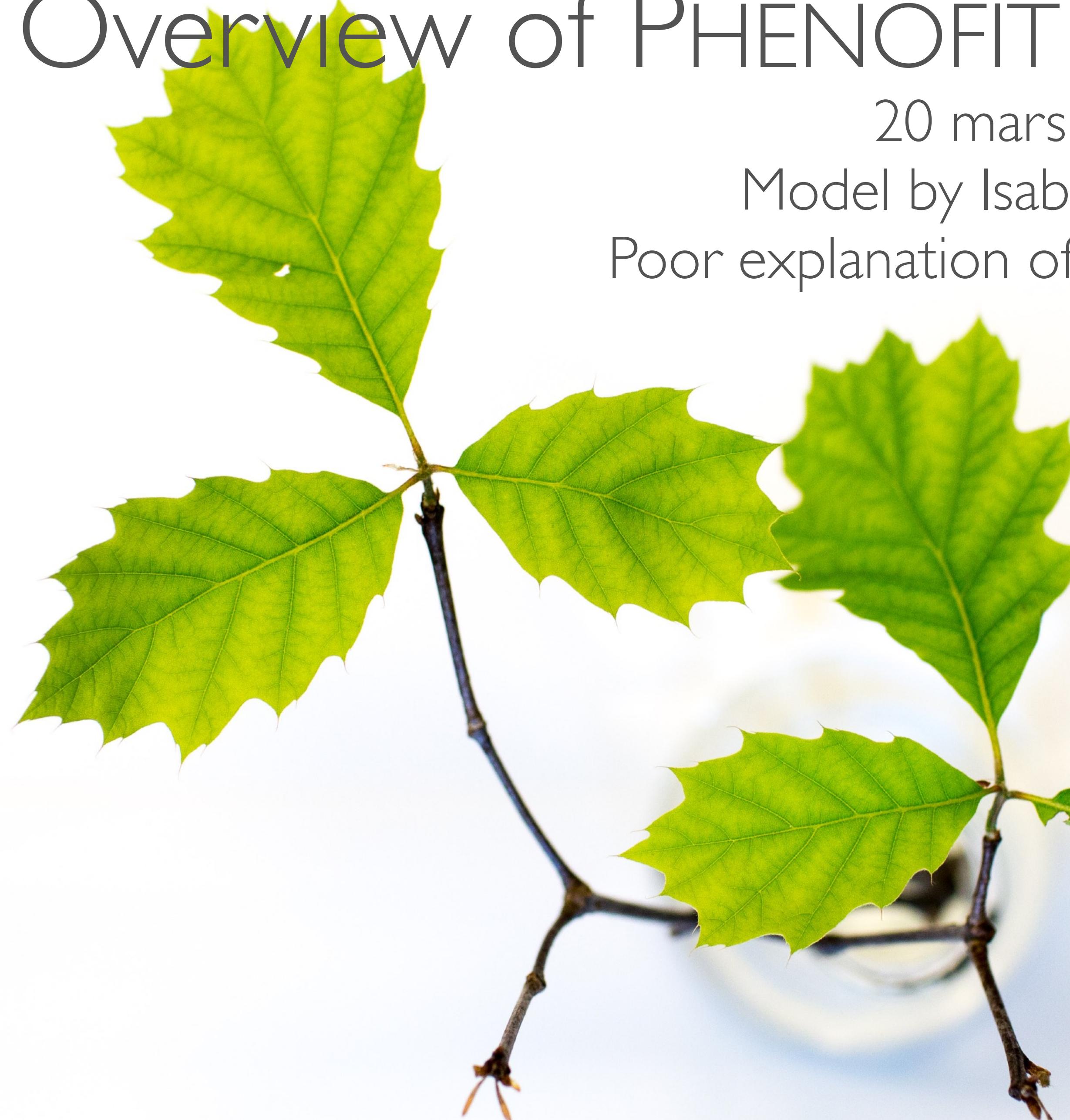


# Overview of PHENOFIT model

20 mars 2023

Model by Isabelle Chuine

Poor explanation of it here, by Lizzie



# What is PHENOFIT?

- Process-based model to explain how phenology affects survival and reproductive success (for temperate trees)

