

# Forest Disease Management Notes

United States  
Department of  
Agriculture

Forest Service  
Pacific Northwest  
Region



## Phytophthora Root Rots of Seedlings

Several species of the fungus genus *Phytophthora* cause root rots of conifer seedlings grown in Pacific Northwest bare root nurseries.

**Hosts:** Conifer seedlings.

**Recognition:** Patches of, or scattered dying seedlings. Stunting, yellowing, and wilting usually precede death; patches may expand in size; red to brown discoloration of cambium of roots and root collar is a common symptom; the line separating discolored from unaffected tissue is usually distinct; often only root tips are infected. No visible signs of the fungi occur on the roots or above ground parts.

**Disease Spread:** *Phytophthoras* invade the root cambium from the soil; mycelium and infective spores of *Phytophthoras* are quite fragile and require high soil moisture to survive. Thick-walled spores (oospores, chlamydospores) are formed in host tissue. These may survive several years in the soil. Infested soil may be moved on trees, machinery, or by man to noninfested areas. Contact of spores with susceptible roots leads to spore germination and production of motile “zoospores” which infect host roots. Zoospores are spread via water or soil. More spores are formed soon after infection. Often the disease is confined to wet, low-lying areas, along drainages, or where drainage is poor. The fungus requires high soil moisture in order to infect and survive.

**Management:** Avoid use of low, poorly drained areas for nursery production. Improve drainage by tiling. Restrict use of machinery in infested areas, particularly when soil is wet. Prevent movement of soil from infested to noninfested areas of nursery. Avoid overwatering to puddle or run-off point. Sanitize infested beds by removing and burning all infected trees. Avoid movement of infected trees within and between nurseries. Fumigate soil before sowing. Plant resistant or less susceptible species in previously infested areas.

**May be Confused With:** Nematodes, *Cylindrocladium* root rot.

Phytophthora root rot in transplanted Douglas-fir



Cambium discoloration  
caused by *Phytophthora*

Wilting and killing of  
Douglas-fir seedlings caused by  
*Phytophthora* root rot

