



# Early establishment of photosynthesis and auxin biosynthesis plays a key role in early biomass heterosis in canola hybrids

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# Heterosis in crops



Mo17

F<sub>1</sub>

B73

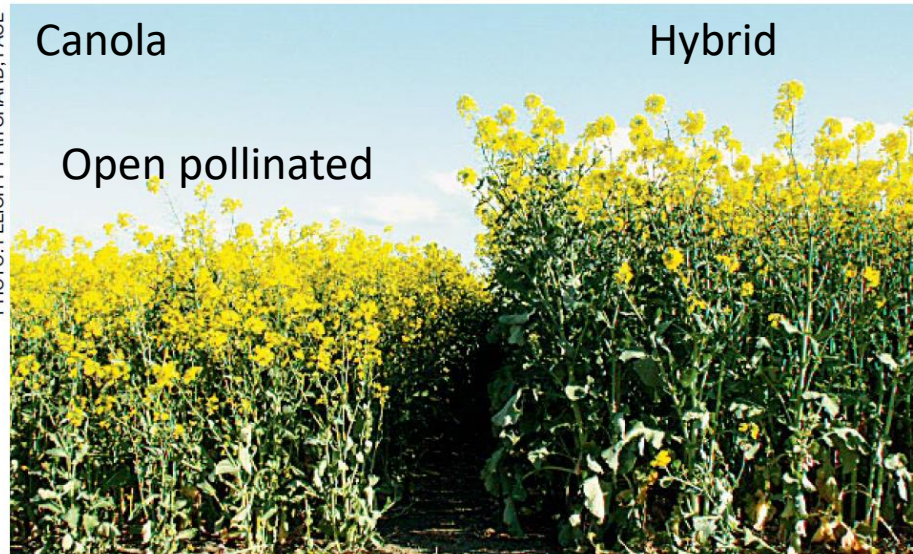


(Springer and Stupar, 2007)



(Yang and Zhang, 2012)

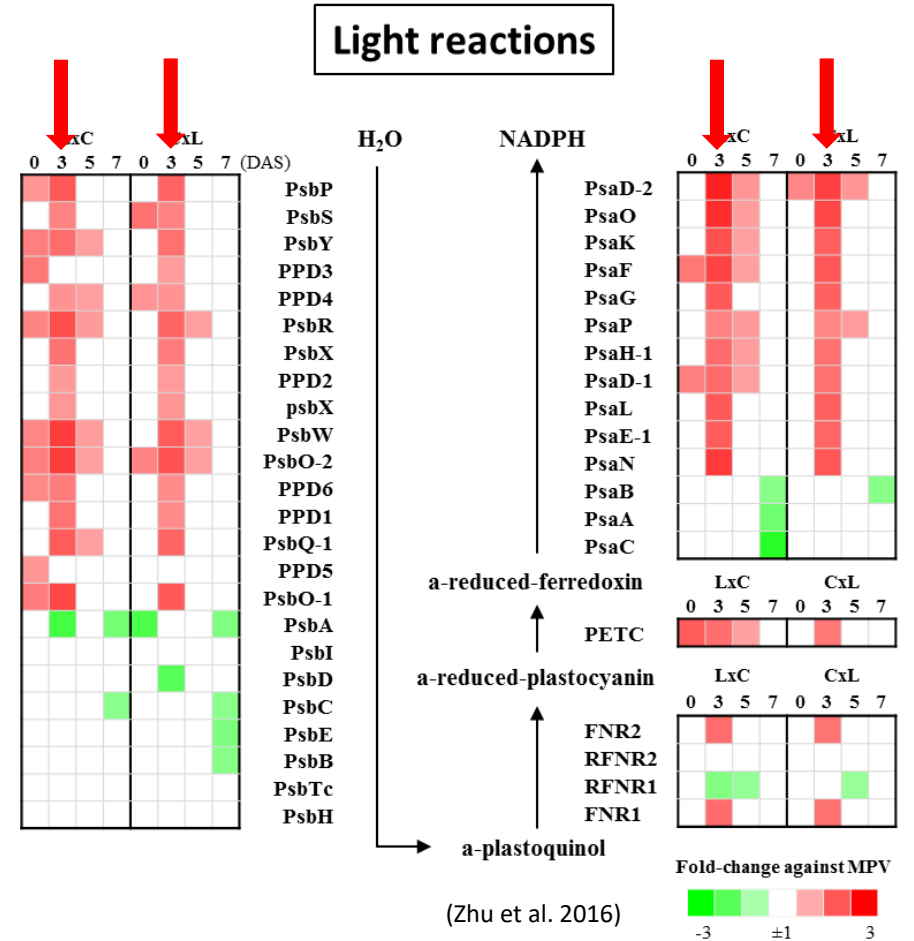
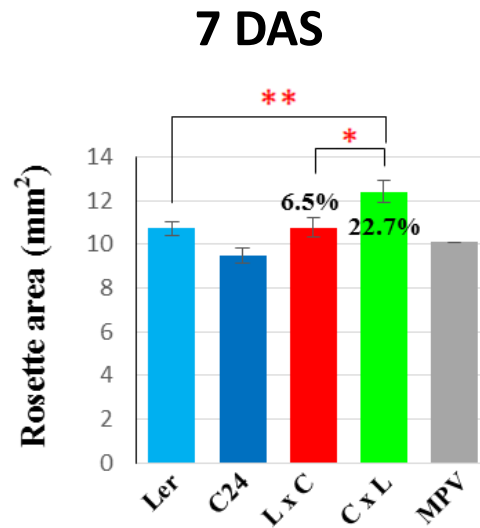
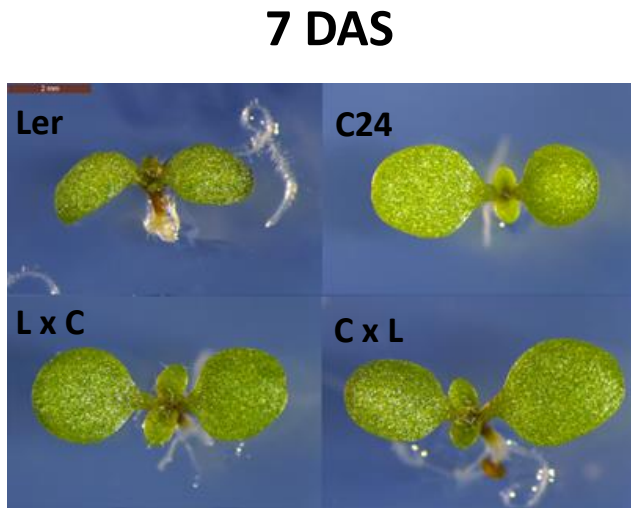
PHOTO: FELICITY PRITCHARD, PACE



