



## Introduction

In forest ecosystems, trees are an important habitat for predatory arthropods performing important ecosystem roles such as regulating herbivorous insect population levels. The few existing studies on higher trophic levels in arboreal habitats have found that spider abundances increase with more complex tree architecture, such as leaf density<sup>1,2</sup>. Here, we ask:

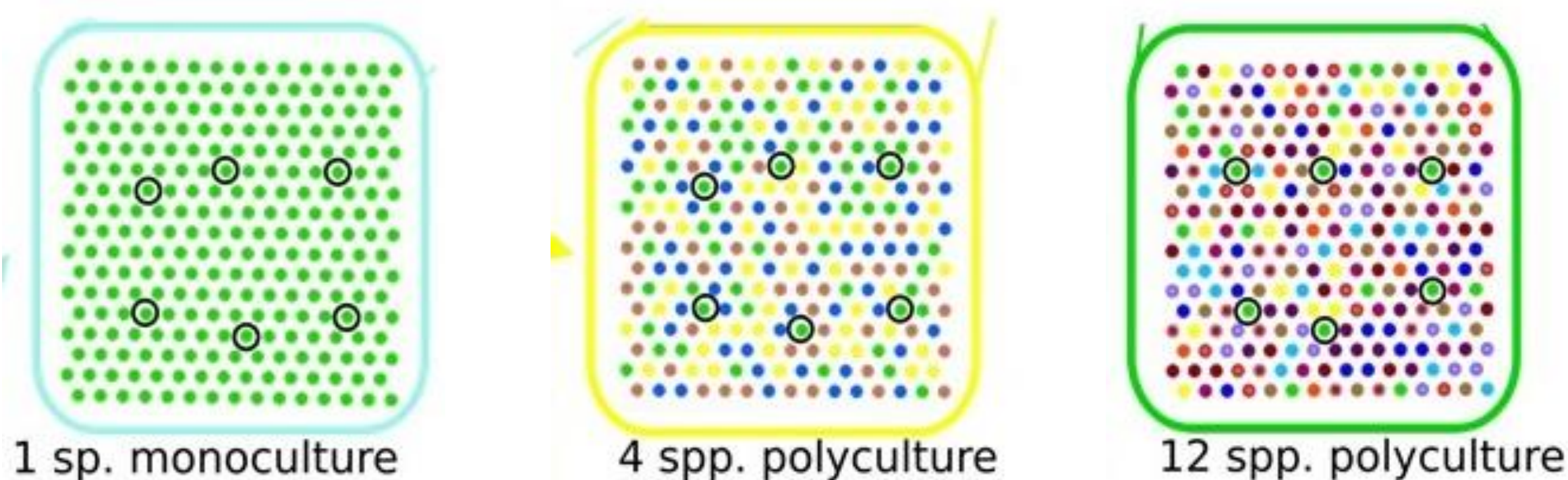
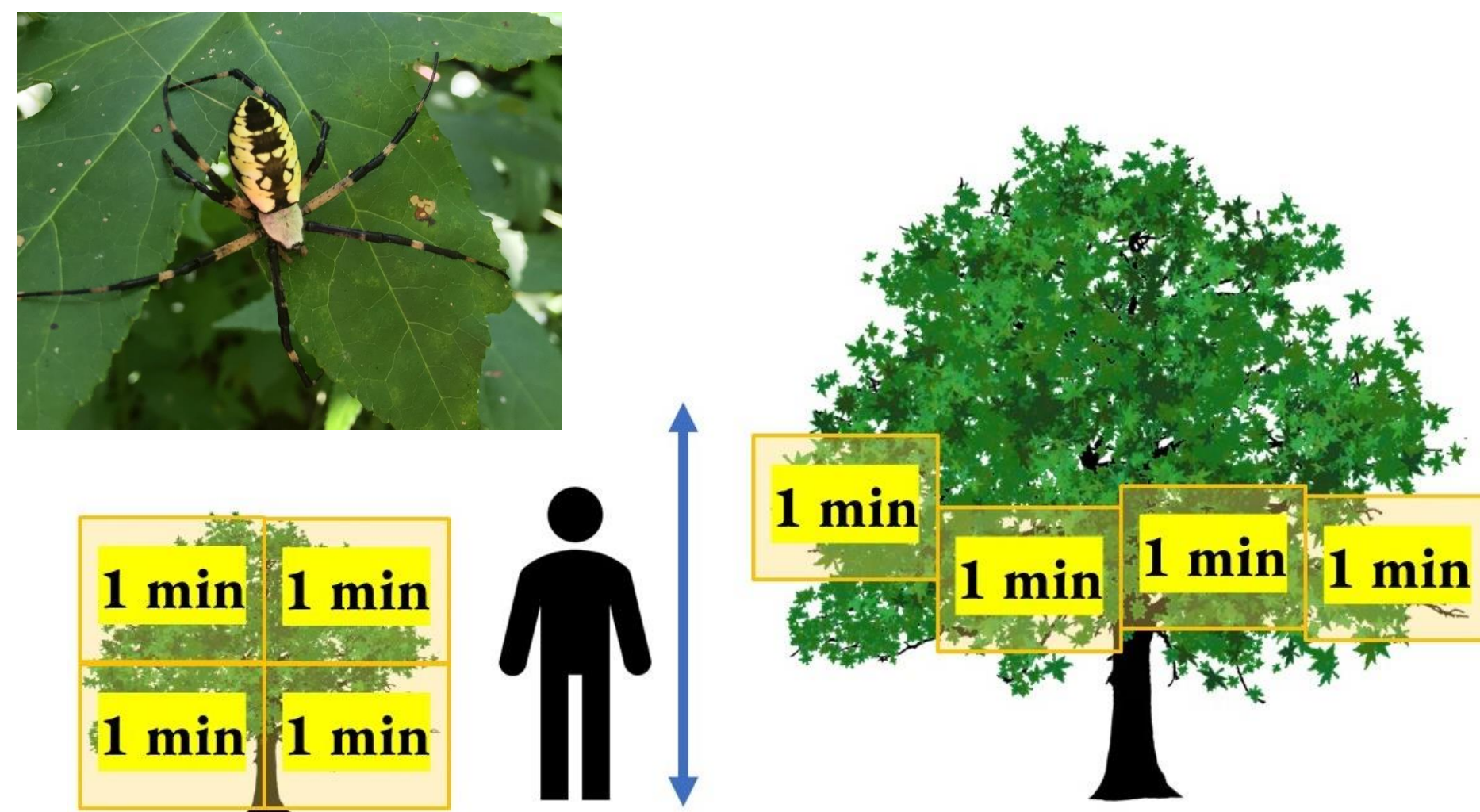
- 1) Are spider abundances influenced by tree species identity or diversity level?
- 2) How do habitat covariates influence spider abundances?
- 3) How does the influence of these variables on spider abundances change across summer?

