

Grain yield predictions

Yield prophet estimate: (Date of report 08/09/2014)
These estimates are based on a 50% probability

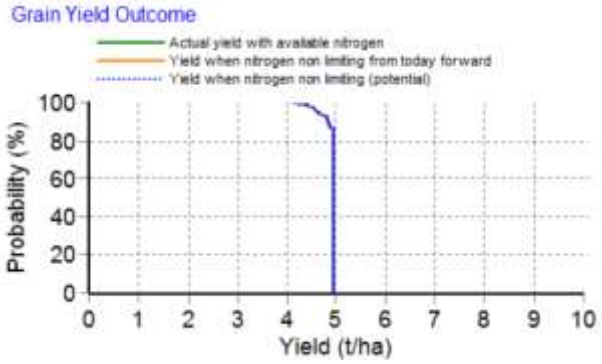
Yield t/ha	Sown 1st May (see graph)	Change since last report	Sown 20th May	Change since last report
Grain	5.0	+0.1	4.9	-0.6

French & Schultz grain yield estimate:
100% WUE: 6.3 t/ha, 80% WUE: 5.0 t/ha

This model assumes that there is 27 mm stored moisture, 110 mm of evaporation and decile 5 (87 mm) rainfall for the rest of the season.

Crop growth

Variety: Mace wheat **Sowing date:** 1st May
Nitrogen fertiliser: 30 kg N/ha + 46 kg N/ha



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

Hart Field Day program – Sept 16th 2014

For lots more Hart Field Day information, visit our website: www.hartfieldsite.org.au

Time							
10:00am	WELCOME & OPENING Justin Wundke, Hart chairman *Choose your own program - each session lasts for 30 minutes*						
10:30	A Herbicide tolerance	D Canola clethodim	I Controlling grass weeds	K Cereal time of sowing	O Pulse varieties	Q Legume N	R Frost & heat stress
11:00	B Robotics & UAVs (includes demo)	C Oat varieties	F Canola varieties	H Durum varieties & agronomy	J Fence line weed control	L Insect management	N Pulse agronomy
11:30		A Herbicide tolerance	G Wheat varieties	I Controlling grass weeds	M Pasture production	P Green Flame	S In furrow disease control
12:00	E Barley varieties	H Durum varieties & agronomy	J Fence line weed control	O Pulse varieties	Q Legume N	R Frost & heat stress	L Insect management
12:30	LUNCH *includes address by special guest speaker DR ROBERT FITCH, Senior Research Fellow, Australian Centre for Field Robotics, University of Sydney*						
1:30	B Robotics & UAVs (includes demo)	D Canola clethodim	G Wheat varieties	K Cereal time of sowing	M Pasture production	P Green Flame	S In furrow disease control
2:00		A Herbicide tolerance	C Oat varieties	E Barley varieties	F Canola varieties	N Pulse agronomy	Q Legume N
2:30	D Canola clethodim	G Wheat varieties	I Controlling grass weeds	K Cereal time of sowing	L Insect management	O Pulse varieties	R Frost & heat stress
3:00	E Barley varieties	F Canola varieties	H Durum varieties & agronomy	J Fence line weed control	M Pasture production	N Pulse agronomy	S In furrow disease control