# Early size heterosis correlates to upregulated photosynthesis genes

In Arabidopsis, heterosis can be observed at 7 DAS

- Larger cotyledon area in hybrids
- Up-regulated photosynthesis genes at 3 DAS in hybrids

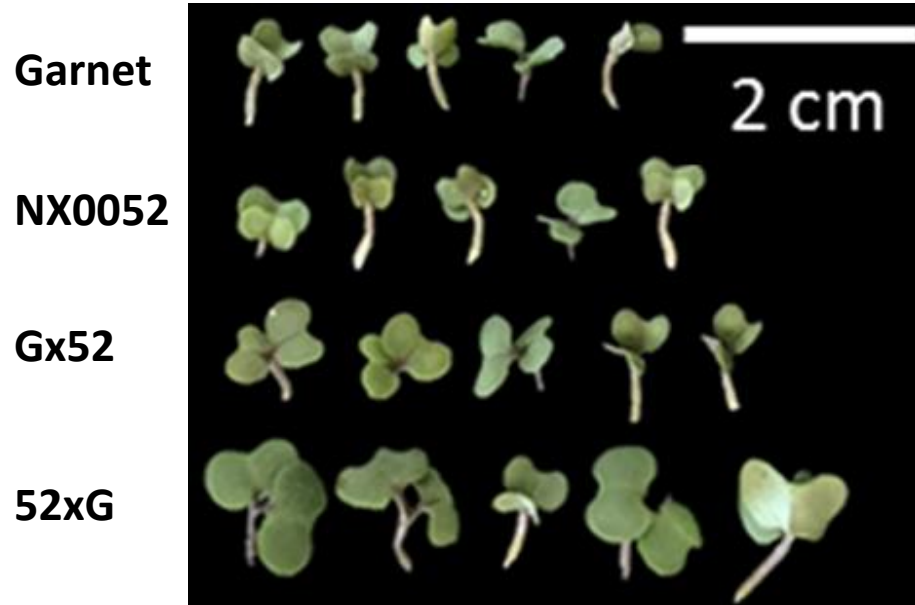


# Aims

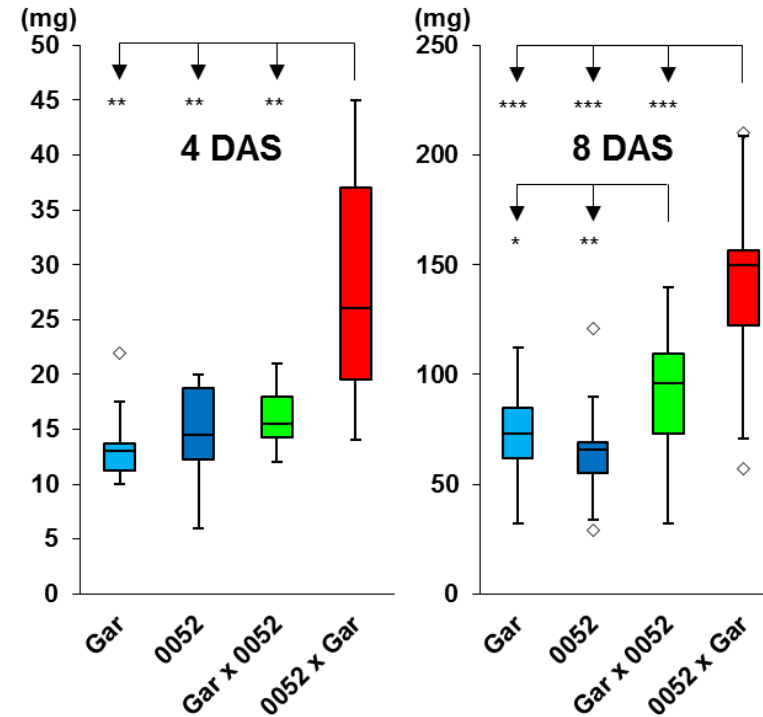
- **Identify factors leading to early biomass vigour in Canola hybrids.**
- **Correlation between early biomass vigour and final seed yield in Canola?**

