



Crop Flowering Calculator – an online tool to optimise sowing date for wheat, barley and canola

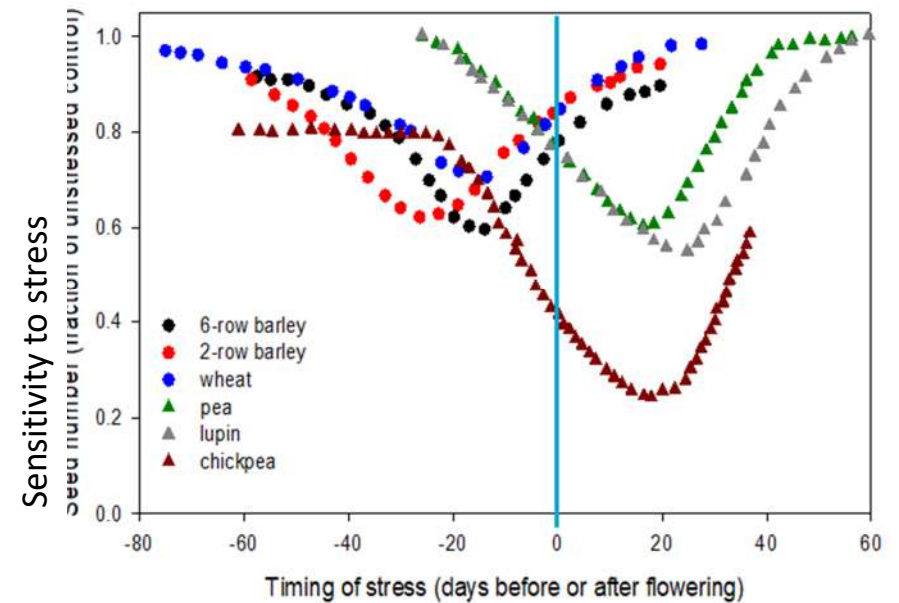
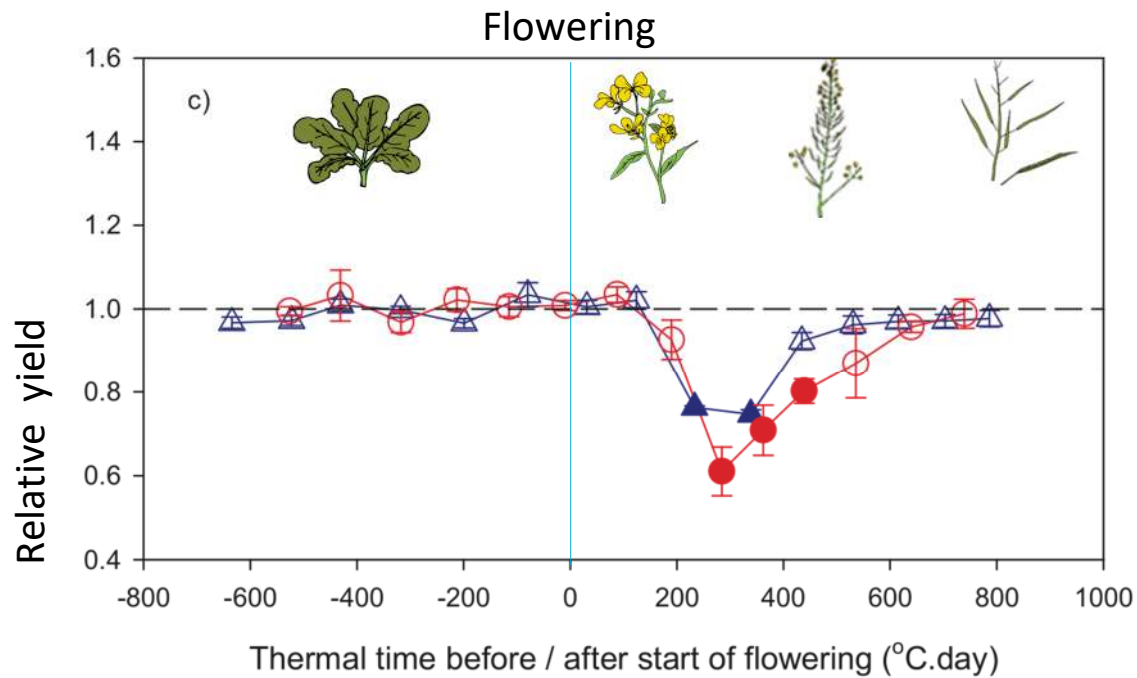
Julianne Lilley, **Jeremy Whish**, Shannon Dillon, Pengcheng Hu, Bangyou Zheng, Di He, Alex Boyer, Chris Helliwell, Enli Wang, Jessica Hyles

