

# Elevated CO<sub>2</sub> reduces leaf damage by insect herbivores in a forest community

Rachel G. Knepp<sup>1</sup>, Jason G. Hamilton,<sup>2</sup> Jacqueline E. Mohan<sup>3</sup>, Arthur R. Zangerl<sup>4</sup>, May R. Berenbaum<sup>4</sup> and Evan H. DeLucia<sup>1</sup>

<sup>1</sup>Department of Plant Biology, University of Illinois, Urbana, IL 61820, USA; <sup>2</sup>Department of Biology, Ithaca College, Ithaca, NY 14850, USA; <sup>3</sup>Department of Organismic and Evolutionary Biology, Harvard University, Cambridge, MA 02138, USA; <sup>4</sup>Department of Entomology, University of Illinois, Urbana, IL 61820, USA

## Summary

Author for correspondence:

Evan H. DeLucia

Tel: +1 217 3336177

Fax: +1 217 2447246

Email: [delucia@life.uiuc.edu](mailto:delucia@life.uiuc.edu)

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- By altering foliage quality, exposure to elevated levels of atmospheric CO<sub>2</sub> potentially affects the amount of herbivore damage experienced by plants.
- Here, we quantified foliar carbon (C) and nitrogen (N) content, C : N ratio, phenolic levels, specific leaf area (SLA) and the amount of leaf tissue damaged by chewing insects for 12 hardwood tree species grown in plots exposed to elevated CO<sub>2</sub> (ambient plus 200 µl l<sup>-1</sup>) using free-air CO<sub>2</sub> enrichment (FACE) over 3 yr.
- The effects of elevated CO<sub>2</sub> varied considerably by year and across species. Elevated CO<sub>2</sub> decreased herbivore damage across 12 species in 1 yr but had no detectable effect in others. Decreased damage may have been related to lower average foliar N concentration and SLA and increased C : N ratio and phenolic content for some species under elevated compared with ambient CO<sub>2</sub>. It remains unclear how these changes in leaf properties affect herbivory.
- Damage to the leaves of hardwood trees by herbivorous insects may be reduced in the future as the concentration of CO<sub>2</sub> continues to increase, perhaps altering the trophic structure of forest ecosystems.

**Key words:** arthropod, carbon content, global change, herbivory, leaf nitrogen, leaf phenolic content, specific leaf area (SLA).

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