

PHYTOCAL

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Action in Plant Sciences

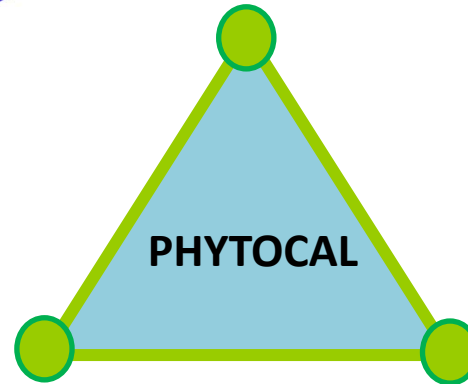


Phytochrome Control of Resource Allocation and Growth in Arabidopsis and Brassicaceae crops



ROBuST

HALLIDAY



STITT

NEMHAUSER



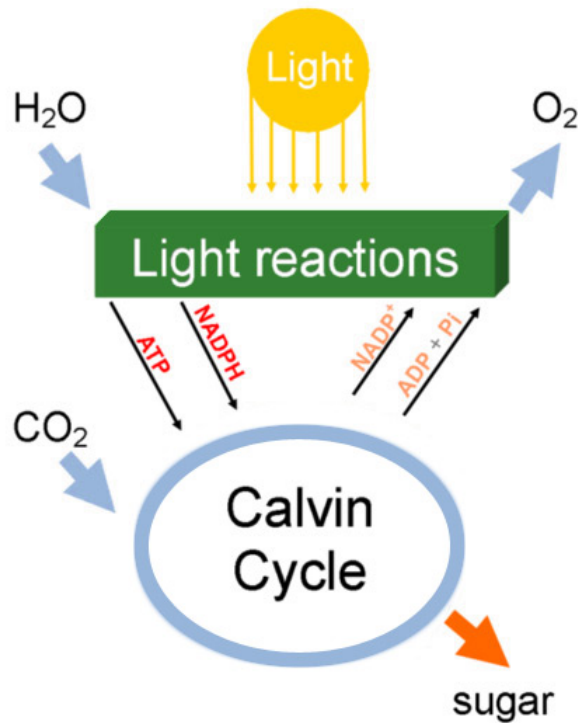
TiMet

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Plant life is dependent
on TWO light systems

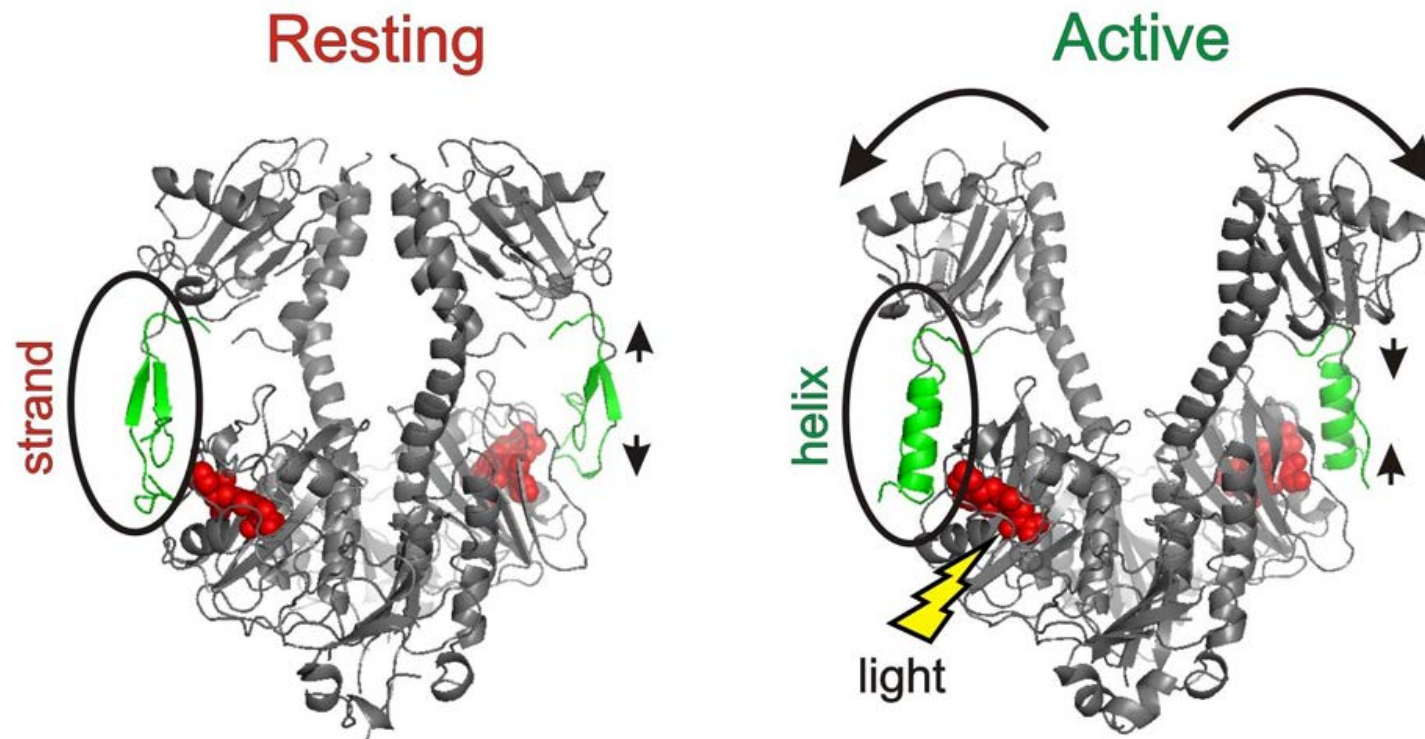
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Light Drives Photosynthetic
Carbon Fixation and growth