# Early biomass and seed yield vigour in canola hybrids

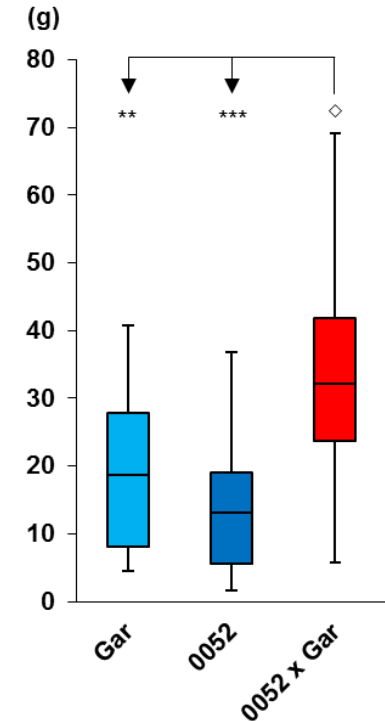
4 DAS



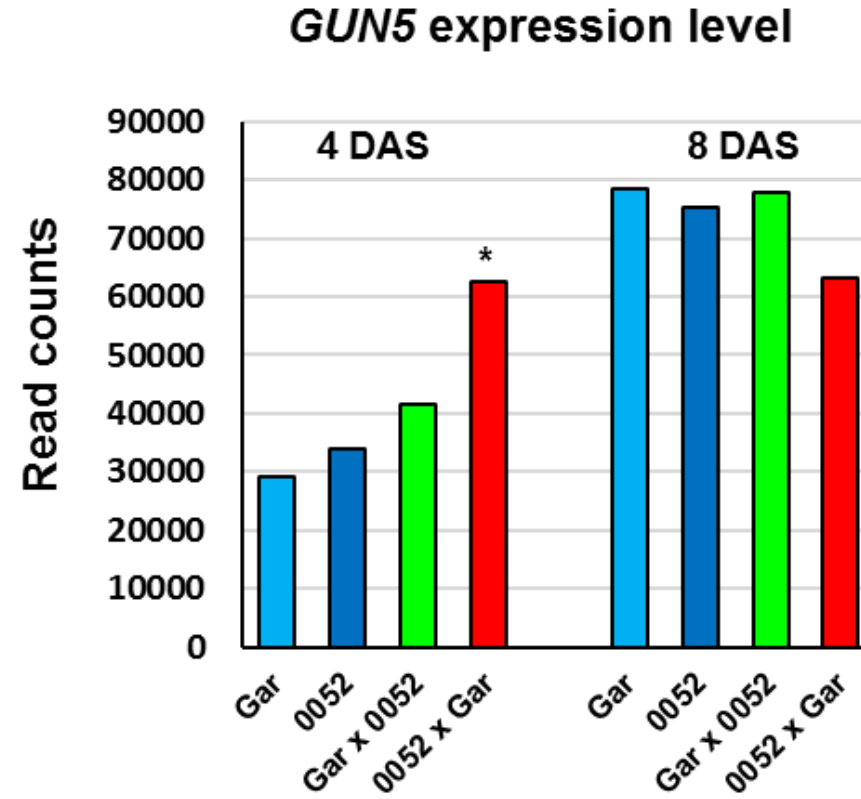
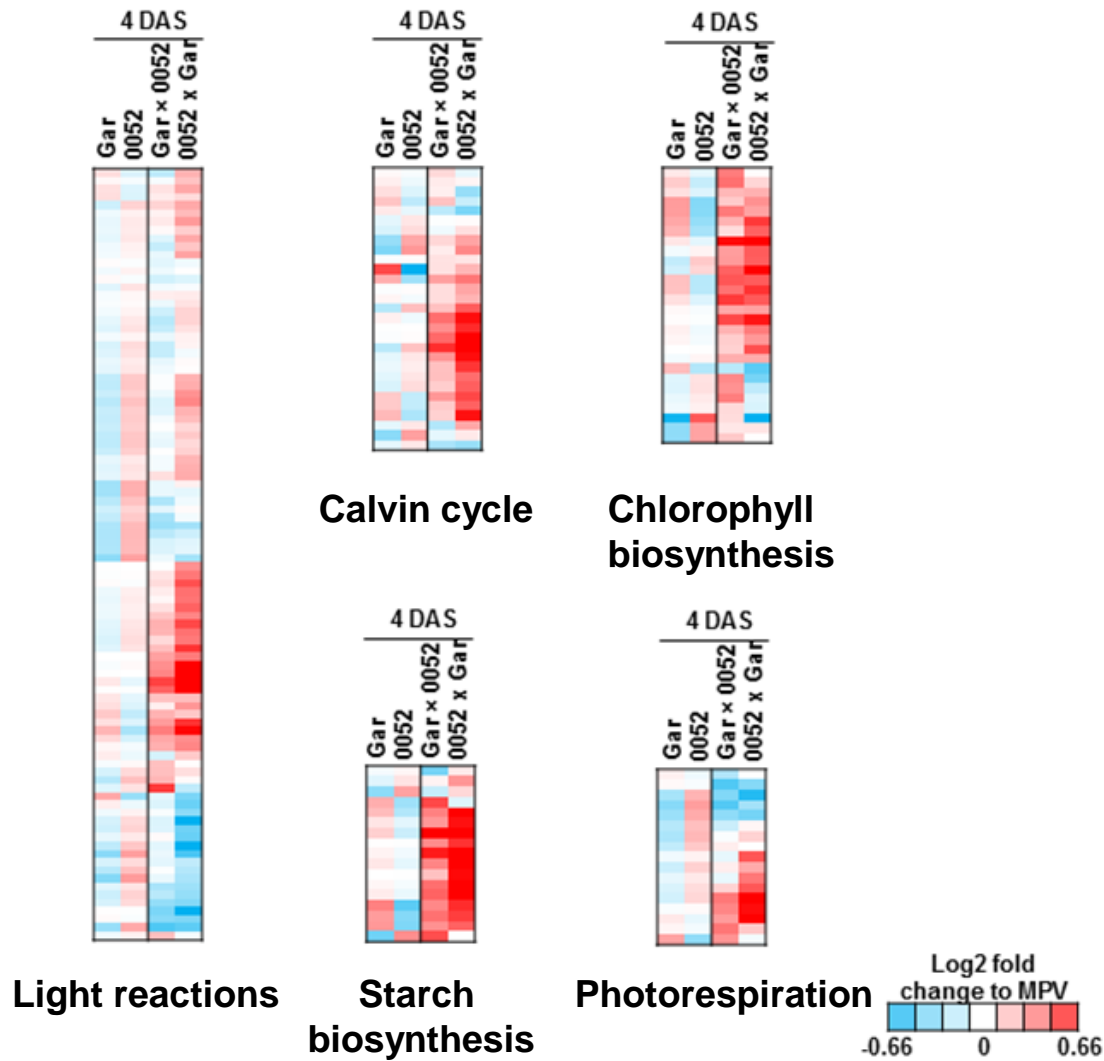
Fresh weight



