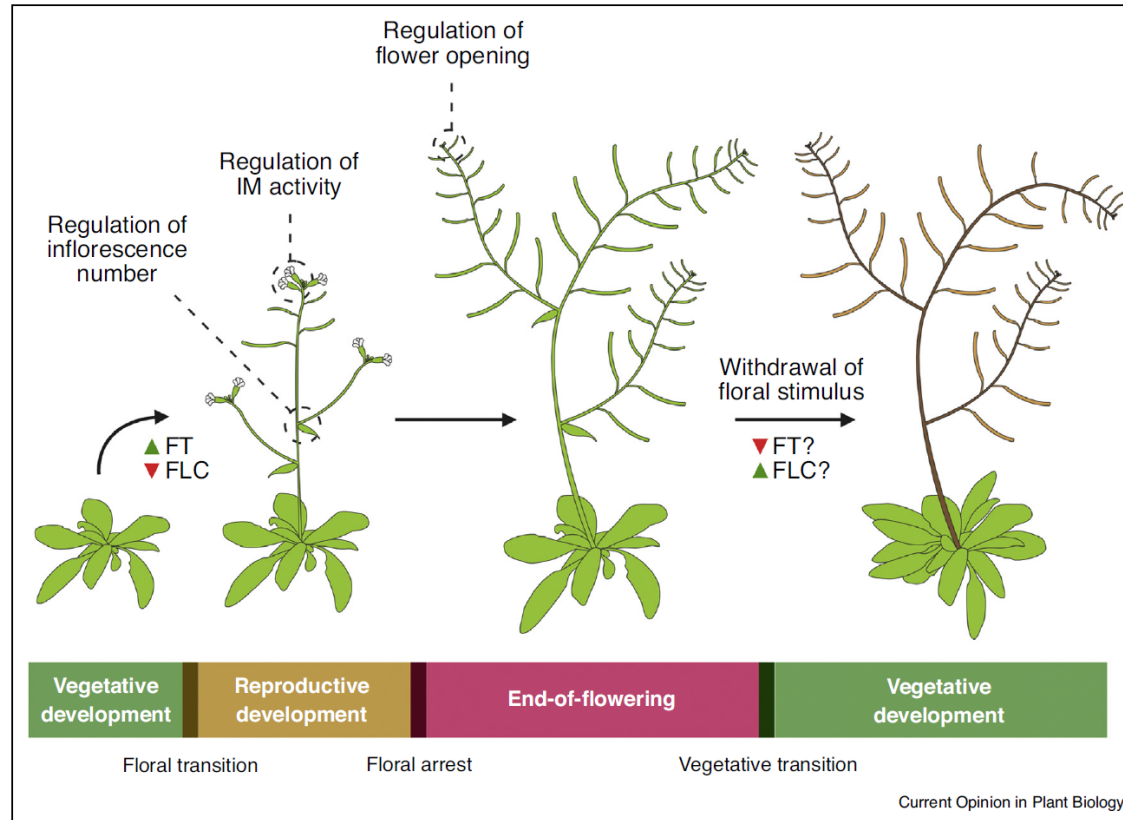


*Understanding photothermal
control of development in
Brassicaceae*

Tom Bennett

Centre for Plant Sciences, University of Leeds

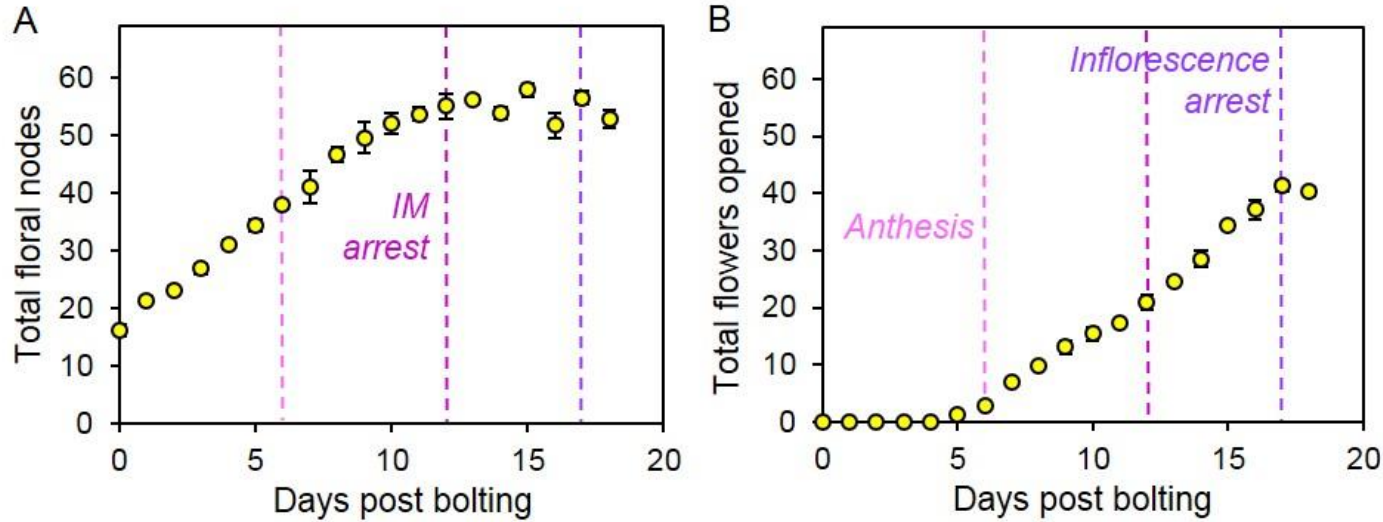
When do plants stop flowering?



