

The Effects of Various Tree Species on Moss Growth

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Introduction

- Epiphytic communities include plants that grow on other plants, absorb moisture from the atmosphere, and get their nutrients from the bark of their host tree species (Lobel *et al.* 2012).
- Bryophytes are nonvascular plants that lack roots, stems, and flowers and includes the mosses, liverworts, and hornworts (Halpern *et al.* 2014).
- Obligatory bryophytes are a branch of epiphytes that grow only on the trunks of trees, and their growth is influenced by factors such as tree moisture, bark characteristics, humidity, temperature, and light availability (McGee *et al.* 2019).
- Epiphytic bryophytes are good indicators of air quality as they are very sensitive to atmospheric changes (Leith *et al.* 2008).

Materials and Methods

- Tree and bryophyte species was examined at two sites in Northeastern Pennsylvania: the Lehman Sanctuary and a forested plot in Harding, PA.
- The Lehman Sanctuary is composed of three different ecosystem conditions: a marsh area, shaded and moist area, and a dry forest edge. The forest in Harding also has three different ecosystem conditions: an area with a creek, a shaded, drier area, and a dry forest edge.
- The various tree species were photo documented along with its epiphytic bryophytes growing on the bark and tree base. The survey took place in the summer, from June through August of 2019.
- A systematic survey of all live trees in both environments was done by photo documentation of the bark and leaves of each tree.
- Photos for tree and bryophyte identification were taken to identify the different species from each study site using a Nikon D5500 camera.
- Three 100m x100m sections were chosen in each location to determine the frequency of tree and the bryophyte species richness.
- Identification of the trees and bryophytes were completed using Little (1980), Rhoads & Block (2004), Rhoads & Block (2007), Sibley (2009), Munch (2006), and Pope (2016). The identification process was completed from September through December of 2019.



Figure 1: *Quercus rubra* (Northern Red Oak) Bark



Figure 2: *Quercus rubra* (Northern Red Oak) Leaves

Results

Table 1: Tree species present in both locations

Trees Present in Both Areas	Trees Present at Lehman Sanctuary	Trees Present at Harding Forest
American Basswood	Alternate Leaf Dogwood	Bigtooth Aspen
Black Cherry	American Mountain Ash	Bitternut Hickory
Eastern Hemlock	Arrowwood Viburnum	Black Birch
Eastern White Pine	Chokecherry	Black Walnut
Flowering Dogwood	Dotted Hawthorn	Eastern Hophornbeam
Northern Red Oak	Mountain Holly	Shagbark Hickory
Red Maple	Sour Cherry	Striped Maple
Staghorn Sumac		Sycamore
Sugar Maple		White Oak
Yellow Birch		
White Ash		
Witch Hazel		

Table 2: Tree species frequency in three selected plots at both locations

Tree Species	Lehman Sanctuary	Harding Forest
Black Birch	0	3.6
Black Cherry	0	0.3
Bitternut Hickory	0	0.3
Eastern Hemlock	4.3	0.6
Red Maple	0.6	0.3
Red Oak	0.3	0.3
Shagbark Hickory	0	0.3
Sugar Maple	0	0.3
White Oak	0	0.6
Yellow Birch	1.6	0

Table 3: Moss species in three selected plots at both locations

Moss Species	Lehman Sanctuary	Harding Forest
<i>Anomodon attenuatus</i>	Not Present	Present
<i>Bryhnia novae-angliae</i>	Present	Not Present
<i>Hypnum spp.</i>	Present	Not Present
<i>Pleurozium schreberi</i>	Present	Not Present
<i>Polytrichum commune</i>	Present	Not Present
<i>Pseudotaxiphyllum elegans</i>	Present	Not Present
<i>Thuidium delicatulum</i>	Present	Not Present



Figure 3: *Quercus alba* (White Oak) with *Anomodon attenuatus* at the Harding forest



Figure 4: *Tsuga canadensis* (Eastern Hemlock)

Discussion and Conclusions

- Tree diversity: The diversity of trees was greater in the Harding forest than at the Lehman Sanctuary
- Tree frequency: The frequency of tree species in the selected plots was greater at the Lehman Sanctuary than in the Harding forest
- Moss Species: The abundance and diversity of epiphytic mosses was greater at the Lehman Sanctuary than in the Harding forest
- Environmental conditions have a greater impact on moss abundance and diversity than present tree species
- The three most prominent factors that influence growth are soil and bark pH, moisture, and shade/light exposure



Figure 5: *Polytrichum commune*



Figure 6: *Betula alleghariensis* (Yellow Birch) with *Hypnum spp.* (A), *Polytrichum commune* and *Thuidium delicatulum* (B), and *Thuidium delicatulum* and *Pseudotaxiphyllum elegans* (C) at the Lehman Sanctuary

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