Australia's National Science Agency





Critical period of yield formation

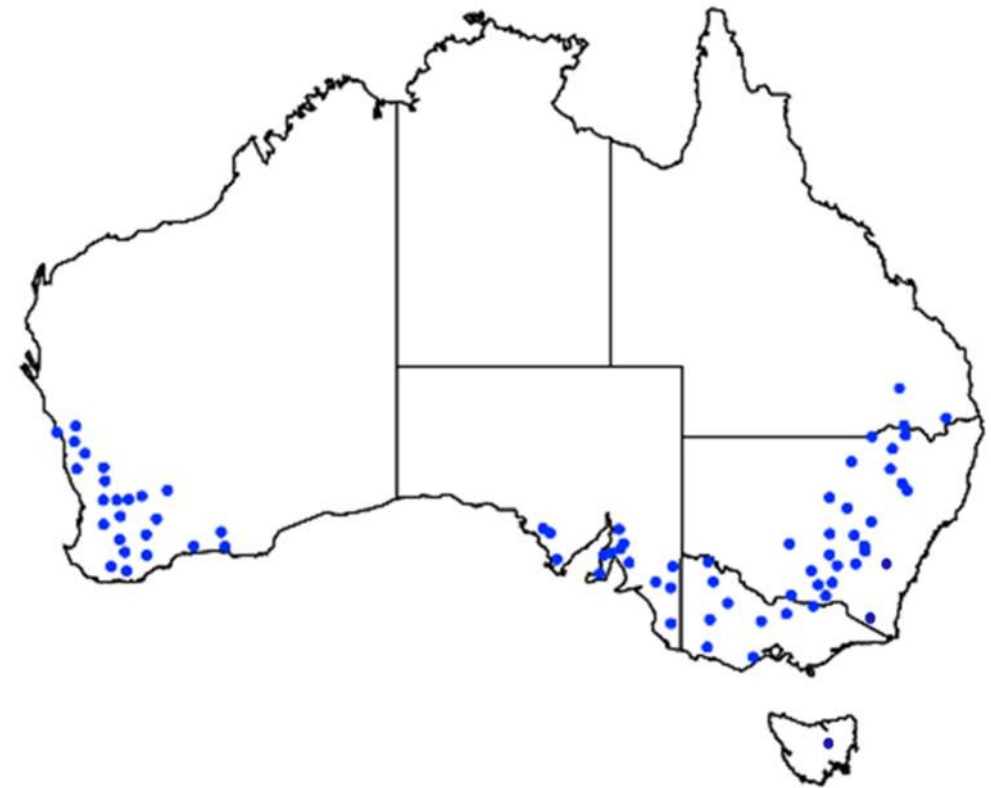
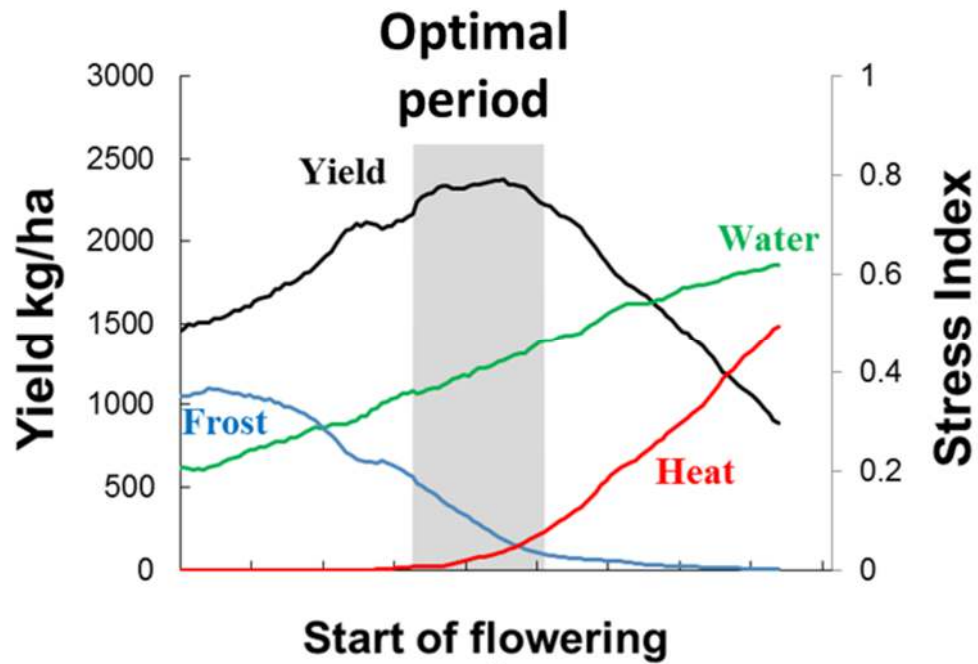


