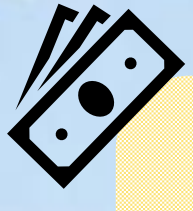




## ? The research question: Why do warm winters cause yield loss in rapeseed?



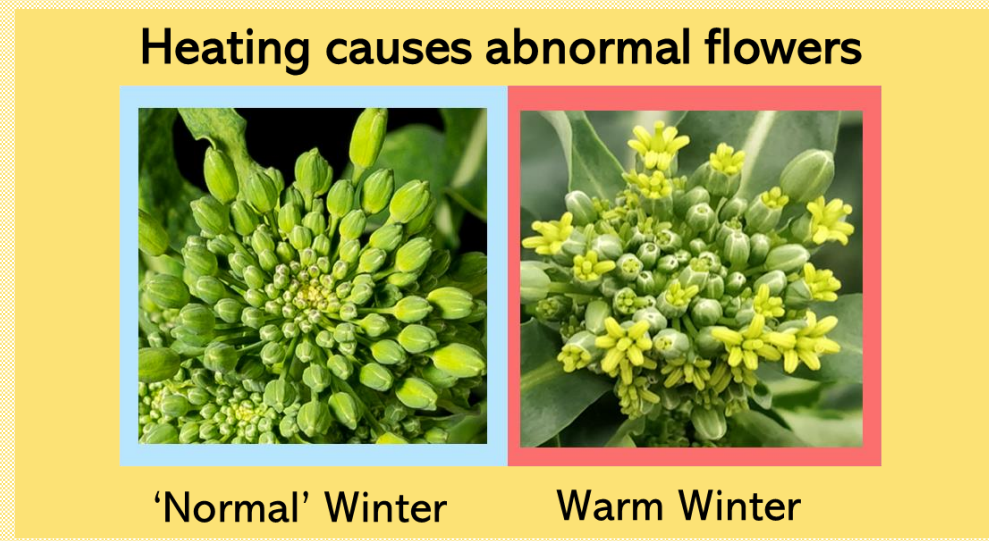
### The £150m problem: *winters are warming*

- Rapeseed is the third most grown UK crop and is sensitive to winter warmth.
- Climate change is causing warmer temperatures and costs £150m in lost UK rapeseed yield.