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How carbon is used depends on the **phytochrome** photoreceptors



(Takala et al. Nature 509, 245, 2014)

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Phytochromes reprogramme growth to canopy light quality

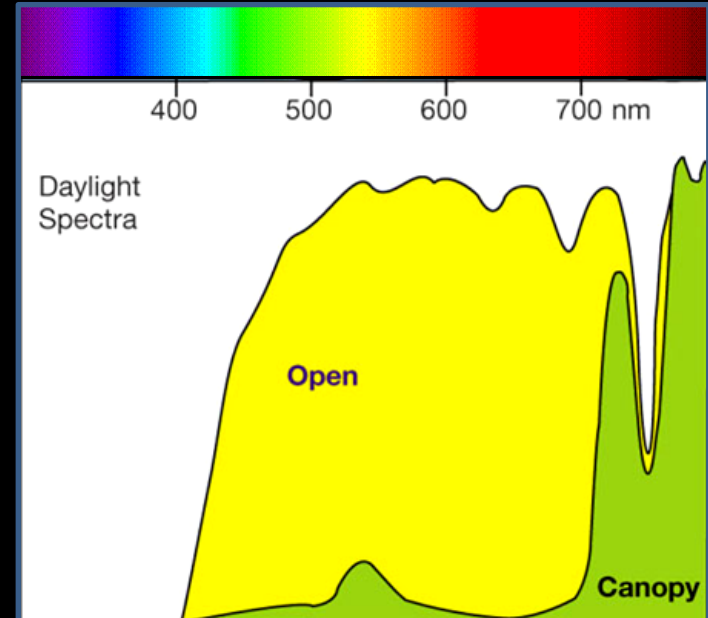
Arabidopsis



Lettuce



Radish



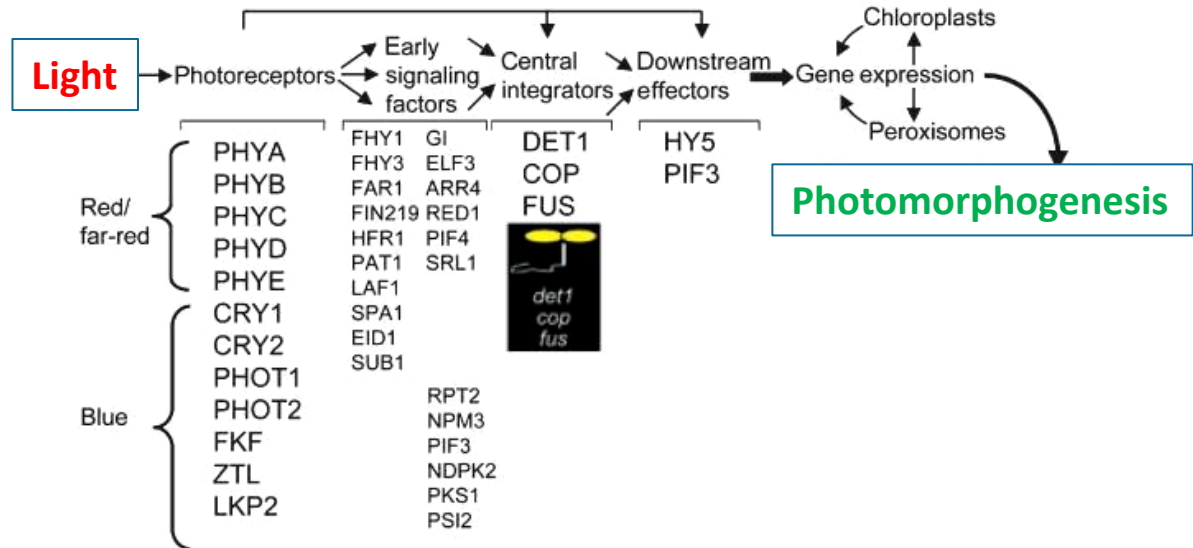
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Yield Cost



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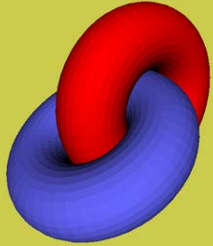
EXPLOIT THIS KNOWLEDGE