Kirkegaard et al. 2018 Field Crops Research 222: 180-188

Sadras and Dreccer (2015) Crop Past Sci 66:1137-1150



Optimal flowering period



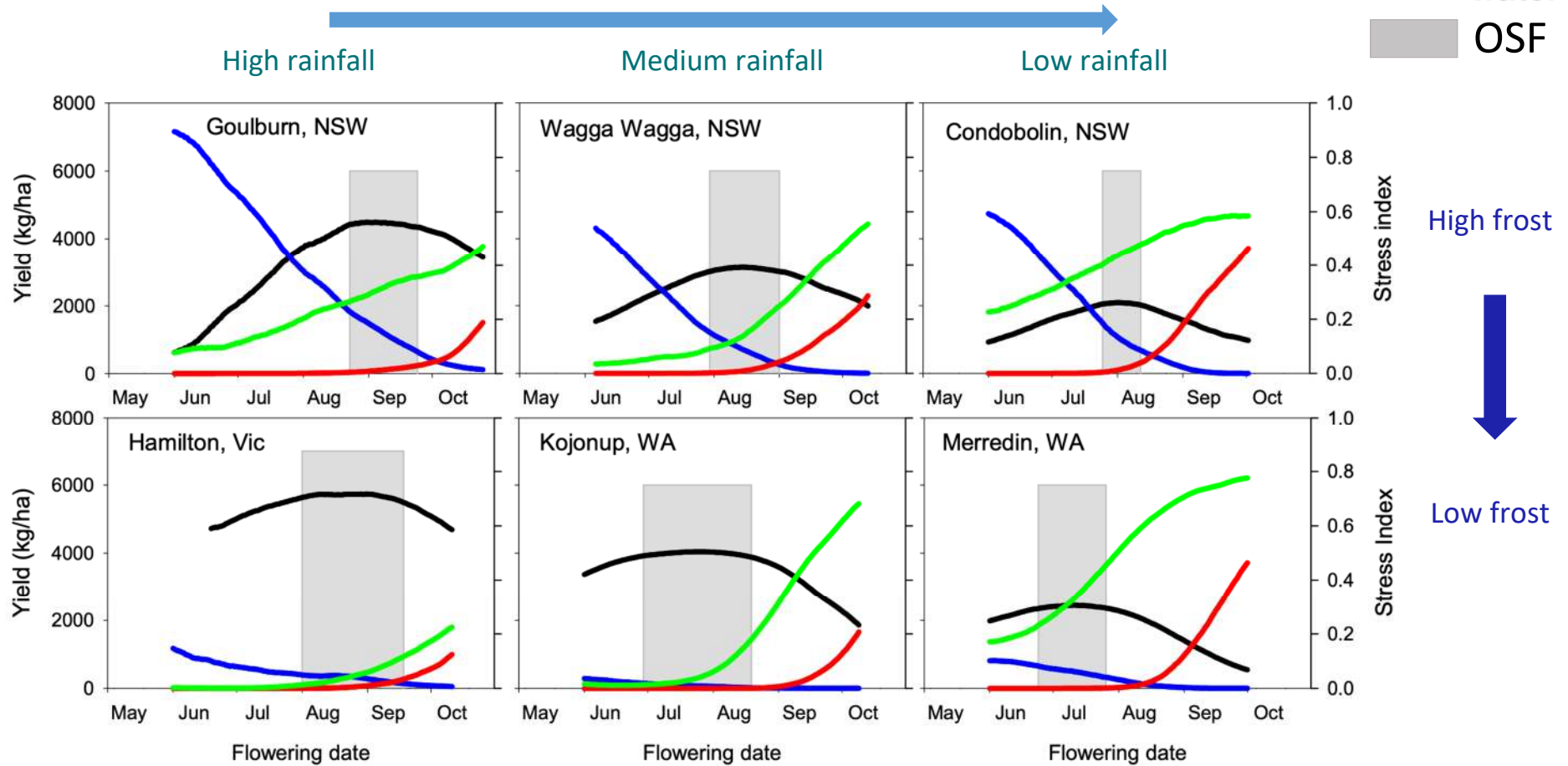
Flohr et al. (2017) *Field Crops Research* 209:108-119

Lilley et al. (2019) *Field Crops Research* 235:118-128



Optimal Start of Flowering - Canola

- yield
- frost
- heat
- water
- OSF





Can't we just use days from sowing



Gatton Qld



Ottawa Canada



Canberra ACT

Sown on the same day, photos taken on the same day, same cultivars three different environments



Genetics and environment drive phenology

Environment

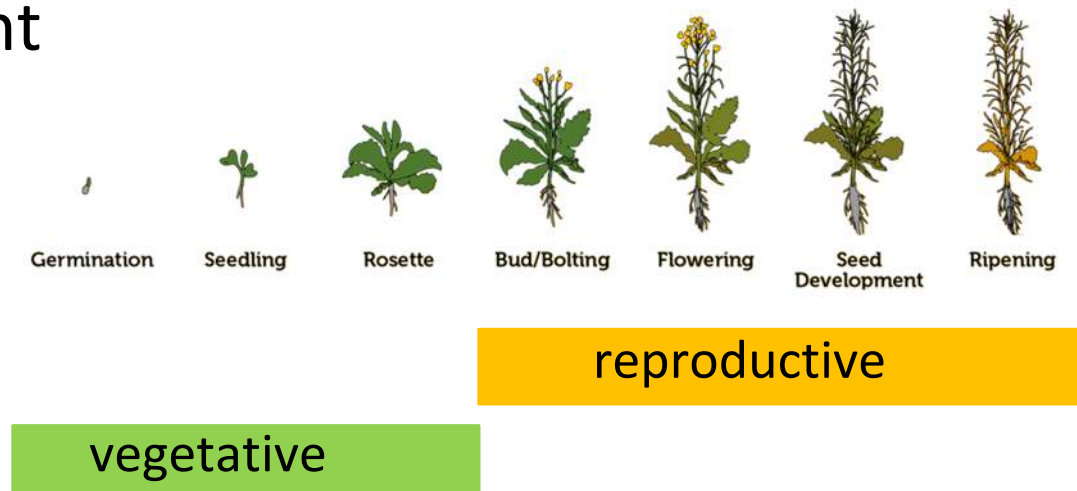
- temperature drives development
- vernalisation
- photoperiod

