60. Cytospora Canker of Spruce

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Cytospora canker, caused by the fungus *Valsa kunzei* (asexual stage *Cytospora kunzei*), is a destructive disease of spruce in the northern Great Plains. The fungus is synonymous with *Leucostoma kunzei* (asexual stage, *Leucocytospora kunzei*).

Hosts and Distribution

This pathogen attacks many species of spruce, including blue spruce and its cultivars, white spruce and its variety Black Hills spruce, Norway spruce, and Engelmann spruce. Cytospora canker also occurs on Douglas-fir. It has been reported throughout the upper Midwest and Northeast United States and adjacent Canada, and in the mountains of Colorado. In the Great Plains, it occurs in the prairie provinces of Canada, and in Montana and North and South Dakota.

Symptoms and Signs

Symptoms start on lower branches and spread to other branches laterally and upward in the tree (fig. 60–1). Needles on infected branches die and turn brown, and resin exudes from cankered areas. After a few months infected needles drop off, and white or light blue patches of resin become obvious on the dead bark of larger branches (fig. 60–2). There is little external evidence of the canker margin, but it can be found by exposing the inner bark. Infected bark tissue and cambium are brown in contrast to the normal light color of healthy tissue. The wood beneath infected bark is not discolored.

Asexual fruiting bodies (pycnidia) of the fungus develop in infected bark but are usually not visible on the bark surface. Superficial cuts in cankered bark will expose the small (1–3 mm dia.) black pycnidia (fig. 60–3). Orange spore masses or tendrils may exude from the pycnidia during wet weather. The spores (conidia) are hyaline, allantoid (sausage-shaped), 1-celled, and 4–6 by 1 μm.

Sexual fruiting bodies (perithecia) are sometimes associated with pycnidia, but they are usually on branches that have been dead for several years. Perithecia are smaller (0.2–0.6 mm dia.) than pycnidia and are grouped in a black stroma. Ascospores from

Figure 60–1. Colorado blue spruce trees with dying and dead lower branches killed by *Cytospora kunzei*.

perithecia are hyaline, allantoid, 1–celled, and 5–9 by 1.5 μm.

Because *Cytospora* will grow in bark killed by other agents, its presence alone does not mean the fungus killed the branches.

Disease Cycle

Spores from fruiting bodies on cankered branches are spread to the same or other trees by rainsplash, wind, insects, birds, and man. Infection occurs through wounds. The fungus grows and kills the bark, then expands until the entire branch is dead. Fruiting bodies form in infected bark. The fungus overwinters as fruiting bodies and mycelium in cankered bark.

Workers in Michigan found that conidia are released during all seasons except winter, and that ascospores are released only in the spring. They found that only the ascospore stage was infective. Other workers have found that the conidial stage is also infective, however.

Cytospora is often believed to damage only trees weakened by environmental stress, especially drought. Water stress increases susceptibility to infection, but apparently healthy trees also develop cankers when inoculated. Because Cytospora canker is rare on spruce in the southern Great Plains, other factors also may be involved.

Damage

Damage may occur in ornamental, plantation, or windbreak situations. The disease destroys the symmetry of spruce trees, reduces their effectiveness in blocking wind, snow, and noise, and in time, may kill them. Norway spruce is particularly prone to stem cankering in some areas, and thus is most likely to be killed. Blue spruce is more susceptible to damage from branch cankers than other species. Damage is most often seen on large trees, but may occur on young trees if they are planted on poor sites or are near infected large trees.

Control

Healthy trees are less susceptible to infection; thus they should be managed for optimum vigor. If possible, water and fertilize trees as needed. Reduce chances of infection by preventing wounds and by maintaining good air circulation around the trees. Do not bring infected branches into the area (such as spruce Christmas trees or branches). Blue and Norway spruce are most susceptible to damage, so consider planting other species or varieties if Cytospora canker is a threat.

If trees become infected, prune diseased branches and dispose of them as soon as possible. Cut back to the nearest living lateral beyond the canker or to the trunk. Pruning is best done in late winter before spores are released, but may be done during dry periods whenever dead branches are found. Disinfect pruning tools with rubbing alcohol after each cut, and apply a fungicidal wound dressing to all pruning wounds.

Protective fungicides have been recommended for control of Cytospora canker on spruce, but none are specifically labeled for this purpose. Information on the efficacy of the newer systemic fungicides against this disease is limited.

Selected References

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Figure 60–2. Resin exudes from cankered branches and is readily visible on dead bark a few months after infected needles are cast.

Figure 60–3. Black pycnidia of *C. kunzei* occur in brown cankered inner bark of infected spruce stems.