

Pest and Pathogen's of New Jersey's Forests: What's next?

Invasive Species Strike Team Annual Conference – 2025 Duke Farms

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Today's Agenda

Current Forest Pest's

- Beech Leaf Disease (BLD)
- Spongy Moth (LDD)
- Emerald Ash Borer (EAB)
- Spotted Lantern Fly (SLF)
- Southern Pine Beetle (SPB)

Future Problematic Pests

- Bacterial Leaf Scorch (BLS) vs. Oak Wilt
- Elm Zigzag Sawfly (EZS)

Current Projects

- BIL Invasive Species Work – Spruce Run
- Pocket Presentations

Beech Leaf Disease (BLD) – Background



Disease affecting trees of the beech genus (*Fagus*)
 The most common beech species in New Jersey is American Beech (*Fagus grandifolia*)

Caused by a foliar nematode Litylenchus crenatae mccannii (LCM)

- Damages internal structure of leaves and buds of the tree
- Testing can detect BLD prior to symptoms
- Symptoms of beech leaf disease are not usually recognizable until nematode populations reach a high enough threshold



Beech leaves, in crosssection, late season

Electron micrograph images: Gary Bauchan, USDA-ARS





Beech Leaf Disease (BLD) -- Symptoms





Beech Leaf Disease (BLD) --Detections

First detected in NJ in 2020 in both Bergen and Essex County

Has since spread to 16 of 21 NJ counties

The most recent county detections are Camden and Gloucester in 2024.





Beach Leaf Disease (BLD) -- Plots



Beech Leaf Disease Detection Map New Jersey



SU S SE X BERGEN WARREN MORRIS HUDSON ESSEX. UNTERDON SOMERSET MONMOUTH MERCER MONMOUTH OCEAN BURLINGTON **BLD** Detection ATLANTIC Survey Plots BLD CUMBERLAND Detected 2020 Detected 2021 Detected 2022 Detected 2023 Detected 2024 Not Delected New Jersev Forest Service Forest Health September 2024

- New Jersey has 12 permanent plots set up across 11 counties
- Plots sampled annually since 2021 to record health change of seedlings, saplings and adult trees
- Hoping to add more plots across additional counties but lessen sample frequency (from annual to biennial)

This data is part of a larger multistate collaborative to track beech leaf disease through the Northeast



Beech Leaf Disease (BLD)

BLD has spread rapidly through the Northeast since initial Ohio detection in 2012

• Why is most of the spread trending Northeast of Ohio with much less spread West?

Currently no landscape scale solution for BLD

- Hopefully in the future a biocontrol is identified
- Likely won't be discovered/identified as quickly as EAB biocontrols were
 - Nematologists are less common than entomologists ☺



Beech Leaf Disease (BLD) – Treatment Options

 Treatments of landscape/shade trees positive results for three different types of chemical treatments

Polyphosphite 30 - fertilizer - root drench

- Broadform fluopyram/trifloxystrobin fungicide/nematicide - foliar spray
- Arbotect 20S thiabendazole fungicide root collar injections



Beech Leaf Disease (BLD) – One Year Progression





2022



Spongy Moth - Background



LDD caterpillar has 6 pairs of red dots and 5 pairs of blue dots. Caterpillar feeding causes the defoliation





Pupa cases (dark brown) are often found in bark crevices. Egg masses (buff tan) are usually located in shady or protected areas

The female moth (white) is flightless. The male moth (brown) can fly and has feathery antennae. *Lymantria dispar dispar* (LDD) Host: Prefers Oaks Found: Statewide Origin: Europe

- Detected in NJ in 1920
- Biological controls released to control populations
- In 1981, the worst LDD defoliation event resulted in over 800,000 acres impacted
- ~3+ consecutive years of heavy defoliation can cause widespread tree mortality

Spongy Moth - Management



Entomophaga maimaiga



Nucleopolyhedrosis virus (NPV)



The egg **parasitoid** *Ooencyrtus kuvanae*

- 40+ biological controls have been released since LDD's detection only about 10 have established
- Most effective biocontrols are Entomophaga maimaiga (a fungus) that relies on wet springs and Nucleopolyhedrosis virus (NPV) which relies on high populations levels of LDD
- Suppression programs are utilized when LDD populations are not sufficiently controlled by biological controls
- Suppression is conducted on state and municipal lands through aerial applications of Btk (Bacillus thuringiensis var. kurstaki) – a biocide containing a soil bacterium that effects the gut of young LDD caterpillars
- NJ AG Municipalities
- NJ DEP state lands

Spongy Moth - Defoliation





~16,000 acres of defoliation in 2023

~140,000 acres of defoliation in 2024 (9x increase)

Suppression program to treat about 7,500 acres statewide with 3,000 acres on Statelands in May 2025

Majority in North and Northwest New Jersey

Many Municipalities dropping out of program due to high costs

NJ AG does cost share with municipalities but is dependent on federal funding

Combination of larger infestation and less federal financial support for program



EAB first detected in NJ in 2014

Now present in all 21 counties

Expected to cause mortality in 99% of Ash trees







EAB Treatments

NJFS contracts annual treatment of high value landscape Ash trees across state properties

Ash Treatments conducted using emamectin benzoate

2024 – treated 43 trees across 7 state locations with DBH total of 1,137 inches

2025 – planning to treat ~100 trees totaling ~1,750 DBH across 6 state properties



Releases of EAB Biocontrols began in 2016 and have occurred annually

Three different species are released in three different forms: Spathius galinae (Bolts and Adults) *Tetrastichus planipennisi* (Bolts and Adults) Oobius agrili (Egg card vials)



- **Released in 13 Counties**
- 34 different sites both state and local municipalities

Biocontrol recovery surveys can be conducted no earlier than 3 years following the release of the biocontrols at a site

Adults are attracted to the color of the yellow pan trap Fly into a preservative solution in the pan trap Traps are collections are determined for biocontrol presence

The most recent recoveries occurred in 2021 and 2022 where a few individuals were successfully recovered from Sussex County!



