Flowers increase ecosystem biodiversity in Midwestern prairies

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Introduction

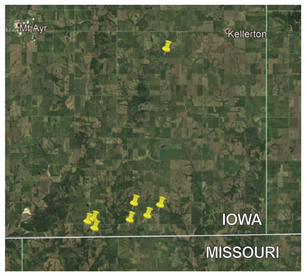
- Plant diversity is critically important for ecosystem biodiversity (Haddad et al., 2009).
- Declines in plant diversity can cascade through trophic levels impacting ecosystem processes (Knops et al., 1999).
- **Richness**: number of different species in a community
- **Order**: taxonomic rank (i.e. organism classifications)
- Increased floral richness is known to aid in increasing pollinator richness, but less is known as to how it influences other arthropod communities (Shepherd and Debinski, 2005).
- Understanding how plant biodiversity influences arthropod communities is important for understanding food web dynamics in order to increase biodiversity within the entire ecosystem.

Hypotheses

1. An increase in floral species richness will positively affect arthropod order richness.
2. Given equal richness of floral species, arthropod orders will be richer at ground level than at 1 meter above the ground.

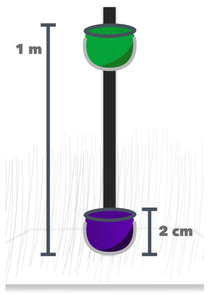
Methods

- Eight study sites in Grand River Grasslands, Iowa



Data Collection and Analysis

- Arthropods and floral species sampled multiple times along 100m transects
- Arthropods were collected from six posts placed 20 meters apart along each transect
- Each post contained 2 bowls; 1 meter above ground ("high") and ground level (~2 cm) ("low")
- Floral species were identified in the field and arthropods were identified to order *post hoc*
- Analyzed and plotted data in the R statistical environment (v 3.4.2)



Acknowledgements

I would like to thank Iowa State University for the opportunity to perform this study. I would also like to acknowledge Emma Stivers and Erin McCall for sample collecting, as well as Dr. Timothy Stewart and Dr. Jannette Thompson for their contributions.

Results

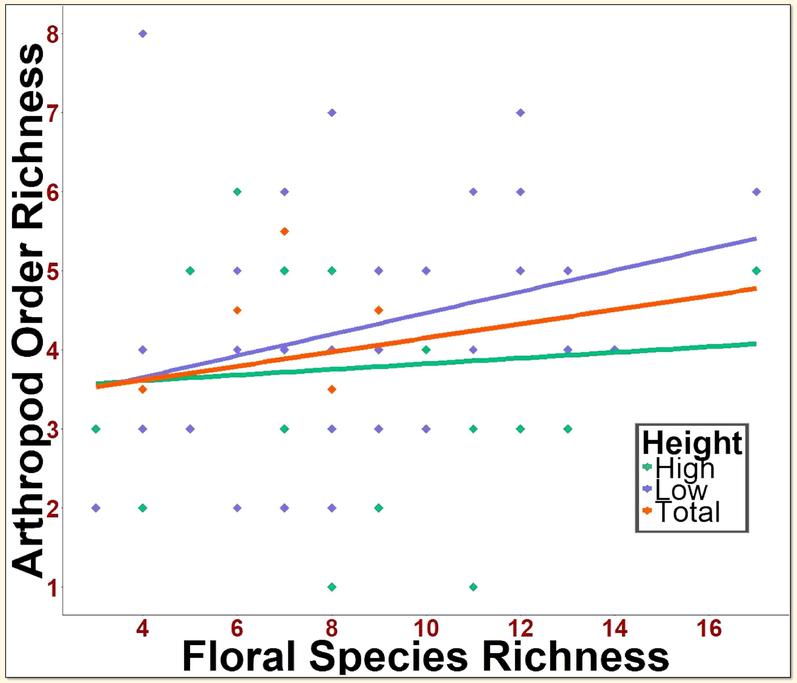
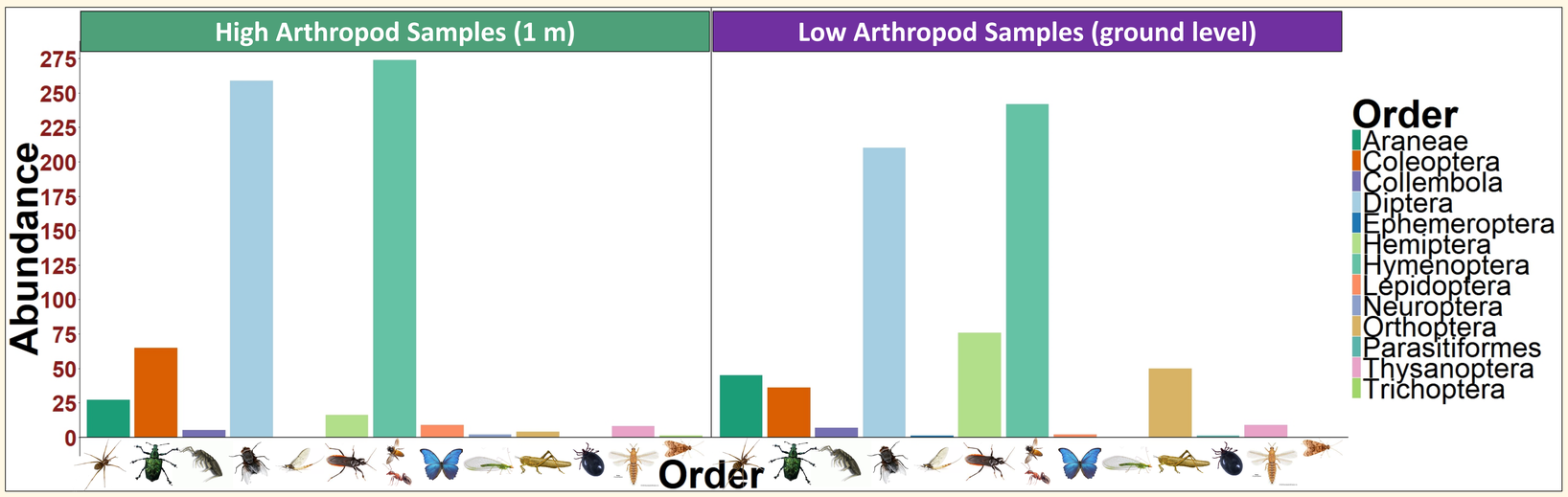


Figure 1. Floral species richness and arthropod order richness measured during each sample round. Results indicate a significant relationship in low sample ($p = 0.046$), but not high or total samples.

Figure 2. Total arthropod abundances by order between high and low samples. Low samples were more commonly found to have a greater array of arthropod orders.



Discussion

- An increase in floral species richness can lead to **denser vegetation** & more **resource availability** at the low sample height
- Increase in floral richness is likely to create **more exploitable niches** at low heights than high, leading to the greater increase of arthropod order richness (Fig. 1).
- High samples did not express a significant relationship (Fig. 1) possibly because abundances of Diptera and Hymenoptera confounded results (Fig. 2).
- Arthropod orders most common in high samples (Coleoptera, Hymenoptera, and Diptera) were scarcely influenced by change in floral species richness possibly due to their mobility (Fig. 1).

Future Research

- Include all plant species rather than floral species to better reflect how plant species richness & diversity affect arthropods.
- Identify arthropods to a finer taxonomic level to allow for more accurate measurements.
- Determine what specific plant species are most influential for arthropod biodiversity through controlled field experiments.

References

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