

Growth of pea (*Pisum sativum*) under conditions for accelerated maturity shifts the expression pattern of key hormones related to embryo physiological maturity

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frontiers
in Plant Science

ORIGINAL RESEARCH
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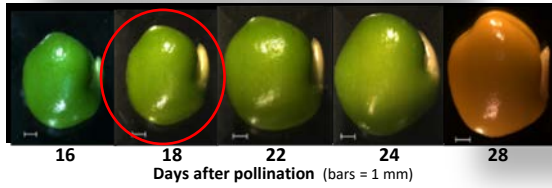
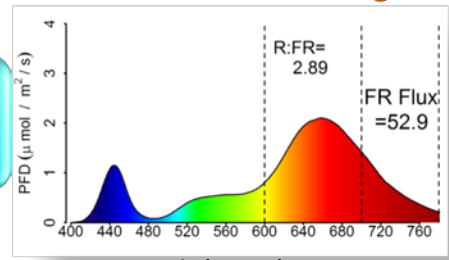
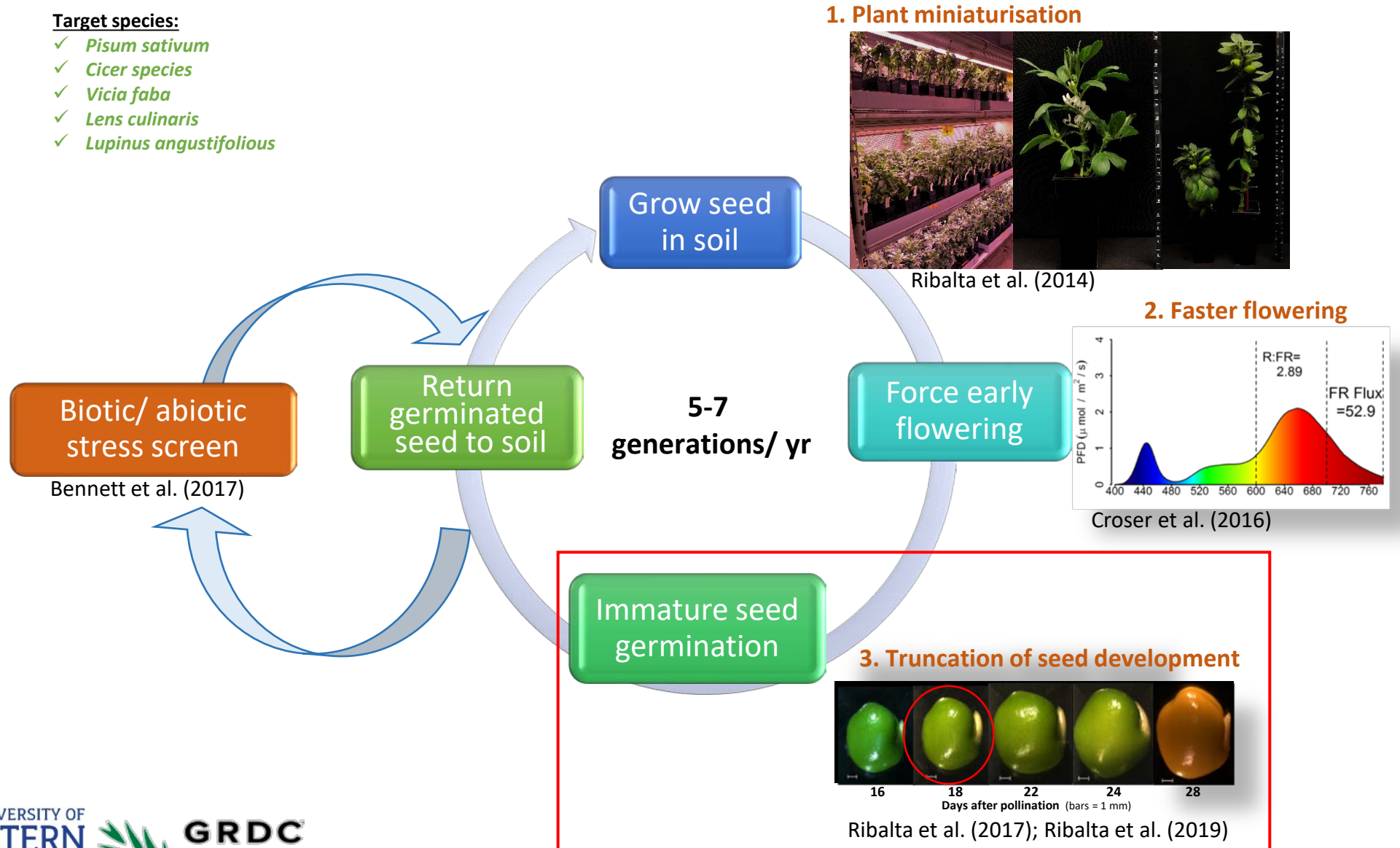
Expression Patterns of Key Hormones Related to Pea (*Pisum sativum* L.) Embryo Physiological Maturity Shift in Response to Accelerated Growth Conditions

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Integrated platform for rapid genetic gain in legumes

