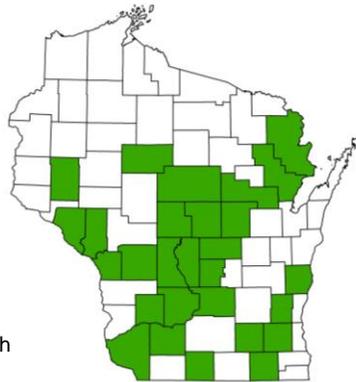


# HETEROBASIDIUM ROOT DISEASE (ANNOSUM ROOT ROT)

## BIOLOGY, SYMPTOMS AND PREVENTION

Wisconsin Dept of Natural Resources, Forest Health Protection – November 2018

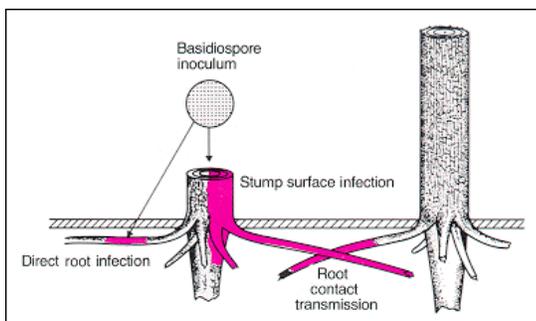
**Locations:** First observed in Wisconsin in 1993, Heterobasidion root disease (HRD) is now known to occur in 28 counties, including Adams, Buffalo, Columbia, Dunn, Grant, Green, Iowa, Jefferson, Juneau, La Crosse, Marathon, Marinette, Marquette, Monroe, Oconto, Portage, Richland, Sauk, Shawano, Sheboygan, Taylor, Trempealeau, Walworth, Washington, Waukesha, Waupaca, Waushara, and Wood Counties.



A pocket of fading and dead trees, caused by HRD. Note progression of mortality into the stand and the understory filling in with woody shrubs.

**Impact:** Although many woody species have been reported as hosts in the world, HRD has been most commonly observed on red and white pine plantations in Wisconsin. Infection has been observed on overstory red pine, white pine, white spruce, and Norway spruce, and understory balsam fir, jack/red/white pines, red cedar, white spruce, black cherry, oaks, and buckthorn. Of those species, mortality has been observed/suspected on jack/red/white pines, balsam fir, red cedar, and white/Norway spruces.

Infected trees will have reduced height, shoot and diameter growth, thin foliage and eventual mortality. These 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.



Infection occurs through freshly cut stump. From: Annosus Root Rot in Eastern Conifers, K. Robbins, 1984. FIDL 76.

**Biology:** The disease is caused by the fungus, *Heterobasidion irregulare* (formerly *H. annosum*). Infection most often occurs when basidiospores, 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.

Basidiospores are most often produced when the temperature is between 5° - 32° C (41° - 90° F). Though most spores are deposited within 90 meters (300 feet), spores can be carried in the wind over many miles.

The fungus colonizes the stump, moves into the root tissue and progresses from tree to tree via root contact at the rate of approximately 1-2m/yr (3.2-6.5 ft/yr). Infection through root and lower stem wounds can also occur. The pathogen degrades both the lignin and the cellulose and causes a stringy yellow decay in the roots and lower stem.



Stringy yellow decay caused by *H. irregulare*



Shelf-like HRD fruit-body hidden in duff layer



Popcorn stage of HRD fruit body

**Identification:** Fruit bodies or conks of HRD can be found at the base of fading and dead trees as well as stumps. These fruit bodies may be buried among 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, they become bracket-shape or shelf-like. They are perennial, but can disintegrate quickly. Fruit bodies vary in color but are usually light to dark brown above and white to tan below.



A perforated sawbar. Liquid fungicide is sprayed through small holes at the time of felling (a marker dye was added)

**Prevention:** Once the disease exists in a stand, it is very difficult to control it. **Prevention of this disease is the best approach.**

If you are planning a thinning, consider treating freshly cut stumps with fungicides. Stumps must be treated as soon as possible after cutting and no later than one day after cutting. The fungicide application is most effective when it is applied to prevent new infections through fresh cut stumps.

There are factors that 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 particular stand.



A stump sprayed with a fungicide (a marker dye was added)

Currently there are two products registered and available in Wisconsin to prevent HRD. Cellu-Treat (disodium octaborate tetrahydrate) is a Borate-based chemical and RotstopC 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.

#### **Where to purchase fungicides**

**Cellu-Treat:** available in a 25-lb bucket through on-line. As of November 2018, the cost for a 25-lb bucket is \$92.70 plus shipping.

Website: <http://nisuscorp.com>

#### **Cellu-Treat Local Distributor:**

Crop Production Services, Plainfield

715-335-4900

Servco FS, Antigo

715-627-4844; 800-807-9900

**Rotstop C:** available in two package sizes – 0.13 oz. package (1 gallon) and 0.67 oz. package (5 gallons)

As of November 2018, the cost for a 0.13 oz. package is \$1.89 and \$9.45 for a 0.67 oz. package.

Contact: [order@bioforest.ca](mailto:order@bioforest.ca), 1-888-236-7378

Website: <http://www.BioForest.ca>

For more information about HRD, please visit WI DNR website at [dnr.wi.gov](http://dnr.wi.gov). Key word "HRD"