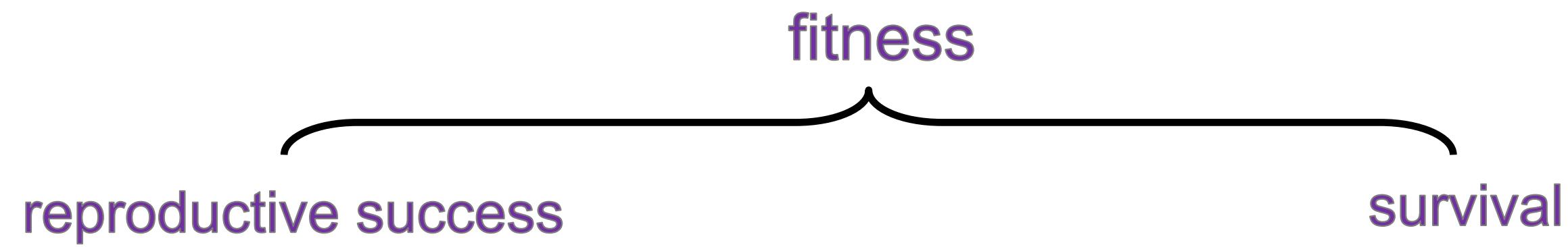


# What is PHENOFIT?

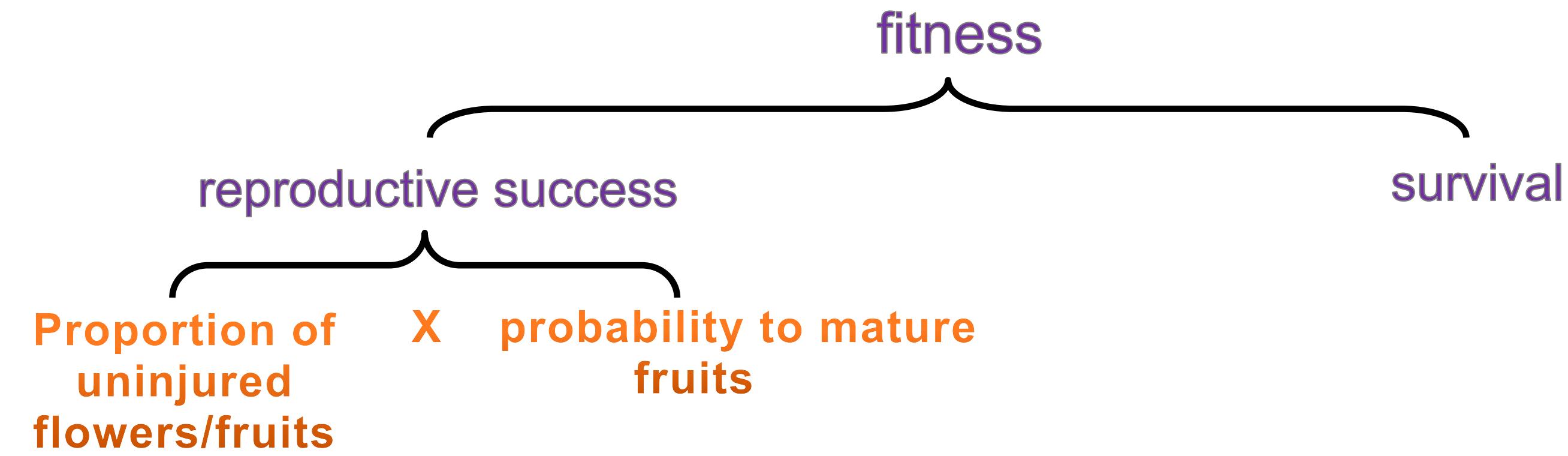
- Predicts fitness at individual plant level (0-1)
- Includes several sub-models (coming up)
- As best I can tell, they fit it using climatic and phenological data, then test its accuracy based on species distribution data.



