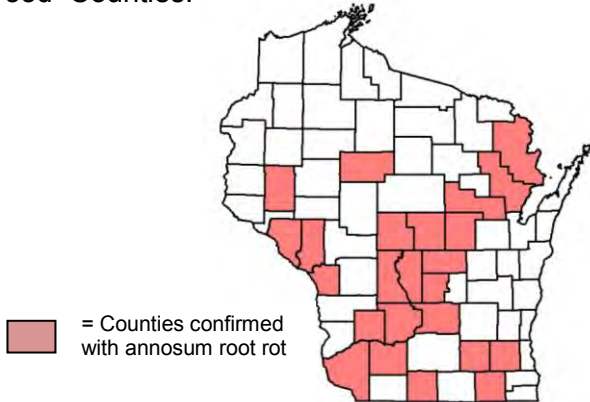


ANNOSUM ROOT ROT

BIOLOGY, SYMPTOMS AND PREVENTION

Wisconsin Dept of Natural Resources, Forest Health Protection – November 2013

Locations: First observed in Wisconsin in 1993, annosum root rot is now known to occur in 24 counties, including Adams, Buffalo, Columbia, Dunn, Grant, Green, Iowa, Jefferson, Juneau, La Crosse, Marinette, Marquette, Oconto, Portage, Richland, Sauk, Shawano, Taylor, Trempealeau, Walworth, Waukesha, Waupaca, Waushara, and Wood Counties.



Annosum root rot pocket. Note progression of mortality into the stand and the understory filling in with woody shrubs.

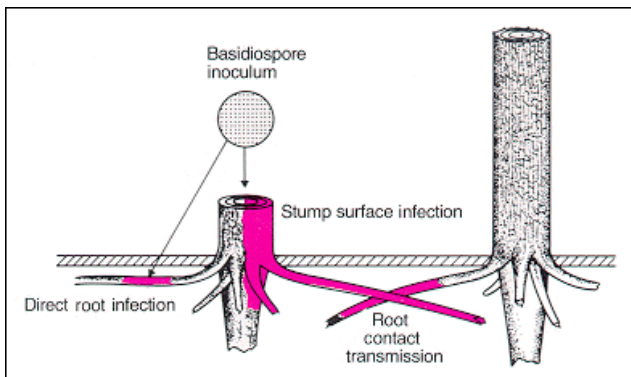
Impact: Although many woody species have been reported as hosts in the world, annosum root rot has been most commonly observed on red and white pine plantations in Wisconsin. Infection has been observed on overstory red and white pines, and understory balsam fir, jack/red/white pines, red cedar, white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

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.

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 annosum root rot 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.



Identification: Annosum fruit bodies or conks 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.

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



Shelf-like Annosum fruit-body hidden in duff layer



Popcorn stage of Annosum root rot fruit body



Sporax application with a salt-shaker style container

Where to purchase fungicides

Sporax: available in 25-lb bags from Wilbur-Ellis Company. As of November 2013, the cost for a 25-lb bag is \$68.50 plus shipping.

Wilbur-Ellis Company
P.O.Box 15289, Sacramento, Ca, 95851-0289
Phone: 1-800-426-3491

Website: www.wilbur-ellis.com
Local distributors of Wilbur-Ellis in WI
Almond, WI 715-366-2500
Grand Marsh, WI 608-339-9661

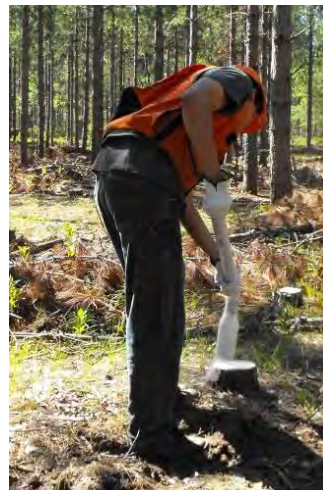
Sporax application device contact:

MS Properties, Inc.
Website: screaming@charter.net
Phone: 920-295-4114

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. Fungicides will help prevent new infections, but will not stop the growth of the pathogen if the stump is already infected.

There are factors that influence the risk of infection by annosum root rot. 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. For more information about the guide, visit <http://dnr.wi.gov> key word "annosum".



Sporax application with a special dispensing unit



Cellu-Treat application using a backpack sprayer

Two products are currently available in Wisconsin to prevent Annosum root rot. Sporax (sodium tetraborate decahydrate) is granular and can be applied using a salt-shaker style container or a special dispensing unit made of a PVC pipe and a plastic nozzle. Cellu-Treat (disodium octaborate tetrahydrate) is a water-soluble powder and can be applied using a backpack sprayer or an attachment to a harvester.

Where to purchase fungicides

Cellu-Treat: available in a 25-lb bucket or 50-lb bag through on-line. As of November 2013, the cost for a 25-lb bucket is \$90 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

For more information about Annosum root rot, please contact Kyoko Scanlon at 608-275-3275 or E-mail at Kyoko.Scanlon@Wisconsin.gov.