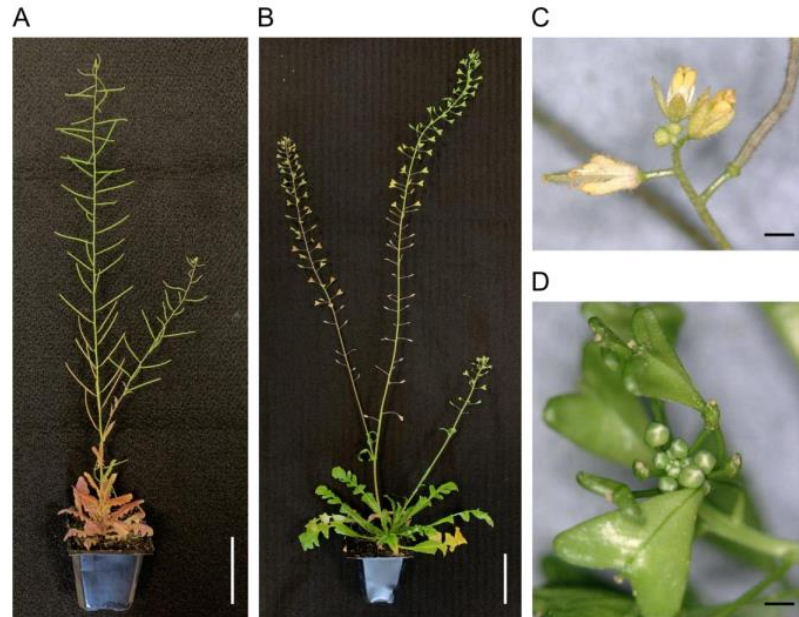
Gonzalez-Suarez et al, *Curr Opin Plant Biol*, 2020

- When they stop opening flowers, right?
- What is the relevant control point?

How do Brassicas stop flowering?

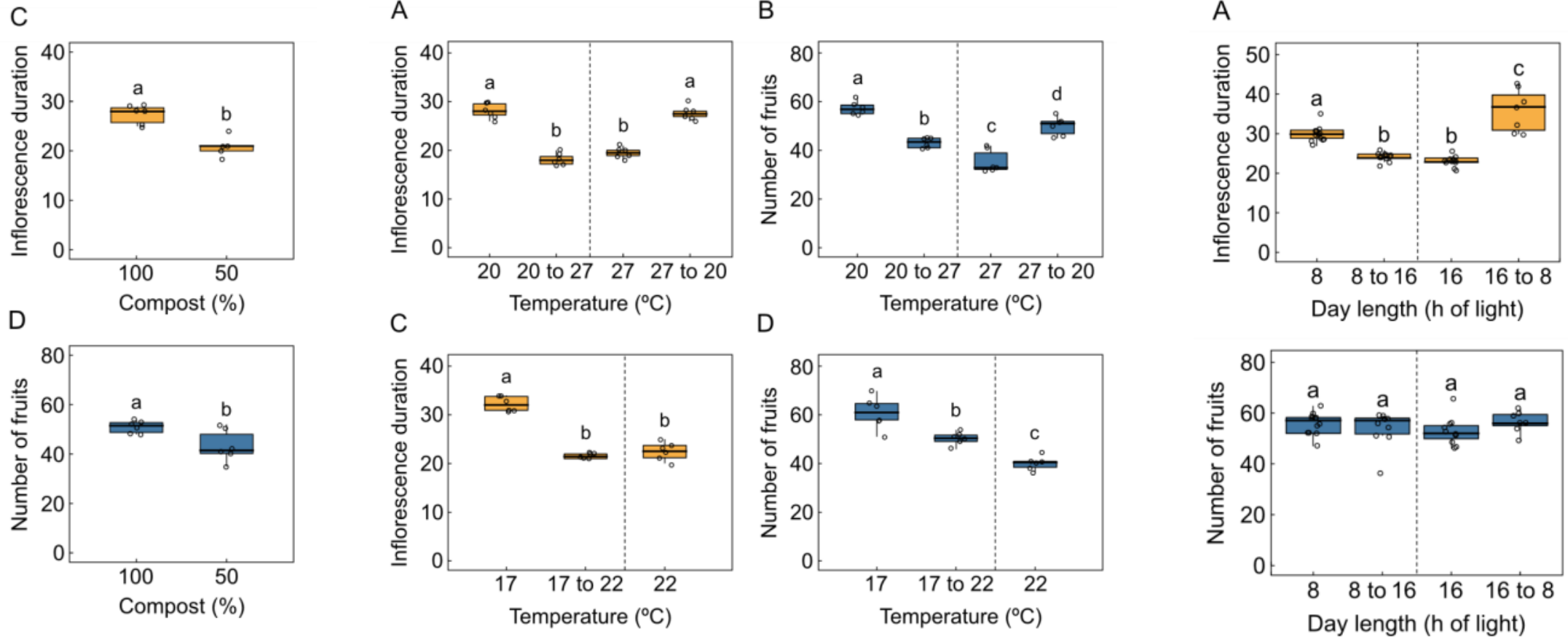


- Two key, separable processes:
- Inflorescence meristem arrest (no more primordia).
- Floral arrest (no more flower opening).
- Typically not all flowers open.



