



Branching out

from the Canadian Forest Service ■ Laurentian Forestry Centre

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Climate change: response of black spruce

Climate change is an undeniable reality, and the boreal forest's response to accelerated global warming will surely have a major impact on forest ecosystems. The effect that higher concentrations of carbon dioxide (CO₂) will have on the growth and productivity of forest tree species is one of the concerns at hand.

Researchers at the Canadian Forest Service have assessed the response of black spruce exposed to CO₂ levels that are twice as high as current levels¹. Compared with seedlings growing in a normal environment, black spruce seedlings exposed to high concentrations of CO₂ responded as follows:

- In fall (cold acclimation), the CO₂ fixation rate through photosynthesis was higher, indicating enhanced carbon sequestration.
- At the start of the cold acclimation period, there was less frost damage, as evidenced by the early appearance of buds at the end of the growing season.
- The growing season was shorter: half of the buds appeared on seedlings approximately 20 days earlier than expected.
- In August, at the end of the growing season, the nitrogen level in shoots and roots was lower. This drop may

result in slower springtime growth, even if stored sugar levels (carbohydrates) are similar to those found in a low CO₂ environment.

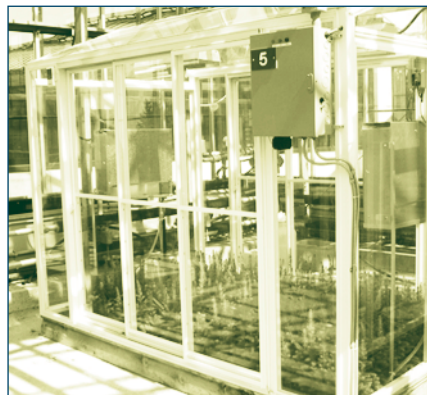
Assessing the impact of climate change on various forest tree species is clearly a complex exercise. Certain factors seem to favour growth and productivity, while others have the opposite effect. In addition, prediction models will not only need to take into account the

impact of climate, but also the new dynamics of ecosystems and disturbance regimes (fire, diseases, insects). Greater knowledge of these factors is the basis for developing response strategies.

FOR MORE INFORMATION, PLEASE CONTACT:

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Elevated CO₂ mini-greenhouses.
Photo: F. Bigras



¹ Specialists expect CO₂ levels to reach 700 ppm by 2100, compared with the current level of 370 ppm.