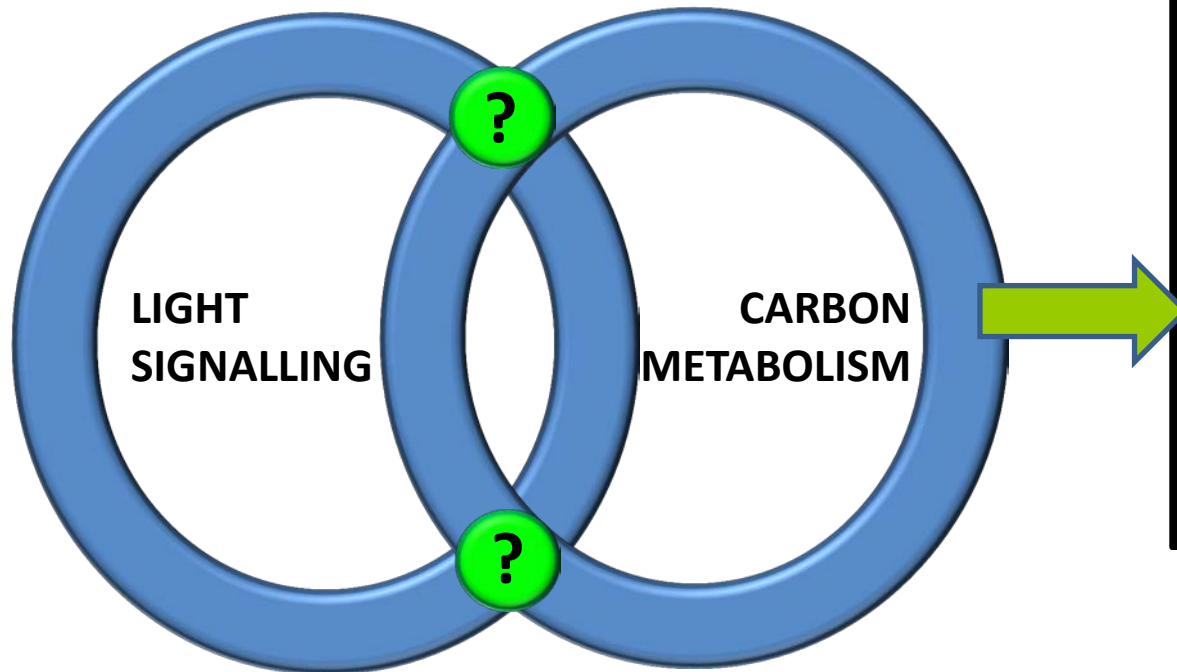
SEEDLING MODEL

(Chory J. Plant J. 61(6):982-91, 2010)

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Coupled?



