

The Development of Forest After Beech Trees

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Project Motivation & Goals

IMAGINE...

An estimated 57 million trees disappear from Connecticut forests.¹

Parks, backyards, and forests look drastically different. Habitats for a multitude of animals will shift, displacing several species. This may be a reality, with the introduction of Beech Leaf Disease, the American Beech, a staple in Connecticut forest could disappear, making a hypothetical a reality.

Beech Leaf Disease (BLD):

Due to BLD, a disease caused by a nematode (Litylenchus crenatae mcannii), American beech (Fagus grandifolia)) tree populations are declining. 1. While the actual mortality rate has not been determined, the disease first made its appearance in Connecticut in 2019.² Since then, it has spread and impacted all of New England, New York, Pennsylvania, Ohio, Virginia, West Virginia and parts of Canada (Fig. 1). The disease presents as splotching on the leaves, causing the leaf to appear curled with yellow and brown spots (Fig. 2). This affects the tree's ability to develop and photosynthesize, resulting in the tree lacking sunlight and puts it at risk for mortality.⁴

Importance:

American Beech trees are crucial to the food web, with animals like turkeys, white tailed deer, and chipmunks relying on it as a food source.³ American Beech are also important to native communities; the Iroquis traditionally used beech leaves as medicine to treat wounds and scars, the Potawatomi used beech leaves to treat frostbite - years of history and tradition will be erased with the disappearance of beech trees.⁴

Goal: Develop three plots (plot 1 left alone, plot 2 cleared, and plot 3 cleared and planted) to research and learn about the future of Connecticut's forest with Beech Leaf Disease, and present findings plus additional necessary information on preventatives for Beech Leaf Disease to the public at Connecticut's Beardsley Zoo.

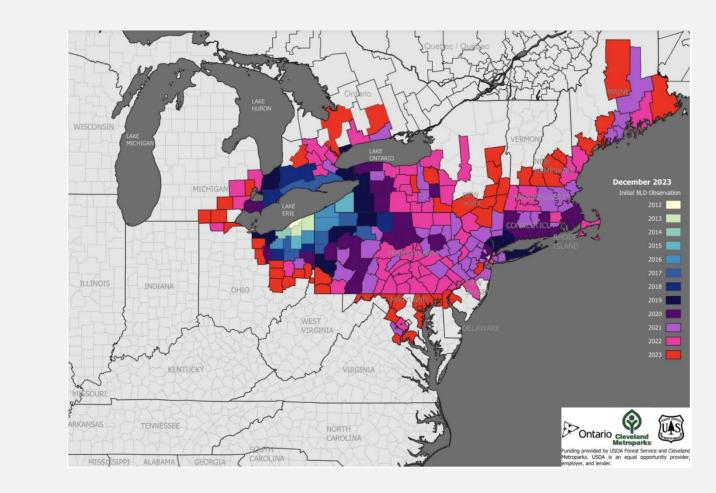


Fig 1. Map of places Beech Leaf Disease is found.



Fig 2. Photo of Beech Leaf infected by Beech Leaf

Project Outcomes

Beech Tree Monitoring:

- This effort assisted the Fairfield Department of Conservation with launching a long term monitoring strategy, which will determine the survival rate and growth rate of the 4 species of trees planted following Beech tree removal (Fig. 5).
- Long-Term Monitoring: This information will be useful to town managers as they create plans to manage forests amidst the outbreak of Beech Leaf Disease (BLD).
- Short-Term Monitoring: Within 6 months, we observed 100% survival rates.

Presentation at Beardsley Zoo:

- With the help of Des Flemings (Connecticut Beardsley Zoo Program Coordinator), I organized a session to present my work on Beech Leaf Disease on April 6, 2025 (Fig. 6).
- This presentation covered: 1) the importance of native tree species in CT like Beech trees, 2) what Beech Leaf Disease is, 3) how invasive species spread, 4) how to prevent invasive species, and 5) the future of young forests.
- Audience included zoo volunteers and staff, around 30 people attended.

Impact of Environmental Education:

- In presenting at the Connecticut Beardsley Zoo I hope to create short term and long term effects on my audience, in order to spread awareness throughout the state (Fig. 6).
 - Short Term Education Effect: Increase personal awareness on issues such as Beech Leaf Disease in order to mitigate human contributions to the spread of invasive species
 - Long Term Educational Effect: Motivate the audience to continue to disseminate my conclusions among zoo visitors to raise awareness of Beech Tree Disease.