Seed yield/plant

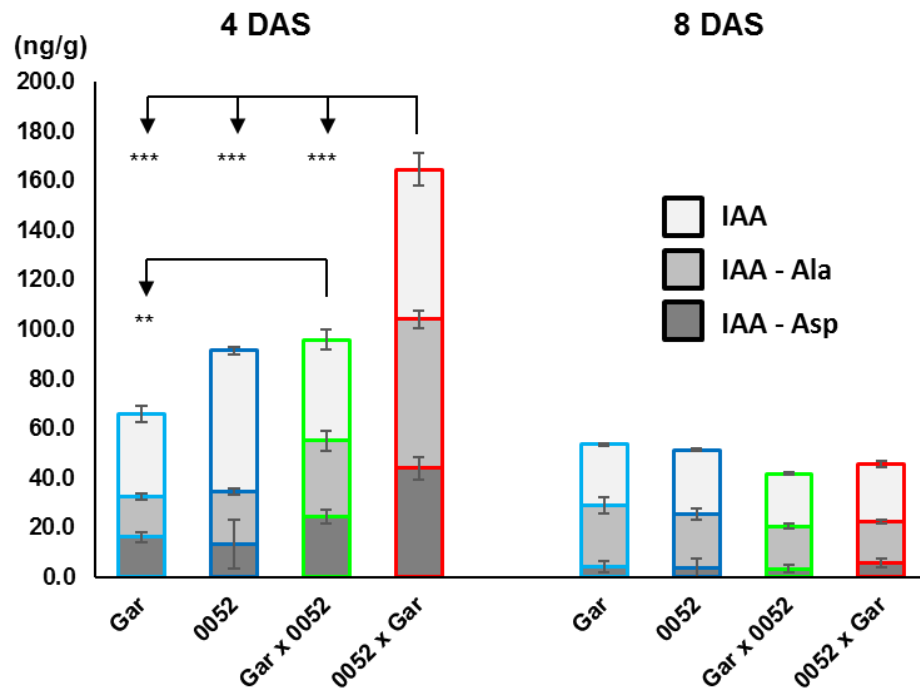


# Early energy production in hybrids at 4 DAS

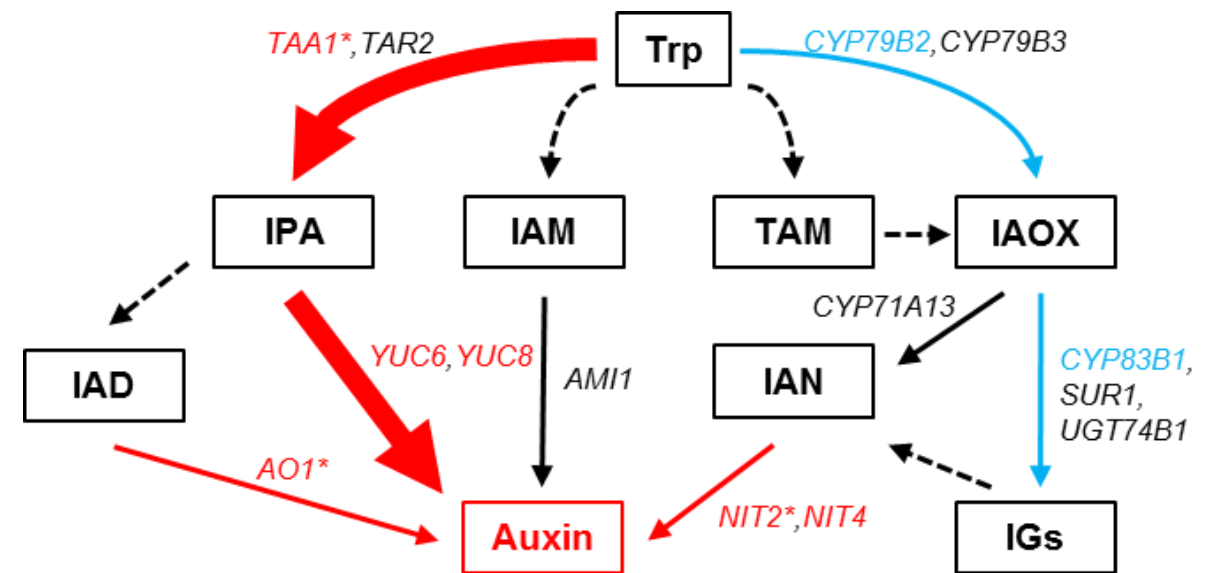


# Increased level of a growth promoting