The length of photoperiod affects photosynthesis efficiency of *Betula pendula*

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Background

While temperature, CO_2 concentration, air humidity and many other factors change due to global warming, photoperiod remains the same.

Photoperiod affects growth of plants due to the daily rhythm of light availability and the effect on timing of height growth cessation in the autumn.

Plants that cover a wide geographic range need to cope with the different photoperiods.

However, little is known about the acclimation capacity of plants to new light environments or the possible adaptations to local photoperiodic regimes.

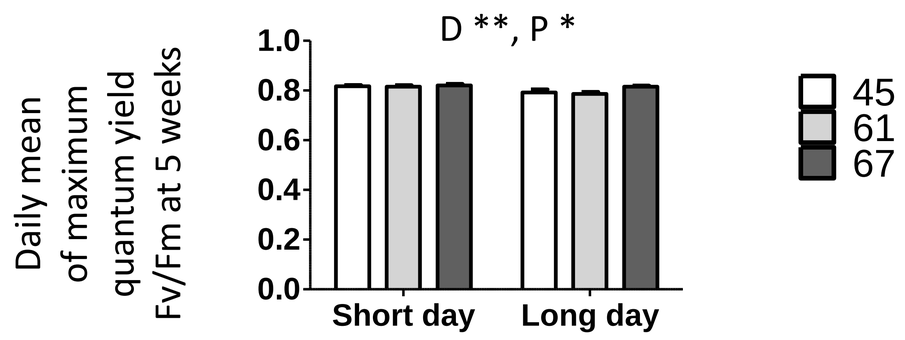
Questions (Q) and Answers (A)

Plantlets grown in short day

Plantlets grown in long day

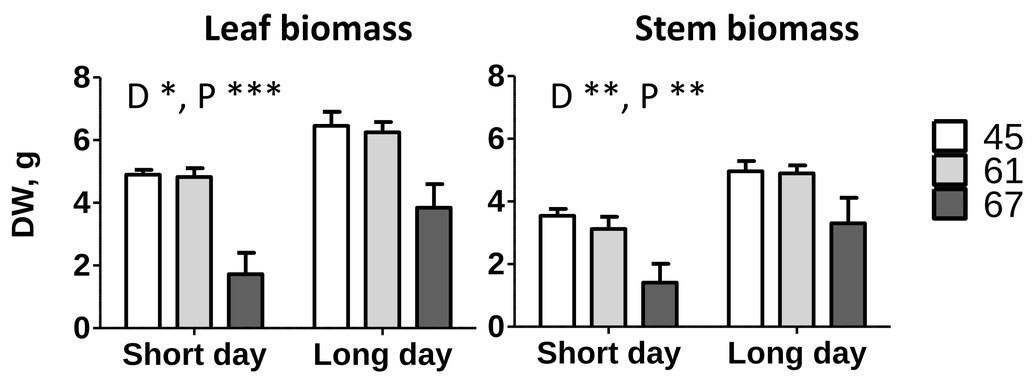
Six-week experiment:
Three populations:
45 °N, 61 °N, 67 °N
Two day lengths:
Short 16/8, long 24 h

Q1: Do southern and northern silver birch populations differ from each other in photosynthetic efficiency?
A1: Yes. Northern ones had higher photosynthetic efficiency than southern ones, but only in long day conditions.



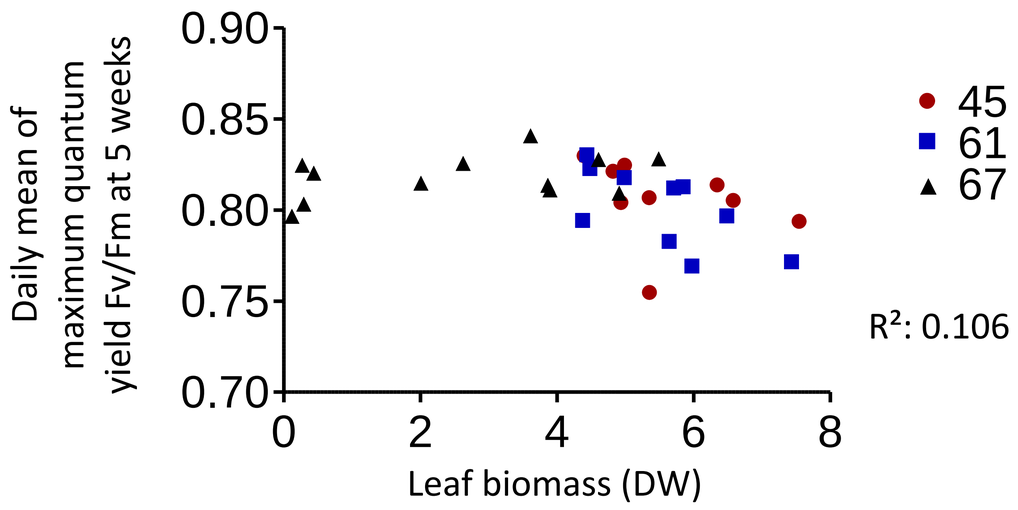
D, Day length; P, Population

Q3: Are plants able to utilize long days for higher growth?
A3: Yes, growth was higher in long day than in short day in a 6-week experiment.



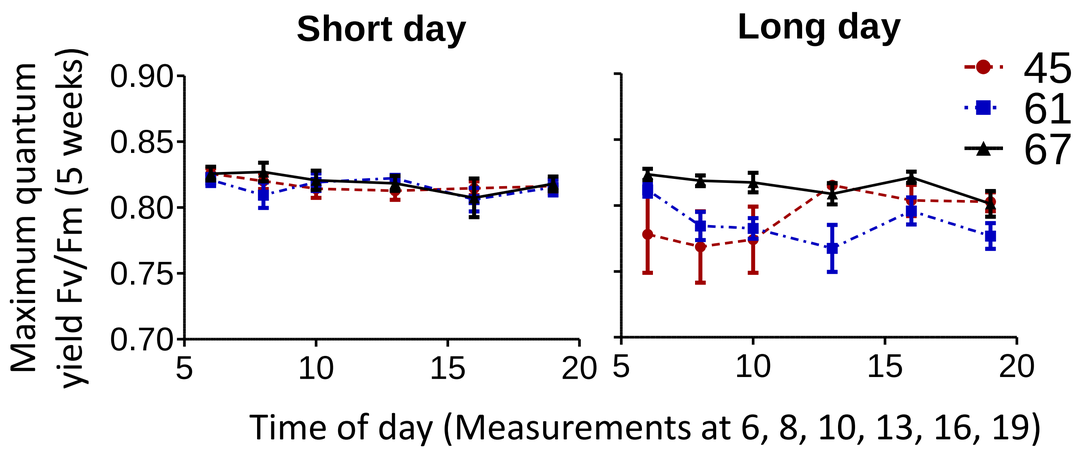
D, Day length; P, Population

Q2: Does higher photosynthetic efficiency translate directly into higher growth?
A2: No. Northern birches grow less despite their higher photosynthetic efficiency. There was a weak negative correlation in a 6-week experiment.



Q4: Are there diurnal changes in photosynthesis efficiency of silver birch?
A4: Yes, but only for southern populations in the long day conditions.

D ***, P *, T×D*, T×P*, T×D×P*



D, Day length; P, Population; T, Time of day

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