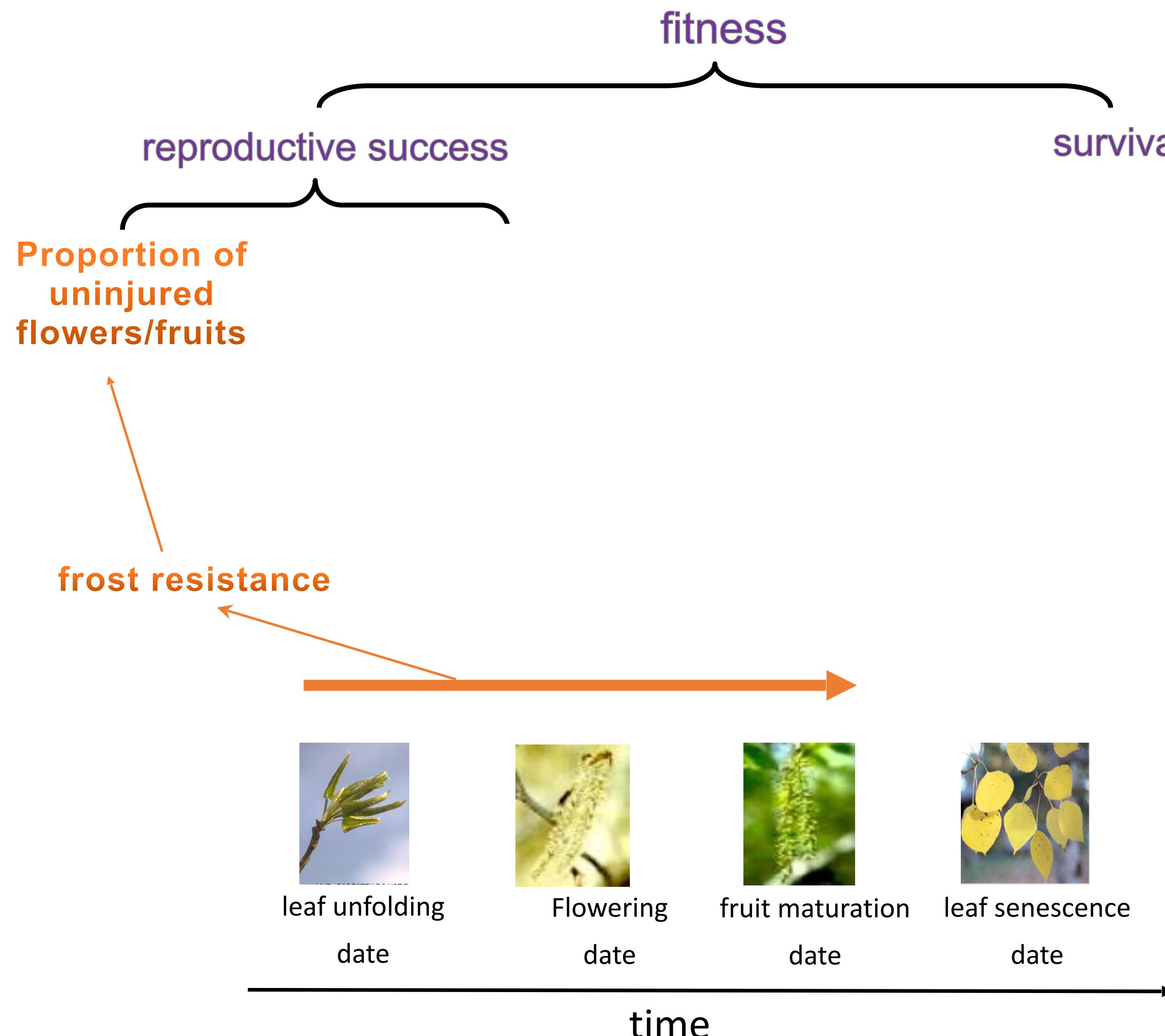
# PHENOFIT 4: What goes into model



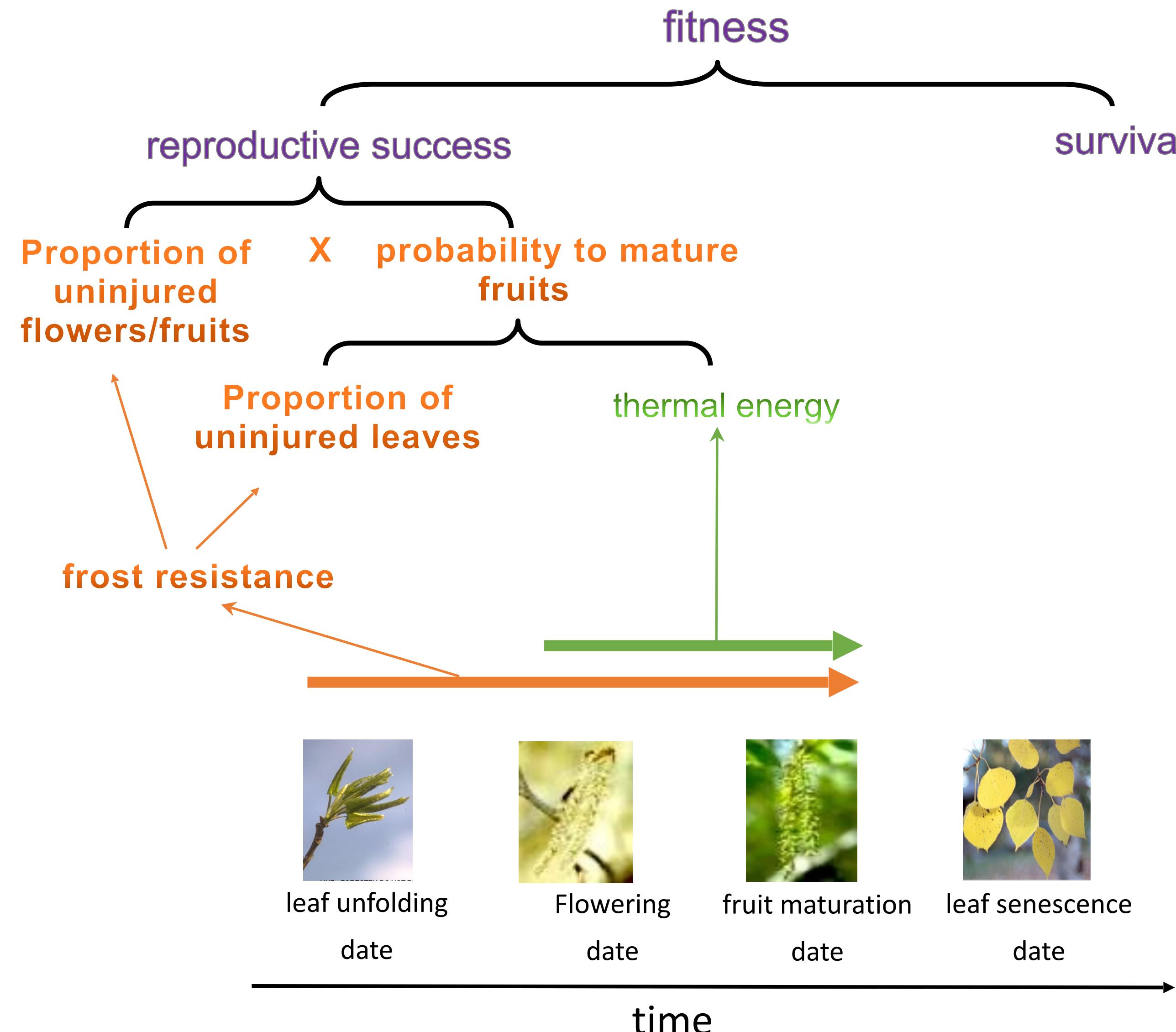
# PHENOFIT 4: What goes into model



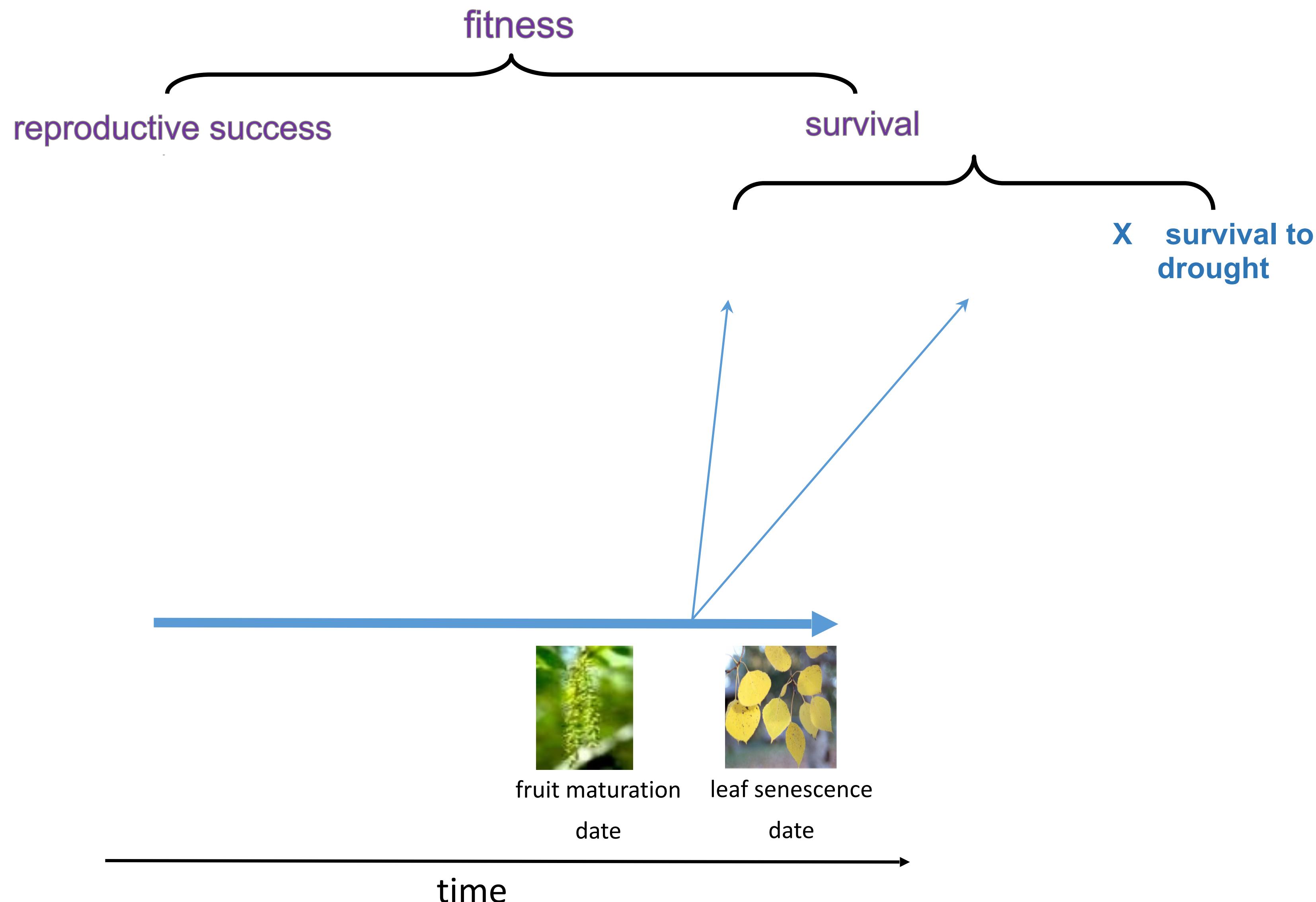
# PHENOFIT 4: What goes into model



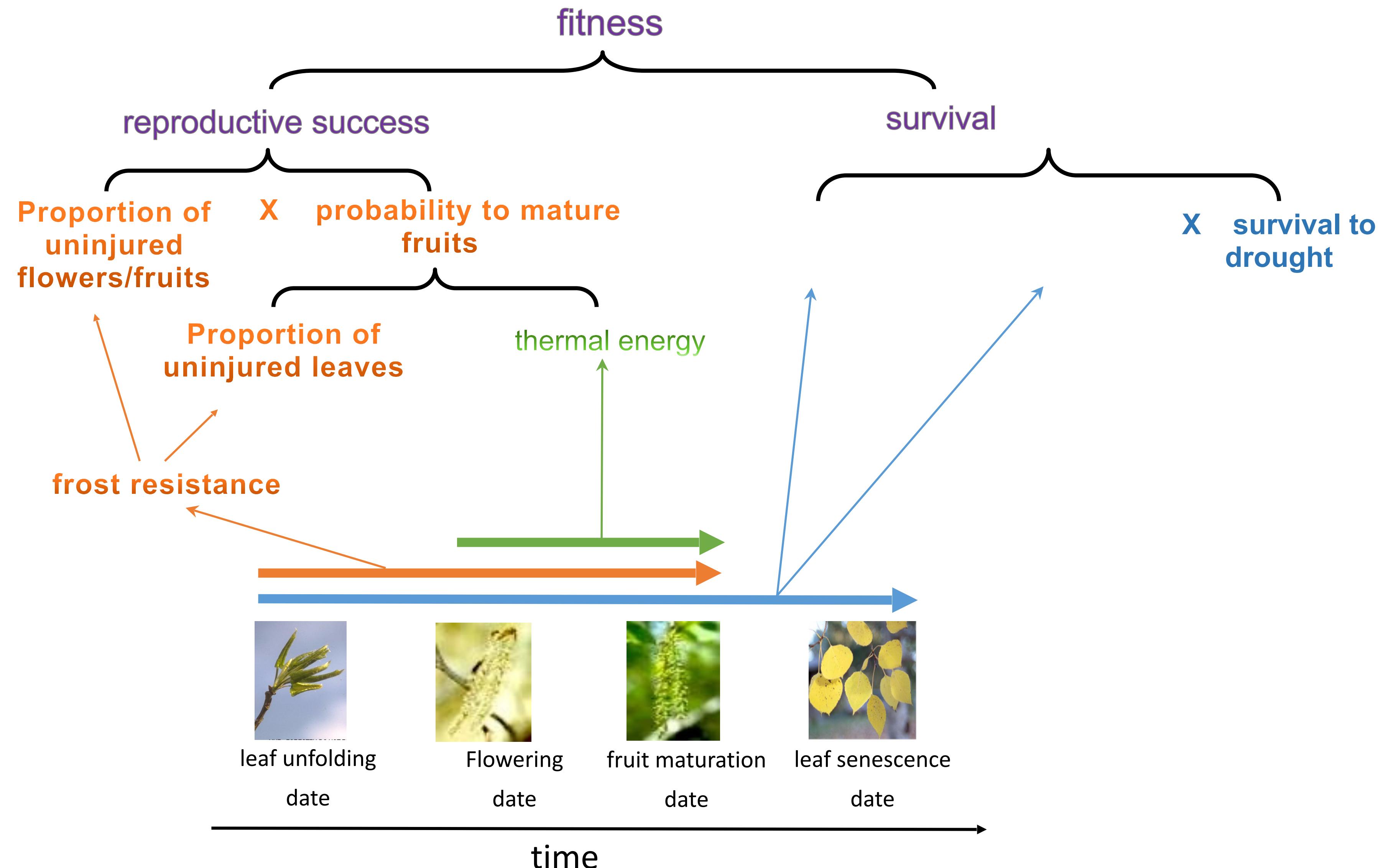
# PHENOFIT 4: What goes into model



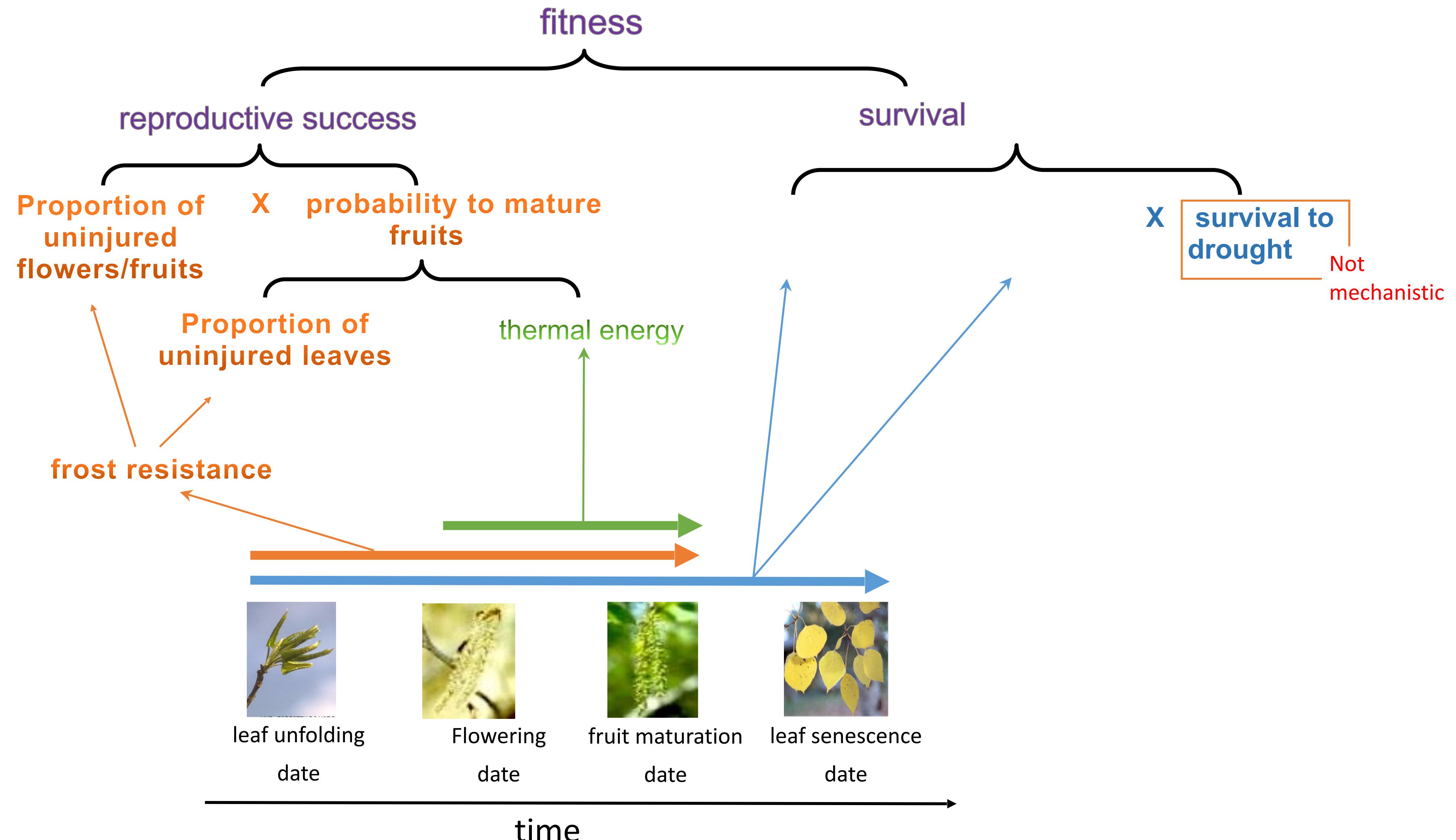
# PHENOFIT 4: What goes into model



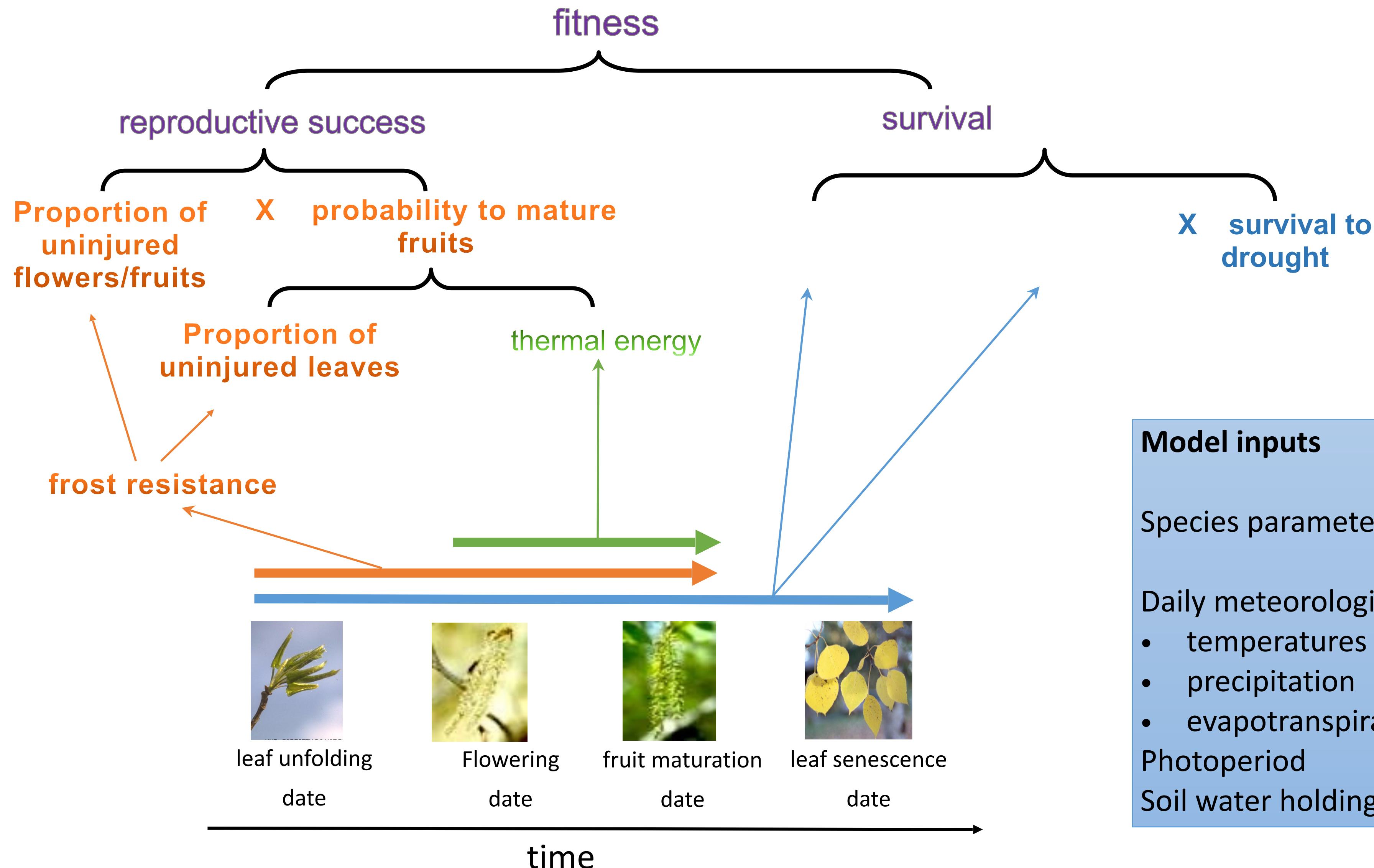