GROWTH

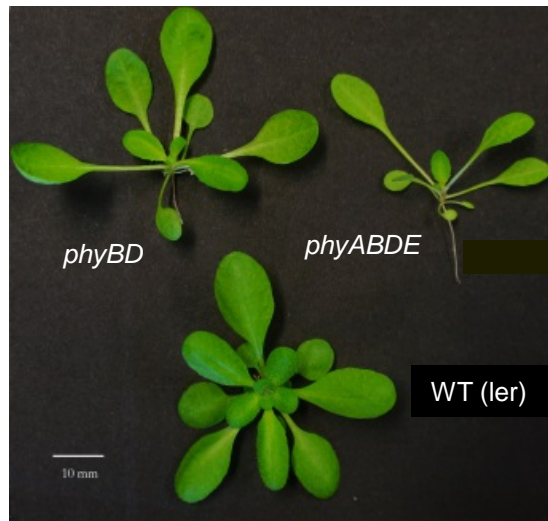


Arabidopsis



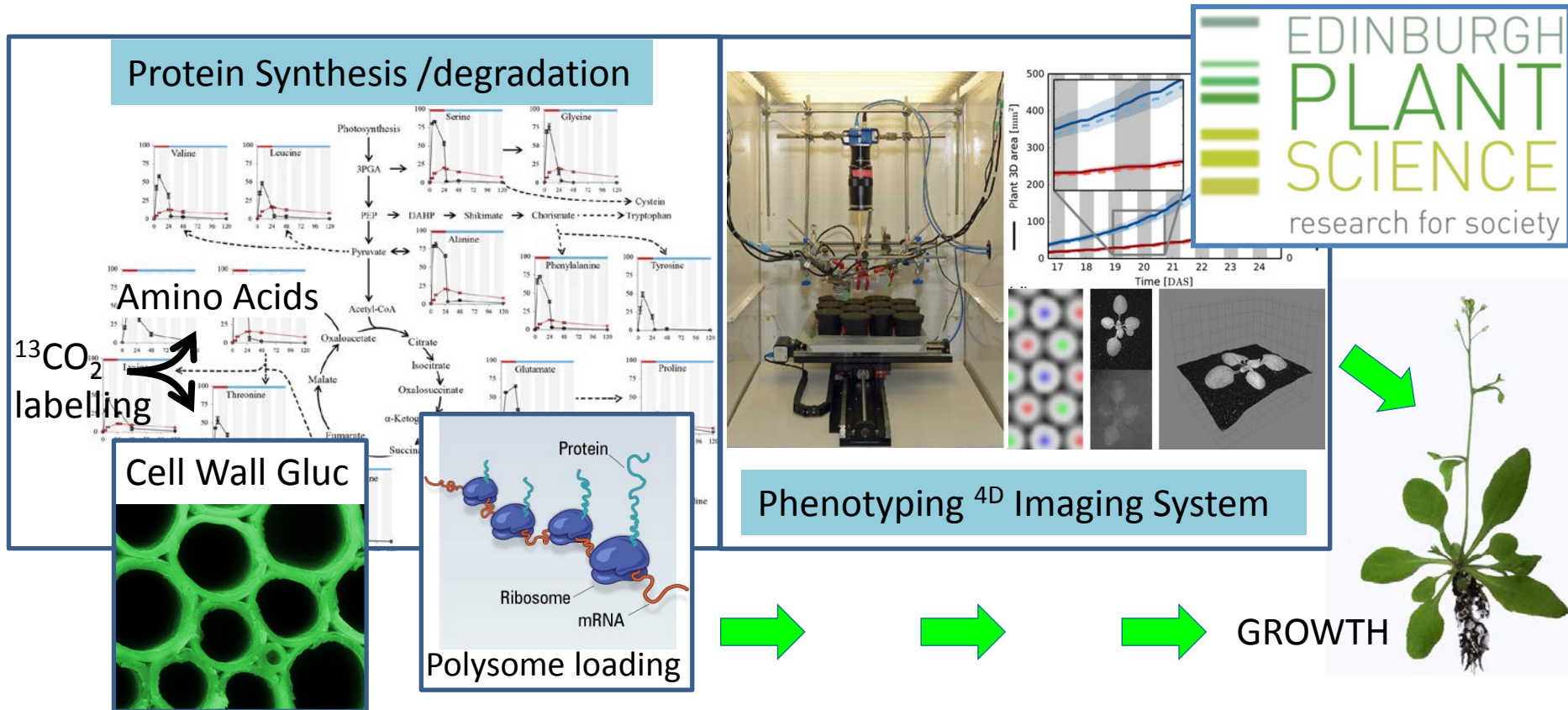
Brassica spp.

PHYTOCHROME IS NEEDED FOR EFFECTIVE CONVERSION
OF PHOASSIMILATE INTO BIOMASS



Fundamental Question 1

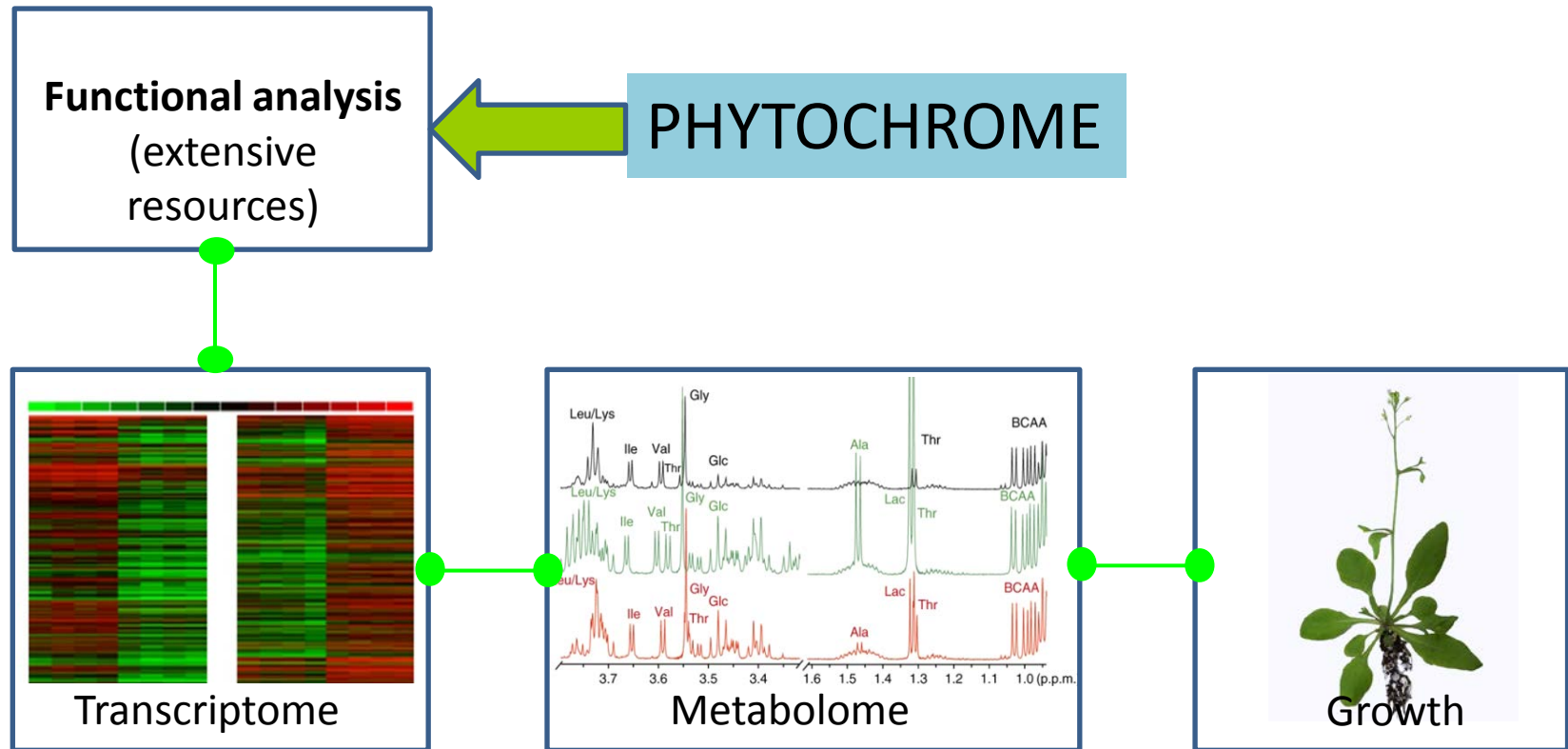
How does PHY regulate the use of carbon for growth?