Target species:

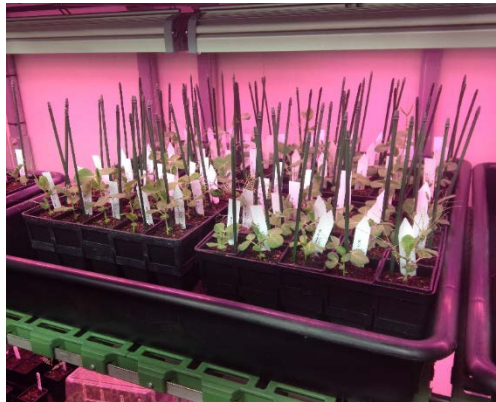
- ✓ *Pisum sativum*
- ✓ *Cicer species*
- ✓ *Vicia faba*
- ✓ *Lens culinaris*
- ✓ *Lupinus angustifolius*



How do plant **growth conditions regulate seed hormone profiles** and what is the relevance of these fluctuations to **precocious *in vitro* germination?**

1) **Three pea genotypes:** E, M, L phenologies

2) **Two environments:** Intensive vs glasshouse

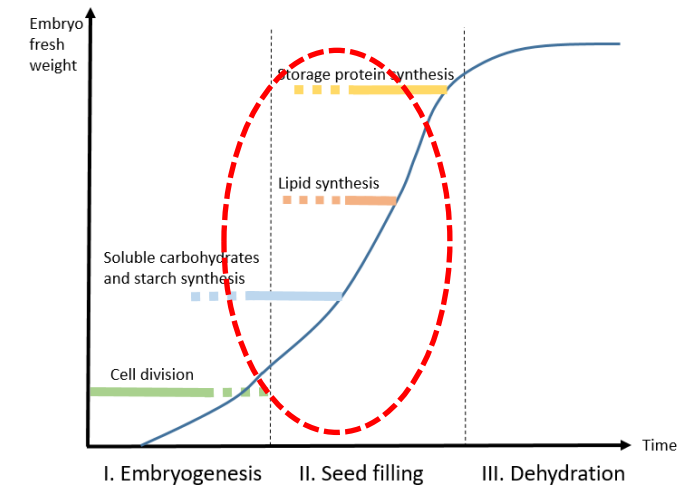


Extended photoperiod with
optimised LED light spectrum



Natural light

3) **Developing seeds:** 10-22 DAP

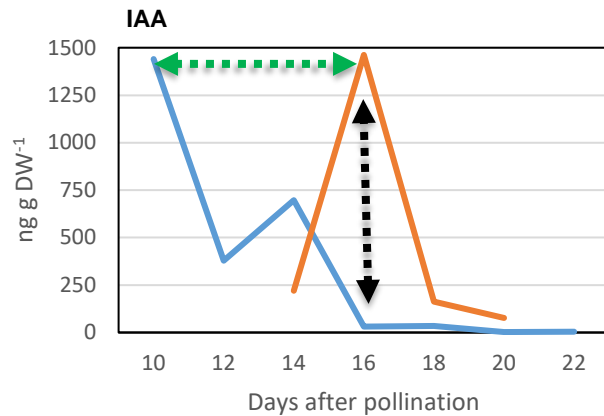
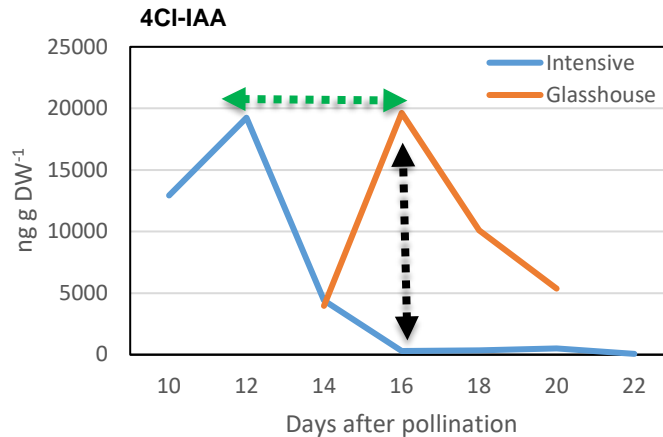


Modified Ochatt, 2015

4) **Seed development hormone analysis**

Auxins (IAA, 4Cl-IAA)
Gibberellins (GA₁, GA₂₀)
ABA

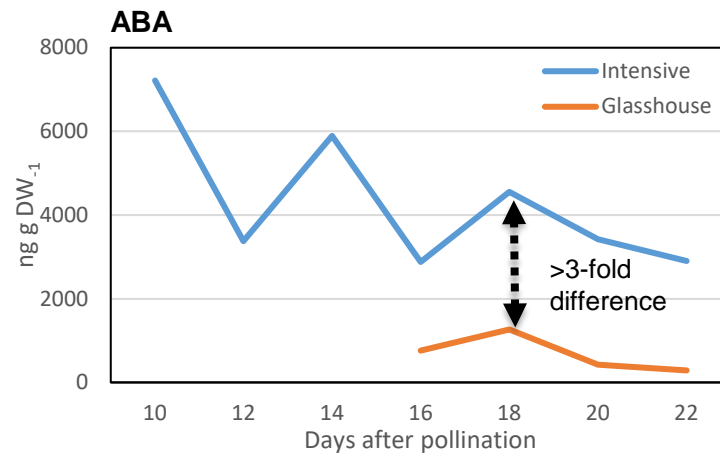
Cv. PBA Pearl



- Auxin profiles brought forward by up to 8 days under intensive conditions
- Synchronisation of auxin profiles between E, M and L genotypes under intensive conditions
- Significantly lower levels at physiological maturity under intensive conditions ($P \leq 0.001$)

