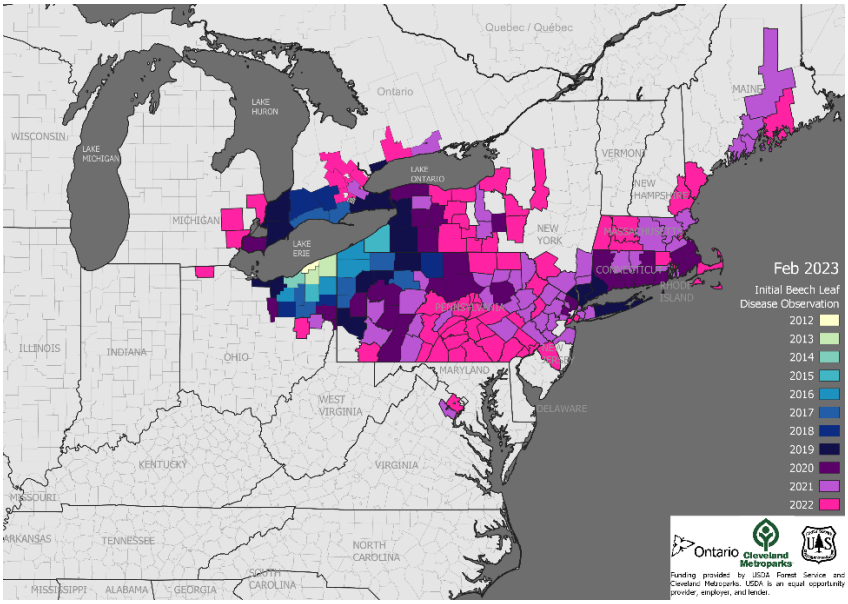
Beech leaf disease

March 29, 2023

Beech leaf disease (BLD) is a serious threat to our native American beech trees and the ornamental European beech. The disease has spread quickly from Ohio since first being detected in 2012. It is now found in 12 states and one Canadian province, Ontario. It's infecting beech in all New England states except Vermont. It was first found in CT in 2019, and in RI and MA in 2020.



Beech leaf disease is caused by a foliar nematode, *Litylenchus crenatae ssp. mccannii*. Nematodes are microscopic worms. We don't know where the nematodes came from or how it has spread so quickly, though birds are likely involved with transporting the nematodes. We do know that the nematodes spend the winter in beech buds and beech leaves emerge in the spring showing damage.

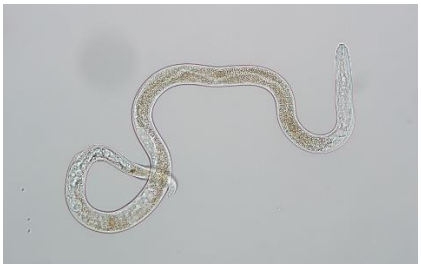


Photo by Paulo Vieira, USDA, ARS

SYMPTOMS

It's easy to determine if American beech trees are infected with BLD. In the spring when new leaves are emerging from buds, infected leaves will have some dark bands between leaf veins, or the leaves will be very crinkled, smaller, and leathery. In severely infested trees, some buds won't open because the buds were killed. Banded leaf symptoms can best be seen by backlighting infected leaves against the sky.

Leaf banding symptoms

Crinkled leave symptoms
Symptoms on American beech

Dead beech buds

Symptoms are less obvious on European beech trees. Some leaves will be banded, but many of the leaves will look tattered or distorted.

Tattered leaves on infected European copper beech

Banded leaf symptoms on European copper beech

On heavily infected trees many buds will be killed, and severely damaged leaves will fall off soon after emerging in May. In late May or early June, many American beech trees produce new leaves. The new leaves are formed in newly produced buds. The new leaves do not show symptoms of BLD. This is because the BLD nematodes overwinter in beech buds and damage the leaves inside of the buds. When new, replacement buds are produced and new leaves emerge, the new leaves don't have nematodes and don't have BLD symptoms. The new leaves are paler and wimpier than normal, healthy leaves.