Walker et al, *Plant Physiology*, 2023
Gonzalez-Suarez, *unpublished*

Why do Brassicas stop flowering?



Gonzalez-Suarez et al, *Plant Physiology*, 2023; Gonzalez-Suarez, *unpublished*

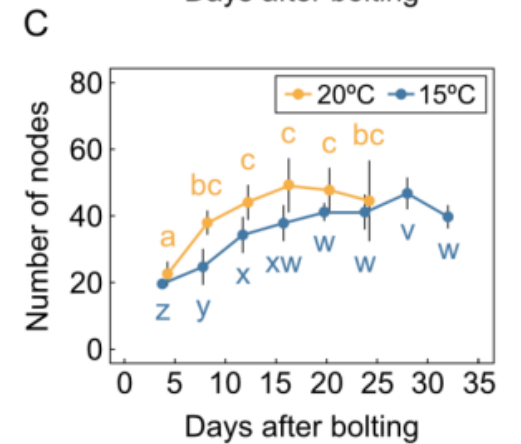
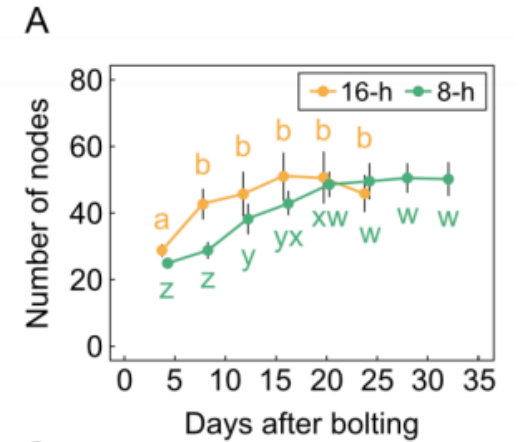
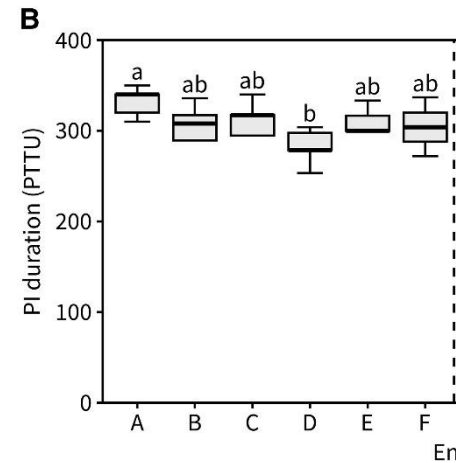
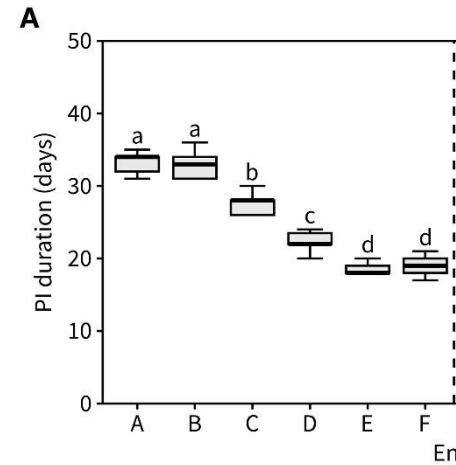
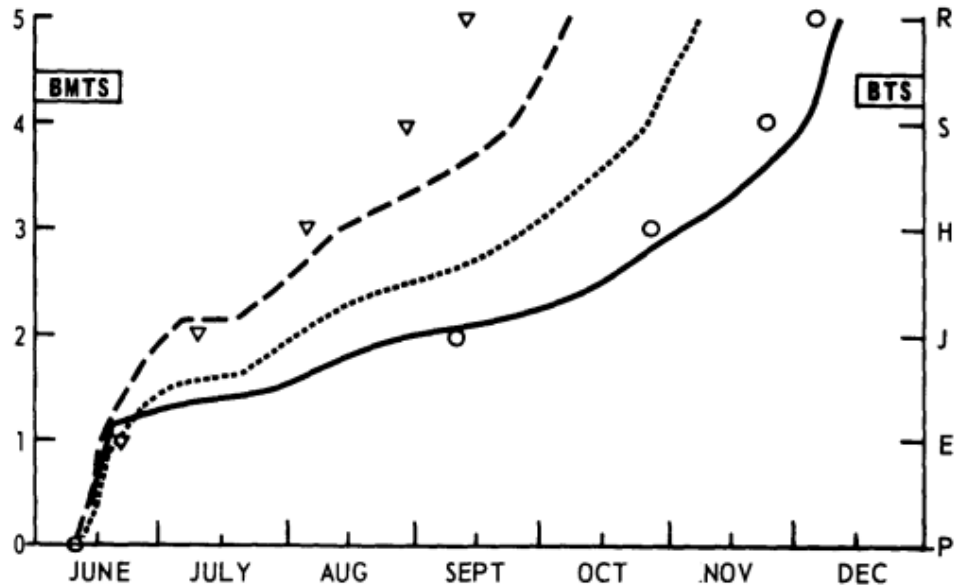
- Environmental conditions strongly regulate duration of flowering.
- Including **temperature** and **light exposure**.

