Deciphering the physiological basis of recovery from transient water stress

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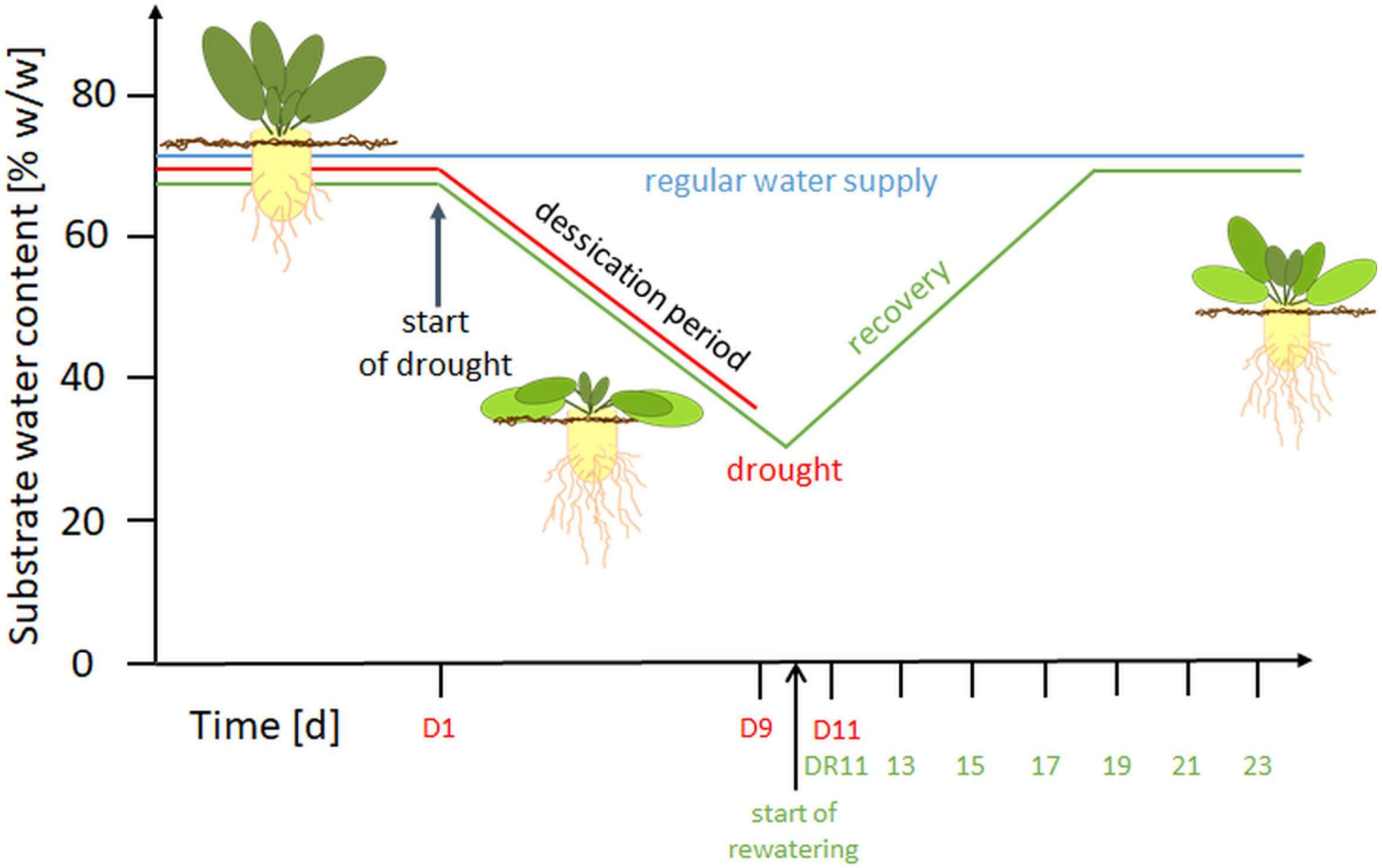
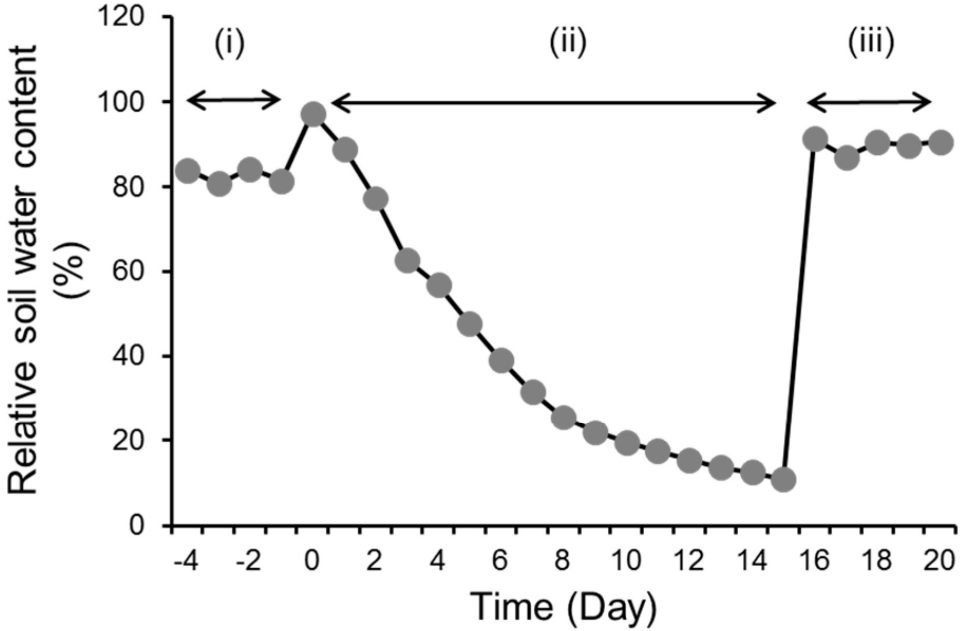
Periods of drought can be interrupted by heavy rainfall