Refoliated leaves are paler and less robust than normal, healthy beech leaves

In Ohio, researchers are seeing American beech trees die in 6 – 10 years after infection. I'm afraid we are finding some trees dying in fewer years in Rhode Island.

MANAGEMENT

What can be done about BLD? In 2017, Ohio researchers started treating the soil around small beech trees (2-4 inches in diameter) with a phosphite product known as PolyPhosphite 30, which is a potassium fertilizer produced by the Plant Food Company. The researchers got encouraging results after the first year of treating twice, about one month apart, between May and August. After five years of treatment, treated trees were significantly healthier than untreated control trees; and fewer nematodes were found in the leaves of treated trees than in the control trees. These are preliminary results, and the research was conducted on small trees. Our hope is that we will see similar results in New England.

Phosphite products are known to stimulate plant defenses. Many phosphite products are sold as fungicides such as Agri-FOS, Fosphite, Reliant, Fungi-Phite, and Prophyt. Beech trees treated with either the fertilizer formulation (PolyPhosphite 30) or a fungicide formulation should respond similarly. When using a fungicide formulation, you can not apply at a higher dose than what is listed on the label. The label is the law.

Many people couldn't purchase PolyPhosphite 30 in 2022. There is a similar product that may be easier to find – Foliar Phosphite Fertilizer 0-0-26, produced by Pendelton Turf Supply.

To use one of the phosphite fertilizers (PolyPhosphite 30 or Foliar Phosphite Fertilizer), plan to make two applications about one month apart between the months of May and August. Mix 2 fl. oz. of phosphite fertilizer plus 14 oz. of water per inch DBH (diameter at breast height). So, a 4-inch diameter tree will require 8 oz. of phosphite fertilizer in 48 oz. of water. Pour this around the base of the tree. If the soil is dry, moisten the soil first with water so that the solution can penetrate the soil.

Research in Ohio was performed on small (2-4" diameter trees) trees. There is a concern that using the rate of 2 oz. of phosphite fertilizer per inch DBH is not enough to improve the health of larger beech trees. Of course, bigger trees have more foliage than smaller trees, and to account for this difference you may need to increase the amount of phosphite fertilizer to more than 2 oz./inch DBH. It's been suggested that for every doubling of DBH, there should be an increase of 1.5× the amount of phosphite fertilizer applied per inch. So, where a 4-inch DBH tree requires 2 oz./inch DBH (total of 8 oz for the tree), then an 8-inch DBH tree may require 2 oz. x 1.5 or 3 oz./ inch DBH (totaling 24 fl. oz. for the 8-inch DBH tree). And then, with another doubling a tree diameter, a 16-inch DBH tree may require 1.5 x 3 oz./inch DBH, which is 4.25 fl. oz./inch DBH. That is a lot of phosphite fertilizer. Concern over overloading the soil with salts suggests that this quantity of product should not be directed entirely near the root flare but should be applied over a larger area. Otherwise, we may damage the tree with too much fertilizer or cause pollution. Nothing is straightforward and easy!

There is a pesticide that kills nematodes when sprayed on beech leaves. The product, fluopyram, is a fungicide found in two pesticides: Broadform (ornamentals label) and Luna Experience (agricultural use label). Fluopyram has been shown to be very effective at killing nematodes and might be something that landowners want an arborist to apply to their beech trees. Since BLD nematodes spend the winter in buds, beech leaves would need to be sprayed with fluopyram before nematodes start migrating into the buds in early August. So, the fluopyram application should be made between late May and mid-July. It's unknown at this time if more than one application of fluopyram is needed. Also, it may not be possible to protect beech trees that are too close to infected, untreated trees since nematodes can move on the outside of leaves and twigs when these surfaces are wet. Another important concern is pesticide resistance. It seems likely that BLD nematodes will quickly develop resistance to fluopyram.

I'm very worried about our beech trees. I wish I had more encouraging news, but at least we have a couple of strategies to try to save our beech trees.

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