

Biology, Symptoms and Management of Scleroderris Canker

Scleroderris canker (caused by the fungus *Gremmeniella abietina*) is a disease that causes shoot and tree death of jack and red pine in the Lake States.

Biology & Symptoms

In Michigan and northern Wisconsin, *Gremmeniella* is most often observed in red and jack pine plantings. The fungus produces a sexual fruiting structure called an apothecium on tissue that has been dead one to two years (figure 1). The spores from this structure are wind dispersed during moist weather from April to October, though most spore dispersal occurs in June and July. The spores infect buds and the base of needle fascicles. The fungus does not grow into the shoot and kill tissue until the shoot is dormant during the winter, so damage is not evident until the following spring. Stressed trees (such as those in frost pockets) are prone to more damage, as host defenses against the disease are reduced. The fungus grows well in the cool, moist conditions that are present under snow cover, so damage is greatest below snow level. Symptoms of infection are first visible in the spring, when the needles on infected shoots begin to turn red from the bases outward (figures 2 & 3). The killed needles are loose in the fascicle, and are easily pulled or fall out.

Figure 1. Apothecia of *Gremmeniella* on the cankered bark of a small red pine stem





Figure 2. Death of lower branches of red pine, Caused by *Gremmeniella* infection. Photo taken in June.



Figure 3. Close-up of branch death in June. Note the discoloration of the needles from the base outwards.

On shoots where the needles are loose or have fallen out, a green stain can often be observed beneath the bark. Black asexual fruiting structures called pycnidia are formed in the needle fascicle holes of recently killed shoots (figure 4). These fruiting bodies produce spores that ooze out of the shoot during wet weather from April to October and are rain splashed to nearby branches. The infections resulting from these spores cause a localized build-up of damage.

The fungus can continue to grow in the branch tissue and reach the main stem, where it can cause a canker. This more commonly occurs on very small or stressed trees.

There are two recognized strains of the fungus. The North American or "low" strain usually causes damage primarily below six feet above ground. This is the only strain believed to be present in Michigan and Wisconsin. The European or "high" strain can cause damage throughout the crown of the tree, and thus has the potential to be much more damaging. This strain has been identified in parts of Quebec, New Brunswick, Newfoundland, Ontario and New York.

Figure 4. Green discoloration and pycnidia of *Gremmeniella* in red pine shoot (bark has been cut to show symptoms).



Management

The impact of Scleroderris canker is greatest when it occurs on trees while they are still very small. Impact on larger trees is minimal. Therefore it is very important to keep trees disease-free during plantation establishment.

- * Plant only disease-free material. Infected nursery stock is thought to be the source of many of the Scleroderris canker outbreak problems that occurred in the 1960's. Effective fungicide programs were developed for the nurseries in the 1970's, and, as long as the nurseries are maintaining an effective fungicide program, the outplanted material should be free of this problem.
- * Do not replant red or jack pine onto sites that have failed due to Scleroderris canker or that are adjacent to stands with a high incidence.
- * Avoid planting in frost pockets, which stresses trees and makes them susceptible to infection by *Gremmeniella*.
- * Use buffer strips without trees or with trees of resistant species (hardwoods, balsam fir, tamarack, white spruce or white pine) between newly planted trees and infected trees. Buffer strips should be approximately 100 yards wide.
- * Maximize the rate at which pines will attain a height of greater than six feet. This may include site selection, site preparation, weed control, or fertilization. The impact of Scleroderris canker on pines greater than six feet tall should be minimal. If you observe high impact above this height, let Forest Health Protection staff members know about it.
- * Sanitation can be done to reduce the level of the disease available to infect new plantings on or adjacent to a site. Pruning out of infected branches has been effective in reducing new infections. One study indicated that it was not necessary to remove the infected pruned material from the site in order to obtain a reduction in disease levels. However, the pathogen is able to survive and produce inoculum on diseased branches for up to 10 months after they have been pruned off. Chipping, burning, or burying infected branches is recommended.

(prepared 7/97, Linda Haugen)
