12. Lower Stem Canker

Philip B. Hamm and Everett M. Hansen

Hosts

Lower stem canker, caused by the fungi *Fusarium roseum* and *Phoma eupyrena,* occurs primarily on Douglas-fir seedlings, though some damage occurs on noble fir. In addition, these fungi are found commonly on a broad range of conifer seedlings without causing disease.

Distribution

Damage due to lower stem canker occurs in bareroot nurseries in western Oregon and Washington, but the causal fungi are widely distributed.

Damage

Significant mortality may occur in localized areas.

Diagnosis

Symptoms first appear on seedlings in late winter or early spring, when temperatures begin to rise. Look for stems encased in soil with lower needles turning brown (fig. 12-1). With time, the tops of infected seedlings turn yellow and later, red brown. Wilting is dramatic if girdling occurs when new growth is present (fig. 12-2).

To uncover the stem canker, remove the soil collar from around the main stem of the infected seedling. The girdling canker is under the soil collar, usually above the original groundline (fig. 12-3).

Generally, damage occurs in areas associated with poor drainage and spreads within beds more rapidly than between beds (fig. 12-4). Damage can be particularly heavy in areas where tractor use during the winter has resulted in the formation of large, deep puddles of water between beds.

Figure 12-1—Brown needles associated with dark soil collars on Douglas-fir seedlings affected by lower stem canker.

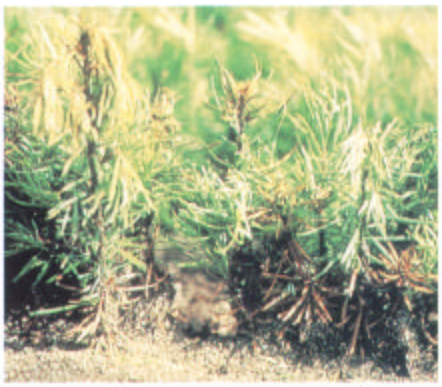

Figure 12-2—Wilting of new growth on Douglas-fir seedlings affected by lower stem canker.

Figure 12-3—Girdling canker found beneath soil collar on lower stem.

Lower stem canker causes foliar symptoms similar to Phytophthora root rot (see chapter 16) but can usually be differentiated from that disease by absence of the root decay associated with *Phytophthora* and by the presence of a distinct girdling canker on the lower stem. Lower stem canker can readily be confirmed by isolating both fungi from infected stem material on potato dextrose agar.

Biology

Lower stem canker is a complex disease caused by two organisms, acting singly or together. *Fusarium roseum* is most commonly associated with the disease; *Phoma eupyrena* may or may not be present. Both organisms form chlamydospores, which survive in the soil. Chlamydospores or conidia transported via contaminated equipment, blowing soil, or possibly even on seeds serve as inoculum.

Figure 12-4—Localized areas in beds of Douglas-fir seedlings affected by lower stem canker.

Infection occurs beneath soil collars built up by rain splash around the lower portion of the main stem. Spores germinate and infect needles, buds, or stem tissue lying beneath the soil collar. Once they invade the stem, these fungi readily form a girdling canker.

Neither fungus has been found sporulating on infected tissue. However, large numbers of propagules of both fungi have been found in soil making up soil collars.

Control

Cultural—Reduce the buildup of soil collars on seedlings by mulching or by allowing naturally occurring moss to form on seedbeds.

Chemical—Several fungicides have been tested for control of this disease, but none have significantly reduced mortality. This may be due to the inability of the materials to penetrate the soil collars around the seedling stems.

Selected References

Cooley, S.J.; Kanaskie, A. 1986. Evaluation of seven fungicides to control canker diseases in bare-root Douglas-fir in Pacific Northwest nurseries. For. Pest Manage. Rep. R6-86-14. Portland, OR: U.S. Department of Agriculture, Forest Service, Pacific Northwest Region. 23 p.

Hamm, PB.; Hansen, E.M.; Kanaskie, A.M. 1985. Symptomology of the "top blight" diseases of Douglas-fir bare-root seedlings in the Pacific Northwest. [Abstract.] Phytopathology. 75: 1367.

Hansen, E.M.; Hamm, PB. [In press.] Canker diseases of Douglas-fir seedlings in Oregon and Washington bare root nurseries. Canadian Journal of Forest Research.

Morgan, P. 1983. Fusarium stem rot of Douglas-fir seedlings. Plant Disease. 67: 441-442.