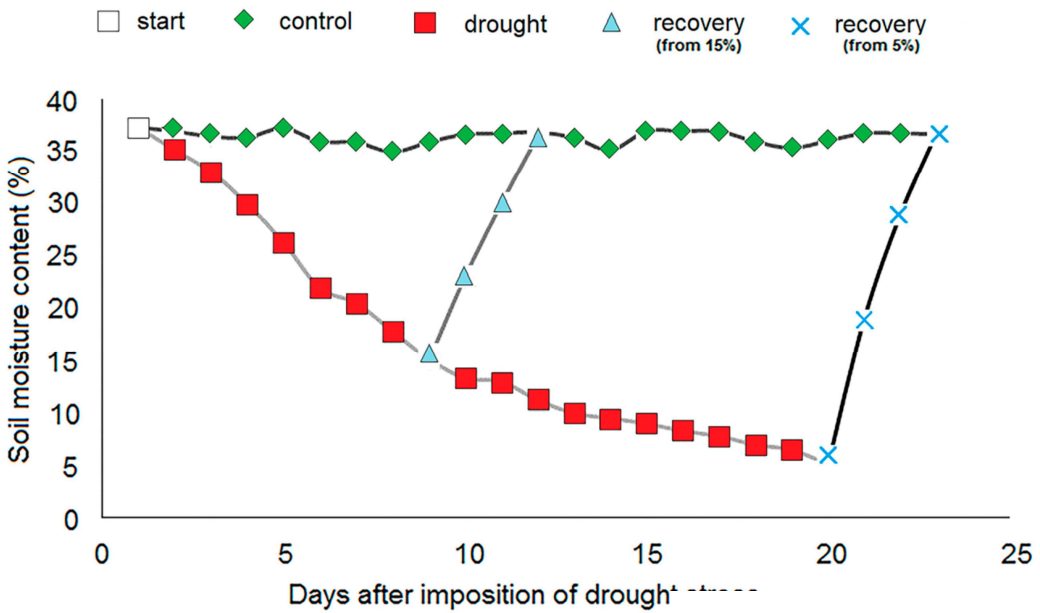


Rehydration is not the reverse of dehydration

Recovery has been largely neglected by plant physiologists

The kinetics of stress imposition ≠ the kinetics of stress relief

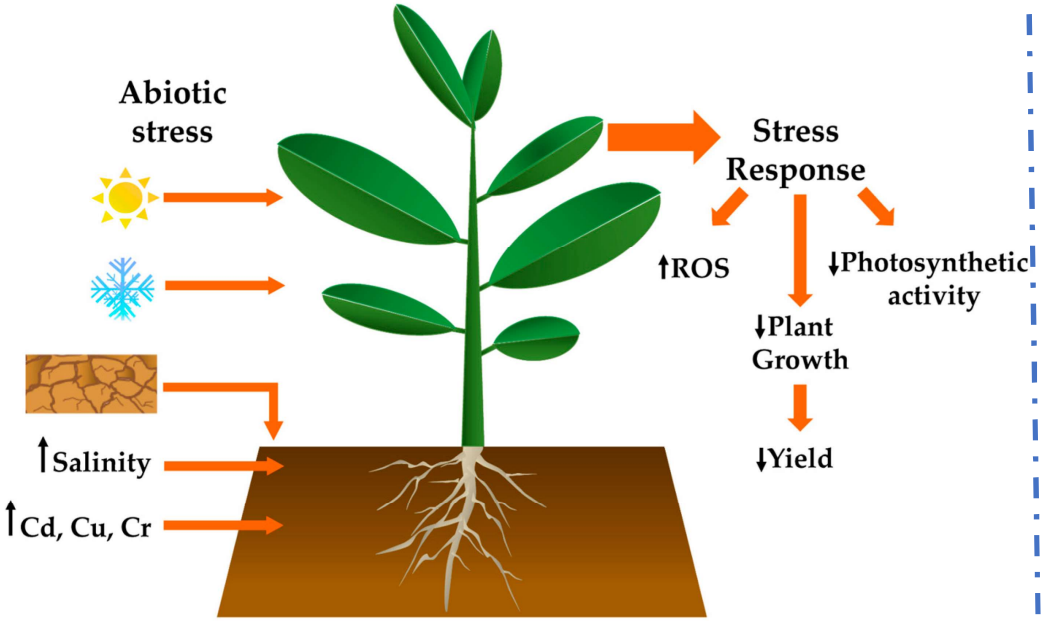




Sudden and massive hydration causes numerous cell damages in previously dehydrated tissues

Resilient plants must be tolerant to dehydration **and** rehydration.

Can plants anticipate ?

