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BEECH LEAF DISEASE – UPDATES 2021

Beech leaf disease (BLD) was first discovered on American beech (*Fagus grandifolia*) in Lake County, Ohio, in 2012. BLD is now, in 2021, well-established in Ontario, Canada, and throughout much of northern Ohio, northwestern Pennsylvania, western and southern New York, eastern Massachusetts and several counties in Maine. In Connecticut, BLD was first found in 2019, in Fairfield County (Figure 1), and is now found in all counties except Hartford County, with the greatest severity occurring in

Fairfield, New Haven, Middlesex, and New London Counties. The disease has been observed mainly in forests and private woodlots, but it has also been reported in landscaped areas. While principally observed on American beech, BLD has also been confirmed on European, Oriental, and Chinese beech (*F. sylvatica*, *F. orientalis*, and *F. engleriana*). The severity in trees can vary, but in advanced stages, BLD can result in premature leaf drop, branch and tip

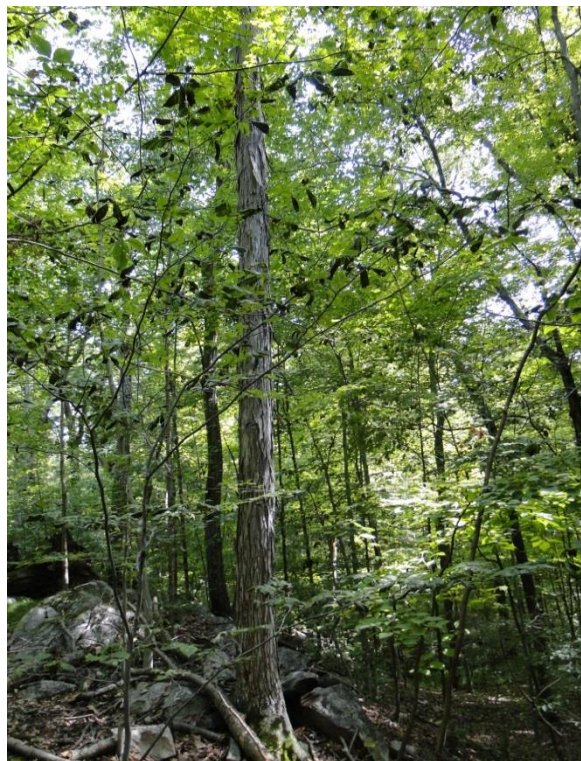


Figure 1. A beech sapling affected by beech leaf disease (arrow).



Figure 2. BLD symptoms when viewing leaf underside against light.

dieback, aborted buds, thin canopies, and may also increase susceptibility to other pests.

SYMPTOMS AND DIAGNOSTICS

The characteristic and diagnostic symptom of BLD is dark banding between leaf veins, which appears immediately upon leaf emergence in the spring; this is especially noticeable when viewing leaves from below, looking upward into the canopy against light (Figure 2). This symptom is much less noticeable when viewing the upper leaf surface; viewed from above, the affected bands will appear cupped and leathery (Figure 3). As disease progresses, the cupping becomes more pronounced, and the affected bands may turn yellow or brown (Figure 4).



Figure 3. BLD symptoms in spring 2021, exacerbated by summer 2020's excessive heat and drought, followed by a dry March in 2021, showing chlorosis in affected interveinal bands.



Figure 4. BLD symptoms in spring 2021, exacerbated by summer 2020's excessive heat and drought, followed by a dry March in 2021. Note the malformed and undersized leaves, excessive cupping of bands, and browning.

In 2021, many beech trees in Connecticut, both young saplings and mature trees, are exhibiting much more severe symptoms, ostensibly exacerbated by the record heat and drought of the 2020 summer, and the dry 2021 spring. In addition to aborted bud development, many of the leaves that do emerge are heavily infected, curled downward and shrunken, with all or nearly all the interveinal bands affected; in some cases, these leaves are prematurely dropped (Figure 5). Saplings and young trees are more susceptible to the disease and are reported to die within three to five years after symptoms are observed; the long-term consequence of this on forests is uncertain, but will likely result in a reduction in the proportion of American beech, and the loss of recruits for



Figure 5. Shrunken, curled leaves, heavily symptomatic with BLD, on partially defoliated branches.

regeneration in forest stands. Symptoms of other pests and pathogens, such as beech blight aphid, European beech scale, eriophyid mites, and anthracnose, can superficially resemble BLD, but properly taken photographs can, in most cases, be diagnostically determinative. When in doubt, samples can be evaluated in the diagnostic laboratory.

DISEASE DEVELOPMENT

In 2020, the cause of BLD was proven, in published research, to be a newly described foliar nematode, *Litylenchus crenatae* subspecies *mccannii*, closely related to *L. crenatae* subspecies *crenatae*, which was first described on Japanese beech (*F. crenata*) in Japan in 2019. *L. crenatae* ssp. *crenatae* has not been found on ornamental plantings of American beech in Japan. Conversely, *L. crenatae* ssp. *mccannii* has not been found on ornamental plantings of Japanese beech in North America. While the origin of *L. crenatae* ssp. *mccannii* and its native distribution are unclear, it should be noted that all other known species in the *Litylenchus* genus are found in the Pacific Rim (Korea, Japan, and New Zealand).

The BLD nematode overwinters occasionally in leaf litter, but predominantly in buds, preceded by migration of juveniles and adults

(the microscopic worm-like stage of the life cycle) from leaves beginning in August. After budbreak in the spring, juvenile or adult nematodes are not found in symptomatic leaf tissue until late June or early July; however, DNA-based markers confirmed the presence of the nematode, presumably due to eggs. Beginning in early summer, nematode numbers increase through fall.

The mechanisms of transmission and spread within trees, among trees, and from site to site, are unknown but the subject of current and ongoing research.

DISEASE MANAGEMENT

Because little is known about the biology of the pathogen and epidemiology of the disease, effective control or eradication measures are still the subject of ongoing research. In general, the spread of invasive species can be prevented by restricting the movement of plant materials and monitoring trees closely for signs and symptoms. Beech leaf disease has spread very quickly eastward in the United States. Management efforts for the disease should focus on preventing the introduction of this invasive pathogen. Quarantines and regulations can be used to prevent further spread of beech leaf disease.

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