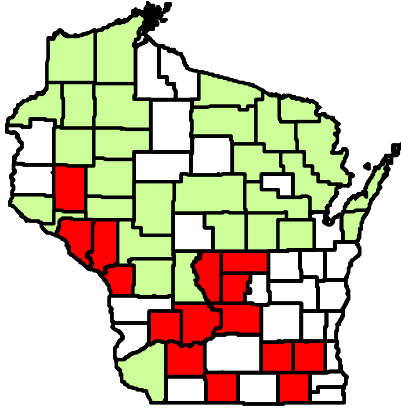


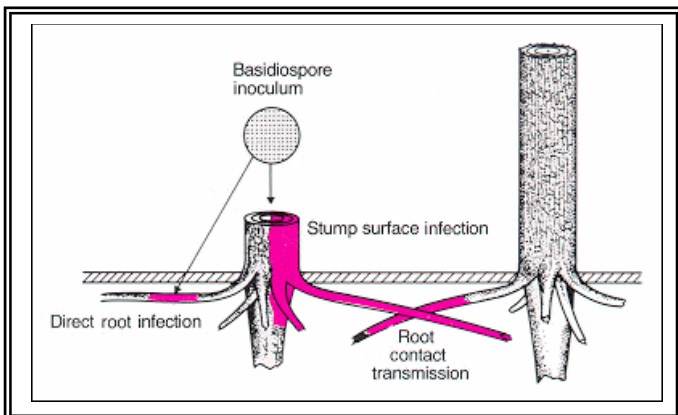
ANNOSUM ROOT ROT – *Heterobasidion annosum*
SIGNS, SYMPTOMS AND PREVENTION
 Wisconsin Dept of Natural Resources, Forest Health Protection – July, 2006

Introduction/Locations: First observed in Wisconsin in 1993, Annosum root rot is now known to occur in fifteen counties, including Adams, Buffalo, Columbia, Dunn, Green, Iowa, Jefferson, La Crosse, Marquette, Richland, Sauk, Trempeleau, Walworth, Waukesha and Waushara Counties.



Known locations of Annosum root rot, 2006.
 □ Counties surveyed for Annosum root rot in 2002
 ■ Known counties of Annosum root rot

Impact: Although over 200 woody species have been reported as hosts, Annosum root rot has been most commonly observed on red and white pine plantations in Wisconsin. Infected trees will have reduced height, shoot and diameter growth and thin foliage. These symptoms typically appear 2-3 years after a thinning. As decay advances through the root system and into the lower stem, the tree will become more susceptible to wind throw and eventually die. Red, jack and white pine seedlings and saplings in close proximity to infected overstory may also become infected.



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

The number of infection centers in a stand can vary widely. Infection centers create gaps in the forest canopy where brush and early successional trees can regenerate.

Biology: 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 disease and thinned stands.

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

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. *Heterobasidion Annosum* degrades both the lignin and the cellulose and causes a stringy yellow decay in the roots and lower stem.

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

Signs: Annosum fruit bodies or conks (spore-producing structures) can be found in the root collar area 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. They are perennial, but can disintegrate quickly and thus may appear annual. Fruit bodies vary in color but are usually light to dark brown above and white to tan below. Young fruit bodies look like small white popcorn.



Underside of Annosum Fruit-Body. New growth (white) with pores is seen on the underside of this old fruit body



Annosum fruit-body hidden in duff layer

Prevention: Once the disease exists on 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 Sporax (sodium tetraborate decahydrate). Stumps must be treated as soon as possible after cutting and no later than one day after cutting. Sporax will help prevent new infections. The risk of infection by Annosum will be higher when a stand is closer to infected stands. Counties where Annosum root rot is found are shown in this publication. The map is based on the surveys conducted in randomly selected plantations in 2003 and confirmed reports of Annosum. Since the probability of additional infection centers being present in Wisconsin is high, this treatment is recommended throughout the state of Wisconsin. In counties where Annosum root rot is confirmed, or are adjacent to a county where the disease is confirmed, it is extremely important to pursue this practice.

Sporax is available in 25-pound bags from Wilbur-Ellis Company. As of July, 2006, the cost for a 25-pound bag is \$61.25 plus shipping.

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



Popcorn stage of Annosum root rot fruit body, typically seen in summer



Sporax is applied salt-shaker style on the surface of a freshly cut stump to prevent infection.

For more information about Annosum root rot, please contact Kyoko Scanlon at 608-275-3275 or E-mail at Kyoko.Scanlon@dnr.state.wi.us