

The transgenerational impact of elevated CO₂ on oak progeny growth and development

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Background

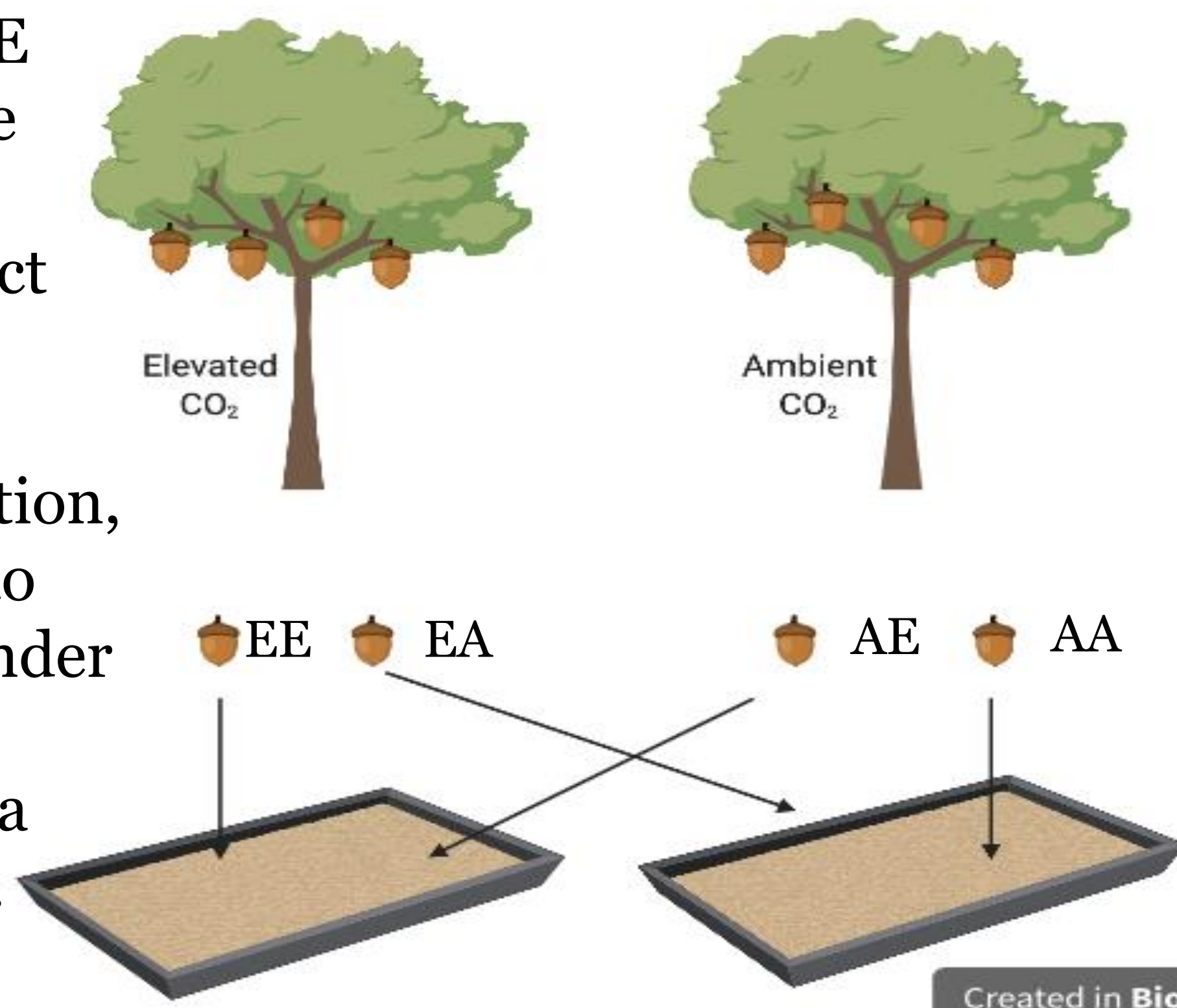
Human activity is causing CO₂ levels to rise. It is currently unknown how this rise will impact on the growth and development of oak trees and their progenies. This is significant as oak is the UK's dominant tree species.