Photothermal time

Int. J. Biometeor. 1968, vol. 12, number 3, pp. 191-223

A Biometeorological Time Scale for a Cereal Crop Involving Day and Night Temperatures and Photoperiod**

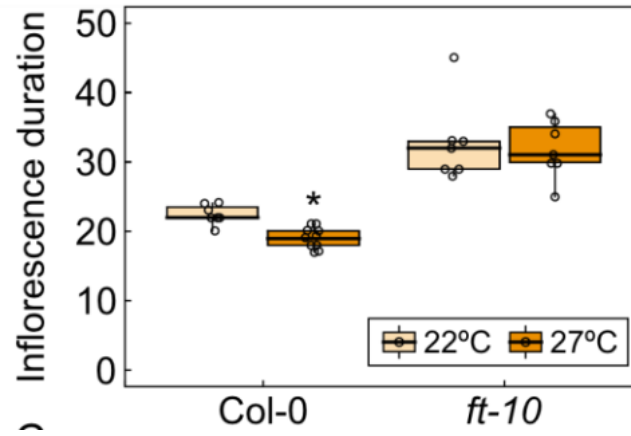
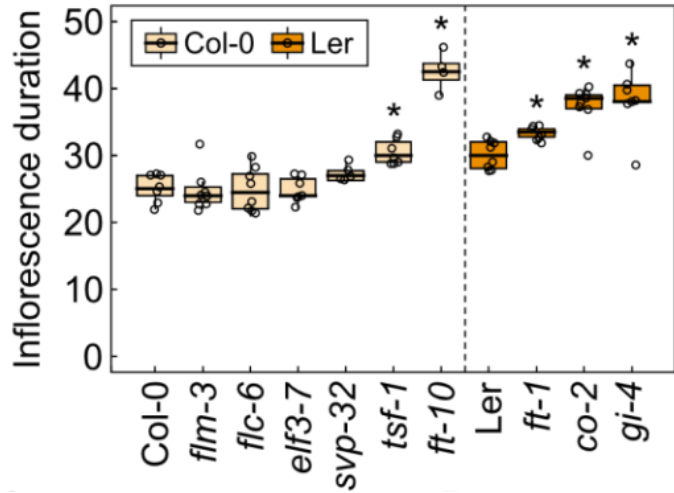
by
G. W. Robertson*



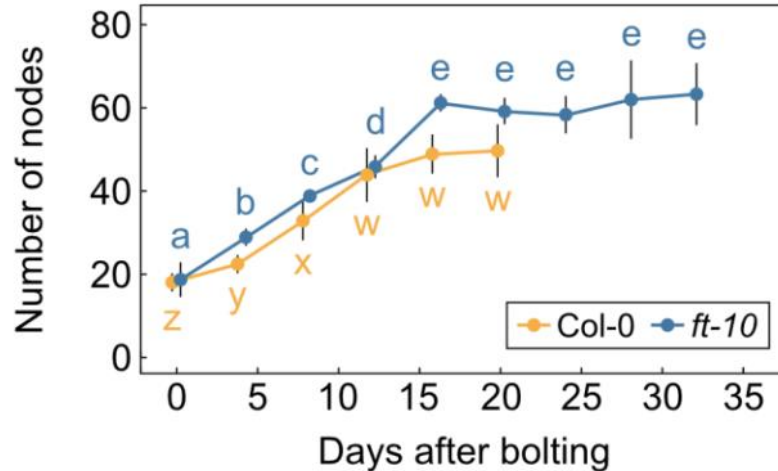
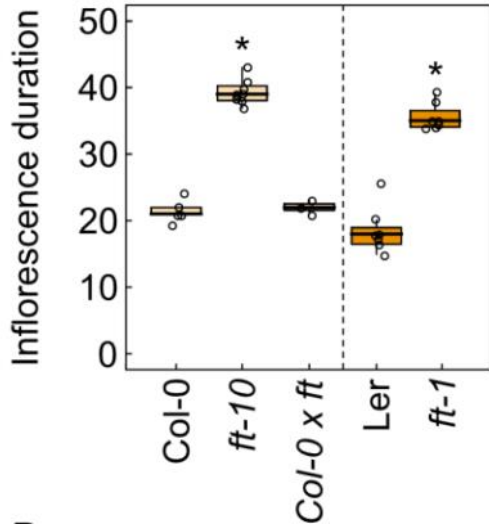
Gonzalez-Suarez et al, *Plant Physiology*, 2023

- Photothermal time integrates growing degree days and cumulative light exposure.
- Arabidopsis seems to stop flowering after a given photothermal, rather than absolute time.