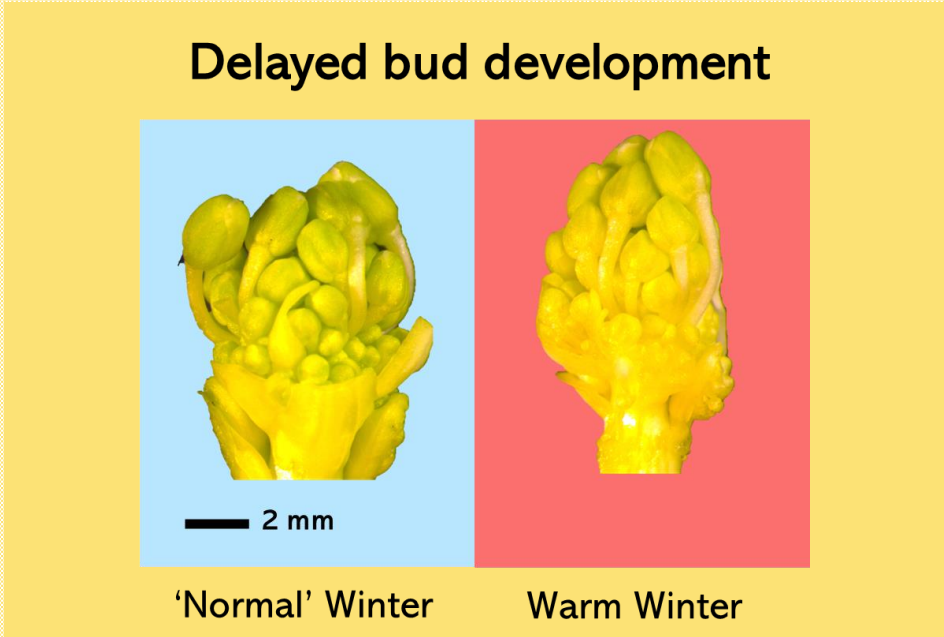


## The finding: Warm winters delay floral development. This causes low yields.

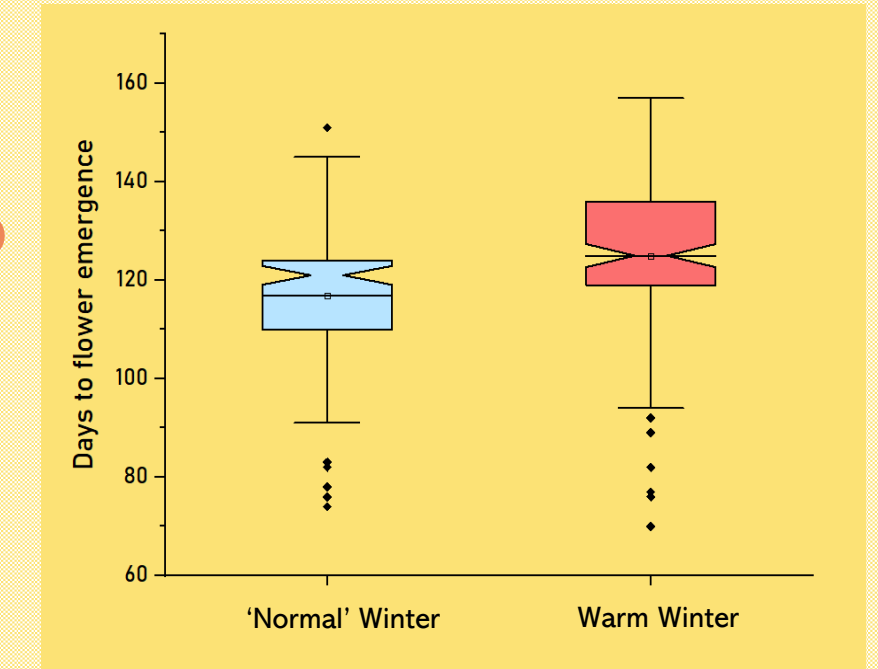
Warm winters disrupt floral development.



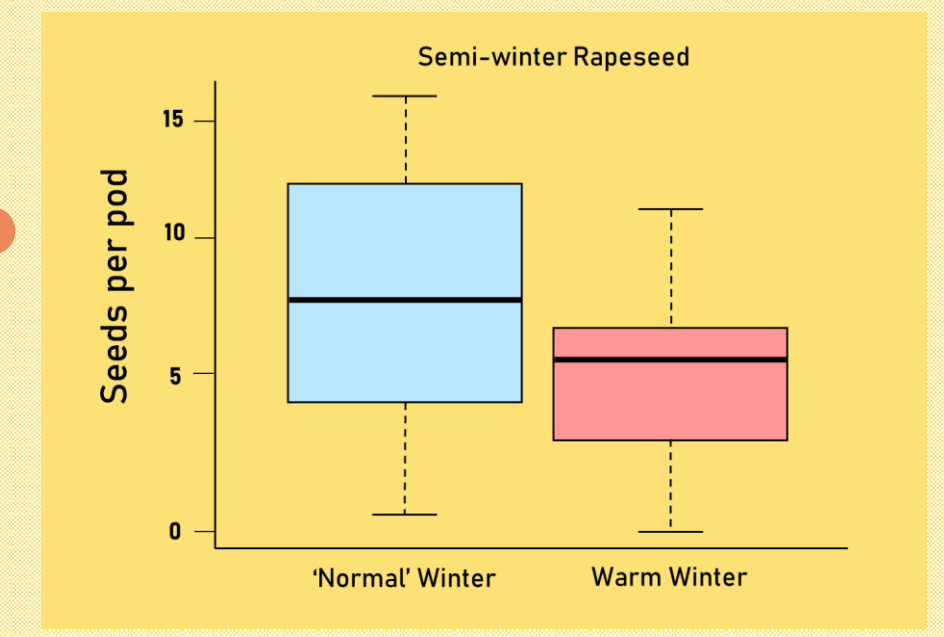
Warm winters slow bud development.



Flowering is delayed by 14 days on average.



There is a 27% yield reduction in temperature-sensitive varieties.



## The molecular solution: *unlocking the unknown*

- I have uncovered gene variants where floral development is unaffected by warm winters.
- Further testing and analysis will allow us to breed these resistant genes into rapeseed.