Objectives

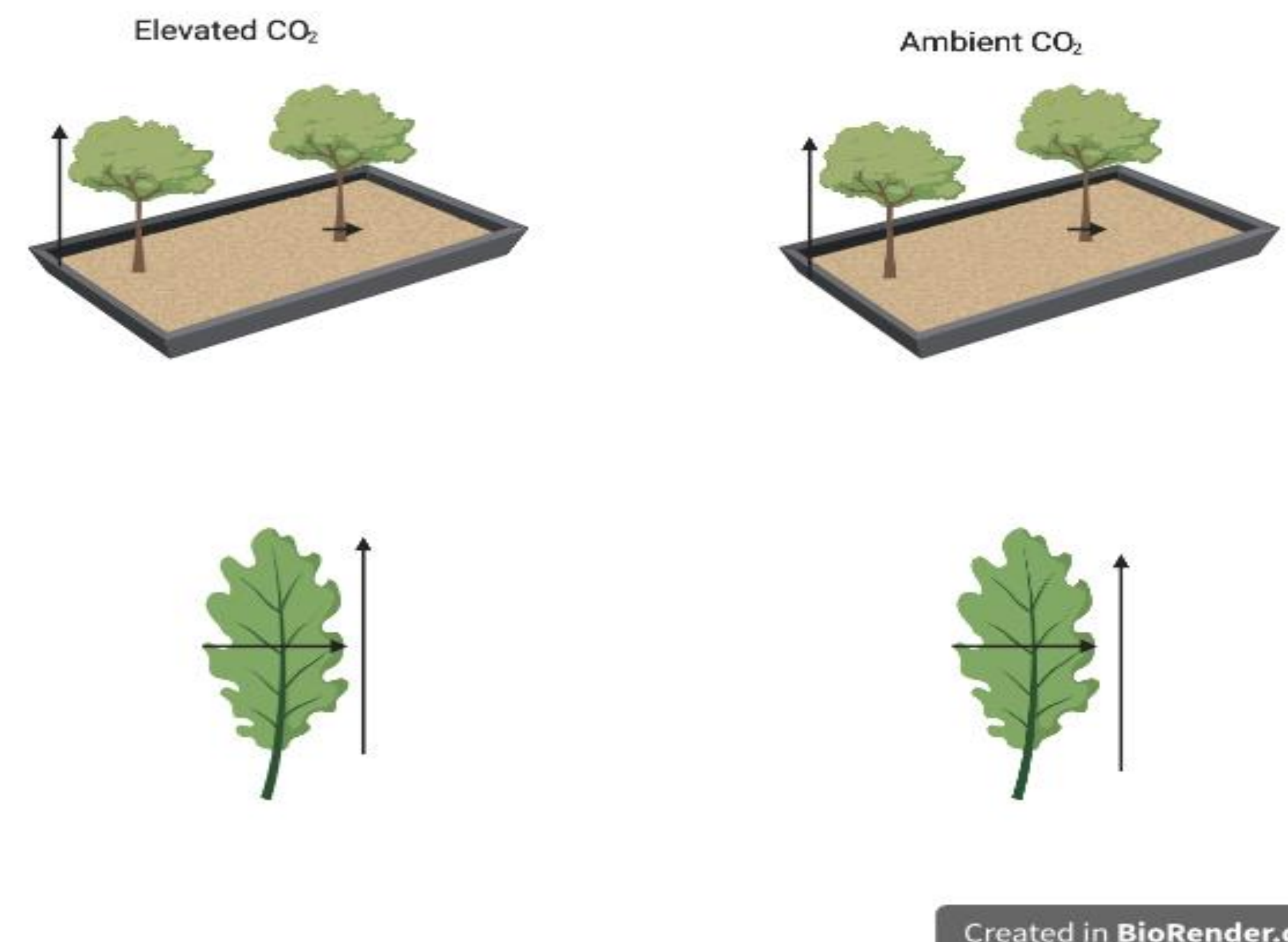
To compare the growth and development of oak seedlings produced under elevated CO₂ (eCO₂) and ambient CO₂ (aCO₂) (parentage) and then grown under either eCO₂ or aCO₂ conditions.