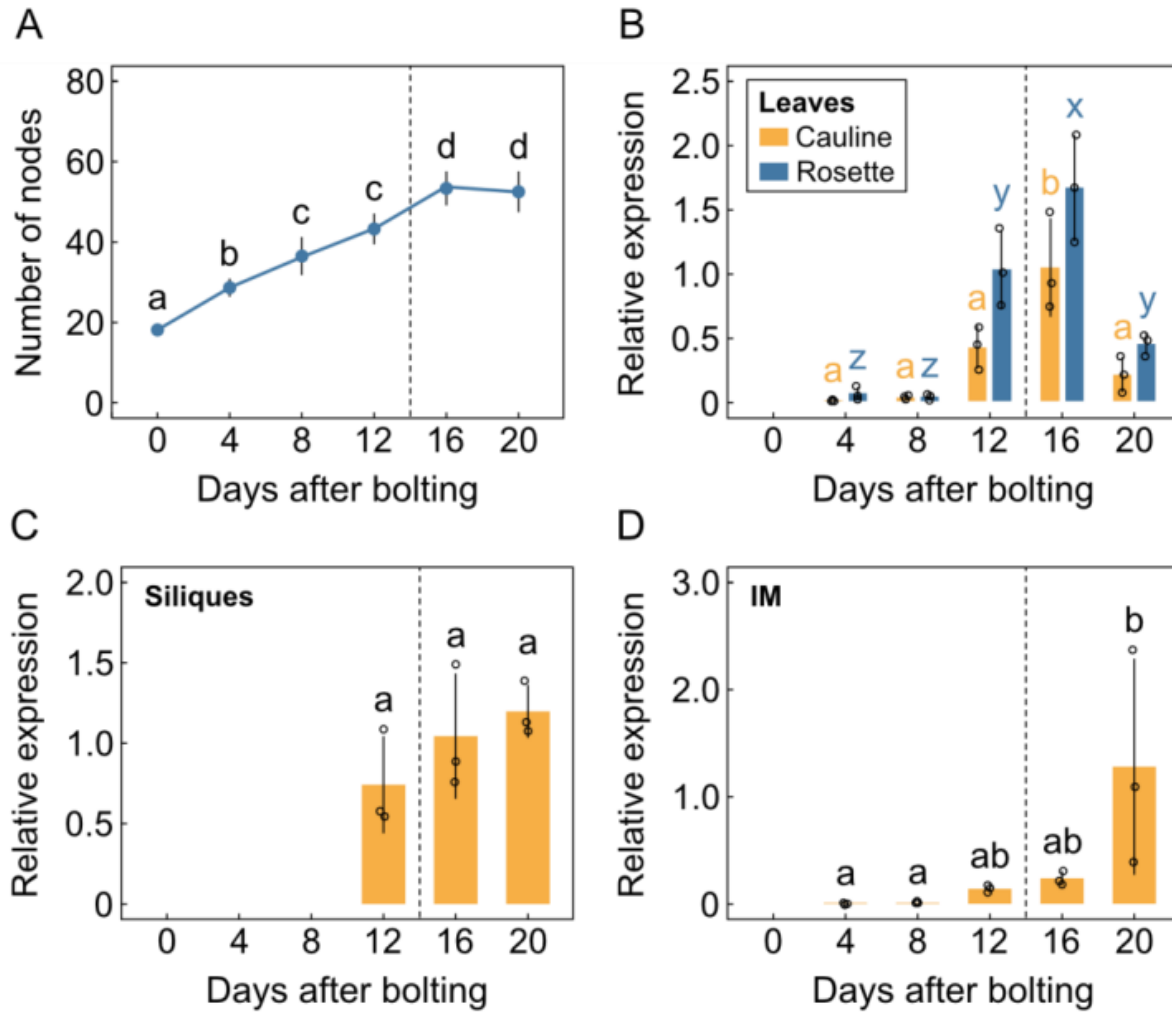
How do Brassicas measure photothermal time?



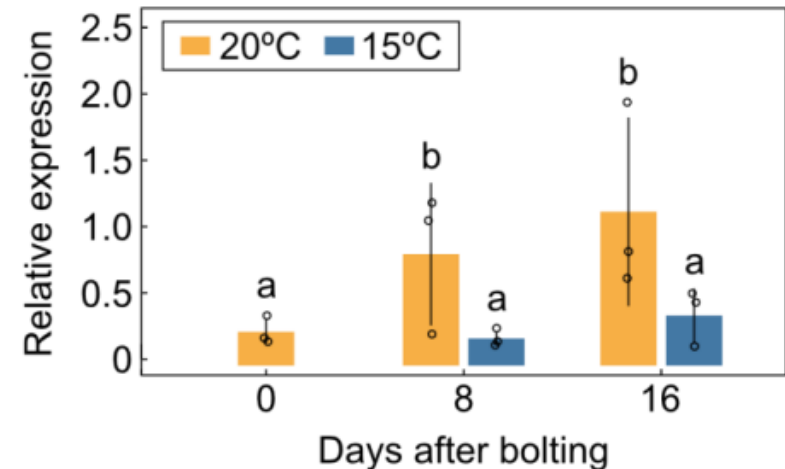
- FT is required for timely inflorescence meristem arrest.
- And in order to respond to photothermal cues.