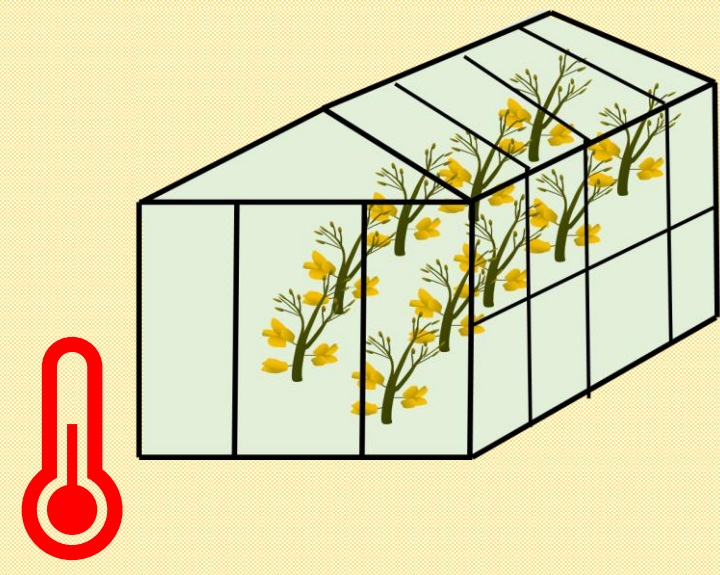


## The technique: using genetics to find climate resilient rapeseed

Rapeseed has been bred to survive in different climates.



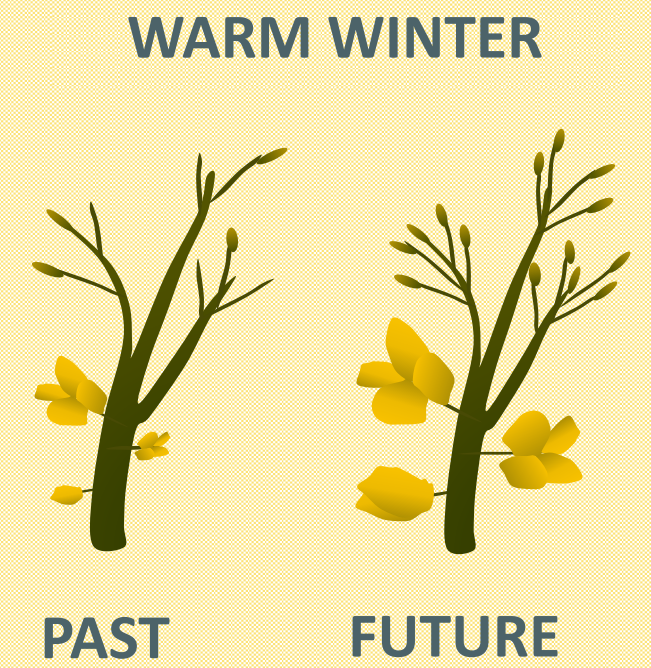
This means there is existing natural variation to winter warming.



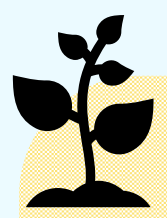
Artificially create a warm winter to confirm temperature is the main cause for yield reduction.



Statistical modelling can match how a plant responds to warm winters to variation in its DNA sequence.

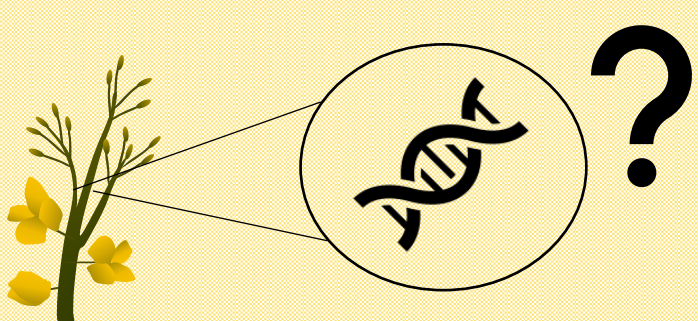


We can isolate these low-yield causing genes. Then we can breed rapeseed fit for the 21<sup>st</sup> Century.



## The future: What next?

How are these genes affected?



Incorporate into climate crop models



Protecting other crops

