

Spruce Needle Rust

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Additional information on this disease and control alternatives can be obtained from your local Alaska Cooperative Extension office, Alaska State Forestry office, or from:

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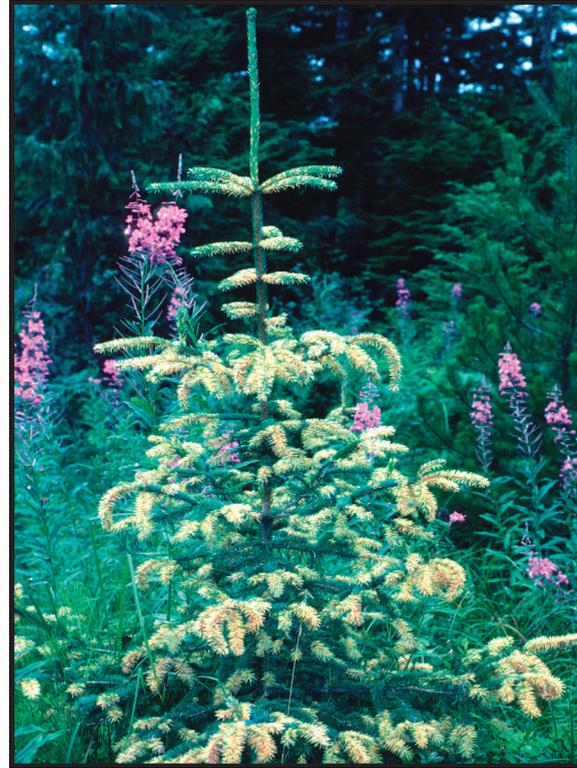
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Spruce needle rust, *Chrysomyxa ledicola* Legerh., can infect spruce trees in forests and urban areas of southeast, south-central and interior Alaska. This disease affects only current year needles on white spruce, black spruce and Sitka spruce; stems and mature needles are resistant.

Identification

Spruce needle rust is easily identified by pale orange spore masses that erupt from infected needles in summer (Figure 1). If only part of the spruce needle is infected, it develops a yellow band that contrasts with the dark green, unaffected portion of the needle. Heavily diseased trees have a yellow-orange appearance (see front cover). When great numbers of trees are infested (Figure 2) and large quantities of spores dispersed, an orange film may cover nearby vegetation and discolor streams.

To complete its life cycle, spruce needle rust must infect another plant, Labrador tea, *Ledum* spp. (Figure 3). This low-growing evergreen has



Figure 1. Pale orange pustules of the rust fungus on spruce produce spores that infect Labrador tea, the alternative host.



Figure 2. Some spruce stands may become heavily infested with spruce needle rust.

leathery, aromatic leaves with brown woolly hairs on the underside and commonly grows in poorly drained sites such as muskegs or bogs. When both hosts grow in or near these boggy areas, spruce needle rust can be severe.

Because the fungus attacks new needles exclusively (Figure 4), it can be distinguished from other common spruce diseases, such as spruce needle cast or broom rust. Spruce needle cast fungi invade new needles but the needles remain green until they are one year old and then turn reddish-brown. Two-year old needles become straw-colored and develop black fruiting bodies on the underside. Broom rust invades the woody parts of spruce and results in dense branch clusters.

Life History

As with most rust fungi, spruce needle rust has a complicated life cycle. It attacks and causes disease on two different host plants, Labrador tea and spruce trees (Figure 5). The fungus has a total of five spore stages. Two are produced on spruce and three on Labrador tea, but only three spore types can spread the disease. These three are discussed below.

The orange pustules that occur on spruce needles consist of numerous microscopic fungal spores. Dispersed by air currents, the spores are only capable of infecting Labrador tea; they never reinfect spruce trees.

Once transmitted to Labrador tea, another orange mass of spores is produced on the upper surface of the leaves (Figure 3). This second type of spore infects neighboring Labrador tea, thus increasing the number of infected plants. The rust fungus overwinters in Labrador tea leaves.



Figure 3. Labrador tea, the alternative host of spruce needle rust. Notice pustules of the rust fungus on the upper surface of leaves.



Figure 4. Only current-year needles of spruce are infected. Notice that the one-year old needles are not infected.

The following spring, another type of spore is produced on Labrador tea. This stage occurs at the same time spruce needles are emerging and elongating. Only these young, succulent needles are susceptible to the rust fungus. During summer months, the infected spruce needles yield the orange spores that can infect Labrador tea, beginning the cycle once again. Later in the season, infected needles are usually shed.

Impacts

Spruce trees are rarely killed by spruce needle rust. Essentially, the damage is cosmetic, with diseased trees appearing discolored. Infection levels by spruce needle rust can be very high (nearly 100 percent of new spruce needles), especially on trees that grow close to boggy areas with infected Labrador tea. New spruce needles produce the most food of all needles on a tree. Therefore, the fungus attacks the most important class of needles. It is possible that spruce growth may be impaired, although this has not been adequately researched.

For spruce needle rust to cause severe defoliation, serious growth loss, or mortality, infection of a tree would have to occur for several consecutive years. The fungus can be noted in a particular location for a year or two, but is not epidemic every year. The fluctuating incidence of rust from year to year may be due to different weather conditions. Wet and cool weather is conducive for spore formation and spore dispersal from Labrador tea, as well as infection of new spruce needles.

Generally, spruce needle rust is not a threat to commercial spruce stands. Trees growing on drier sites, more than 1,000 feet from Labrador tea are only slightly affected.

Management

Because spruce needle rust is primarily a cosmetic disease, one management option is to take no action. Infected needles are eventually shed, giving spruce a greener, healthier, though slightly thinner, appearance. Since heavy levels of infection do not generally occur several years in a row, this is probably the best option for commercial forests and possibly for ornamental trees.

The only spores of this disease that infect spruce are produced on Labrador tea; therefore, removing or killing Labrador tea can help to reduce damage on nearby spruce. For effective protection, all Labrador tea plants within 1,000 feet must be removed.

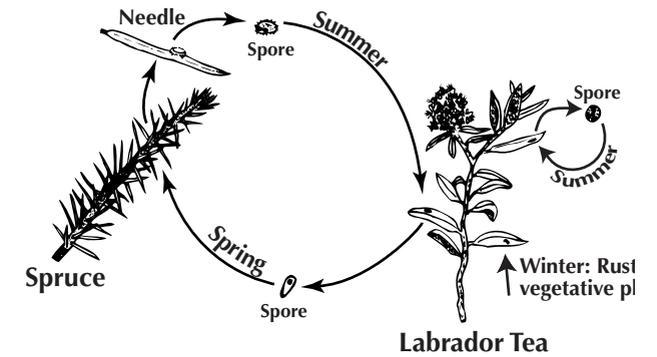


Figure 5. The life cycle of spruce rust requires two host plants: spruce and Labrador tea. Fungal spores are microscopic seed-like structures.

Chemical control such as protective fungicides can effectively protect spruce trees and help reduce infection levels. However, to be effective, fungicide application must coincide with rust spore production, which occurs in spring/early summer when the new spruce needles are emerging and elongating. Contact the Alaska Cooperative Extension Service for recommended fungicides.

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