MONMOUTH COUNTY PARK SYSTEM
GREEN HERITAGE
The Newsletter of Monmouth County's Open Space, Parks & Recreation Agency
Vol. 58 No. 4 Winter 2024-25

Beech Leaf Disease: Symptoms, Causes, And What We Are Still Discovering

Stephanie Horton, Recreation Leader

In winter, the tender flowers of the garden die back while our trees stand tall and shelter overwintering wildlife. Fallen leaves of deciduous trees provide the perfect place for insects to wait out the cold winter months. Luna moths' cocoons, bumble bee queens, and red-banded hairstreak larvae are just a few examples of insects that use leaf litter for winter protection from predators and the harsh, cold weather. Fallen leaves also help plants during the freeze-thaw cycles by providing extra insulation for their root systems[1].

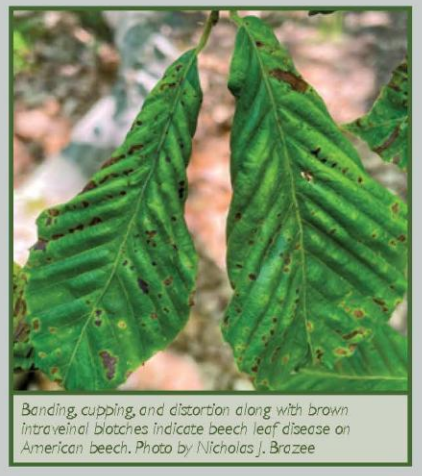
Leaf litter protects overwintering insects and larvae, which become crucial food sources for vertebrates in the forest ecosystem.

Leaf litter provides crucial habitat for beneficial insects during the winter months, but it isn't the only place small invertebrates can be found flourishing in the winter. Some nematodes found overwintering in beech tree buds may be the cause of a newly discovered disease threatening native beech trees. Before we discuss the potential cause of this issue, let's talk about what we know.

American beech trees (*Fagus grandifolia*) are a common species of hardwood tree, occurring from Nova Scotia and Southern Ontario to Northern Florida and Eastern Texas. These trees are foundational to our North American forest ecosystems. Their trunks and canopies provide nesting sites and shelter, and their beech nuts provide a vital food source essential to many forest vertebrates[2]. American beech trees have dealt with large scale diseases in the past century including beech

including New Jersey. In 2020 BLD was confirmed in 10 New Jersey counties including: Bergen, Essex, Hunterdon, Mercer, Monmouth, Morris, Passaic, Somerset, Sussex, and Union[4]. Since this is a newly emerging and rapidly spreading disease, it is crucial to know how to detect it, what causes it, and how it can be treated.

Infected beech leaves start showing symptoms through dark green interveinal banding. Photo by Nicholas J. Brazee.



Banding, cupping, and distortion along with brown intraveinal blotches indicate beech leaf disease on American beech. Photo by Nicholas J. Brazee

Identifying BLD can be done by examining the leaves of the beech tree. Initial symptoms of the disease appear as a dark green, interveinal banding pattern on foliage located in the

by canopy thinning, branch dieback, and mortality for mature trees within seven years and sooner for saplings. In some dense clusters of saplings, a mortality rate as high as 90% has been observed[2].

Researchers have been scrambling to find the cause of this disease. In 2019, there was a breakthrough when nematodes less than 0.1mm in length were extracted from the buds of an infected American and European beech trees. These nematodes, no larger than the width of a piece of paper, were found to be genetically similar to *Litylenchus crenatae*, which is a species known to cause leaf gall symptoms in Japanese beech trees. Scientists believe the nematodes invade the beech tree buds from mid-summer to autumn where they feed and overwinter[6]. Researchers found eggs, juveniles, and adult females living inside infected buds during the winter months[2]. After bud break, the life cycle of the nematode continues in the leaf tissue. Rarely are the nematodes found on dead symptomatic leaves retained on the tree, but researchers found these tiny creatures in the leaf litter of the beech tree, presumably protected from the winter elements.

Researchers found eggs, juveniles, and adult female nematodes overwintering in infected tree buds.

The difference in bacterial communities between symptomatic and asymptomatic leaves suggest that these nematodes may be altering the microbiome of the infected beech tree leaves[7]. Because the disease is new and rapidly infecting native beech tree populations, options for mitigating it are limited but necessary. For land resource managers, nematicide sprays exists for some level of control. However, given the limited information available, the optimal time for application is still unknown. More research on this disease is going to be crucial for the preservation of beech tree populations.

Literature Cited:

1 Foltz Jordan, S., Hopwood, J., & Morris, S. (2020). Nesting & Overwintering Habitat for Pollinators & other Beneficial Insects. The Xerces Society for Invertebrate Conservation. https://xerces.org/sites/default/files/publications/18-014.pdf

2 Marra, R. (2020). An Overview of Beech Leaf Disease. New England Society of American Foresters, 81(4), 4–7. https://ctpa.org/wp-content/uploads/BLD_2020_October_SAF-NE.pdf

3 Reed, S. E., Volk, D., Martin, D. K. H., Hausman, C. E., Macy, T., Tomon, T., & Cousins, S. (2022). The distribution of beech leaf disease and the causal agents of beech bark disease (Cryptococcus fagisuga, Neonectria faginata, N. ditissima) in forests surrounding Lake Erie and future implications. Forest Ecology and Management, 503, 119753. https://doi.org/10.1016/j.foreco.2021.119753

4 Buckley, R. (2021, December 22). Beech Leaf Disease in New Jersey. Plant & Pest Advisory. https://plant-pest-advisory.rutgers.edu/beech-leaf-disease-in-new-jersey/

5 Ewing, C. J., Hausman, C. E., Pogacnik, J., Slot, J., & Bonello, P. (2018). Beech leaf disease: An emerging forest epidemic. Forest Pathology, 49(2), e12488. https://doi.org/10.1111/efp.12488

6 Brazee, N. J. (2023, June 21). Beech Leaf Disease. Center for Agriculture, Food, and the Environment. https://ag.umass.edu/landscape/fact-sheets/beech-leaf-disease#:~:text=Lcm%20invades%20beech%20buds%20from