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Jackson Dodds
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Dear Jackson:

Thanks for your inquiry on the status of Beech Leaf Disease (BLD) on Long Island and in the rest of the US. I wish I had more helpful information to impart, but much about this disease remains a mystery and there are certainly no practical solutions in sight. Meanwhile, the symptoms on both the American beech and the European beech are all too apparent—trees appear to have become much more seriously injured by the disease this year than last. Trees from estates on the South Fork, in Connecticut, at Bayard Cutting Arboretum and Old Westbury Gardens have all shown an advancement of symptoms this spring that is shocking. Rather than a mere doubling of symptoms in a tree, many buds have failed to open and in some cases only a few leaves are produced at the top of trees. . .the tree decline shows a logarithmic progression.

BLD is associated with a new nematode (microscopic worm) that was discovered in 2019. This nematode was associated with symptoms in American beech that had been seen in northeast Ohio since 2012; we saw it here on Long Island in 2019. In Ohio forests, they see death of beech saplings in 2-3 years and death of some large trees in 6-10 years in native American beech (we do not know whether European beech will also be killed, but it is certainly showing severe injury). In some cases in western PA, trees continue to have symptoms, but persist from year to year with a partial leaf-out.

Here is an approximation of how BLD progresses on a tree. The number of years at each stage might vary with weather or with the health or species of the tree:

Year 1-3: Symptoms of the disease are unnoticed

Year 4: A few leaves with dark bands between the leaves are noticed (these bands are shallow galls)

Year 5: A higher proportion of leaves with bands are noticed

Year 6: Many dead buds and severely stunted leaves are apparent. Some lateral buds produce leaves free from the symptoms.

Year 7: The percentage of buds affected increases, with the leaves at the top of the canopy the last ones to show the symptoms

The nematode, *Litylenchus crenatae* pv. *mccannii*, has been shown to cause symptoms of BLD when inoculated onto beech buds on seedlings in a greenhouse. Initially we thought it might be the whole cause of the disease, and yes it might be. But because these were not 'sterile'

nematodes that were used in the experiments, researchers continue to consider that there might be other microscopic organisms (bacteria? fungi?) that could be involved in the problem as well. There is still no major federal funding for research on this new disease, just a little bit of US Forest Service money that has helped with surveying for BLD in forests: it is now known to be up to Maine and down to Northern Virginia. The disease is very new, and it takes time to marshal resources for studies. There is a collaborative working group of university and government researchers that meets quarterly by zoom to discuss their observations and findings, and the sad truth is that no one has reported a benefit (visible reduction in symptom progression) from any of the treatments that have been tried. There have only been 2-3 years to try treatments, so we don't even have enough information to be sure we should give up on the things that we've been trying yet.

Three kinds of therapy have been tried. #1 is injection with emamectin benzoate, labeled for control of beech leaf disease as an injection to be applied every other year. Although effective against emerald ash borer, this treatment has not shown benefits yet in beeches injected in 2020 or 2021 here on LI or elsewhere. The distribution of the material is thought to be the main problem, as it may not be getting into the buds where the nematodes multiply and overwinter. #2 is bark sprays or root drenches with a phosphonate (e.g. AgriFos), which are effective against Phytophthora canker on beech and thus are legal to apply to the tree for a different purpose than BLD. It is hoped that the SAR (systemic acquired resistance) action of this treatment might help the tree to defend itself against the nematodes, but the active ingredient itself is not directly toxic to nematodes. #3 is sprays with Avid, an insecticide that is labeled for control of mites on beech, which could have a side effect of killing nematodes because it is nematicidal for *Aphelenchoides* nematodes affecting herbaceous perennials. Trees treated with Avid have not thus far shown any slowed progression of symptoms.

Fresh symptoms develop only once each year on a tree, so treatments for the whole previous year can only be assessed in late May of the next year; a tree's health in the spring reflects the sum effect of the whole previous year's efforts. A few arborists on LI tried some treatments in 2020, a few more in 2021, but they have all been encouraged to make it perfectly clear to their customers that none of these treatments have been demonstrated to be beneficial: they are just the only available treatments legal for application to beech trees that have a *chance* of controlling the nematode. Their use is experimentation, in hopes that it will help to prevent the loss of some of our beautiful beech specimens.

With time, natural biological controls will (probably) come in and reduce the populations of the nematode and the injury it causes on forest and ornamental trees, but that kind of thing doesn't happen overnight, any more than research can provide instantaneous answers to hard questions. Scientists are still trying to understand the mechanisms of the nematodes' attack and to identify any helper microorganisms that might be essential for the disease. We are also not yet sure of how the nematodes are moved from tree to tree, but it appears to be happening very easily, perhaps just by wind movement of leaves in the fall, and wind-driven rain at any time. Insects or birds could also be involved, and certainly movement of beech trees as nursery plantings will move infected plants.

The one thing to cling to is that healthy beech will be better able to persist until there is an effective treatment identified (and certified by EPA). This suggests to me that light fertilization or compost over the root system in the springtime is appropriate (no late fertilization that would increase susceptibility to winter injury), and certainly protecting trees against extremes of drought or flooding. None of the 3 treatments now being tested is guaranteed to help but staying in touch with the current research will be important so that you can take advantage of any insights that become apparent. Treatments in spring make the most sense to me, because by midsummer the nematodes have gotten into the buds and will be feeding on next year's leaves, injuring them, and hard to contact.

That's pretty much the state of affairs right now. I'm sure that arborists' inability to solve this problem with a few sprays will cause some frustration to their clients, but this is a scientific frontier, and we just don't have the answers yet.

Sincerely yours,

A handwritten signature in cursive script that reads "Margery".

Margery Daughtrey
Senior Extension Associate