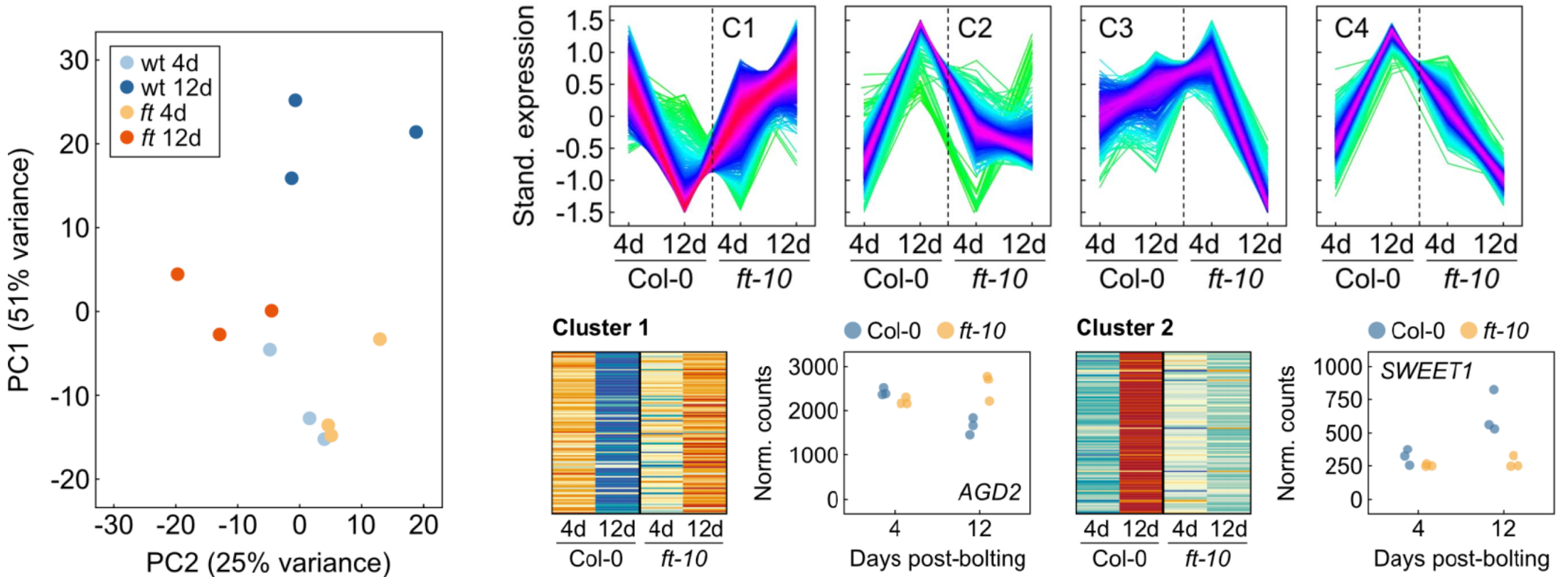
How do Brassicas measure photothermal time?



- FT transcription peaks at IM arrest.
- FT transcription continues to track photothermal exposure post-flowering.
- FT is not just 'florigen'.
- Is FT a photothermal stopwatch?



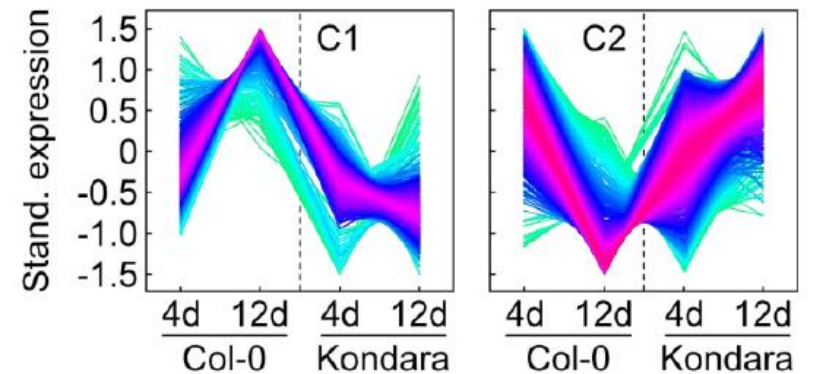
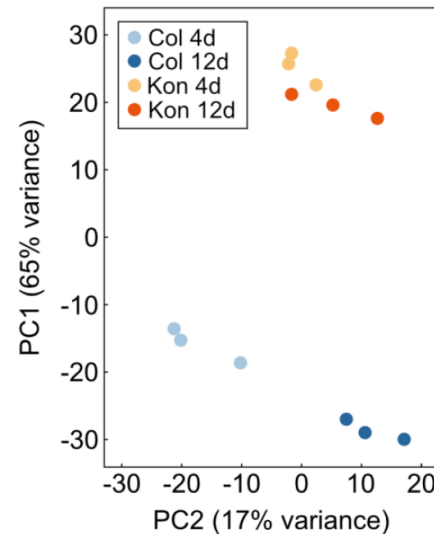
How does FT regulate IM arrest?



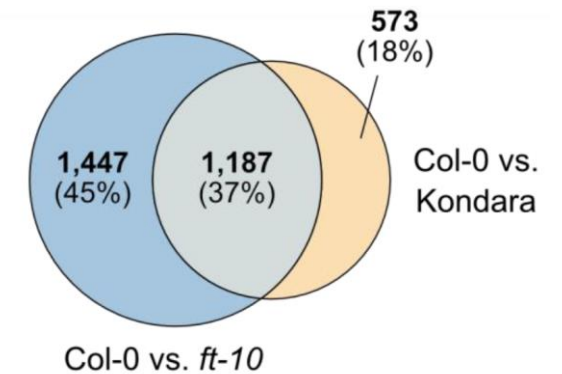
Gonzalez-Suarez et al, *unpublished*

- Transcriptome analysis of Col-0 vs *ft-10* inflorescence meristems.
- 1447 DEGs in 4 clusters.