hormone - Auxin

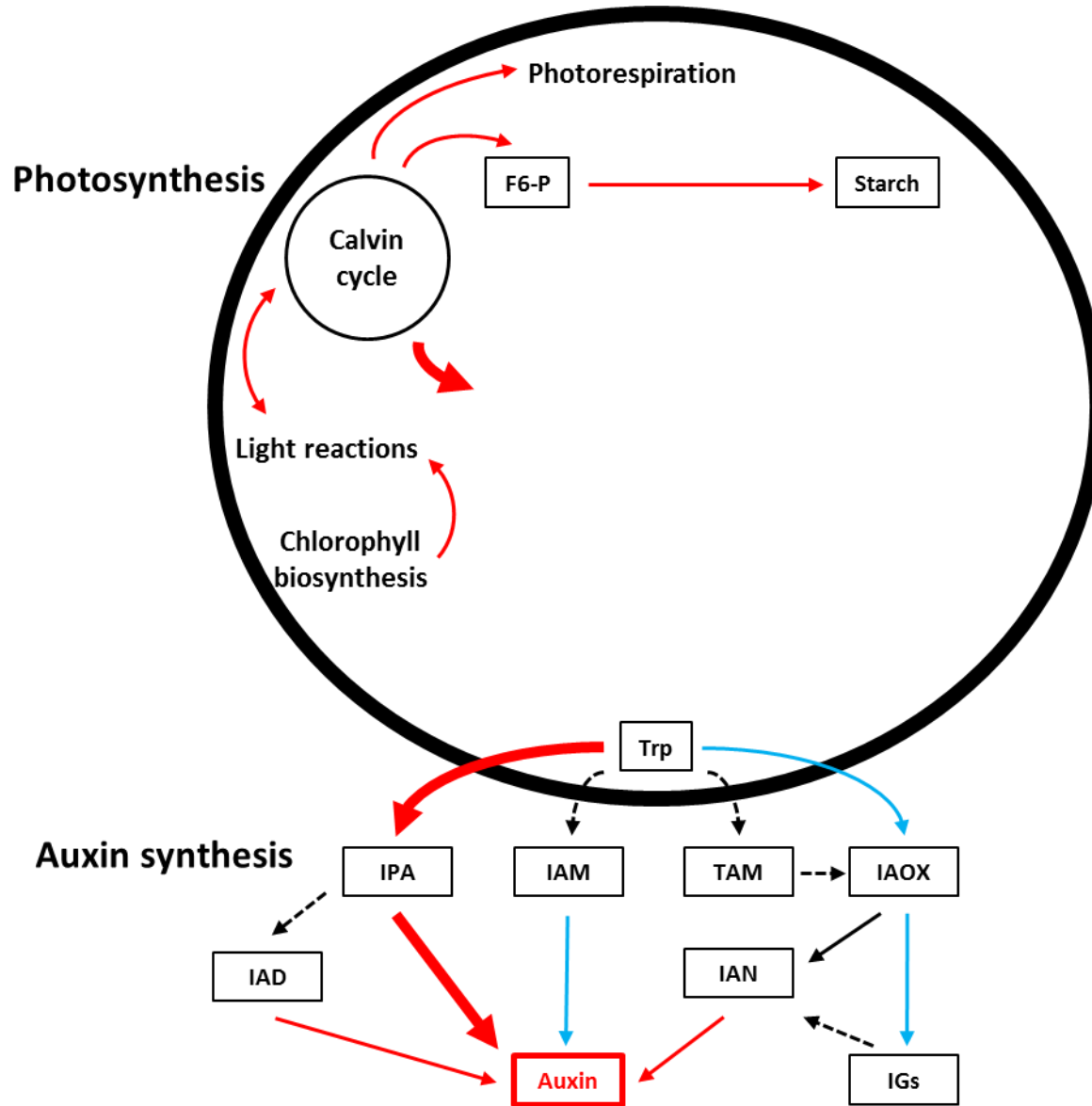
## Auxin concentrations



## Relative gene expression level at 4 DAS

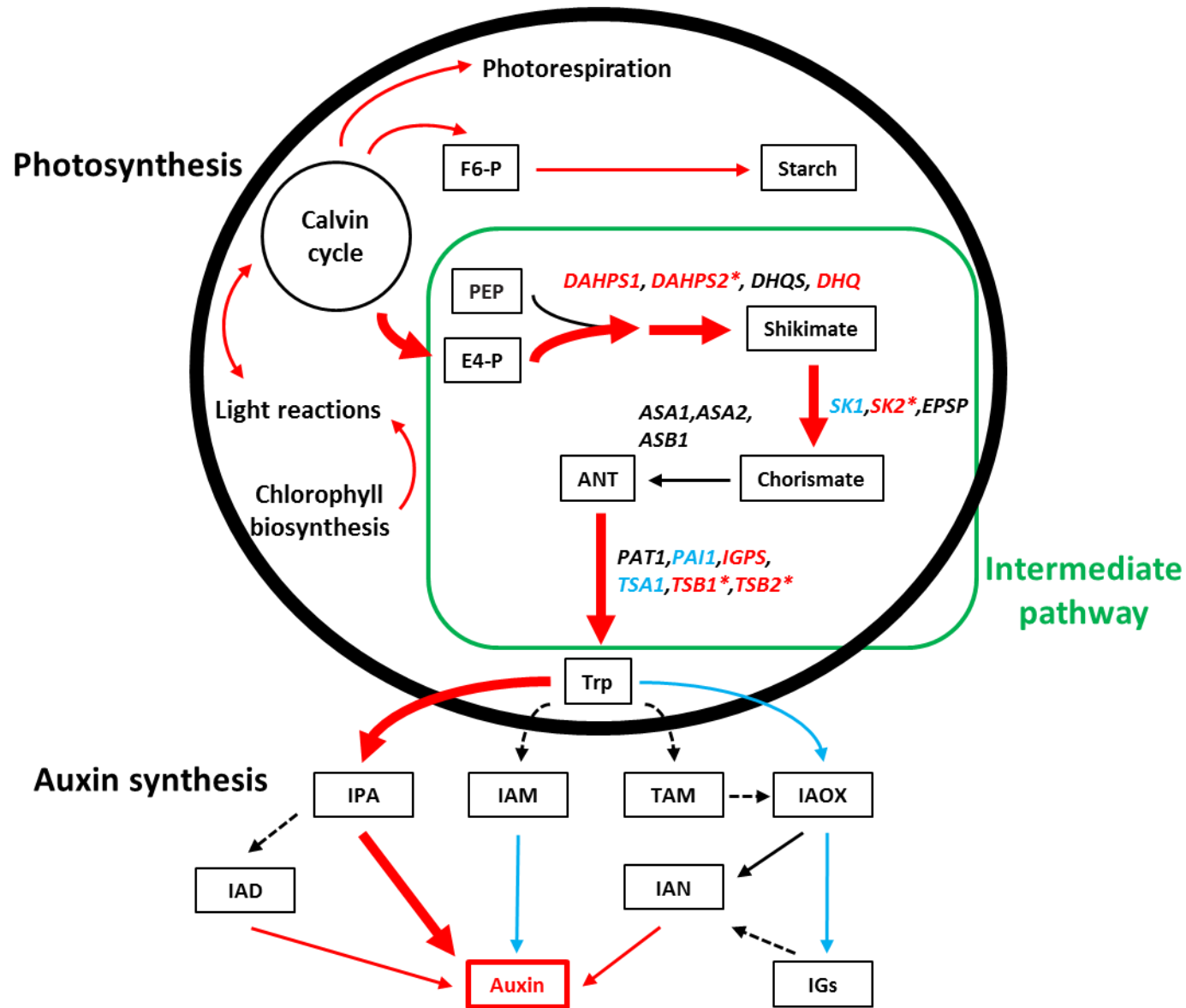