Genome

- genetic effects

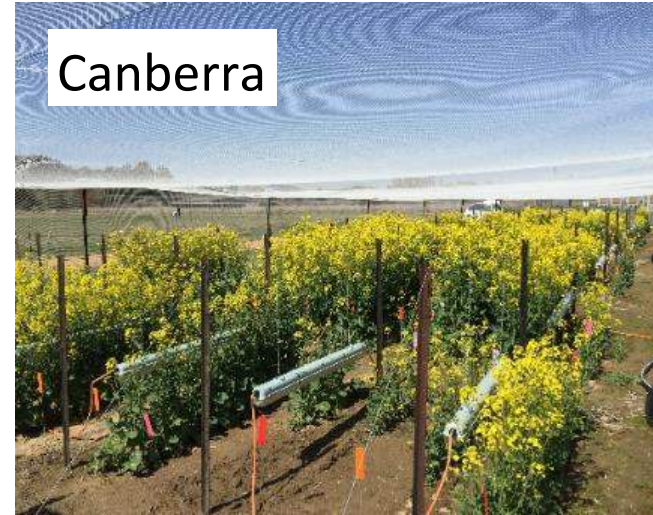
Interactions

- GxE



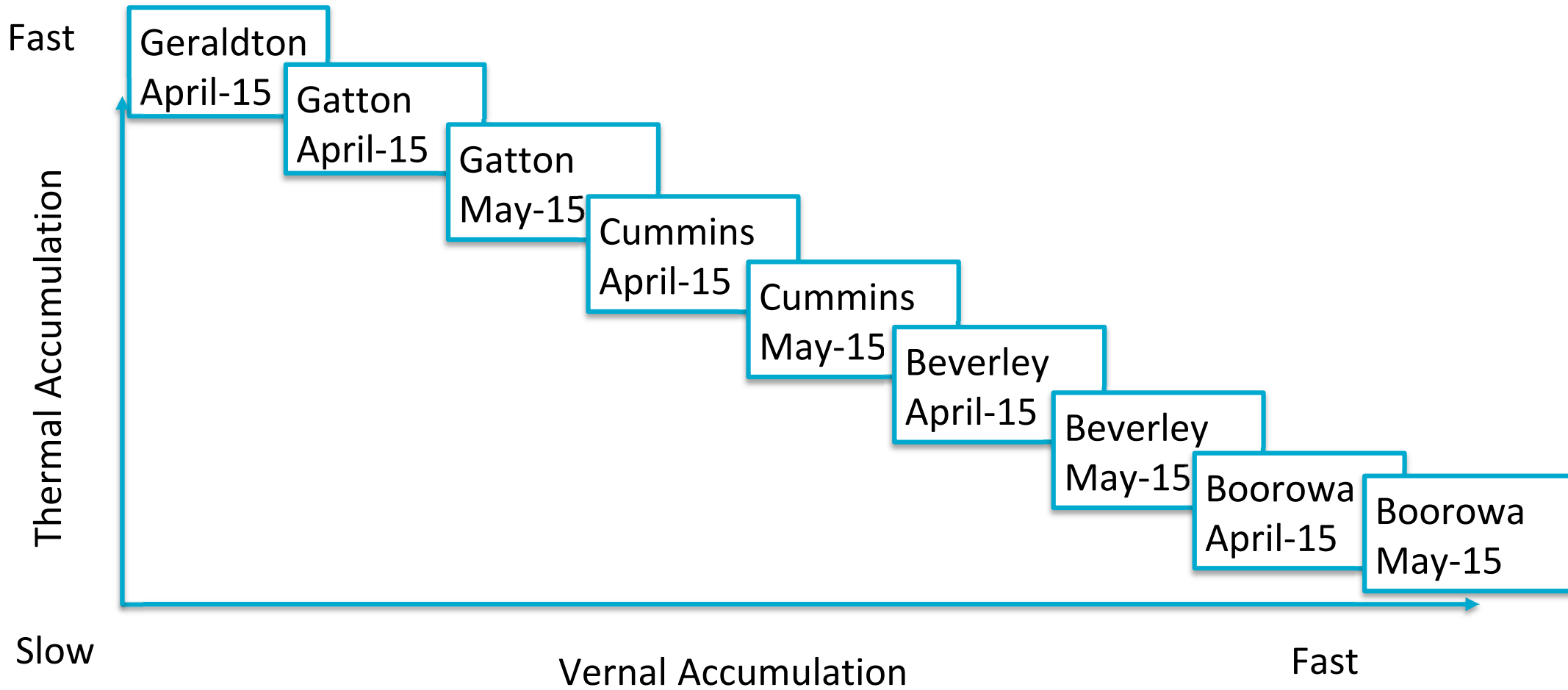
 Understanding control of flowering time