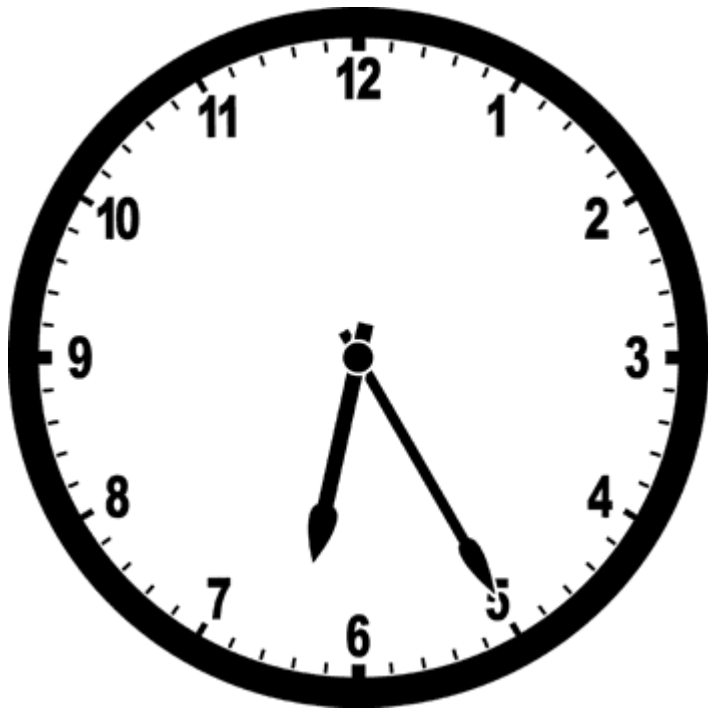
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Fundamental Question 1

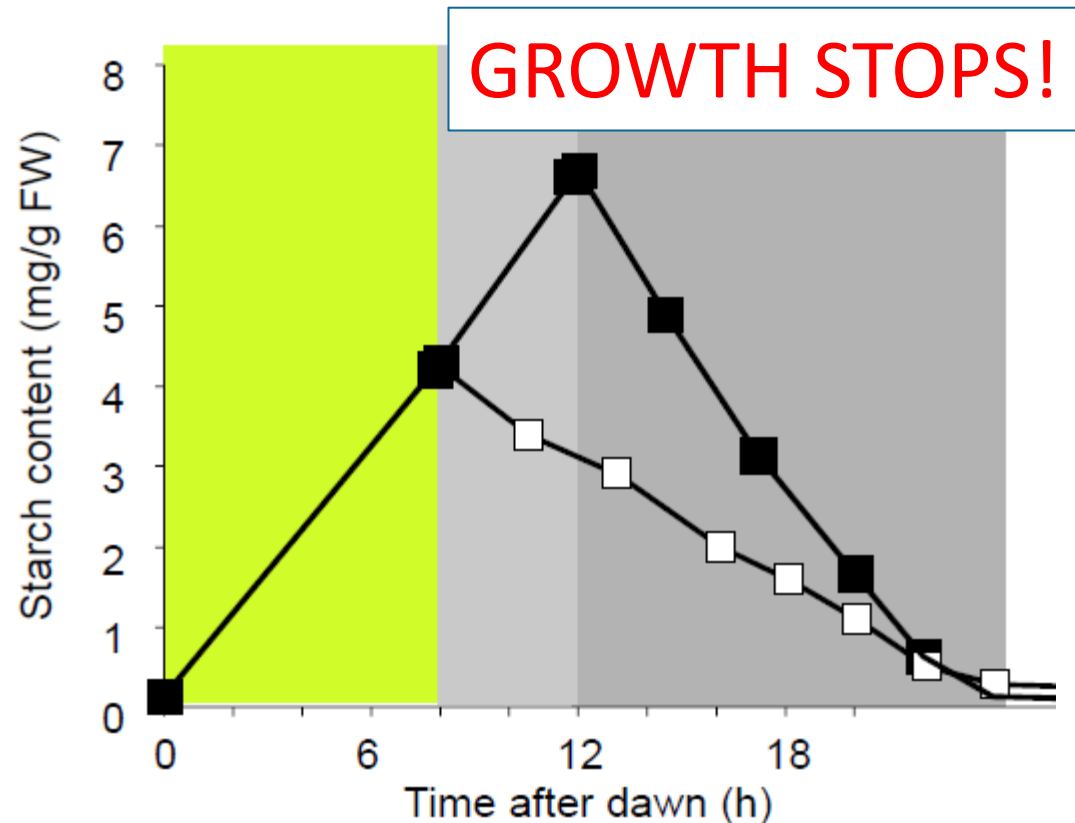
How does PHY regulate the use of carbon for growth?