## Methods

We sampled at the “BiodiversiTREE” experimental site in Edgewater, MD in June and August 2021. We sampled 540 focal trees representing 15 species across plots with a diversity of 1, 4, and 12 species. For each tree, along with plot diversity level and focal tree species identity, we recorded:

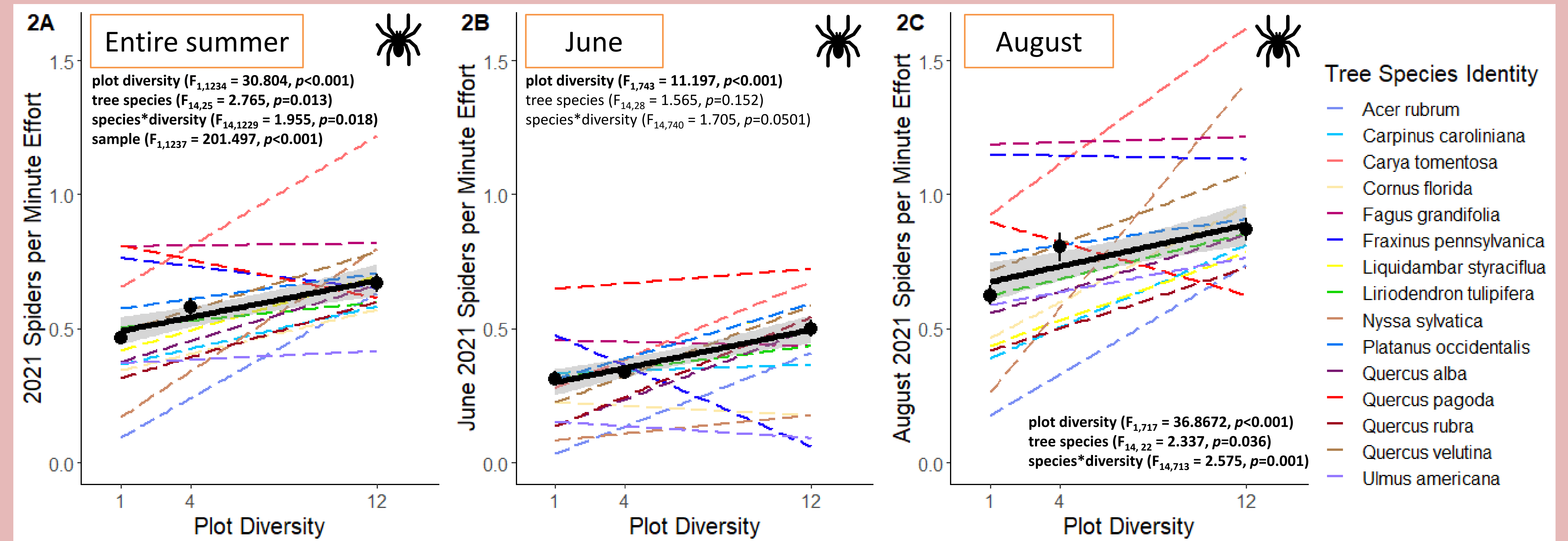


Data were log-transformed and analyzed using a linear mixed model in R using a random effect structure<sup>3,4</sup>. Data were analyzed across the entire summer and then individually for June and August.

