

Respiratory responses to changes in temperature in broadleaf trees found in the northeastern US

Rachel Arkebauer¹, Angelica Patterson², Kevin Griffin²

¹Department of Ecology, Evolution, and Environmental Biology, Columbia University, New York NY 10027, USA, ²Department of Earth and Environmental Sciences, Lamont-Doherty Earth Observatory, Columbia University, Palisades NY 10964, USA

Global climate change is predicted to have an effect on species ranges as warmer temperatures lead to increased plant respiration. Current models that predict future species ranges often either do not incorporate plant respiration or do so without including the dynamic respiratory response to temperature. However, understanding this response will be important for accurately predicting plant growth and competitive ability and thus CO₂ fluxes from plant respiration into the atmosphere. Northern-, central-, and southern-ranged species in the northeast United States were sampled to determine if the respiratory response varies with changes in temperature. Northern ranged species were found to have a lower E_0 and a higher R_{20} compared to their central and southern counterparts. Carbon to nitrogen ratio was significantly lower for northern-ranged species than centrally-ranged species but not significantly different from southern-ranged species. Specific leaf area did not vary by range group. These results suggest that northern-ranged species are at a physiological disadvantage compared to southern- and centrally-ranged species. This may lead to changes in the species composition of northeastern forests as temperatures rise in the region.