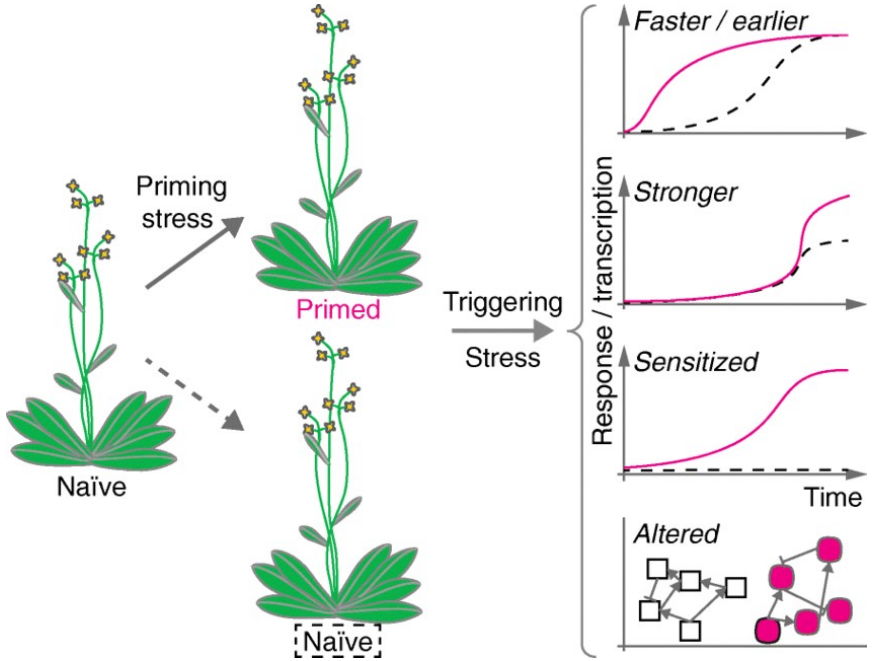


In a stressed plant, maintaining growth is energy-intensive

Some wild plants invest their energy in survival rather than growth

Physiological mechanisms unknown

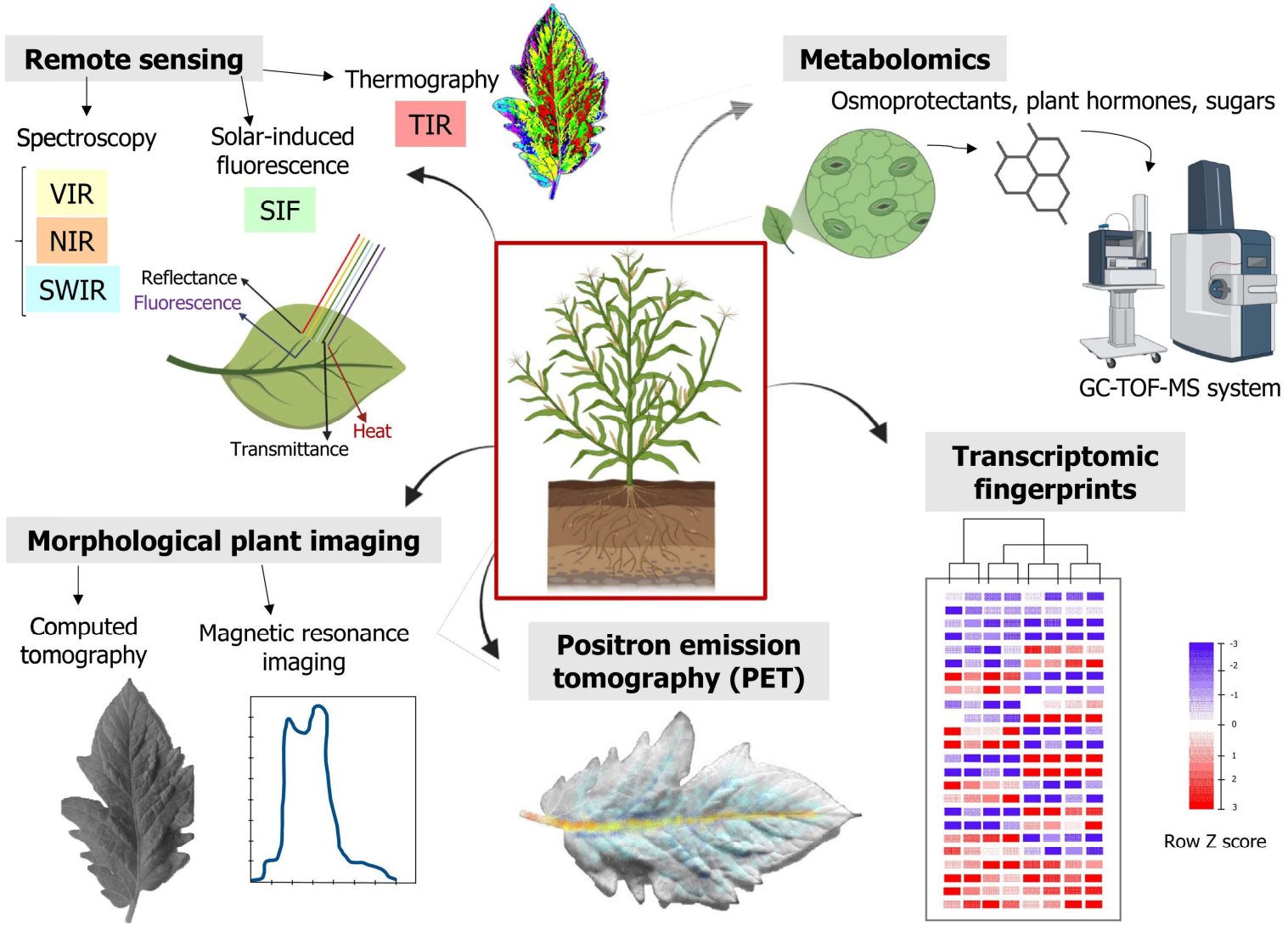
Can plants remember ?