Natural variation in end-of-flowering

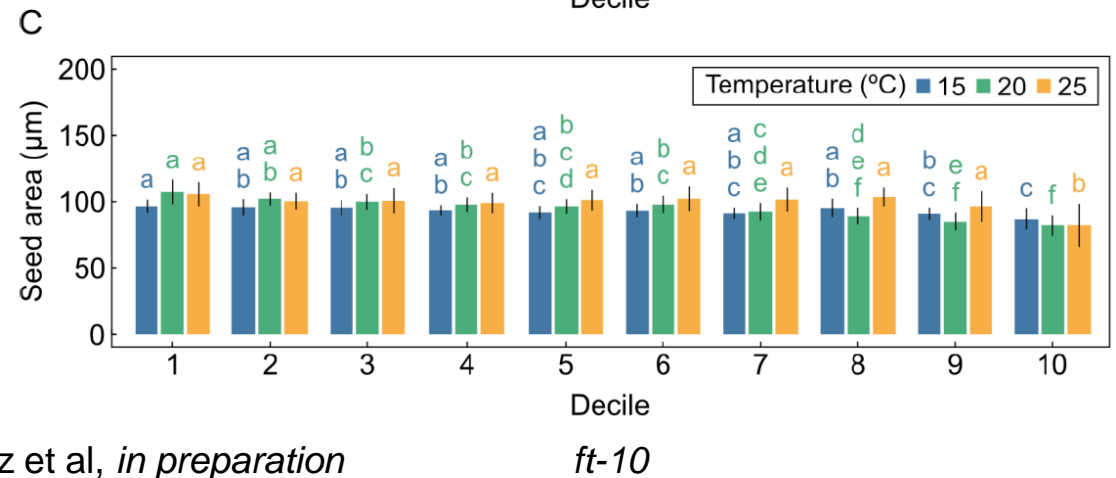
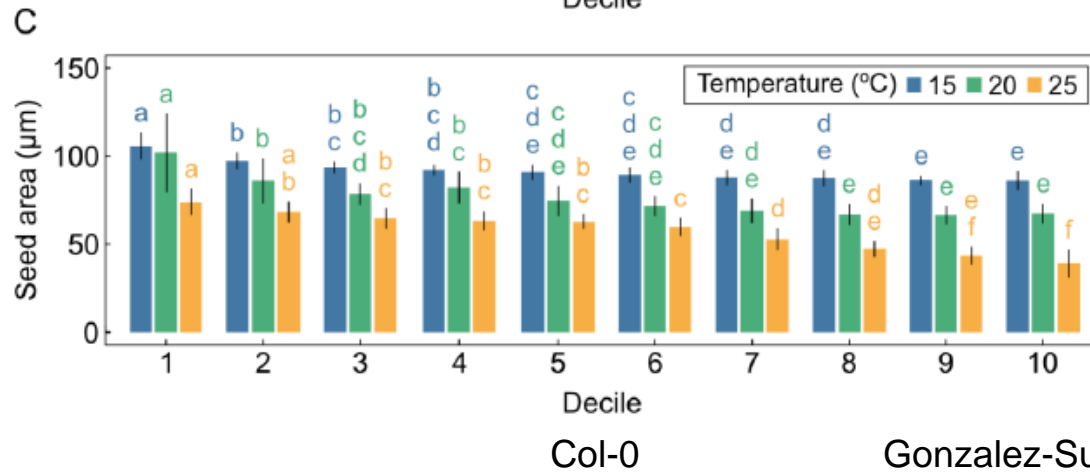
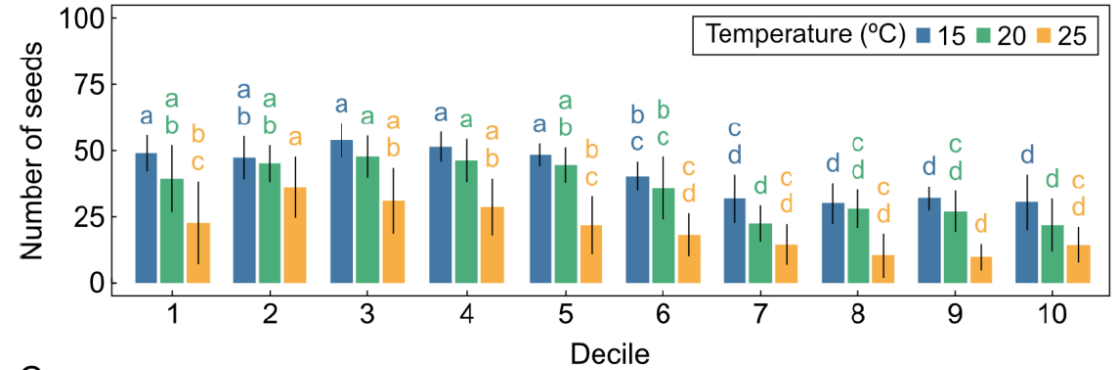
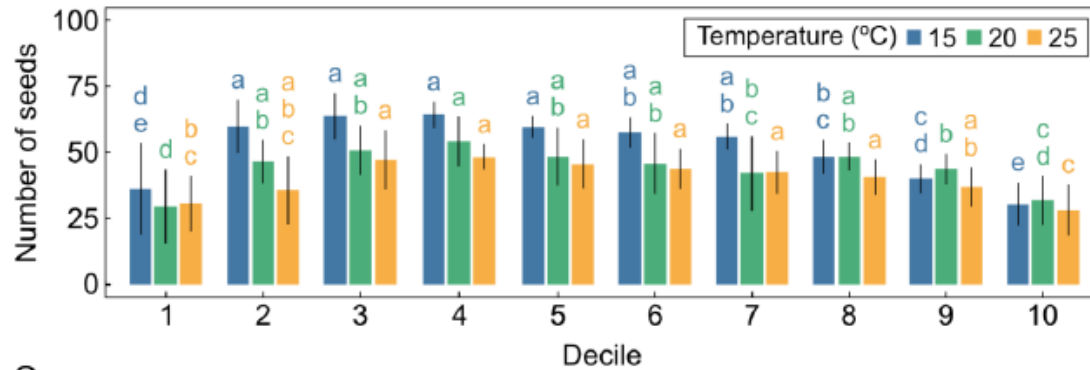