- Thermal time
- Vernalisation
- Photoperiod





Climate analysis

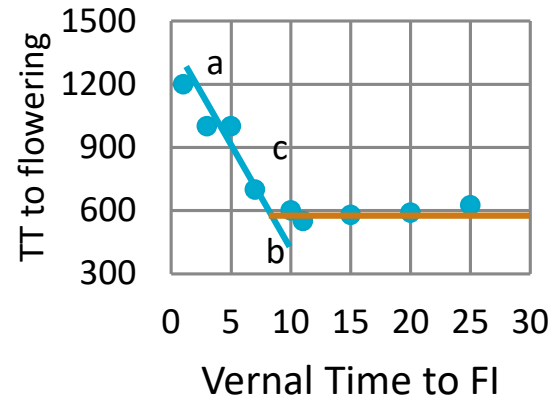




Capturing response to temperature

Example - phenology response multi-site data

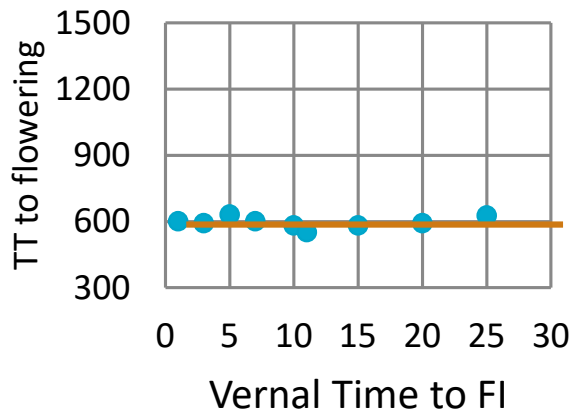
Variety x



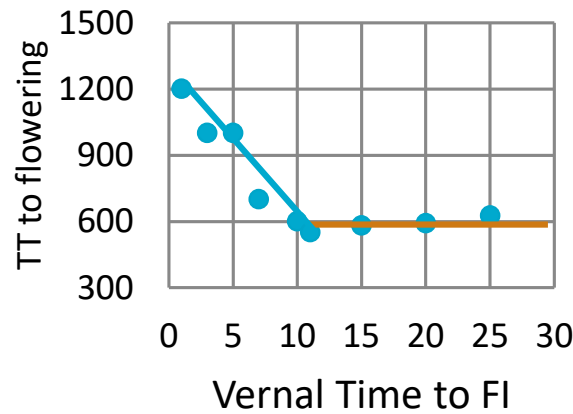
Parameters

- a. TT to flower – no vern
- b. Vern response saturated
- c. Rate of response to vern

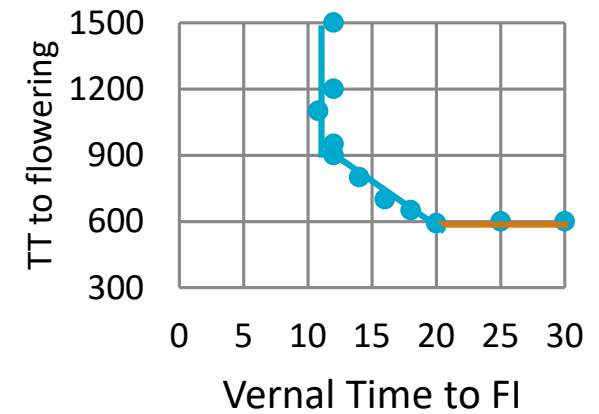
Vern-Neutral



Facultative-Vern



Obligate-Vern





Putting it all together





Developing dynamic tools

APSIM models simulate phenology

Does this accurately

But..

Phenology parameters must be estimated first

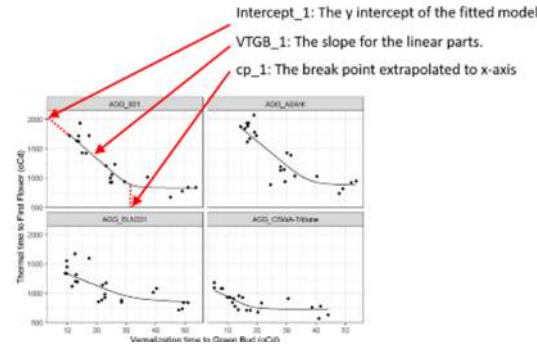
Compounded by new varieties
- rapid turn-over for canola