Fundamental Question 2 Carbon reserves... starch



(Graf et al., PNAS 2010)

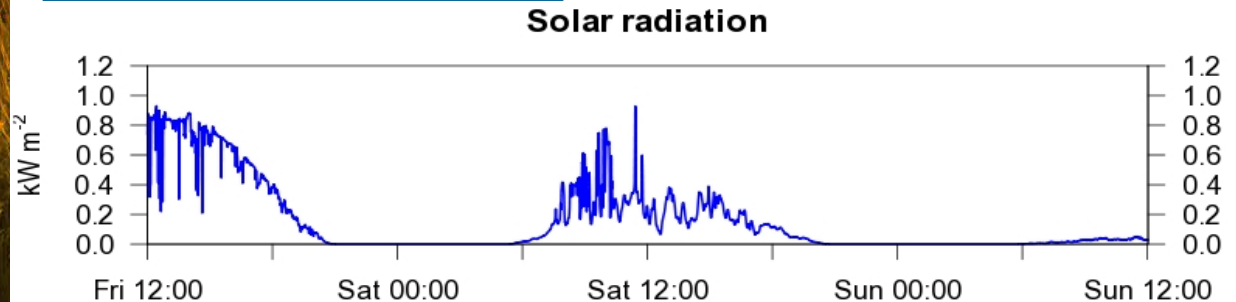


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Fundamental Question 2

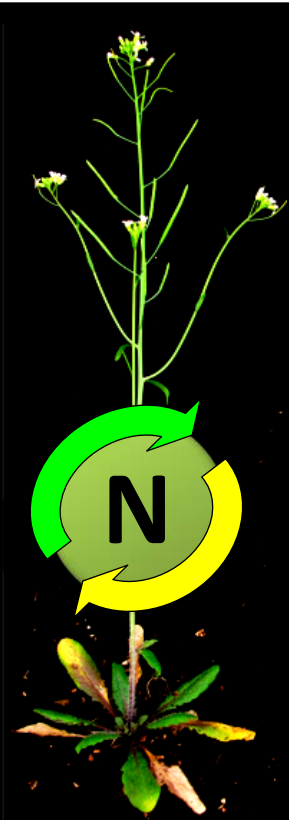
Is PHY - Photosynthesis co-action required to conserve C reserves?

Natural Dawn



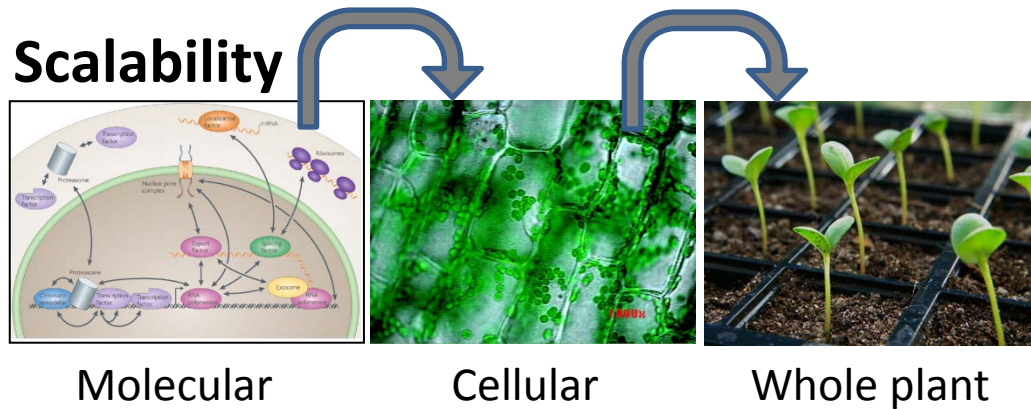
Fundamental Question 3

How do PHY + C signalling control resource allocation in canopies?