Gonzalez-Suarez et al, *unpublished*



- Some (but not huge) natural variation in Arabidopsis for inflorescence duration.
- Kondara is a model long-flowering ecotype.

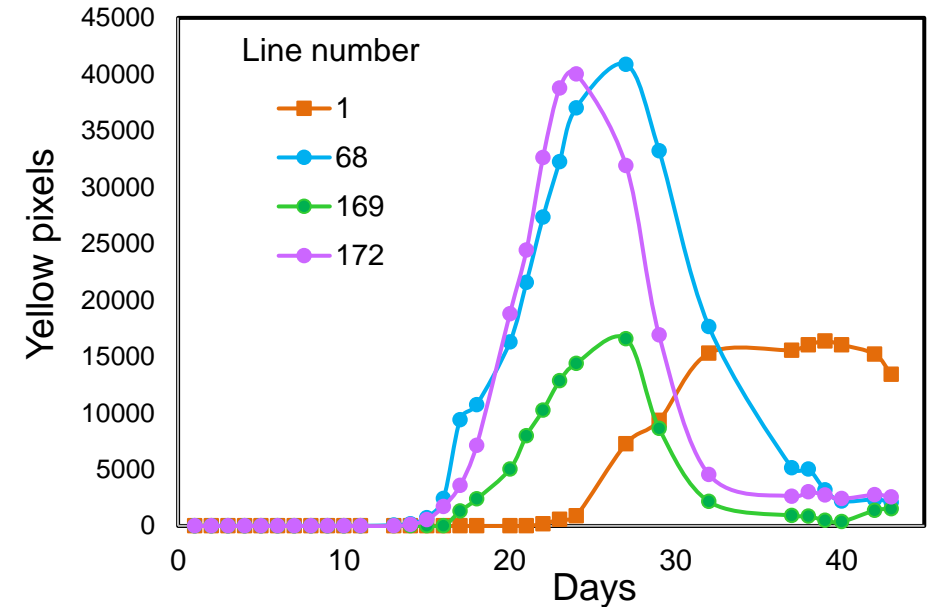
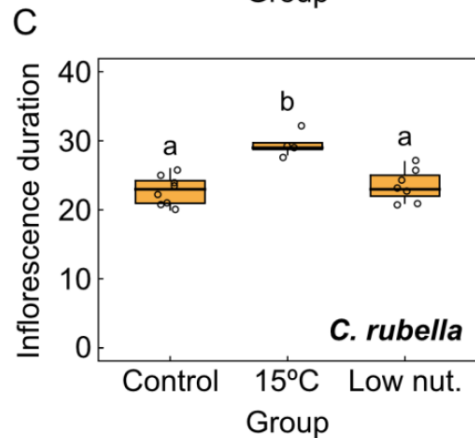
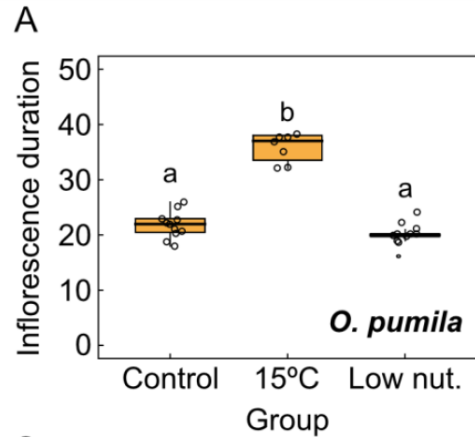
It's not just inflorescence duration...



Gonzalez-Suarez et al, *in preparation*

- Multiple parameters of inflorescence morphology change during flowering.
- And change more with greater photothermal exposure...

Doing something about it



Data from BRAVO

- Arabidopsis is not Brassica sp., but responses are almost certainly conserved.
- In a warming world, inflorescence durations and yields will tend to decline in Brassicas.
- Adjust rate of FT accumulation under photothermal exposure to offset increasing temperatures.

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