# Increased auxin results from early photosynthesis



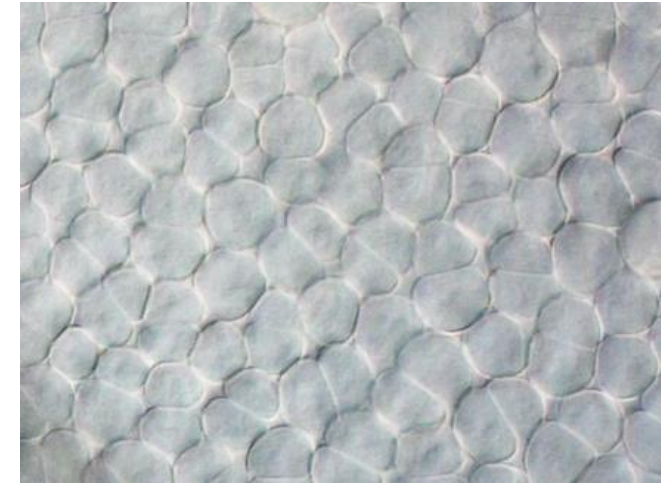
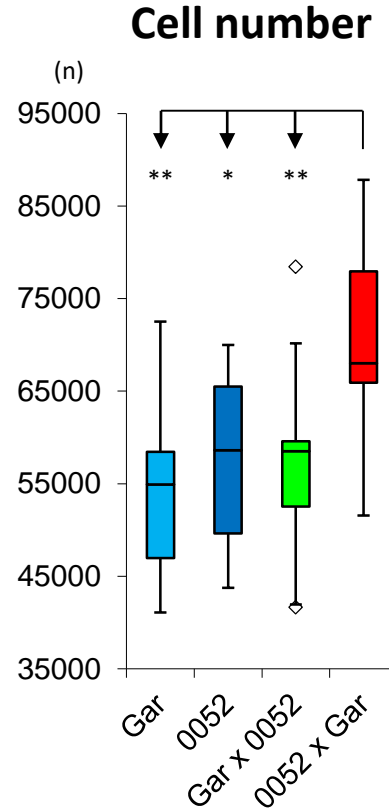
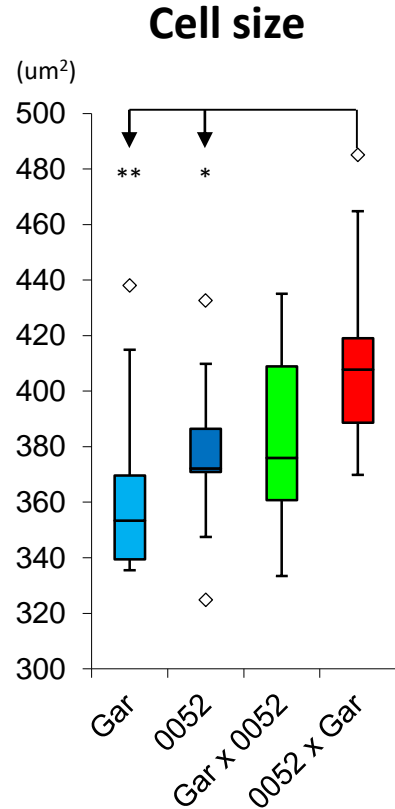
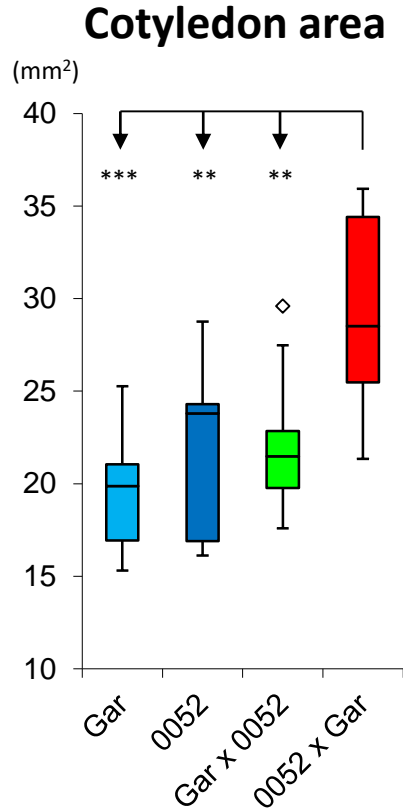


