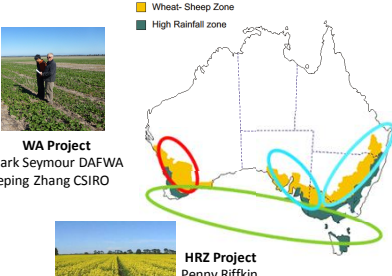


**Optimised Canola Profitability (CSP00187)**  
Melbourne Highlights Summary 2016

SUSTAINABLE AGRICULTURE FLAGSHIP  
www.csiro.au

GRDC Grains Research & Development Corporation  
NSW Department of Primary Industries  
SARDI  
Mallee Sustainable Farming  
VICTORIA  
CSIRO

### Integrated National Projects



Wheat-Sheep Zone  
High Rainfall zone

**WA Project**  
Mark Seymour DAFWA  
Heping Zhang CSIRO

**HRZ Project**  
Penny Riffkin

**"Eastern" Project**  
NSW/SARDI Team  
McCaffrey/Brill/Ware  
Regional DPI teams  
MSF, BCG, CSU

CSIRO Team  
Kirkegaard/Lilley  
Whish  
McBeath

Optimising Canola Profitability Workshop - Orange - 8 May 2014

### Canberra 2015 Workshop and Special Issue

Special Issue in *Crop and Pasture Science*, April 2016

20 manuscripts including 4 International papers (from Canada and Germany)

Topics covered:

*breeding, molecular genetics, blackleg, physiology modelling, agronomy, rotations, farming systems*

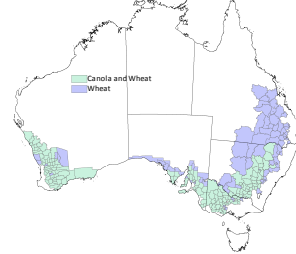
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### Collaboration: Yield Gap Analysis

Wheat and canola

Simulated potential yields  
water limited, high N supply

- 4043 locations
- 9 soil types
- 19 years (1996 to 2014)
- best-adapted cultivar



District yields (grain deliveries)  
– agricultural census data (ABS, ABARES)

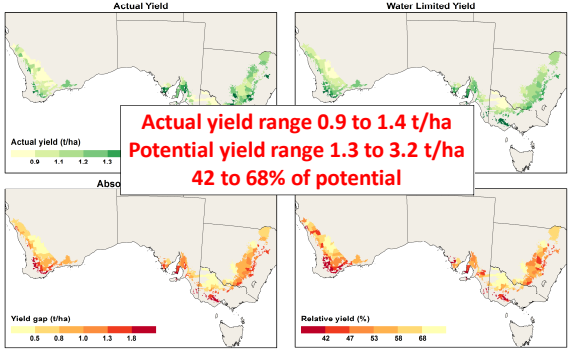
[www.yieldgapaustralia.com](http://www.yieldgapaustralia.com)

www.yieldgapaustralia.com

CSIRO

### Canola Yields and Yield Gaps

17 year averages (1996-2012) calculated by SLA



**Actual yield range 0.9 to 1.4 t/ha**  
**Potential yield range 1.3 to 3.2 t/ha**  
**42 to 68% of potential**

Actual yield (t/ha)  
0.9 1.1 1.3 1.5

Water Limited Yield (t/ha)  
0.9 1.1 1.3 1.5

Yield gap (t/ha)  
0.5 0.8 1.0 1.3 1.6

Relative yield (%)  
42 47 53 58 68

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### Our challenge and focus.....

