

INTERACTING EFFECTS OF OZONE AND CO₂ ON GROWTH AND PHYSIOLOGICAL PROCESSES IN NORTHERN FOREST TREES

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Globally, surface-level concentrations of both CO₂ and ozone (O₃) are increasing annually. Because many studies have shown beneficial effects of increasing CO₂, predictions have been made that elevated levels of CO₂ would compensate for growth decreases caused by O₃. For the past two years, we have been examining the interaction of O₃ and CO₂ on trembling aspen (*Populus tremuloides*) and eastern white pine (*Pinus strobus*) in open-top chamber studies involving both plants in pots and plants growing in the ground.

After two seasons of exposure to elevated ozone, alone or in combination with elevated CO₂ (ambient plus 150 ppm), soil-grown aspen and eastern white pine trees are exhibiting different response. While neither of the two pine seed sources has been negatively affected by ozone, significant negative effects of O₃ have been found for two aspen clones differing in O₃ tolerance: The negative impact of ozone was not compensated by CO₂ and for some physiological responses such as photosynthesis, stomatal conductance, chlorophyll content and leaf abscission, a significant negative interaction has been demonstrated for O₃ plus CO₂ treatment. Second-year growth and biomass measurements appear to be following our physiological measurements. Crown architecture has also been altered by the O₃ and CO₂ combination.

In addition, elevated CO₂ appears to alter the sensitivity of the tolerant aspen clone, making it more sensitive to O₃, as determined both by gas exchange and biomass measurements. The implications for these findings for modeling and response predictions will be discussed.

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