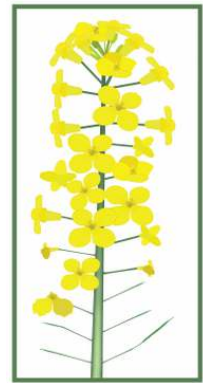
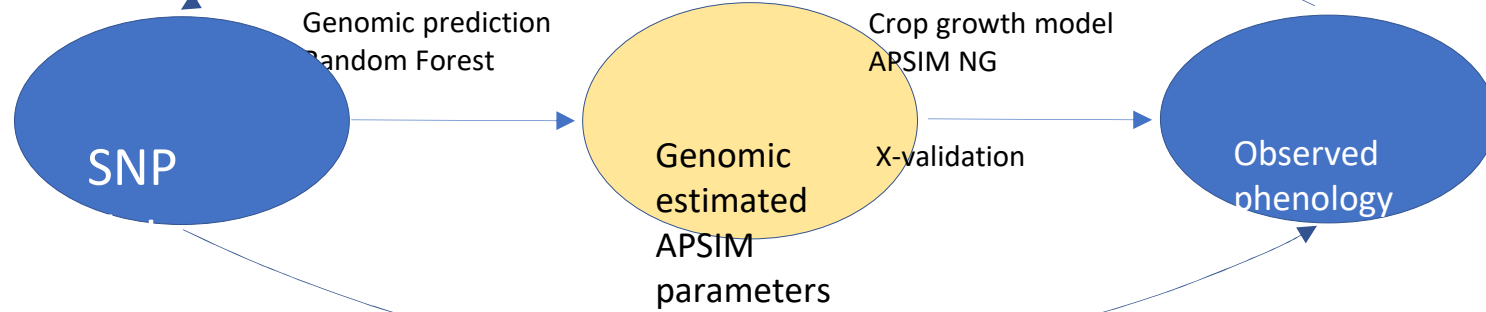
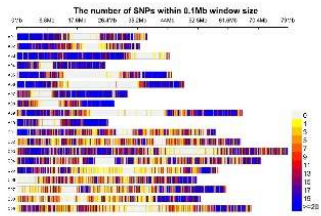
The screenshot shows the 'Canola Flowering Calculator' interface. At the top left is the CSIRO logo. The main header is yellow with the title 'Canola Flowering Calculator' and the subtitle 'Helping you optimise your canola program'. A link 'Learn more about this tool >' is on the right. Below the header, the text 'Choose your scenario below to get started' is displayed. There are two dark teal buttons with yellow icons and text: 'Which variety should I sow? (I know my intended sowing date)' with a canola flower icon and a 'Go' button; and 'When should I sow? (I know my variety)' with a sun icon and a 'Go' button.



Hybrid genomics-APSIM-NG model



APSIM parameter optimisation





National Phenology Initiative (Phase 2)

- Use genomics to predict phenology parameters
- Tool for selection of cultivar and sowing date combinations which flower in the optimal period for each location.
- Wheat, barley canola
- Validate against National Variety Trial data
- 77 locations (2023)
- 850 locations by 2025





Welcome to the flowering calculator



[About this tool](#)

Prototype Flowering Calculator

Helping you optimise your sowing programs

How the Flowering Calculator Works

The Flowering Calculator helps you optimise your program by finding the variety or sowing time that best matches the optimal flowering window for your location. Once you've specified your location and crop type, you can choose to either Find a Variety (to match a fixed sowing date), or find When to Sow (to match a fixed variety). If you're looking to understand "When to Sow", you can choose up to three varieties to compare.

This calculator is a prototype and has not yet been validated. Any results from the calculator are to be used at your own risk and with the understanding that this product has not undergone formal validation.

Select your Location

Click the button below to find your nearest modelled point on the map.

Find location on map

Please contact us at research@csiro.au if you have suggestions or comments about this tool.



Select a site

A satellite map of Australia showing various locations marked with red location pins. The map covers parts of New South Wales and Victoria. A yellow pin is highlighted over Goulburn. At the bottom of the map, there is a white search bar containing the text "Goulburn". To the right of the search bar is a "Find my location" button with a location pin icon, and further right is a green "Select" button. The map includes labels for cities like Sydney, Newcastle, Canberra, Melbourne, and various regional towns. National parks like Wollemi and Kosciuszko are also labeled. The Google logo is visible in the bottom left corner.

NEW SOUTH WALES

VICTORIA

Goulburn

Find my location

Select

Keyboard shortcuts | Map data ©2023 Google, Imagery ©2023 TerraMetrics | Terms



Select a crop



 About this tool

Prototype Flowering Calculator

Helping you optimise your sowing programs

< Back

I would like to calculate flowering for



Wheat



Canola



Barley

Please contact us at feedback@canolaflowering.com.au if you have suggestions or comments about this tool.



Choose a scenario



 About this tool

Prototype Flowering Calculator

Helping you optimise your sowing programs

< Back

I would like to calculate flowering for



Wheat



Canola



Barley

Select your scenario

Which variety should
I sow?
(I know my intended
sowing date)

When should I sow?
(I know my variety)

Please contact us at feedback@grainsresearch.com.au if you have suggestions or comments about this tool.