Method

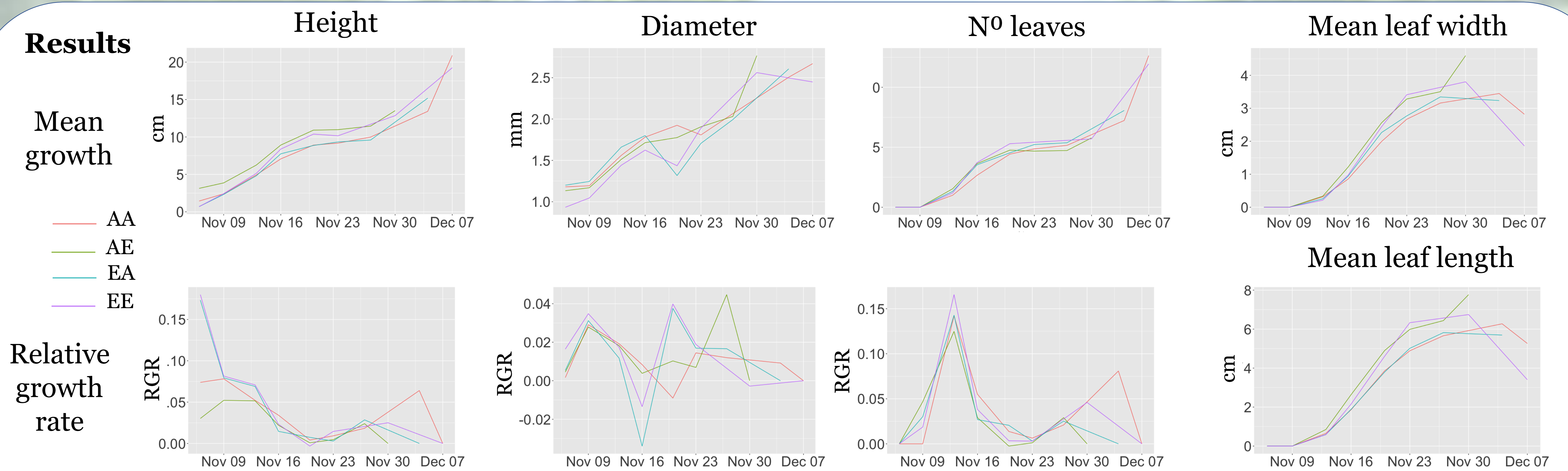
2020 was a mast year in the BIFoR FACE facilities, therefore giving us the possibility to collect acorns to study transgenerational effects. After collection, acorns were split to either be grown under eCO₂ or aCO₂ in growth cabinet in a laboratory setting.



For 1 month, we recorded their height, diameter of main stem, leaf number and leaf size (width and length)



Results



Conclusions

- Preliminary statistical analysis (MANOVA) found that at multiple timepoints seedlings grown under eCO₂ were taller and had bigger diameters than the ones grown under aCO₂. Therefore, eCO₂ impacts growth of seedlings.
- The amount of leaves produced by the plant and their size was not affected by eCO₂.
- Tree's parentage (i.e. CO₂ conditions where acorns were produced) does not impact on seedlings' rate of growth.

Future Work

- Develop an statistics pipeline to include modelling of the responses
- To test the effect of CO₂ in the response of seedlings to biotic stresses, including infection to powdery mildew and insect infestation.
- To carry out similar experiments at the BIFoR FACE facility with naturally regenerated oak seedlings
- To carry out molecular studies to see how eCO₂ impacts oak gene expression and metabolism