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Rising atmospheric CO_2 levels: a holy grail for trees or not?

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To better understand plant survival in a changing climate, it is mandatory to gain a comprehensive insight into the mechanisms contributing to both the carbon balance and the hydraulic functioning of trees. Rising atmospheric CO_2 levels can lead to enhanced carbon assimilation. This CO_2 fertilization has however more implications than initially thought. Our recent research demonstrates that trees grown under well-watered conditions and elevated CO_2 (T_E) levels indeed benefited from an increased phloem speed compared to trees grown under ambient CO_2 (T_A) concentrations. However, when subjected to sudden drought, T_E trees exhibited a faster decrease in phloem speed compared to T_A trees (81% versus 61%, respectively) making them more vulnerable to adverse effects of drought-stress and induced carbon starvation. To asses this phenomenon, state-of-the-art plant-positron emission tomography (plant-PET) in combination with compartmental modelling was applied. Different branches of well-watered *Populus tremula* seedlings grown under ambient and elevated CO_2 concentration were fed *in vivo* with radioactive $^{11}CO_2$ and placed in a PET scanner for 90 minutes. This results in dynamic 3D images from which phloem characteristics could be derived using compartmental modelling. Our results address how trees grown under a changing climate (i.e. elevated CO_2 levels) have a higher phloem vulnerability to drought.