End of morphogenesis and initiation of embryo maturation occur between 10-12 DAP under intensive conditions

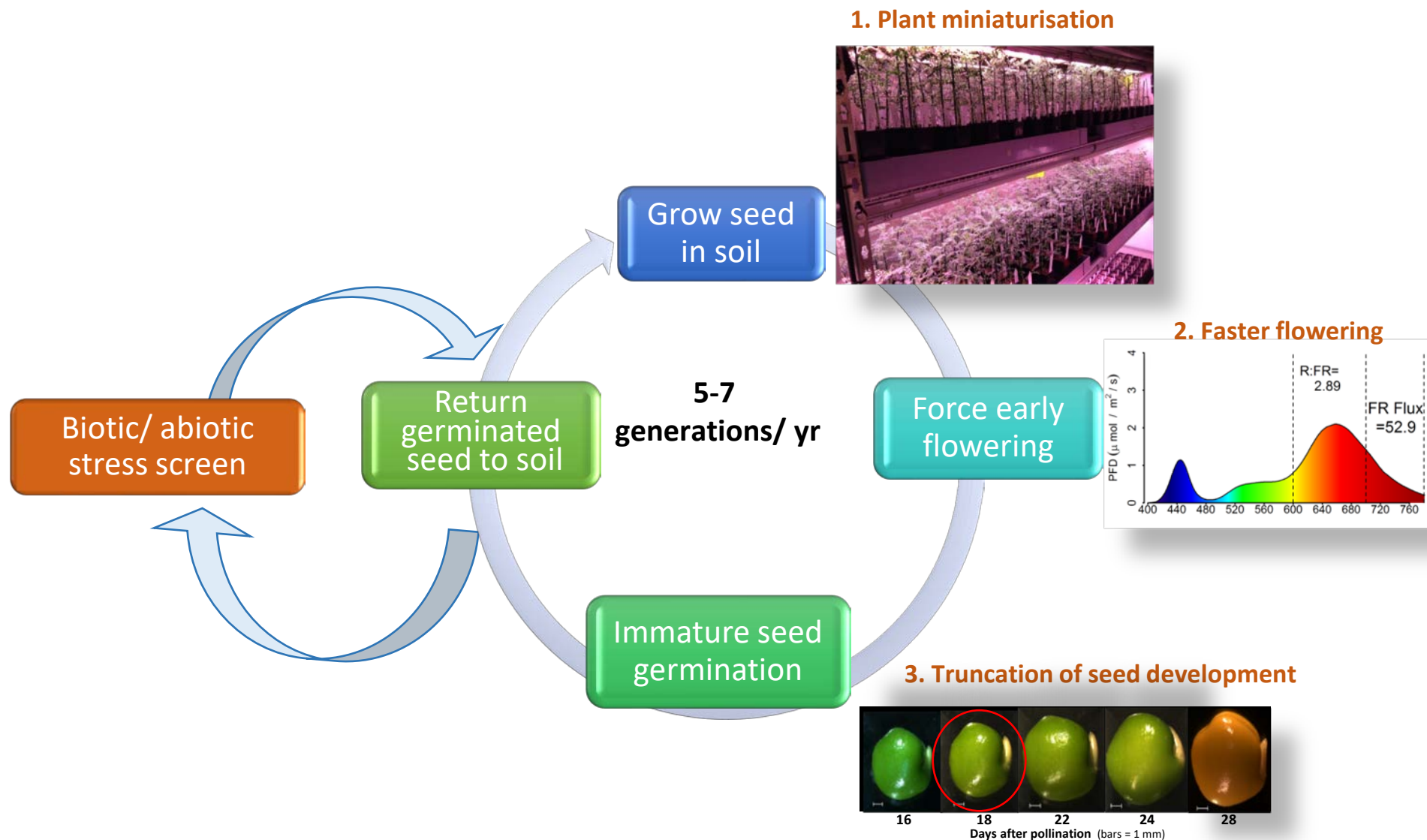
Cv. Kaspia



- Consistently lower ABA in glasshouse ($P \leq 0.01$)
- Intensive conditions peaks: 4000-7000 ng g DW⁻¹
- Glasshouse peaks: 1000-1500 ng g DW⁻¹

Growth under intensive conditions:

- Acceleration of auxin, GAs and ABA profiles by 4-8 days
- Synchronisation of auxin profiles across genotypes
- Auxin and GA are reliable indicators of the transition from morphogenesis to seed maturation



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