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Dear Editorial Board at *New Phytologist*,

Please consider the attached manuscript, titled “Negative effects of allelopathic plant invasion intensify as the growth season progresses”, for consideration as a full research article to *New Phytologist*. The manuscript contains two tables and four figures in the main text, with two tables and two figures included as supplemental material.

1. What hypotheses or questions does this work address?

This study examines the effects of allelopathic plant invasion on native plant physiology, focusing on two native species grown in the presence or absence of *Alliaria petiolata*. Known to disrupt the mycorrhizal symbioses of neighboring native plants, *A. petiolata* likely impacts native plant nutrient and water provisioning to support photosynthesis. We assessed net photosynthesis, stomatal conductance, relative chlorophyll content, and indices of apparent photosynthetic capacity at two time points in the growing season. Specifically, we tested two hypotheses: (1) native plants will reduce net photosynthesis rates in the presence of *A. petiolata* due to decreases in photosynthetic capacity or stomatal conductance, and (2) the effects of *A. petiolata* on native plant physiology will vary by time point, becoming more pronounced either early in the growing season when soil resource demand is high or later in the growing season when soil resources are depleted and reliance on mycorrhizal partners increases.

1. How does this work advance our current understanding of plant sciences?

Our findings reveal that both native species exhibited reduced net photosynthesis rates in the presence of *A. petiolata*. Species-specific mechanisms drove these responses: one species reduced apparent photosynthetic capacity, while the other reduced stomatal conductance. These effects were strongest later in the growing season when soil resources were depleted.

This study advances our understanding of plant sciences by emphasizing the importance of temporal dynamics in regulating native plant responses to allelopathic invaders. While previous research has documented reductions in net photosynthesis and stomatal conductance due to allelopathic invasion, our study is the first to show how these effects vary across the growing season. Furthermore, the species-specific mechanisms we observed suggest that allelopathy can impair nutrient provisioning (evidenced by reductions in apparent photosynthetic capacity) or water provisioning (evidenced by reduced stomatal conductance) to photosynthesis. Our study is the first to connect net photosynthesis and stomatal conductance responses with measurements of apparent photosynthetic capacity, offering nuanced insights into the mechanisms underpinning these responses. Finally, our findings caution against relying on single-timepoint measurements to make inferences about the impacts of allelopathic invasion on native plant communities, as such approaches may lead to incomplete or misleading conclusions.

1. Why is this work important and timely?

Although the detrimental impacts of allelopathic invaders on native plant communities are well-documented, the dynamic nature of these impacts and their physiological mechanisms remain poorly understood. Our study shows that the negative effects of *A. petiolata* intensify as the growing season progresses, highlighting the importance of accounting for temporal dynamics when evaluating the consequences of allelopathic invasion. Moreover, we found that photosynthetic responses to *A. petiolata* align with its known effects on AM fungal communities and plant community dynamics. This suggests that the physiological impacts of allelopathic invaders could serve as keystone that links aboveground and belowground responses to allelopathic invasion, providing a novel framework for understanding how disruption of AM fungal communities due to allelopathic invasion scales up to affect plant demographic responses.

Thank you for considering our manuscript for publication at *New Phytologist*. The manuscript is not being considered at any other journal at this time. Please do not hesitate to contact me using the information listed above if you have any questions about our submission.

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*