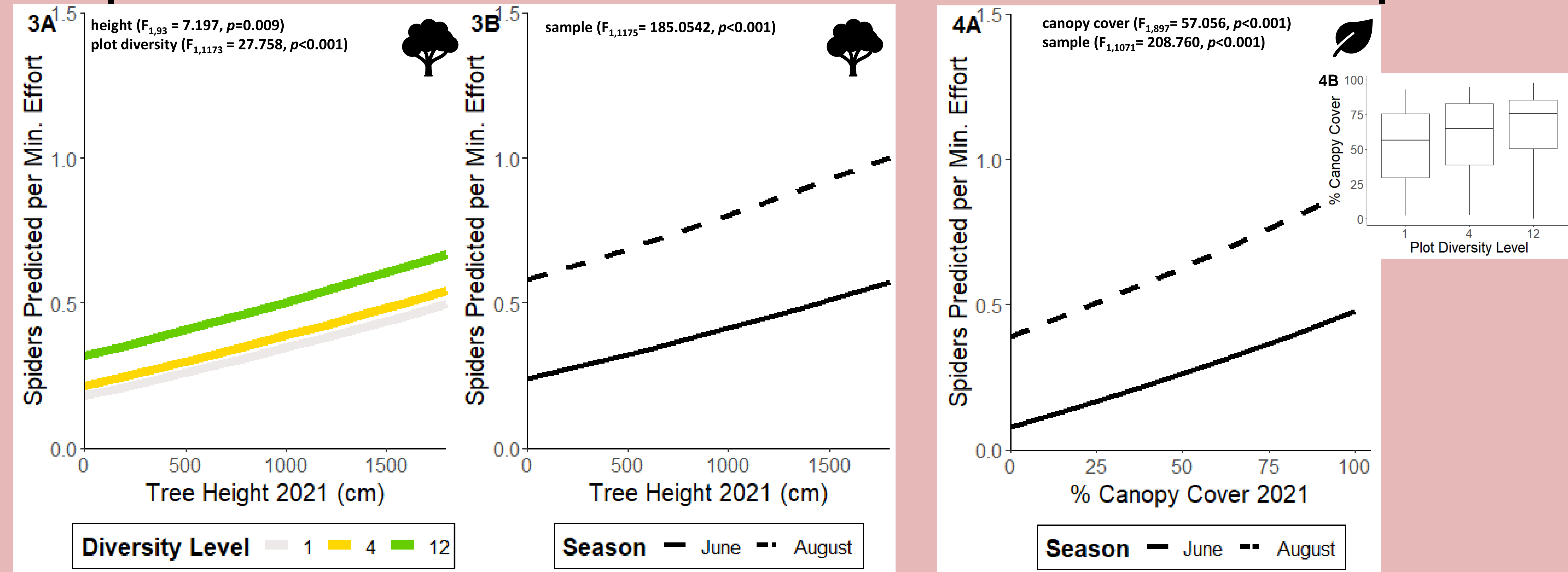


## Results

### Plot diversity increases spider abundance and abundances vary by tree species



### Spider abundances increase with taller trees and more dense canopies



## Discussion

Spider abundances vary based on species identity and are higher in diverse plots and later in summer. There are several potential explanations:

- Spiders may find higher herbivore abundances in more diverse plots (e.g., increased prey)
- Spiders may increase throughout summer due to life cycle differences across the summer (e.g., traveling to the forest floor in order to mate)
- Spiders are more abundant in taller trees and with greater canopy coverage because of the increased niches available (e.g., more foliage for ambush spiders as well as branches for web-builders)

Next steps include including spider functional guild in the analysis in order to determine how species diversity is influenced by our habitat covariates.

## References

- (1) Esquivel-Gómez, Luis, et al. “Effects of tree species diversity on a community of weaver spiders in a tropical forest plantation.” *Biotropica*, vol. 49, no. 1, 2017, pp. 63–70. *Wiley Online Library*.
- (2) Staab, Michael, and Andreas Schuldt. “The Influence of Tree Diversity on Natural Enemies—a Review of the ‘Enemies’ Hypothesis in Forests.” *Current Forestry Reports*, vol. 6, no. 4, Dec. 2020, pp. 243–59. *DOI.org (Crossref)*.
- (3) RStudio Team (2018). RStudio: Integrated Development for R. RStudio, Inc., Boston, MA.
- (4) Kuznetsova, Alexandra, et al. “LmerTest Package: Tests in Linear Mixed Effects Models.” *Journal of Statistical Software*, vol. 82, Dec. 2017, pp. 1–26. [www.jstatsoft.org](http://www.jstatsoft.org).