1. **What is the scientific question you are addressing?**

This paper uses patterns expected from the progressive nitrogen limitation hypothesis and eco-evolutionary optimality theory to pose the question: “What is the role of nitrogen demand, nitrogen supply, and inoculation with symbiotic nitrogen-fixing bacteria on leaf and whole-plant responses to elevated CO2?”.

1. **What is/are the key finding(s) that answers this question?**

Leaf-level photosynthetic responses to elevated CO2 were independent of soil nitrogen availability, while whole-plant responses to elevated CO2 were enhanced with increasing soil nitrogen availability. Reductions in indices of photosynthetic capacity under elevated CO2 were indicative of optimal coordination, allowing individuals to increase net photosynthesis rates with increased photosynthetic nitrogen-use efficiency. Inoculation with symbiotic nitrogen-fixing bacteria did not modify leaf or whole-plant responses to elevated CO2 due to similar investment in nitrogen fixation between CO2 treatments.

1. **What are the novel results, ideas, or methods presented in your work?**

We grew *Glycine max* seedlings under full-factorial combinations of two CO2 treatments, two inoculation treatments, and nine soil nitrogen fertilization treatments. Findings suggest that nitrogen demand and supply each controlled plant responses to elevated CO2, though these factors operated at different scales. Demand to build and maintain photosynthetic enzymes determined leaf photosynthetic responses to elevated CO2, while whole-plant responses to elevated CO2 were constrained by nitrogen supply. These patterns reconcile the longstanding question about the role of nitrogen supply and demand on plant responses to elevated CO2

1. **Does your paper fall within the scope of GCB; what biological AND global change aspects does it address?**

This paper reconciles a longstanding question about the role of nitrogen availability on plant responses to elevated CO2. Specifically, the paper addresses plant photosynthetic and growth responses to elevated CO2 – key biological processes that determine the magnitude and direction of the land carbon sink due to increasing atmospheric CO2 concentrations.

1. **What are the three most recently published papers that are relevant to this question? This information will assist the Editors in selecting reviewers**

**Gardner A, Jiang M, Ellsworth DS, *et al.*** 2023. Optimal stomatal theory predicts CO2 responses of stomatal conductance in both gymnosperm and angiosperm trees. New Phytologist **237**, 1229–1241.

**Pastore MA, Lee TD, Hobbie SE, Reich PB**. 2019. Strong photosynthetic acclimation and enhanced water-use efficiency in grassland functional groups persist over 21 years of CO2 enrichment, independent of nitrogen supply. Global Change Biology 25: 3031–3044.

**Terrer C, Vicca S, Stocker BD, Hungate BA, Phillips RP, Reich PB, Finzi AC, Prentice IC**. 2018. Ecosystem responses to elevated CO2 governed by plant–soil interactions and the cost of nitrogen acquisition. New Phytologist **217**, 507–522.