Heterobasidion Root Disease (Annosum Root Rot)

Biology, Symptoms and Management

FOREST HEALTH FACTSHEET

Wisconsin Department of Natural Resources, Division of Forestry, Forest Health Program, Revised January 2022

LOCATIONS

First observed in Wisconsin in 1993, Heterobasidion root disease (HRD) is now known to occur in 30 counties (Figure 1). *The Wisconsin 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 (see bottom of page 2).*

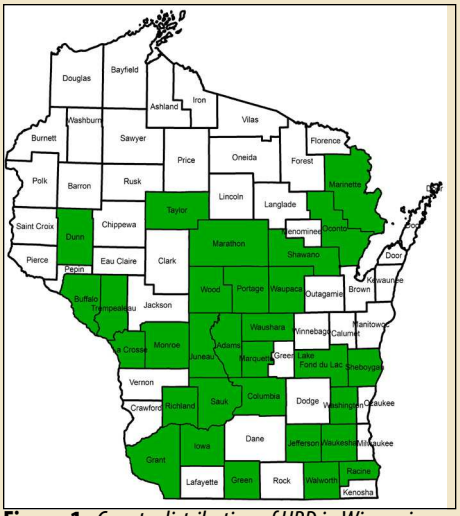

Figure 1. *County distribution of HRD in Wisconsin.*

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 (Figure 2). Infection has been discovered on some hardwood species, but impacts appear to be minimal.

HRD infected trees have reduced height, shoot and diameter growth and thin foliage. Symptoms progress over several years and result in mortality (Figure 3). 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 41^0 - 90^0 F. Though most spores are deposited within 300 feet, 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- 6.5 ft/yr. Infection through root and lower stem wounds can also occur. The fungus degrades both the lignin and the cellulose and causes a stringy yellow decay in the roots and lower stem.

IDENTIFICATION

Fruit bodies or conks of HRD can be found at the base of fading and

Figure 2. *A red pine, white pine and balsam fir killed by root spread of HRD.*

Figure 3. *A pocket of red pines impacted by HRD infection.*

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 (Figure 4) and under favorable environmental conditions, become bracket-shaped or shelf-like (Figure 5). Fruit bodies vary in color but are usually light to dark brown above and white to tan below.

Figure 4. *Young HRD fruit bodies "popcorn".*

Figure 5. *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 fungicides. Stumps should be treated as soon as possible after cutting and no later than one day after cutting (Figure 6).

Many factors influence the risk of infection and impact by HRD. A risk-based fungicide treatment guide is available for landowners and property managers in Wisconsin to determine whether fungicide treatment is warranted in a stand *(See below for more information).*

Currently there are two pesticides to prevent HRD registered with the Dept. of Agriculture, Trade and Consumer Protection in Wisconsin. Cellu-Treat® (disodium octaborate tetrahydrate) is a Borate-based chemical and Rotstop®C is a biological fungicide that contains spores of the naturally occurring wood decay fungus, *Phlebiopsis gigantea*. Both products can be mixed in water and applied using a backpack sprayer or an attachment to a harvester.

Figure 6. *A pine stump treated with fungicide. Blue dye is added to ensure acceptable coverage.*

WHERE TO PURCHASE FUNGICIDES

Cellu-Treat®: available in a 25-lb bucket on-line. As of January 2022, the cost for a 25-lb bucket is $98.26 plus shipping. Website: http://nisuscorp.com

Cellu-Treat® Local Distributors:
Crop Production Services
Plainfield, WI 715-335-4900
Insight FS
Antigo, WI 715-627-4844

Rotstop®C: available in two package sizes – 0.13 oz. package (1 gallon) and 0.67 oz. package (5 gallons). As of January 2022, the cost for a 0.13 oz. package is $1.89 and $9.45 for a 0.67 oz. package.

Rotstop®C Distributor:
BioForest
Sault Ste. Marie, Ontario, Canada
1-888-236-7378; order@bioforest.ca
Website: http://www.BioForest.ca

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. DNR makes no endorsement or guarantee regarding any product or distributor.

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 (Figure 7)
4. Clear-cut areas where pockets are coalescing or the entire stand if pockets exist throughout
5. Clean logging equipment between sites

Figure 7. *Pockets in a red pine stand after management practices were implemented.*

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For more information about HRD, visit bit.ly/WisHRD
To contact DNR Forest Health staff, visit bit.ly/DNRForestHealthStaff