

CYTOSPORA CANKER



Cytospora canker, caused by the fungus *Cytospora kunzei* (also known as *Valsa kunzei* var. *piceae*), is the most prevalent and destructive fungal disease of Colorado blue spruce and Norway spruce. Occasionally, Cytospora canker is found on Douglas-fir, hemlock, and larch. Susceptibility varies widely among species, but generally trees under stress or growing outside their natural range are more prone to the disease. Cytospora canker rarely affects trees less than 15 to 20 years old. Infected trees are weakened substantially, but are rarely killed. However, they can be severely deformed, often making them unsuitable for the landscape.

Symptoms & Identification

The disease normally starts on the lowest branches of the tree and, over a period of several years, progresses upward. At first, needles have a purplish hue, eventually turning brown and dropping, leaving dry, dead, brittle twigs and branches.

On severely infected trees, the fungus will enter the trunk through wounds (usually where the branch meets the trunk of the tree), killing the cambium layer and leaving dead bark. This dead tissue is called a “canker.”

A conspicuous white resin or “pitch” covers the cankered portion of the branch or trunk, sometimes flowing several feet down the trunk of the tree. This is an important means of diagnosing Cytospora canker; however, resin flow can also be associated with other tree injuries and is not exclusively symptomatic of Cytospora canker. Within the cankered area, black, pinhead-size fruiting structures (pycnidia) of the fungus can be seen with a microscope or hand lens and are a positive sign of the disease.

Disease Cycle

The fungus survives long-term as mycelium and spores in diseased stems. The canker grows slowly, eventually circling and killing a twig or branch. The fungal spores (conidia) are the principal means by which the disease spreads to other branches, entering through bark wounds and injuries. Infections occur in cool, wet weather. Spores are dispersed by splashing rain, wind, sprinklers, pruning tools, and possibly by movement of insects and birds.

Canker development is most severe in trees under stress from drought, insect damage, crowding, nutrient imbalance, and mechanical damage to branches, trunks, or roots. Symptom development becomes more common one or two years following a severe summer drought.

Control: Cultural

Because *Cytospora* canker is a stress-induced disease:

- Plant new trees in sites that are favorable to their growth (e.g., avoiding places where they become too crowded).
- Plant Norway or white spruce instead of Colorado blue spruce if your site is not favorable.
- Minimize stress to established trees by taking care not to injure the root system or compacting the surrounding soil. Use a 3-4 inch layer of organic mulch to retain moisture and reduce rapid soil temperature fluctuations.
- Water trees well in dry periods and provide adequate moisture in late fall before the ground freezes.
- Infected branches should be removed to improve appearance and reduce chances of further spread. Avoid pruning or working around trees when foliage, twigs, and branches are wet because water disperses the fungal spores. It may take two or more consecutive seasons of pruning to significantly reduce the disease.
- Clean tools thoroughly and disinfect with rubbing alcohol, a 10% bleach solution or comparable disinfectant after each cut when pruning out diseased wood.

Control: Chemical

Applications of copper-containing fungicides have not been effective in preventing or treating *Cytospora* canker and, in general, chemical control is not useful in controlling this disease. Fungicide sprays are generally not effective at controlling canker diseases.

RHIZOSPHAERA NEEDLE CAST



Rhizosphaera needle cast is a common foliar disease of spruces and other conifers caused by the fungus *Rhizosphaera kalkhoffii*. Colorado blue spruce is particularly susceptible and can be severely damaged by this disease. Other hosts include white, black, Engelmann, Sitka, and Serbian spruce; Austrian, mugo, Eastern white, and Japanese red and black pine, as well as Douglas-fir and Siberian fir. Norway spruce is relatively resistant.

Symptoms & Identification

The disease is usually first evident on lower branches and then works upward gradually. Second-year needles turn a purple or brown color and eventually fall from the tree.

After several successive years of needle loss branches may die. In general, trees appear to die from the bottom upward. In some cases, however, infections start higher on the tree, giving the appearance of scattered dead areas.

The disease can be diagnosed by looking at the discolored needles with a magnifying glass or hand lens. Small black spots (fruiting structures of the fungus) appear in rows in the infected needles. The fungus is actually emerging from the stomata (natural pore-like openings) that occur in lines on all sides of a spruce needle. Healthy stomata appear white. The rows of black stomata are a diagnostic feature of *Rhizosphaera* needle cast. Green needles may also show these small black fruiting structures.



Disease Cycle

Rhizosphaera over winters in infected needles on the tree and on needles that have fallen to the ground. The fungus is spread by splashing and dripping water beginning in spring and continuing into the fall. Newly emerging needles can become infected during wet spring weather.

During late summer, this disease causes first year needles to appear mottled or speckled with dull yellow or reddish blotches. Later, (often the next year) infected needles on the interior of a branch turn purplish-brown (from the tips downward) and drop prematurely. Infection generally begins in spring on the needles of the lower branches soon after the needles have elongated. Symptoms spread upward and around the tree.

Sometimes infection will start on branches in the middle of a tree, creating defoliation "holes" among healthy branches. Heavily infected trees can suffer severe needle loss and branches may die as they become defoliated. Trees are rarely killed by Rhizosphaera needle cast, but several years of attack will take its toll and only the current season needles may remain.

In moist conditions, the fungus inside older needles produces black fruiting structures (pycnidia) that appear as distinct rows of black, pinhead-size dots. These fruiting structures emerge through needle pores (stomata), either before or after the needles have dropped. This disease can be frustrating because severe defoliation can occur quite rapidly and without indication that the disease is even present.

Control: Cultural

As with most fungal diseases, infection occurs in warm, wet weather. The spores of Rhizosphaera needle cast are released from spring until fall; thus, working near trees in wet weather should be avoided throughout the growing season.

For trees showing symptoms:

- Remove (when feasible) dead branches, fallen needles, and cones under the tree to prevent further infections.
- Prune surrounding plants to promote better air circulation.
- Keep plants well watered, especially in periods of drought, to alleviate stress. Water all evergreens before winter to avoid root desiccation and winter injury.
- Space new trees adequately to promote good air circulation.
- Do not shear trees when the foliage is wet.

Control: Chemical

Copper-based fungicides, such as Bordeaux or Mancozeb, are currently registered and effective as a preventive control against this disease. Begin applications when new needles are half-grown and again when needles are fully expanded, about three weeks later. If rainy weather occurs, shorten the spray interval. Treatments can only protect uninfected foliage. They cannot "cure" existing infections.

Use pesticides safely and wisely; read and follow label directions on containers for dilution rates and methods of application. The user is responsible for determining that the intended use is consistent with the label of the product being used.

The information provided is for educational purposes only. Reference to commercial products or trade names is made with the understanding that no discrimination is intended and no endorsement made.

Sources:

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