Choose a scenario



[About this tool](#)

Prototype Flowering Calculator

Helping you optimise your sowing programs

[< Back](#)

I would like to calculate flowering for



Wheat



Canola



Barley

Select your scenario

Which variety should I sow?
(I know my intended sowing date)

When should I sow?
(I know my variety)

Please contact us at feedback@grainsresearch.com.au if you have suggestions or comments about this tool.



Filter cultivar options



[About this tool](#)



Canola Flowering Calculator

Helping you optimise your sowing programs

When should I sow?

If you already know what variety you are using but need to work out the optimal time to sow to avoid frost damage, we can help. Select a variety to see the optimal sowing times for your location.*

Filter by:

All Classifications

All Herbicides

All Companies

* You can select up to three varieties to compare at any one time.

44Y89 (CL) ATR Stingray

44Y87 (CL)

45Y86 CI

45Y88 CI

ATR Bonito

ATR Gem

Wahoo

AV Garnet

Sowing Dates

Mullewa

The closer the coloured boxes are to the blue bar the better chance you have of flowering in the optimal flowering period and maximising yield.

- Optimal period for start of flowering
- 44Y89 (CL)
- ATR Stingray

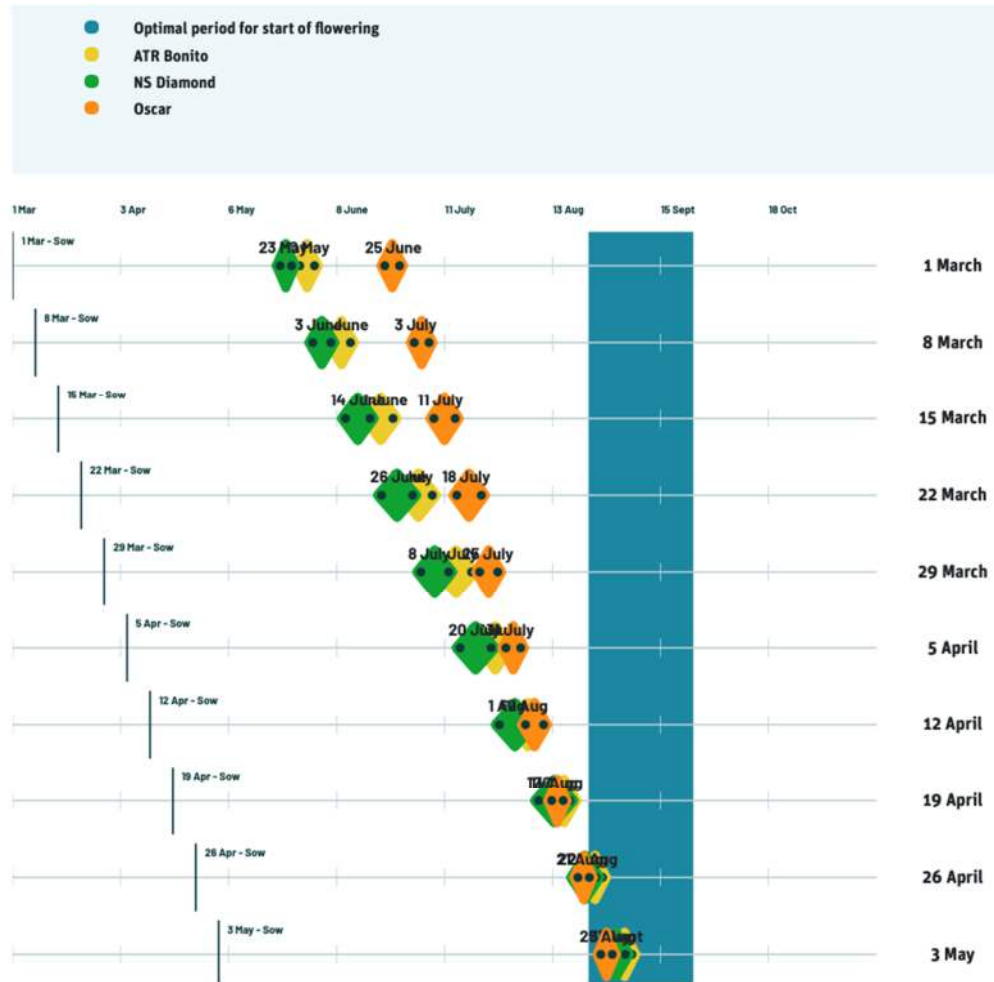
Optimal Start of Flowering Period

Start of optimal flowering period: **8 July**

End of optimal flowering period: **29 July**



Compare cultivars





Select a sowing week



[About this tool](#)



Wheat Flowering Calculator

Helping you optimise your sowing programs

Which variety should I sow?

If you already know approximately when you need to sow your Wheat but have a choice of variety, we can help you choose the most suitable variety for your location.

Select a sowing week to see the optimal varieties for your location.