# PHENOFIT 4: What goes into model



# PHENOFIT 4: What goes into model



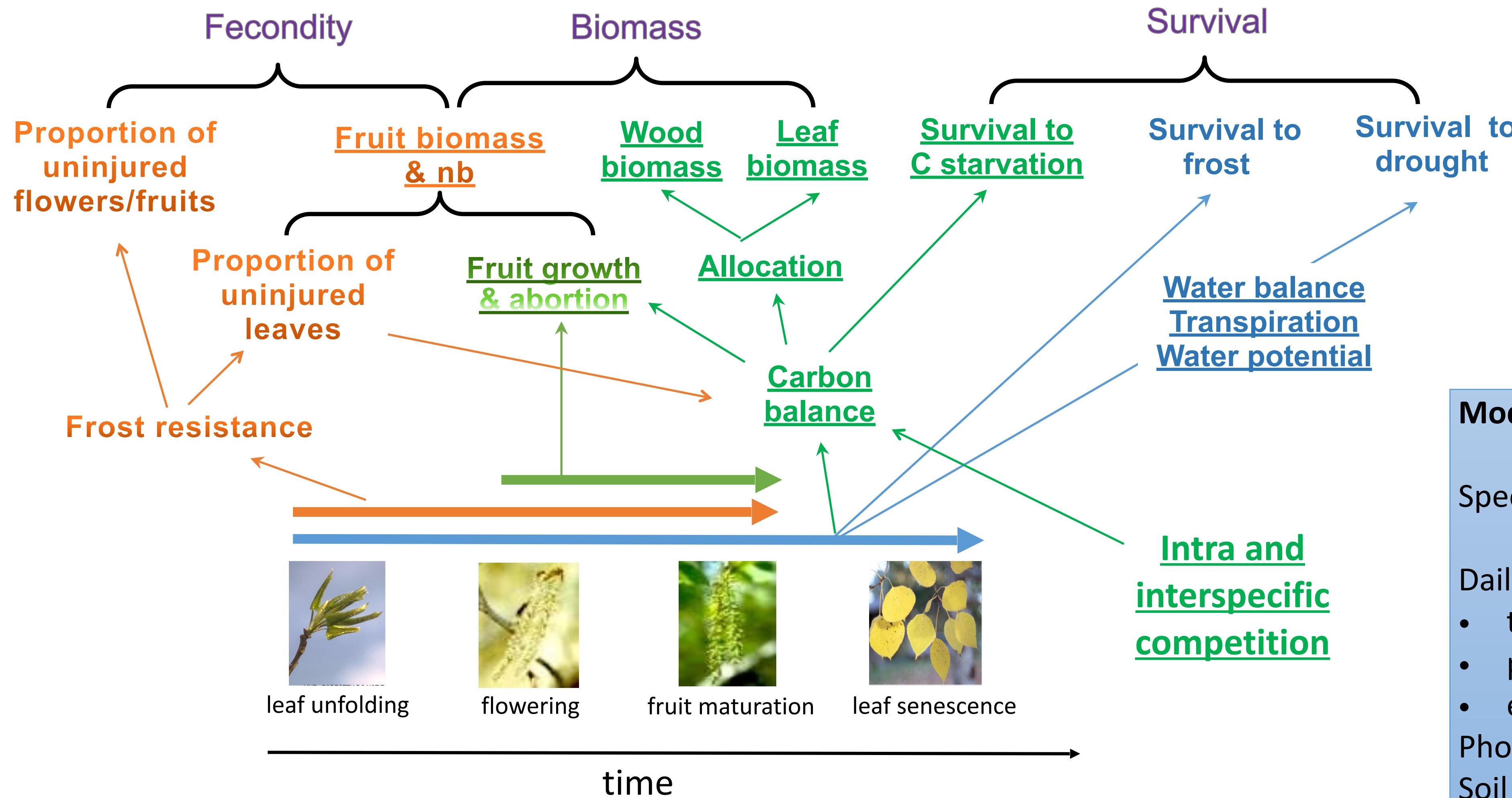
# PHENOFIT 4: What goes into model



Questions &  
Comments  
moment



# PHENOFIT 5: SIERRA carbon model



# Next up ...

- I asked: Do you know of any very good references on why growing season length and growth should be related in woody species?
- “Growing season length is related to NPP but not necessarily to growth.”



