WHAT'S WRONG WITH MY CONIFER?

City of Seattle IPM Pest Recertification 2019, presented by *Bess Bronstein, bess2@centurytel.net*

DISEASE / PEST	AFFECTED PLANTS	SYMPTOMS / SIGNS	MANAGEMENT
FUNGAL DISEASES			
western gall rust ***Endocronartium harknessii* :** ***Peridermium harknessii*** DESCRIPTION: Existing galls produce spores in spring and infect the youngest new terminal shoot growth. Cool moist weather is most conducive to infection.	2 & 3-needled pines jack pine (*Pinus banksiana*) shore pine (*P. contorta* v. *contorta*) lodgepole pine (*P. contorta* v. *latifolia*) mugo pine (*P. mugo*) Scotch pine (*P. sylvestris*) Austrian black pine (*P. nigra*) ponderosa pine (*P. ponderosa*)	• chlorotic and thinning foliage • branch dieback • poor shoot growth • rough, globular galls on branches and trunk • galls are orange or yellow when the fungus is fruiting in spring	• prune out and destroy galls • remove infected trees from stands of susceptible pines
white pine blister rust ***Cronartium ribicola*** DESCRIPTION: The fungus requires 2 plant hosts (5-needled pines and currants/gooseberries, or *Ribes*). There are multiple spore producing stages. In late summer spores are spread by wind from *Ribes* to pines. Needles are infected, and over multiple years the infection spreads down the branch, forming new cankers. Cankers continue to expand, causing branch dieback.	5 needled-pines: most susceptible are- whitebark pine (*Pinus albicaulis*) sugar pine (*P. lambertiana*) Western white pine (*P. monticola*) Eastern white pine (*P. strobus*) limber pine (*P. flexilis*) bristlecone pine (*P. aristata*) foxtail pine (*P. balfouriana*) alternate host: currant, gooseberry (*Ribes spp.*)	ON PINES • needles turn yellow, drop early • diamond-shaped cankers develop at site of infected needles • abundant pitch flow at canker sites • orange spore masses appear at cankers in spring • orange hyphae appear in fall at base of infected needles ON *RIBES* • chlorotic leaf spots on top of leaves • orange spores appear on leaves of currants/gooseberries in spring and summer	• remove alternate hosts near pines • plant in sites with good air circulation • prune and destroy infected branches • remove severely infected pines • plant resistant pine species and varieties
incense cedar-broom rust (pacific coast pear rust) ***Gymnosporangium libocedri*** DESCRIPTION: The fungus requires 2 plant hosts (*Rosaceae* family and incense cedar). Incense cedar infections produce spores in early spring and infect the other hosts. New spores that develop on deciduous hosts infect the incense cedars in late spring, but do not appear until the following year.	Rose family: common hosts are- serviceberry (*Amelanchier spp.*) hawthorn (*Crataegus spp.*) quince (*Cydonia spp.*) apple / crabapple (*Malus spp.*) pear (*Pyrus spp*) mountain ash (*Sorbus spp.*) alternate host: incense cedar (*Calocedrus decurrens*)	ON ROSACEOUS PLANTS • circular yellow-orange leaf spots on leaves, fruit and shoots late spring through summer • fruit deformed, often drop from tree ON INCENSE CEDAR • gelatinous orange masses on foliage in spring • occasional development of witches' broom	• remove the alternate host

juniper-pear trellis rust ***Gymnosporangium sabinae*** DESCRIPTION: The fungus requires 2 plant hosts (pear and juniper). Spores are released from perennial galls on junipers in early spring and infect pears. Spores on the pear leaves disperse in late summer and can cause new infections in junipers.	Rose family host: pear (*Pyrus spp*) alternate host: juniper (*Juniperus spp.*)	ON PEAR • circular yellow-orange leaf spots on top of leaves, fruit and shoots late spring through summer • raised fungal growth on leaf underside in late summer • fruit mummification ON JUNIPER • gelatinous orange masses on foliage and elongated stem galls in spring	• remove the alternate host within a 1,000 foot radius
diplodia tip blight ***Diplodia sapinea*** ***(Sphaeropsis sapinea)*** DESCRIPTION: The fungus enters through wounds and stomata, moving from lower branches upward.	2 & 3-needled pines mugo pine (*Pinus mugo*) Scotch pine (*P. sylvestris*) Austrian black pine (*P. nigra*) ponderosa pine (*P. ponderosa*) Japanese black pine (*P. thunbergii*) other conifers, when stressed Douglas fir (*Pseudotsuga menziesii*) Norway spruce (*Picea abies)* Colorado spruce (*Picea pungens)*	• new needles in spring are small and discolored • new shoot tip is distorted, continues to dieback into stem • dead needles stay on tree • visible black fruiting bodies (pycnidia) often seen on needles, cones and twigs	• keep trees healthy (attacks older, stressed out specimens) • prune out infected branches during dry periods
keithia blight ***Didymascella thujina*** DESCRIPTION: Spores infect new foliage from spring through fall, whenever moisture is high. Symptoms	most susceptible is- western red cedar (*Thuja plicata*) also may infect- eastern white cedar (*Thuja occidentalis*) Pt. Orford cedar (*Chamaecyparis lawsoniana*)	• small light brown spots appear in wet spring on year old scales • black fruiting bodies develop on the infected scales, eventually drop out and leave dark pits • dead foliage drops off in fall	• avoid planting susceptible varieties (*T. plicata* 'Excelsa', *T. plicata* 'Atrovirens') • clean out dead foliage
juniper twig blight **(phomopsis tip blight)** ***Phomopsis juniperovora*** ***(Diaporthe juniperivora)*** **(kabatina tip blight)** ***Kabatina juniperi*** See DESCRIPTION next column.	many juniper species DESCRIPTION: While symptoms are similar from both pathogens, they do have some differences. *Phomopsis* infections occur in wet springs and infect young new growth, not older growth. *Kabatina* infections are in fall, but symptoms don't appear until spring. They infect through wounds.	• tips die back • lesions form where dead tissue meets live tissue • black fruiting bodies visible on dead tissue	• avoid overhead watering • prune out and destroy infected twigs • avoid pruning during wet weather