- Pumpkin ash site in Monmouth County
- Collaborate with Monmouth County Parks to treat the pumpkin ash, collect cuttings



Collaborate with NJ Department of Agriculture to hot callous graft pumpkin ash to white ash rootstock





Spotted Lanternfly - Lycorma delicatula





- NJ Department of Agriculture primarily deals with SLF
 - SLF found in all 21 counties
- Not shown to be destructive in forest stands – more problematic for agricultural commodities and homeowners

Southern Pine Beetle (SPB) - Dendroctonus frontalis

Monitoring

- SPB traps deployed every year
 - Count SPB and Checkered (Clerid) beetles
 - Trapping in Southern NJ Spring
 - Trapping in Northern NJ Fall
- Conduct aerial surveys in late summer and early fall looking for pine mortality



Southern Pine Beetle



Checkered (Clerid) Beetle



Southern Pine Beetle (SPB) - Dendroctonus frontalis



SPB spots are easier to manage when they are addressed early



Southern Pine Beetle (SPB) - Dendroctonus frontalis

Active SPB Pine

Management

 Cut-and-Leave or Cutand-Remove SPB infested



Preventative SPB Pine Management

- Minimize SPB outbreaks by thinning pine stands
- Remove stressed or sickly trees





Before Thinning

After Thinning

Oak Wilt -- Detections





Oak Wilt has not been detected in New Jersey!yet....

— Oak Wilt -- Background





- Oak wilt is a very deadly pathogen that often results in tree mortality within months after host infestation
- Caused by the fungus *Bretziella* fagacearum
- The red oak group is more susceptible to Oak Wilt then the white oak group
- Red oaks exhibit extensive symptoms and even mortality within 8 weeks where as White oaks can survive multiple years until total tree mortality

Oak Wilt -- Identifiers



- There are several key identifiers that can be used to ID oak wilt
 - These include,
 fungal mats under
 the bark and staining
 of a twigs pith in an
 infested tree



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Oak Wilt – Leaf Symptoms



 Similar to Bacterial Leaf Scorch (BLS), wilting is another major symptom of Oak wilt although oak wilt leaf symptoms occur much more rapidly than BLS

How To Recognize Common Diseases of Oaks in the Midwest: A Quick Guide (Clockwise from upper left: anthracnose, oak wilt, bacterial leaf scorch, Botryosphaeria twig canker, oak leaf blister, and bur oak blight. See publication for more detail.)



Oak Wilt – 2023 Survey



- In 2023, we contracted an oak wilt survey where a contractor took samples for lab testing from 50 distressed and wilt appearing oaks around new jersey
 - These samples were tested for both oak wilt and BLS (important to test for one when you test for the other)
 - 45 of the 50 samples were positive for BLS, no detections of oak wilt
- NJFS plans to contract a similar survey in late summer 2025 in an effort to detect oak wilt



Oak Wilt -- Spread

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- Oak wilt spreads above ground by insect vectors (usually Nitidulid beetles)
 - These beetles are attracted by scents released from injured oak trees as well as fungal mats underneath the bark of infested trees
 - Arborists are encouraged to prune oaks during the dormant season (winter) to prevent the spread of oak wilt as insects are less active/inactive
- Oak wilt can spread below ground via root grafting of an infested tree with a healthy tree
 - Root grafting usually occurs when oaks of the same species are within 50feet of each in sandier flat terrain



Bacterial Leaf Scorch (BLS) vs. Oak Wilt

- Bacterial Leaf Scorch is a common systemic disease that affects several different genera of woody plants including: Oak, elm, sycamore, London plane, sweetgum, hackberry, ginkgo, and maple.
 - BLS can also impact a few groups of herbaceous plants
- Red oaks (*Quercus rubra*) tend to be the most impacted species in New Jersey, although BLS can also impact the White oak (*Quercus alba*).
- BLS has similar wilt symptoms but can often be distinguished as the rate of wilting is much slower and usually has a halo appearance between brown and green parts of an infested leaf



Elm Zigzag Sawfly -- Background





- Defoliator of the elm (Ulmaceae) family
- Native to east Asia and first discovered in North America in 2020 in Quebec, Canada and later found in Virginia in 2021

Elm Zigzag Sawfly -- Biology





- Females lay eggs along leaf margin and hatch in about a week
 - Hatched larvae start feeding in "zigzag" pattern
 - This is a key identifier of EZS infestations zigzag feeding pattern caused by early instar larvae
 - Older larvae feed in larger sections
- EZS can have between 1-6 generations annually depending on environmental conditions
 - More generations results in more severe infestations
 - Unsure of how many generations EZS will have in NJ

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Elm Zigzag Sawfly -- Detections



- Reports on iNaturalist for Gloucester and Morris
 County NJ with images of either feeding or adult fly ID
- Still waiting to determine extent of potential damage
- Management likely includes pesticides that are currently labeled for general sawfly control
- Control measures still in study soil fungus Beauveria bassiana has shown efficacy in reducing EZS infestations



Spruce Run Invasive Species Removal & Restoration



Spruce Run is a State Recreation Area that is heavily invaded, particularly with large Autumn Olive Removal of invasives (mechanical and chemical)

2. Restoration of Native Species

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Spruce Run is a State Recreation Area that is heavily invaded, particularly with large Autumn Olive

1. Removal of invasives (mechanical and chemical)

2. Restoration of Native Species

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