To deliver 3:1 return on investment by 2020

**Specific strategies**


- Early sowing systems (low/medium rainfall)
- Risk management – low input (low rainfall)
- Harvest management (Module 3 - north)
- Up to date agronomic advice throughout

Optimised Canola Profitability

CSIRO

### Why earlier sowing systems?

- Changing seasonal conditions
  - Dry/warm springs
  - Increased late summer/early Autumn rainfall
- Changing management
  - Improved Fallow management
  - Improved seeding equipment, pesticides
- Changing varieties
  - Hybrids
- Limited data on early to mid-April sowing



### Early sowing systems

#### Our strategy

- Identify optimum flowering period (OFP) for the site  
*frost, heat, water stress, radiation*
- Target earliest [sowing date x variety] to hit the OFP  
*understand phenology adaptations*
- Manage for adequate biomass at flowering for yield target  
*nitrogen, seeding rate, growth type (which is most cost-effective?)*
- Identify ways to allocate more of the biomass to grain  
*Interesting varietal traits?*  
*e.g. 44Y89 and Diamond has higher HI, also quicker pod maturity*

### Can we revise sowing date recommendations?

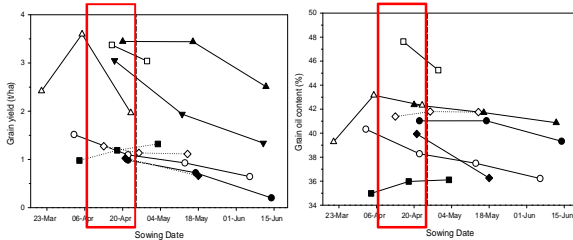
Suggested sowing times

		April				May				June			
Region	Week	1	2	3	4	1	2	3	4	1	2	3	4
Northern	West												
	East												
Central	West												
	East												
Southern	West												
	East												
	Irrigation												

- Best sowing time
- Earlier or later than desirable, possible yield reduction  
Earlier – too vegetative, lodging, disease and/or frost risk  
Later – spring moisture and heat stress
- Too late for good yields, unless favourable spring

NSW DPI 2015 Winter Crop Sowing Guide

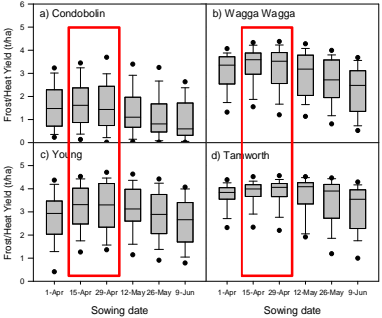
### Earlier sowing systems (a review of data 2002-2012)



- Losses (per week delay) after early April
  - Seed yield (-6.0 to -6.5%)
  - Oil (-0.5 to -1.5%)
  - WUE (-3.8 to -5.5%)
- SGM Losses (per week delay) after early April
  - \$40-\$90 at 2.5 t/ha yield
  - \$15-\$35 at 1.1 t/ha yield

Kirkegaard et al (2016) Crop and Pasture Science (in press)

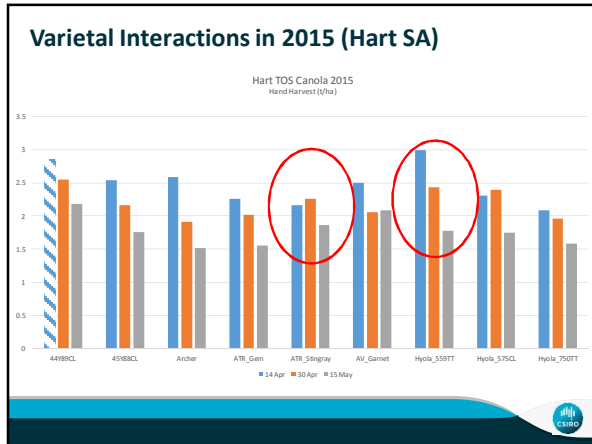
### Earlier sowing systems (recent simulation)



Kirkegaard et al (2016) Crop and Pasture Science (in press)