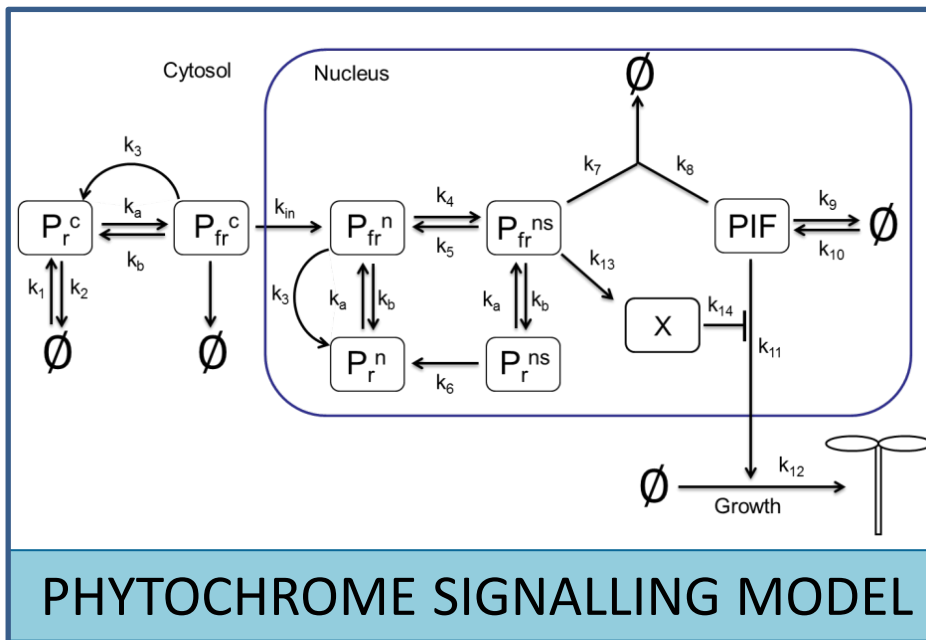
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Challenge: obtain system level understanding

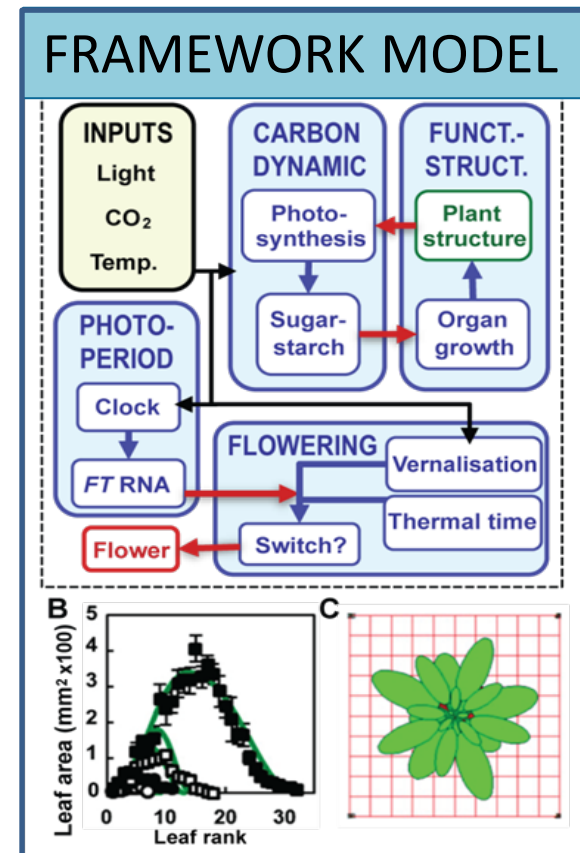


Fundamental Question 4

Can phy-signalling be integrated into Plant Growth Models?



(Johansson et al., Nat Commun. 2014 5:4848)



(Chew et al. PNAS 2014 111(39))

Data Infrastructure




FACILITIES

RESEARCH


Home > Facilities

Facilities



ON DEMAND COMPUTING

EPCC's Accelerator service brings leading edge supercomputing capability directly to your desktop.



