Do fused leaves of *Silphium perfoliatum* prevent flightless arthropods from reaching the apex?

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Overview

- Introduction and Hypothesis
- Methods
- Results
- Discussion

Silphium perfoliatum

- Native to North America prairies and low woodlands
- They prefer full sun, and moist soil.
- Unusual in the Silphium family because of their square stems and fused leaves around the stem creating a cup

Patch of Cup Plants

What's the big deal about the cup plant ?

- The "cup" of the plant serves as an ecological niche as a water source for birds, but does not appear to give any advantage to the plant itself

Previous Studies

- Little study has been done on the structure of the plant. Only recently studies have been done to investigate it's potential as an agricultural crop, role with gall wasps, and medicinal value
- Only one study from 1887 sought to find the function of the cups of the plants

WJ Beal and CE St. John

- Beal and associate tried to decipher the advantage of having fused leaves for *S. perfoliatum* and decided it neither
  - A) provided water for the plant
  - B) gathered nutrients from drowned insects

He then suggested alternatively that perhaps it kept insects from reach the top

Experimental Design

- Count the amount of arthropods on individual plants, using arbitrary division to classify their placement: top, middle, or bottom
- Identify the arthropods that are on the plant, and make note of which ones reach the top

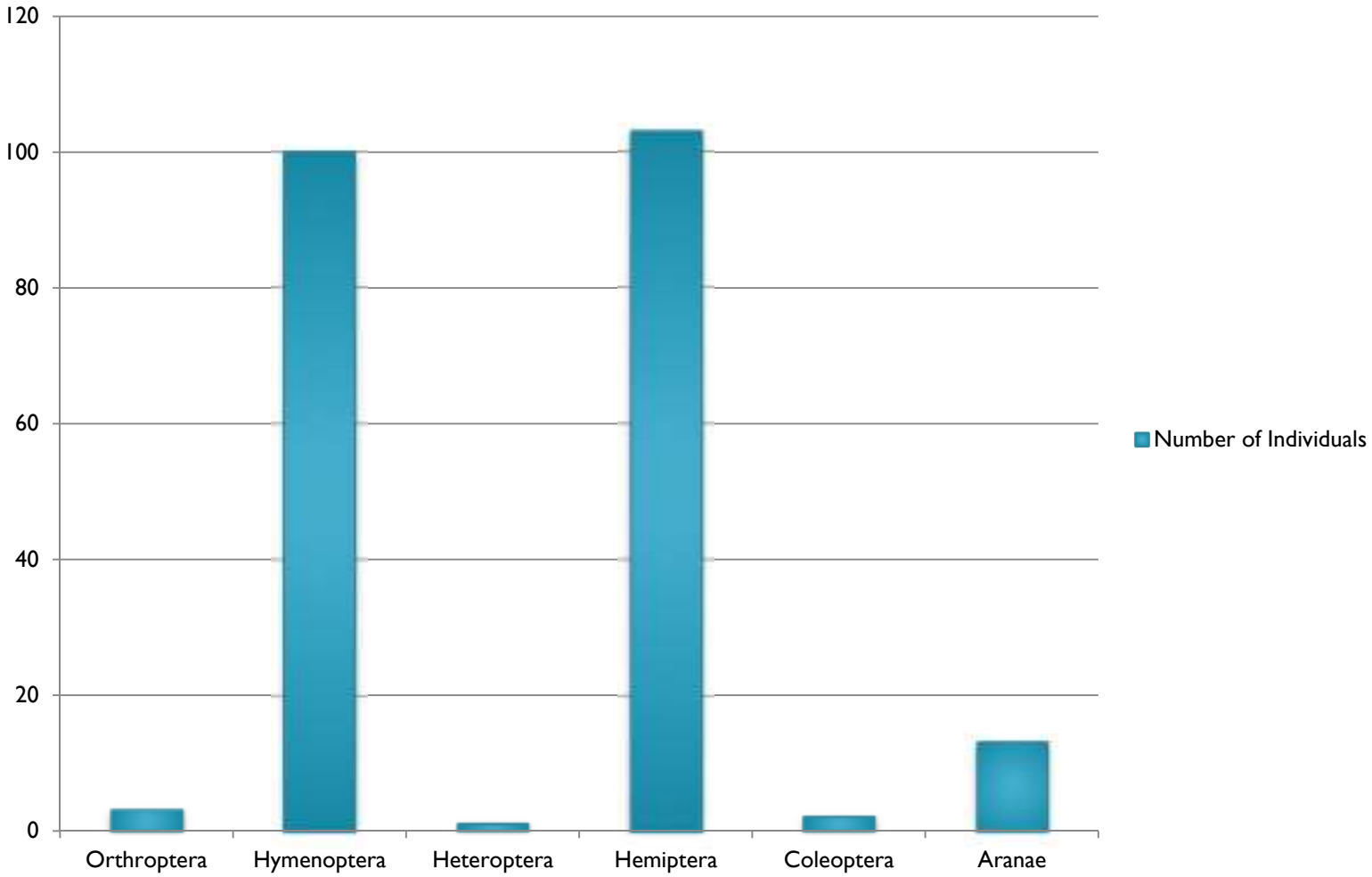
Design

- Litzsinger has 3 prairies (South, North, and Pasture). All patches of cup plants were identified and numbered. A patch needed to be five or more individual together.
- 3 times a week, twice a day.
- Patches were randomly selected

Design Continued

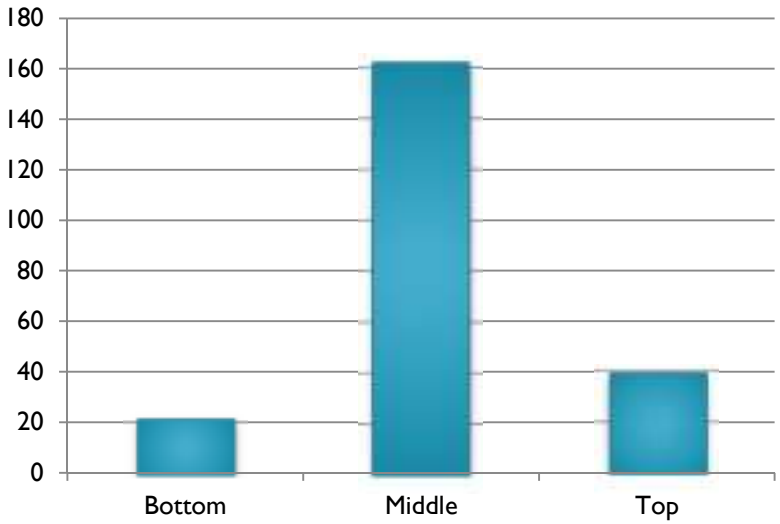
- If arthropods could not be identified in the field they were collected to be identified later
  - Attempted to idenitfy all to family

Results: Total Arthropods Collected

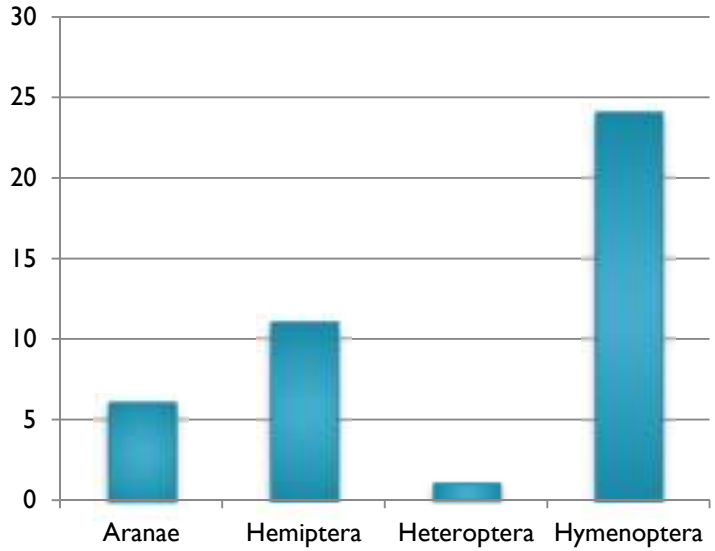


The Problem with Aphids

Distribution of Arthropods



Dispersion of Arthropods on Plant



Arthropods Found at the Top

What does this prove?

- One-way ANOVA show that on a day to day basis, the distribution is no different between the three sections, or when bottom and middle are combined
- Reject hypothesis

Discussion

- Still a combined data from the summer show a difference
- Most arthropods (>50%) come from the South Prairie
- Experimental Design Flaws
  - Plant growth
  - No peak bloom sampling
  - Do arthropods necessarily want nectar?

Conclusions

- Continued research, with modified experimental design
- Look for alternative hypotheses

Acknowledgements

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- Valparaiso University

Questions?

References

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