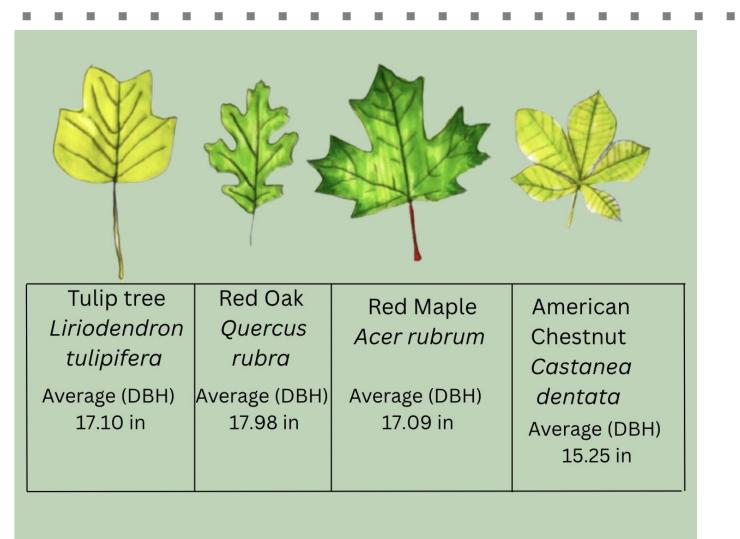


Fig 5. Average Diameter by Breast Height (DBH) of all 100 planted trees recorded in inches on March 11, 2025.



Fig 6. Picture and slides from my Beech Leaf Disease presentation at Beardsley Zoo on how we contribute to spread of invasive species, such as the nematode that causes BLD.

Methods

Study Site:

- Fairfield Conservation Department has 1,270 acres of open space which they maintain in order to restore the rich, natural resources of Fairfield.
- Binger Woods Open Space was selected due to the plot being already owned by Fairfield and the plot having infected Beech trees.
- Department, we organized and planted 100 trees within a 50 by 49 meter lot (Fig. 3).
- (Quercus rubra), 33 Red maple (Acer rebrum), and 1 American chestnut (Castanea sativa)
- Planting was completed on November 7th 2024 by Emily Barnhart, Tim Bishop, Tom Course, JP Bras, and Nicole DeFelice.

In partnership with Fairfield Conservation 33 Tulip (*Liriodendron tulipifera*), 33 Red oak Fig 3. CT map showing location of Fairfield

(green). Within Fairfield, the planting site was a forest stand where three plots were created. Plot one was not touched, plot two was cleared but not planted, plot three was cleared and planted (see mock-up showing distribution of trees planted).

How to Plant Trees?

- JP Bras, Tom Course, Tim Bishop, and I used sharp-shooter shovels to plant trees by pushing the sharp shooter into the ground and then twisting it to create holes (Fig. 4).
- Before planting, holes were 1.5 feet deep and each tree was planted 4-5 feet apart (Fig. 3).

Monitoring Protocol:

- Every few months when trees are not dormant, the planted trees will be measured and recorded to ensure they are growing and establishing within the plot.
- Diameter at breast height (DBH) will be used to estimate the volume of timber.
- Planted trees will be compared to the natural understory of a forest in another plot, where no trees were planted following American Beech removal.

Community Partnership

Through the help of Fairfield's Department of Conservation, I was able to focus my project on the future of the forest after the disappearance of Beech trees. Tim, the Director of the Conservation Department in Fairfield, helped me identify a forest stand impacted by BLD. Together we partnered to give that area a new opportunity by planting tree species that were picked based on availability and location they were native to Connecticut (Fig. 4).

He ordered the trees and had them shipped to the site (Fig. 8). Tom Course, the Conservation Manager, JP Bras, the Conservation Crew Leader, and Nicole DeFelice, the Natural Resource Specialist gave me guidance on the proper protocol to plant trees and monitor them. Nicole took me out a few times to check on the trees and share important information about young forests.

The Fairfield Department of Conservation provided transportation, helped me plant and prepare the lot, while also providing me with useful information about Beech trees and Connecticut forests.





Fig 4. (Top) Picture of Emily Barnhart taking planting a tulip tree. (Bottom) Picture Emily Barnhart and Nicole DeFelice walking towards plot 3.

Conclusion and Next Steps

The 100 saplings that were planted within Fairfield County are a part of a long-term monitoring project. The plan is to simulate three potential situations that could happen as a result of Beech Leaf Disease:

- In the plot that we worked with (plot 3), the goal was to simulate all of the beech trees dying and new trees springing up.
- In plot 1, the goal was to simulate the current situation. The plot was left completely untouched to emulate this.
- In plot 2, the goal was to simulate all the Beech Trees dying but new forest not emerging yet.

These saplings will tell us which Connecticut native species establish well and can be used when considering management of forests following the death of American Beech trees.



Fig 8. Picture of three different kinds of tree saplings (Tulip, Red Oak, Red Maple)



QR code for Beech Leaf Disease Identification Card

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