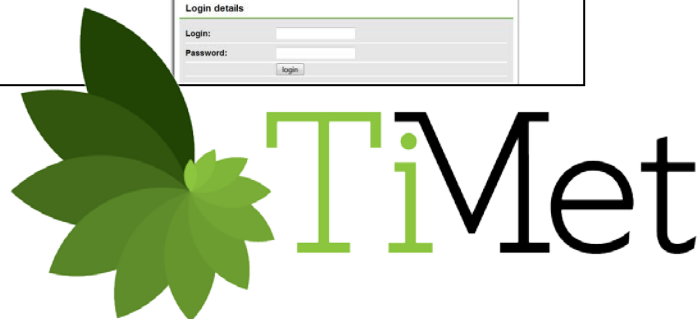
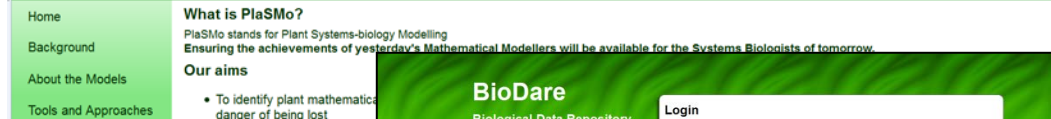
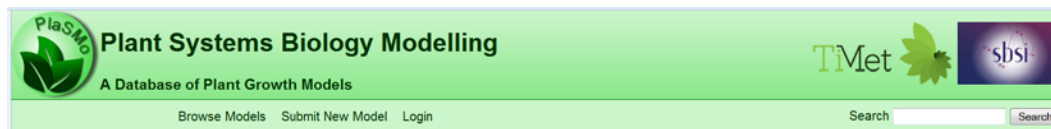
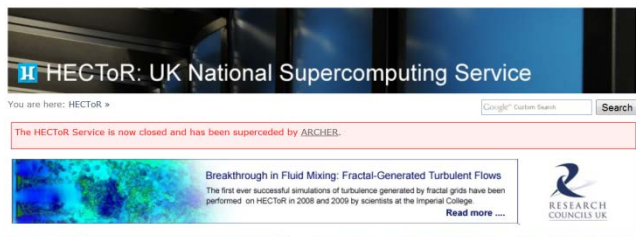
NATIONAL FACILITIES

EPCC hosts and manages several national-level facilities for use by researchers on behalf of UK funding councils.



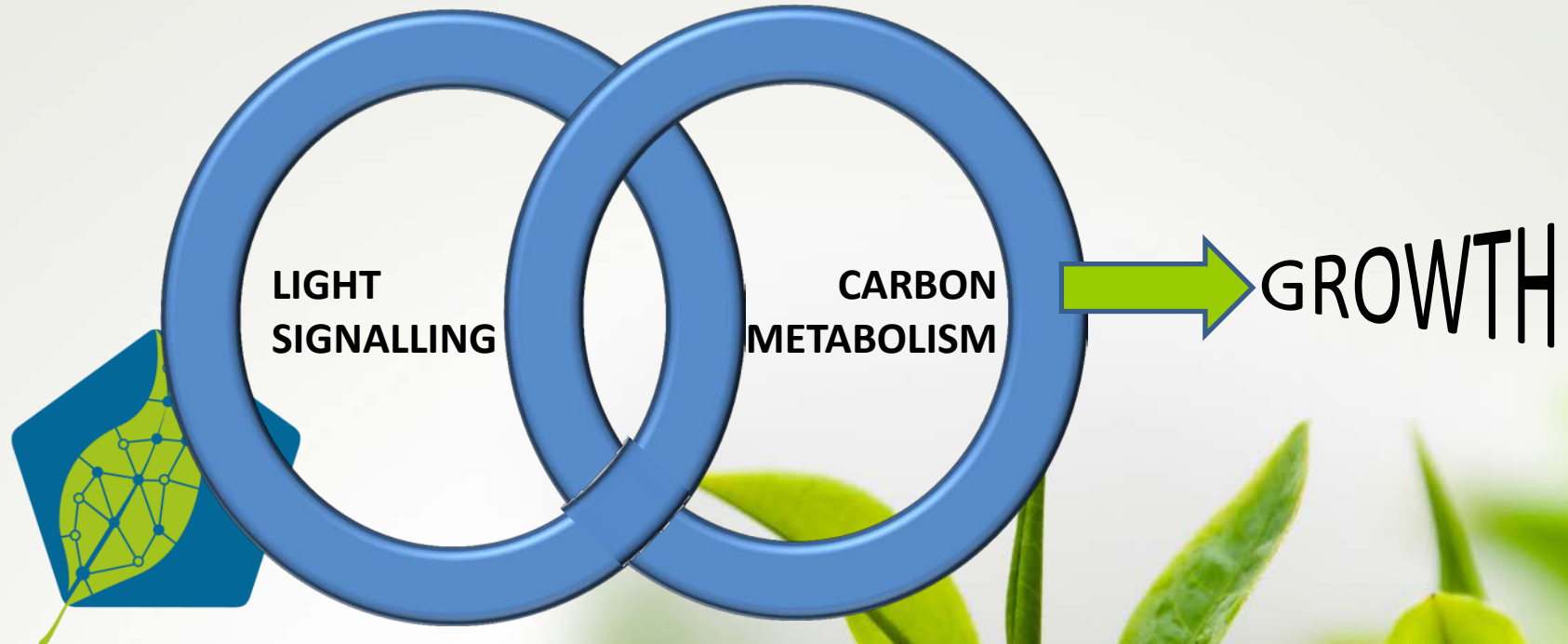
SUPPORT

EPCC's User Support team provides support for all users of EPCC's high-performance computing systems.



**New unifying paradigm that connects light
signalling with metabolism and growth**

THANK YOU



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