Temporary exposure to stress enhances tolerance to subsequent stress

Priming effects

Physiological mechanisms unknown



Tolerance to **re**hydration relies on

- specific genes
- specific metabolites
- specific hormonal profile
- specific morphological status of new leaves

≠ from those involved in tolerance to **de**hydration

Lack of field studies

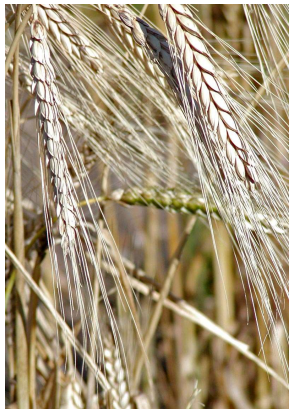
Physiological regulation is still unknown

What can we learn from old neglected (abandoned) crop species ?

Borago officinalis

Buckwheat: *Fagopyrum esculentum*

Fonio: *Digitaria exilis*



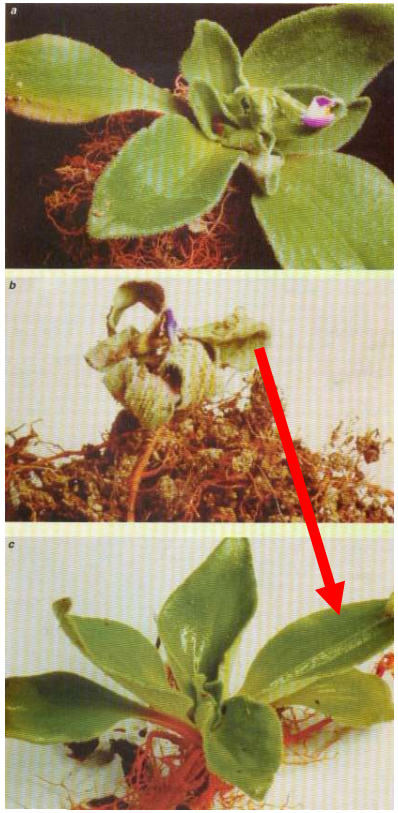
Einkorn
T. monococum

Amaranthus cruentus

Domesticated plants were NOT selected for resilience

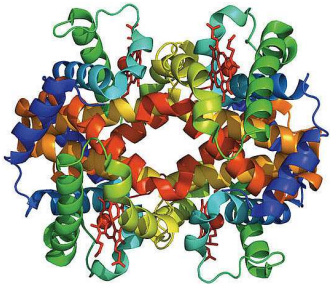
Is the future in the past?

What can we learn from poikilohydric (resurection) plants ?



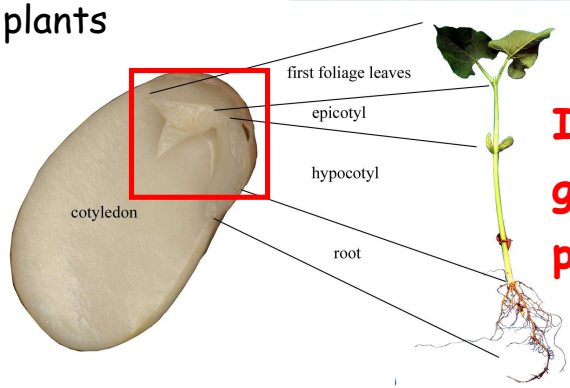
Completely hydrated

Completely desiccated



Drought relief
Fully hydrated living plants

Similar mechanisms (including genes) exist in all angiosperms but are restricted to seed embryos !!!



It's a question of regulating genetic expression, not of possessing genetic information.