13. Phomopsis Canker

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Hosts

Phomopsis canker, caused by the fungus *Phomopsis lokoyae* (sexual state: *Diaporthe lokoyae*), affects coastal and Rocky Mountain Douglas-fir. A similar species, *P. occulta,* causes cankers on Sitka spruce, western hemlock, western larch, and western redcedar.

Distribution

Phomopsis canker is widespread in the Pacific Northwest and northern California.

Damage

Phomopsis canker occurs sporadically in nurseries and plantations, especially 1 to 2 years after droughts and damaging frost events. It is most common on seedlings in the second growing season, although 1-year-old seedlings are occasionally affected. *Phomopsis* species cause cankers at the base of new growth. Shoots above the canker are killed, but lateral shoots below the canker are not affected and normally will develop into a new leader. The greatest impact of the disease in the nursery is a reduction in seedling quality and an increase in the number of culls. In plantations, the disease causes top-kill and occasional mortality of small trees. Mortality is infrequent and is usually scattered throughout nursery beds. Widespread damage has occurred occasionally in nurseries when bud break coincided with prolonged wet weather.

Diagnosis

Cankers become visible on stems and branches of current-year growth in spring and summer (fig. 13.1). Cankers are usually sharply defined and appear sunken because of callus tissue growth around the margins. Often a small dead branchlet is noticeable in the center of the canker. Cutting away bark at the edge of the canker reveals a sharp edge between healthy white and reddish or brown diseased tissue. Foliage beyond the canker turns yellow and dies quickly after the canker encircles the twigs or branches. When the canker occurs in succulent young growing tissue, rapid tissue death may cause the stem to bend into the shape of a shepherd's crook (fig. 13.2). These symptoms are typical of many diseases, so observation of fruiting bodies and spores is necessary to positively identify the pathogen. Both the asexual and sexual states of the fungus produce fruiting bodies on dead tissue within the cankers. They are visible with a 10x hand lens and appear as small, black, spherical pimples (fig. 13.3). *P. lokoyae* and *P. occulta* produce two types of single-celled spores; ellipsoid alpha-spores, and needlelike, curved, beta-spores. The alpha-spores of both species are similar in shape and size (6 to 10 by 2 to 4 microns), while the beta-spores of *P. lokoyae* are smaller (10 to 12 by 1.5 to 2 microns) than *P. occulta* (20 to 30 by 1 microns).

Figure 13.1—*Closeup of Phomopsis canker on a larch seedling.* Photo from USDA Forest Service Region Six Archives.

Figure 13.2—*Douglas-fir seedling with shepherd's crook caused by rapid death of succulent young tissue.* Photo by Katy M. Mallams, USDA Forest Service.

Biology

The asexual spores produced in the pycnidia are waterborne and spread short distances to new hosts by rain splash or sprinkler irrigation. Under favorable temperature and humidity conditions, the

Figure 13.3—*Fruiting bodies of* Phomopsis *on the stem of a larch seedling.* Photo by Petr Kapitola, State Phytosanitary Administration, Czechia, at http://www.bugwood.org.

spores germinate and infect young shoots and small branchlets. Succulent shoots and tops of young seedlings are killed rapidly. In older seedlings with woody tissue, the fungus grows into and kills the inner bark of the branch or stem during the winter. Asexual fruiting bodies are produced the following spring and summer. Fruiting bodies of the sexual state are produced in autumn. These fruiting bodies produce windborne spores, which may play a role in long-distance spread. The fungus can also persist as a saprophyte on fallen cones and dead twigs, and in dead tissue on live seedlings.

Control

Cultural

Weakened trees are most susceptible to infection by canker fungi. In nurseries, extra attention to watering during unusually hot, dry periods may help prevent stress that predisposes seedlings to disease. Seedlings stressed by early fall or late spring frost, herbicide damage, and other abiotic events should also be carefully monitored. Wounds, including those caused by top-pruning, and fissures in the stems of Douglas-fir seedlings caused by rapid elongation, provide infection courts for this and other canker fungi. Preventing wounds and avoiding over-fertilization that results in rapid top growth may reduce the likelihood of infection.

Chemical

Phomopsis canker is normally so scattered that chemical use is not necessary. However, when conditions are especially favorable for the fungus, regular application of fungicides may prevent infection and disease development.

Selected References

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