# Increased auxin results from early photosynthesis

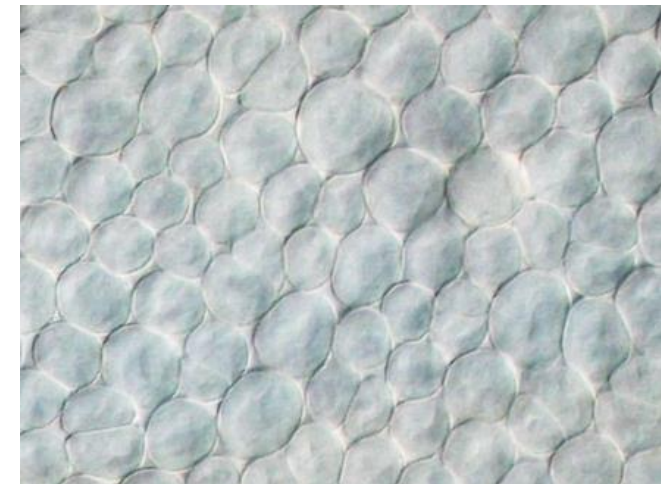


# Cell size and number correlate to auxin level

4 DAS

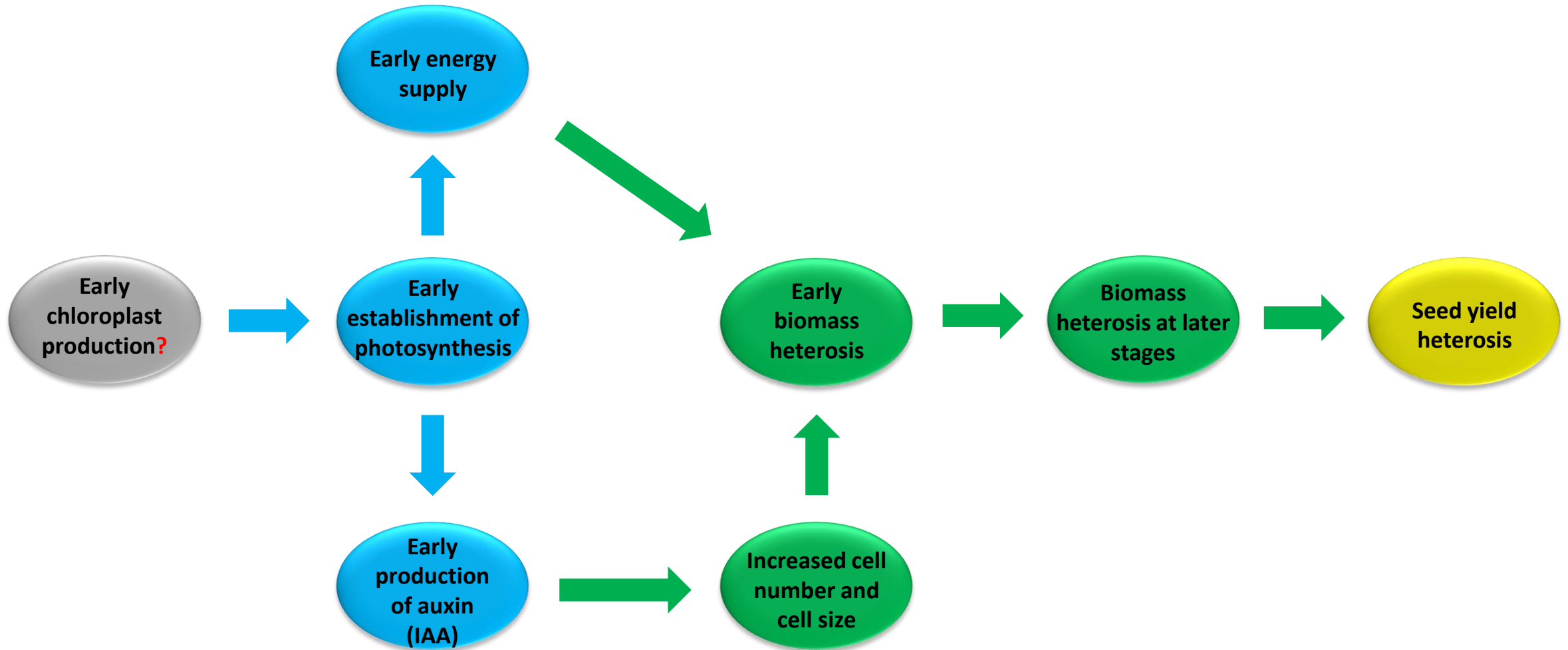


Gar



0052 X Gar

# Early photosynthesis contributes to seed yield heterosis



# Summary

**Early biomass vigour in Canola hybrids correlated with**

- **early establishment of photosynthesis**
- **increased auxin levels**
- **more and larger cells in cotyledons**

**Early biomass heterosis contributes to final seed yield heterosis**

# Acknowledgement

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