# From Chuine 2010 (*ProcB*)

- “Phenology as one and perhaps the most important trait-shaping species distribution.”
- “Studies that have aimed at demonstrating the link between phenology and reproductive success are not numerous and have all concerned flowering phenology”
- “Leaf unfolding and leaf senescence timing have been shown to have a major control on spatial and temporal variation in biologic- ally mediated sources and sinks of carbon in the Mediterranean, temperate and boreal latitudes at stand scale (e.g. White *et al.* 1999; Baldocchi & Wilson 2001; Barr *et al.* 2007), and at global scale (Keeling *et al.* 1996).”
- Earlier leaf unfolding owing to global warming has been positively correlated to longer carbon uptake period, and to increased net annual CO<sub>2</sub> flux and net primary productivity (Goulden *et al.* 1996; Churkina *et al.* 2005; Piao *et al.* 2007).

# From Chuine 2010 (*ProcB*): Connections between phenology & fitness

- Rathcke & Lacey 1985 is an AREES on phenological patterns of terrestrial plants
- Reekie & Bazzaz 1987 is an experiment on perennial grass where they had different nutrient levels and looked at reproductive versus vegetative allocations over time (weeks)
- Kozlowski 1992 is a *TREE* review of energy budgets — energy budgets involve a time component so: longer = more energy (I assume)
- I have shown this link across species (Cleland *et al.* 2010) and the Great tit folks have some complicated versions of how it works for birds.

# Things I wondered about...

- Fitness x phenology gap seems big (as in we don't have so much data on it)
- What do the LSM predict? (What does ED predict?)
- Difference between life history theory and community assembly.

