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Dear Editorial Board at *Functional Ecology*,

I am pleased to submit our manuscript, titled “The negative effects of an allelopathic invader on native plant photosynthesis intensify as the growth season progresses”, for consideration as a research article in Functional Ecology. The manuscript contains 4 tables (including the replication statement) and 4 figures in the main text, with 2 tables and 2 figures included in the supplement. The manuscript is not under review elsewhere, and all data and analysis scripts are publicly available (DOI: [10.5281/13862911](https://doi.org/10.5281/zenodo.13862912)).

Allelopathy has emerged as a key mechanism explaining the success of some invasive plant species. By releasing secondary compounds that negatively impact neighboring plant species and soil microbial communities, allelopathic invaders can significantly alter native plant resource acquisition and allocation to photosynthetic tissue. Alliaria petiolata, a well-studied allelopathic invader with widespread distributions in eastern North America, disrupts arbuscular mycorrhizal (AM) fungal communities that coexisting native understory plants rely on for nutrient and water provisioning. While previous research has shown that *A. petiolata* is associated with reduced native plant net photosynthesis and stomatal conductance, these studies have relied on single-timepoint gas exchange measurements and have not connected these responses to measurements of apparent photosynthetic capacity, limiting our understanding of (1) how the effects of allelopathic invaders vary temporally across a growing season, and (2) the direct mechanisms that contribute to these responses. Our work addresses these important knowledge gaps by quantifying net photosynthesis, stomatal conductance, and photosynthetic capacity responses of two native understory species to *A. petiolata* presence in a long-term manipulation field experiment. Measurements were collected early in the growing season (before canopy closure) and later in the season (after canopy closure).

Both native species exhibited significantly reduced net photosynthesis in the presence of *A. petiolata*. However, the mechanisms driving these patterns were species-specific. In *Trillium spp.*, net photosynthesis responses to *A. petiolata* were linked to decreased apparent photosynthetic capacity and no change in stomatal conductance, suggesting that the allelopathic invader induced a form of nutrient stress among *Trillium* spp. individuals. In *Maianthemum racemosum*, net photosynthesis responses to *A. petiolata* were associated with a reduction in stomatal conductance and increase in stomatal limitation, but no change in apparent photosynthetic capacity, suggesting that the allelopathic invader induced water stress among *M. racemosum* individuals. Regardless of the mechanism, both species exhibited stronger negative responses to *A. petiolata* later in the growing season, highlighting the importance of considering the temporal dynamics that regulate the effects of allelopathic invaders on native plant physiology.

Our study highlights the temporal dynamics of allelopathic invasion and cautions against relying on single-timepoint measurements to assess native plant physiological responses. While previous research has documented invasion-induced reductions in net photosynthesis and stomatal conductance, our work is the first to link these responses to photosynthetic capacity and demonstrate how they vary across the growing season. Additionally, the species-specific mechanisms we observed suggest that allelopathic invasion can impair either nutrient or water provisioning to native plants, depending on species-specific resource-use strategies. We believe that this manuscript aligns well with the mechanism-driven focus of *Functional Ecology* and will resonate with a diverse audience of invasion ecologists, plant ecophysiologists, and ecosystem ecologists.

Thank you for considering our submission. We look forward to your feedback and are excited about the opportunity to contribute to *Functional Ecology*.

Sincerely,

Evan A. Perkowski, Ph.D.

*On behalf of coauthors K. Carroll, Jessie Mutz, Snehanjana Chatterjee, Xianyu Yang, Lalasia Bialic-Murphy, Stephanie N. Kivlin, Susan Kalisz, and Nicholas G. Smith*