### 2015 Experimental Summary

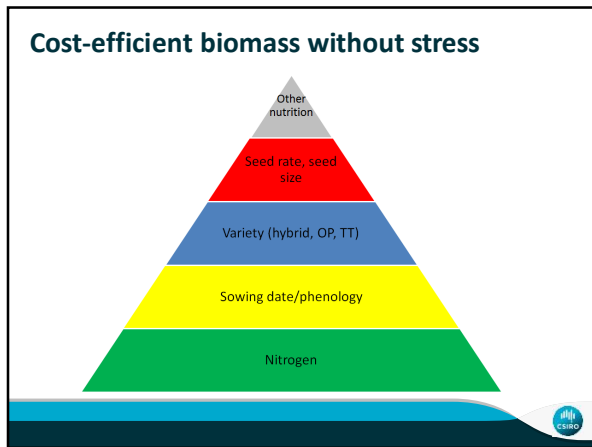
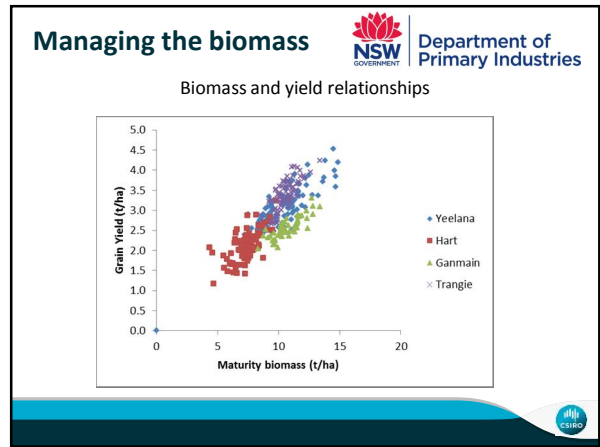
Site	April				May			
	1	2	3	4	1	2	3	4
Breeza			3.1	3.6				2.5
Trangle	3.6		3.6	3.1				
Condobolin (machine)			0.5		0.3	0.2		
Canowindra (N limited?)	2.9		3.1	3.0				
Ganmain (N limited?)	2.5	2.5	2.5	2.5				
Yeelana			3.0	3.3			3.0	
Hart			2.6	2.2			1.7	
Lamaroo			0.8		0.5		0.3	
Minnipa			1.8		1.5			
Mildura			0.5		0.4			



### 2015 phenology links with Western and HRZ

- Gatton (27.6°S),
  - 5 sowing dates
  - 21 cultivars
  - Lights to extend photoperiod on one sowing date
- 3 sites – NSW, SA (plus WA and Vic sites : 37 to 29°S)
  - 1 sowing date
  - 12+ cultivars
- International sites
  - Ottawa, Canada (45.2°N)
  - Christchurch, NZ (43.6°S) (2 sowing dates – autumn, spring)
  - 12 cultivars
- Controlled environments (+/- vernalisation, short/long day)
- NVT and experimental data – flowering and maturity date (10 sites)

**Detail level**  
Emergence, Flowering date, Leaf number, Floral initiation date



### Disease risks with early sowing


(collaboration with National Canola Pathology Initiative)

- Change crop development in relation to disease timing
- Increase flowering duration and hence disease risk
- Increase biomass and hence some disease interactions

**But....**


**Yield gains can be protected with appropriate variety selection and management**

### Disease risks with early sowing (collaboration with National Canola Pathology Initiative)




Sites which included additional disease treatments


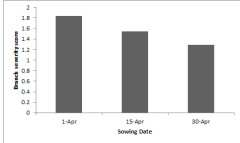
- Canowindra
- Ganmain
- Henty




### Disease risks with early sowing (collaboration with National Canola Pathology Initiative)



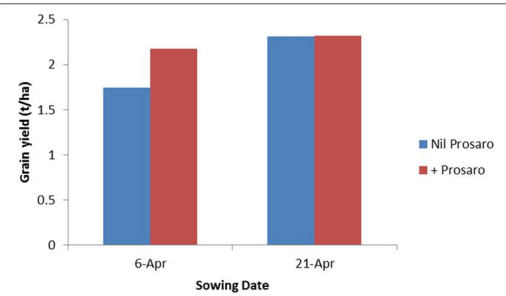
Aerial Blackleg


Sowing Date	Blackleg infection level
1-Apr	~1.8
15-Apr	~1.4
30-Apr	~1.1



### Keeping an eye on Sclerotinia (collaboration with National Canola Pathology Initiative)



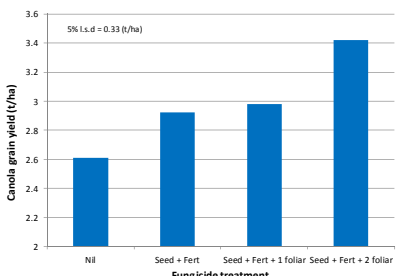
Sowing Date	Nil Prosaro	+ Prosaro
6-Apr	~1.7	~2.1
21-Apr	~2.3	~2.3



