Heterobasidion Root Disease

Biology, Symptoms And Management

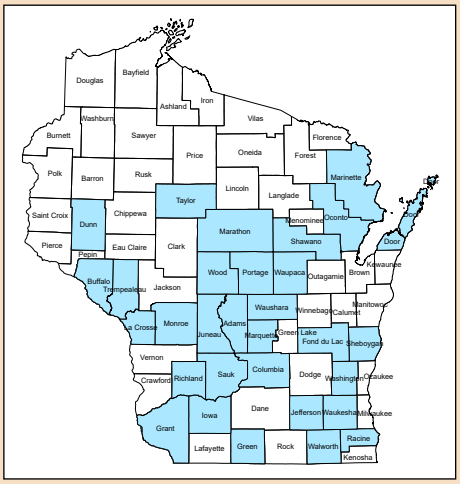
FOREST HEALTH FACT SHEET

Wisconsin Department of Natural Resources, Division of Forestry, Forest Health Program, April 2025

Locations

Heterobasidion root disease (HRD), formerly known as annosum root rot, was first observed in Wisconsin in 1993. It is now known to occur in 31 of Wisconsin's 72 counties.

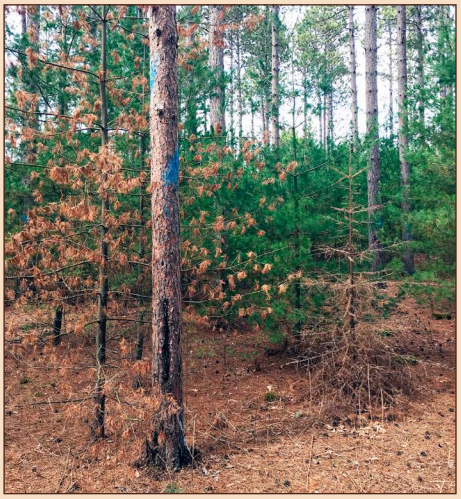
Note: *The Wisconsin Department of Natural Resources (DNR) maintains the locations of all stands confirmed with HRD. If you suspect HRD in your stand, please contact Forest Health staff for confirmation and consultation (link at bottom of page).*



County distribution of Heterobasidion root disease in Wisconsin.

Impact

Many woody species have been reported as HRD hosts in the world. In Wisconsin, HRD is known to infect and kill red, white and jack pines, white and Norway spruces, balsam fir and red cedar.



A red pine, white pine and balsam fir killed by root spread of HRD.

Infection in Wisconsin has been discovered on some hardwood species, but its impact there appears to be minimal.

HRD-infected trees exhibit reduced height, shoot and diameter growth and thinner foliage. Symptoms progress over several years and result in mortality. Symptoms typically appear 3-8 years after a thinning. The number of infection centers in a stand can vary widely. Infection centers create gaps in the forest canopy.

Biology

Infection by the HRD fungus (*Heterobasidion irregulare*; formerly *H. annosum*) most often occurs when spores, produced by the fruit body, land and germinate on the surface of a freshly cut stump. This infection process proves a strong relationship between HRD and thinned stands.

Spores are most often produced when the temperature is between 41 and 90 degrees Fahrenheit. Though most spores are deposited within 300 feet of the source, spores can be carried in the wind over many miles.

The HRD fungus colonizes the stump, moves into the root tissue and progresses from tree to tree via root contact at the rate of approximately 3.2 to 6.5 feet per year. Infection through root and lower stem wounds also can occur. The fungus degrades both the lignin and the cellulose and causes a stringy yellow decay in the tree's roots and lower stem.

A pocket of red pine impacted by HRD.

Visit our website for full information on HRD or contact DNR Forest Health staff.

Young HRD fruit bodies often resemble popcorn.

Identification

Fruit bodies (called conks) of HRD can be found at the base of fading and dead trees, as well as on stumps. These fruit bodies may be buried in the soil and duff layer. Fruit bodies are most commonly observed in the fall, but can be found any time of the year.

Young fruit bodies look like popcorn and, under favorable environmental conditions, become bracket-shaped or shelf-like. Fruit bodies vary in color but are usually light to dark brown above and white to tan below.

Older, conk stage HRD fruit body.

Prevention

Once HRD exists in a stand, it is very difficult to control. Prevention is the best approach.

If you are planning a thinning, consider treating freshly cut stumps with

A pine stump treated with fungicide. Blue dye is added to ensure coverage.

fungicide. Stumps should be treated as soon as possible after cutting and no later than one day after cutting.

Many factors influence the risk of infection and impact by HRD. A risk-based fungicide treatment guide is available for landowners and property managers to determine whether fungicide treatment is warranted in a stand.

Currently, only one pesticide is registered and available in Wisconsin to prevent HRD. "Cellu-Treat®" (disodium octaborate tetrahydrate) is a borate-based chemical that can be mixed in water and applied using a backpack sprayer or an attachment to a harvester.

Pesticide solution is applied on freshly cut stumps through a perforated sawbar on a dangle head processor at the time of harvesting.

The manufacturer states on its website that one pound of Cellu-Treat makes two gallons of solution, enough to cover 2,000 6-inch stumps or 500 12-inch stumps. Cellu-Treat can be purchased in a 25-pound bucket.

Purchasing Fungicide

Cellu-Treat® national distributor: Nisus Corporation, 100 Nisus Drive, Rockford, Tennessee; 800-264-0870. Visit the website.

Cellu-Treat in-state distributors:

- Nutrien Ag Solutions, Plainfield, Wisconsin: 715-335-4900
- Insight FS, Antigo, Wisconsin: 715-627-4844

Note: *References to pesticide products and distributors in this publication are for your convenience and are not an endorsement or criticism of one product over similar products or one distributor over other distributors. The DNR makes no endorsement or guarantee regarding any product or distributor.*

An aerial view of pockets in a red pine stand after management practices were implemented.

Management

Recommended best management practices for harvesting a stand with HRD:

1. Start harvesting in healthy areas of the stand, moving to infected areas last.
2. Utilize dead trees and the bottom eight feet of dying trees with HRD fruit bodies as soon as possible to reduce fruiting body production and subsequent spore production.
3. Healthy trees within 35-65 feet of infected trees may be harvested to capture value before the next harvest.
4. Clear-cut areas where pockets are coalescing or the entire stand if pockets exist throughout.
5. Clean logging equipment between sites.

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All photos, graphics: Wisconsin DNR

Wisconsin Department of Natural Resources

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