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Correlates of Seasonal Variation in a Community of Shelter Building Lepidoptera

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Introduction

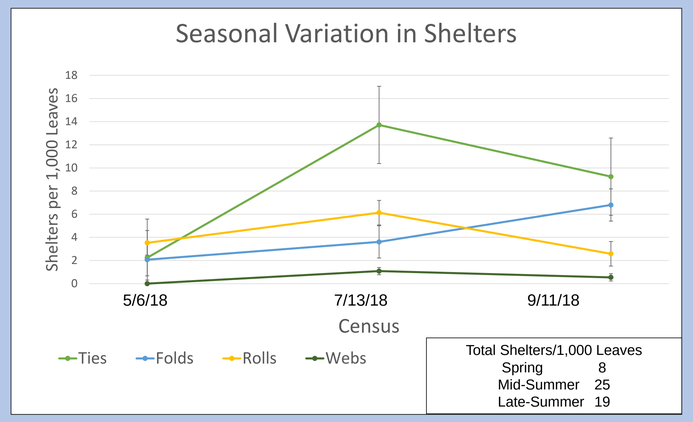
- Many species of Lepidoptera larvae (caterpillars) build structures using leaves and silk, commonly referred to as “shelters”.
- Shelters built vary in basic structure from species to species with noticeable trends in building methods.
- The exact purpose of these shelters is unknown, though hypotheses include avoidance of natural enemies (predators and parasitoids), as well as protection from desiccation.
- Seasonal and host plant variation has been previously unstudied in how they relate to shelter type and the inhabitants of the shelter.

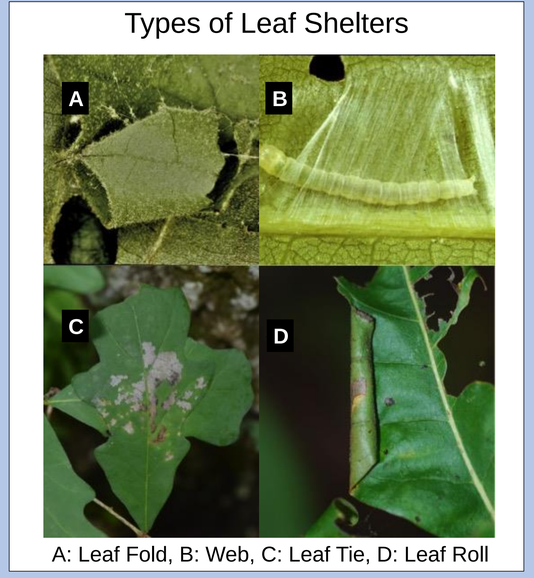
Objectives:

- The objectives of this study were to test whether there is seasonal variation in shelter frequency and composition, to define the inhabitants of leaf shelters, and to look for correlations between host plant traits and leaf shelter frequencies.