### “Beyond the call of duty” award 2015





### Response to fungicides (Canowindra)




Fungicide treatment	Canola grain yield (t/ha)
Nil	~2.6
Seed + Fert	~2.9
Seed + Fert + 1 foliar	~3.0
Seed + Fert + 2 foliar	~3.4

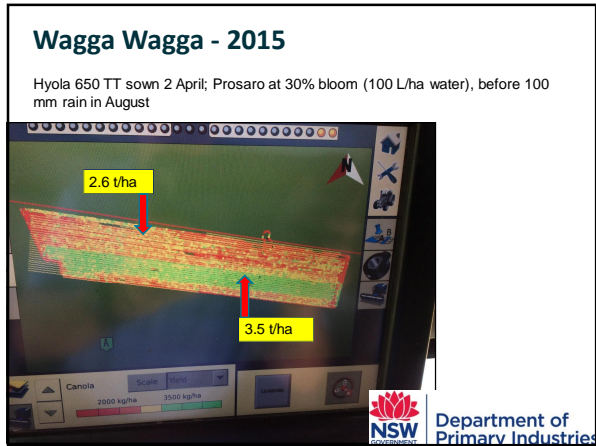
5% L.S.d = 0.33 (t/ha)



### Response to fungicides (Canowindra)

- Fungicide application's increased grain yield by up to **808kg/ha**.
- Blackleg**
  - Highest blackleg internal infection from 15 April sow date (significant)
  - Highest blackleg pod infection from 1 April (not sig)
  - Blackleg internal infection had significant effect on grain yield
  - Branch and pod infection had negligible effect on grain yield.
  - Grain yield related to severity of internal blackleg infection  
(Increase of 1% = yield loss of 50 kg/ha).
- Sclerotinia**
  - Sclerotinia on main stem caused significant grain yield reductions  
(Increase of 1% plants infected = yield loss 100 kg/ha)





## GRDC Grains Research & Development Corporation

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### NVT (2005 – 2014) yield averages

Sites (High rainfall)	Mid-maturity		Sites (Low rainfall)	Early-maturity
	Im-tolerant	Tris-tolerant		
<b>NSW</b>				
SE (Geregy)	2.81	2.75	NW (Coomamble)	1.67
SE (Grenfell)	2.45	2.28	NW (Trangie)	1.72
NE (Wellington)	2.49	2.21	OW (Condobolin)	1.44
NW (Gungahra)	2.10	1.92		
<b>Victoria</b>				
NE (Narrawong)	2.25	1.96	Mallee (Hopetoun)	1.18
NC (Diggara)	2.49	2.01		
SW (Hamilton)	2.51	2.54		
Wimmera (Minyip)	1.58	1.40		
<b>South Australia</b>				
Mid-N (Bordertown)	2.47	2.41	Yorke P (Mintaton)	1.99
Yorke P (Arthorston)	2.90	2.44	Upper EP (Tooringa)	1.26
Lower EP (Mt Hope)	1.99	1.69	SE (Keith)	1.58
SE (Bordertown)	1.89	1.73		
<b>Western Australia</b>				
AZ 1 (Williams)	2.50	2.12	AZ 1 (Mingenew)	2.03
AZ 2 (Katanning)	1.88	1.73	AZ 2 (Nyabing)	1.69
AZ 2 (Cunderdin)	-	1.34	AZ 5 (Hyden)	1.10
AZ 6 (Mungilup)	1.51	1.78	AZ 5 (Scadden)	1.36

**Medium rainfall 1.5 to 2.9 t/ha**

**Low rainfall 1.1 to 2.0 t/ha**