Select sowing week

Week starting 1 March

Week starting 8 March

Week starting 15 March

Week starting 22 March

Week starting 29 March

Week starting 5 April

Week starting 12 April

Week starting 19 April

Week starting 26 April

Week starting 3 May

Week starting 10 May

Week starting 17 May

Week starting 24 May

Week starting 31 May

Week starting 7 June

Week starting 14 June

Week starting 21 June

Week starting 28 June

Week starting 5 July

Week starting 12 July

Week starting 19 July

Week starting 26 July



See what cultivar suits

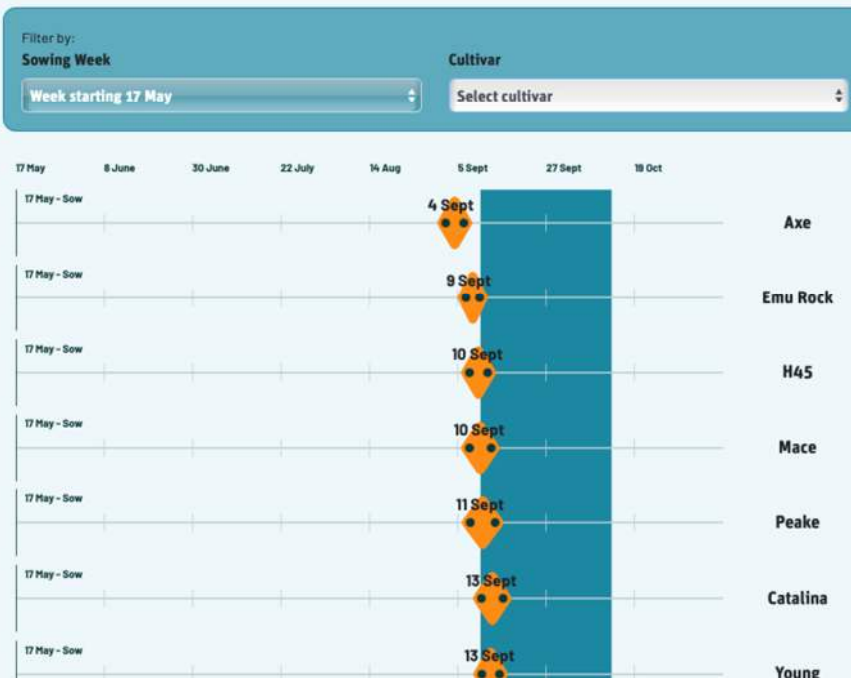
Mt Barker

From 17 May

The closer the orange boxes are to the blue bar the better chance you have of flowering in the optimal flowering period and maximising yield.

The blue bar represents the **Optimal period to achieve 50% flowering** (11 September to 14 October).

The orange boxes represents the **Flowering date range**.





How to access the tool

Crop Flowering Calculator

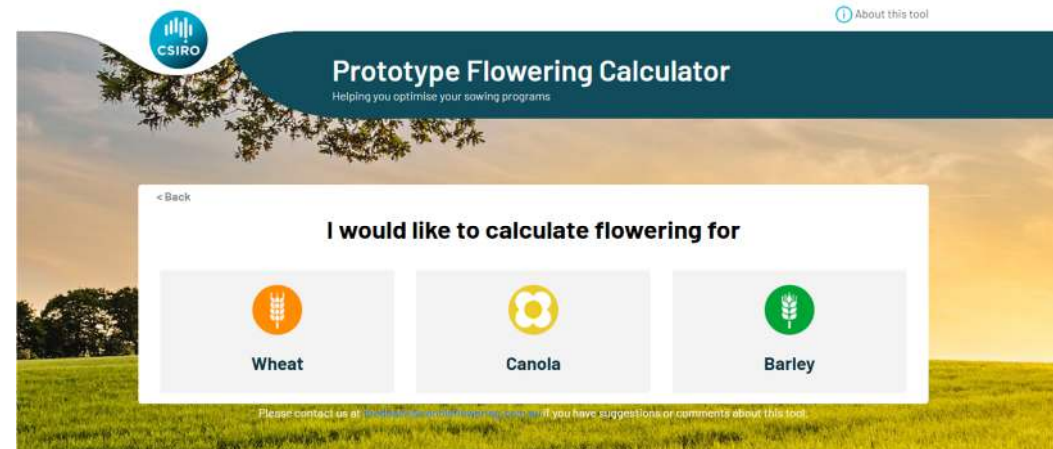
- GRDC investment (started 2022)
- incorporating genomic model
- update model and app annually via NVT

Help Growers

- choose variety or sowing time best suited to their site
- Interpret NVT data

Help breeders

- characterise phenology for new and existing varieties in wider range of locations
- incorporate into hybrid and OP breeding programs



testfloweringtool.squarevdesign.com





Testing and Feedback

<https://testfloweringtool.squarevdesign.com>

Feedback welcome

- Email address link on webpage
- Questions
 - Do you like the look and feel?
 - Do you think the results are accurate in your region - comments?
 - Would you use it? Why?



Thank you

Julianne.Lilley@csiro.au

Jeremy.Whish@csiro.au

Australia's National Science Agency