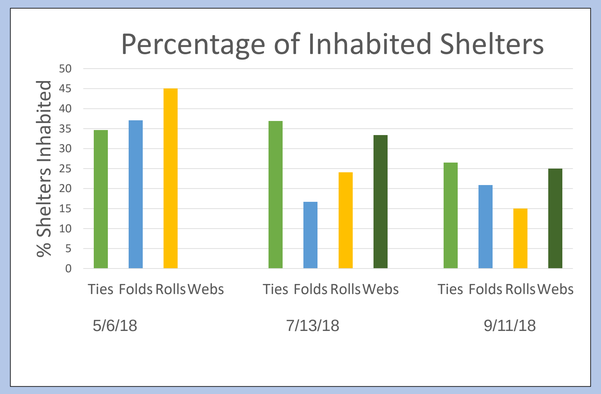
Methods

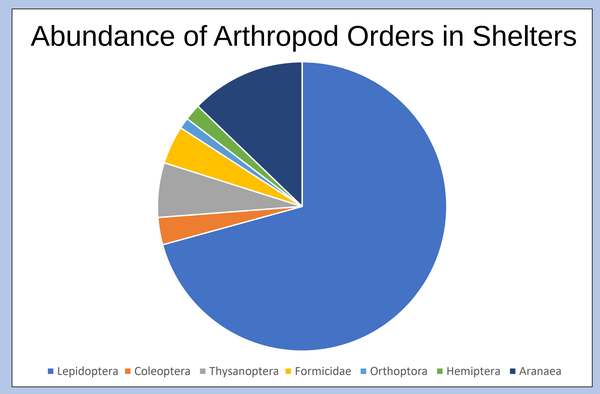
- Censuses at Cuivre River SP, Troy, MO
- Three 50 X 2 m transects sampling woody vegetation between 1-2m tall
- Repeat census in Spring (May), Mid-Summer (July), and Late-Summer (September)
- Recording of all leaf shelters and inhabitants (identified to insect rder)
- Shelters defined in four categories: Tie, Fold, Roll, and Web

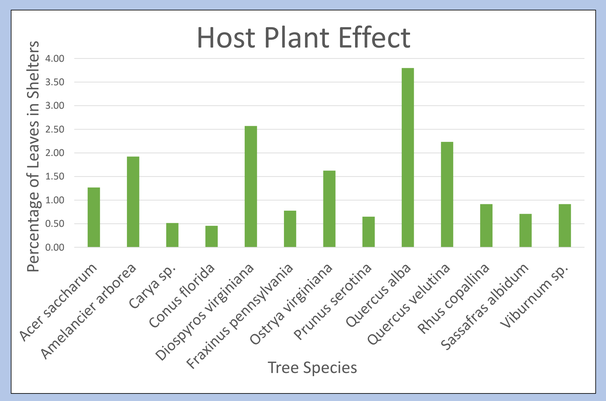


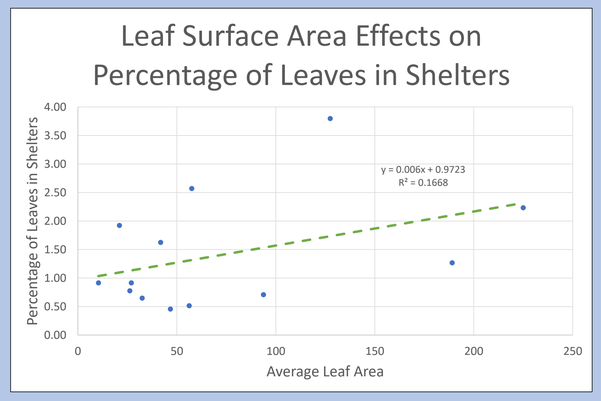


A: Leaf Fold, B: Web, C: Leaf Tie, D: Leaf Roll









Results

- Overall increase in the abundance of leaf shelters from Spring to Summer. Leaf Rolls remained constant in frequency, but Ties and Folds increased dramatically.
- Lepidoptera (caterpillars) were the most abundant inhabitants of shelters. This was expected as they are the constructors of the leaf shelters. Following Lepidoptera, the most abundant inhabitants were Araneae (spiders) and Thysanoptera (Thrips). In the Spring, the highest frequency of inhabitants was in Leaf Rolls, this number dwindled however in the Mid- and Late-Summer.
- Frequency of leaf shelters across host plants varied dramatically. Some positive correlation was seen between leaf size and frequency of shelters.

Conclusion

- Leaf ties and folds became more common in the summer, indicating that their construction may be more beneficial during summer conditions or easier to construct than rolls. This supports previous data that leaf rolls are constructed when leaves are young, and still more flexible at the start of the growing season.
- The fact that frequency of inhabitants in shelters was highest in the Spring may suggest that the seasonal facts affecting the need for shelter building may be stronger in the Spring. Alternatively the accumulation of empty shelters from pupating caterpillars may skew the frequency of inhabitants later in the season.
- The frequency of leaf shelters increasing with leaf size may suggest that larger leaves are easier to manipulate than smaller leaves or that shelters are less important on smaller leaves due to shortened feeding periods per leaf.

Future Directions

- Comparison of temperate shelter composition to data from tropical forests
- Identification of species inhabiting shelters to define trends of host-plant choice and shelter construction or preference
- Analysis of other traits of host plants i.e. secondary metabolites, physical defenses, and nutrient value.

References

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