lophodermium needle cast ***Lophodermium seditiosum*** **Lophodermella needle cast** ***Lophodermella spp.*** DESCRIPTION: Symptoms of these 2 pathogens are similar. Needles are infected in fall, and symptoms show the following spring. Needles fall off, or 'cast' during summer. Lower branches are more severely affected.	Scotch pine (*P. sylvestris*) ponderosa pine (*P. ponderosa*) lodgepole pine (*P. contorta* v. *latifolia*) ponderosa pine (*P. ponderosa*) western white pine (*P. monticola)*	• yellowing and browning of needles in spring, fall off in summer • infected needles have black, football shaped fungal structures with a center slit for spore release • severely infected trees may have a 'lion-tail' appearance as only current season needles remain	GENERAL NEEDLE CAST MANAGEMENT: • do not plant in low areas or areas with poor air movement • weed and thin canopy to reduce conditions that favor humidity • space plantings to provide good air circulation • clean up and destroy fallen needles in branch crotches and on the ground • prune and destroy infected twigs and branches, as well as lower branches
rhabdocline needle cast ***Rhabdocline spp.*** DESCRIPTION: The fungus survives year to year on needles. Infection occurs in summer, with minimal visible symptoms. By the following spring, symptoms are visible, and new spores are released. Diseased needles drop by midsummer.	Douglas fir (*Pseudotsuga menziesii*)	• newly infected needles may show tiny yellow spots in late summer and fall • needle spots develop into reddish-brown splotches by the following spring • orange fungal structures visible when blotches swell and split	
Swiss needle cast ***Phaeocryptopus gaeumannii*** DESCRIPTION: Infection occurs in spring through stomata, but symptoms are generally seen on one year old or older needles.	Douglas fir (*Pseudotsuga menziesii*)	• infected needles vary from yellow-green to brown and may hang on for 2-3 years • older brown needles fall off in late summer • tiny black fruiting bodies appear on the underside of the needle along the midrib in late winter to spring	

INSECT PESTS			
balsam woolly adelgid ***Adelges piceae*** DESCRIPTION: These adelgids are female, wingless insects. They overwinter as nymphs, mature to adults in spring, and then lay eggs. They are immobile except in the crawler stage, so damage is often seen in the same areas of the tree year after year. There are 2-4 generations per year.	silver fir (*Abies amabilis*) balsam fir (*A. balsamea*) fraser fir (*A. fraseri*) grand fir (*A. grandis*) alpine fir (*A. lasiocarpa*)	• swollen, knobby areas at nodes and tips of branches • sparse foliage and stunted growth • eggs are covered by white, cotton-like tufts	• prune out smaller affected branches • hose off infested trees with strong stream of water • introduce predator beetles and syrphid fly larvae
hemlock woolly adelgid ***Adelges tsugae*** DESCRIPTION: This adelgid rarely kills trees in the PNW. Adult females overwinter under wooly tufts, and crawlers emerge in spring and early summer.	western hemlock (*Tsuga heterophylla*)	• premature needle drop • foliage color becomes a dull green • white, wooly tufts cover adults and eggs on needles, bark and stems	• prune out smaller affected branches • introduce predator beetles • use insecticidal soap and horticultural oil sprays in dormancy prior to new growth
cooley spruce gall adelgid ***Adelges cooleyi*** DESCRIPTION: Immature females overwinter either on spruces (near terminal buds) or on Douglas fir (on undersides of needles). Eggs are laid in the spring. Newly hatched nymphs that eat on spruce cause galls to develop in the new growth, and nymphs on Douglas fir cause needle damage.	several spruce species, but in PNW- Sitka spruce (*Picea sitchensis*) alternate host- Douglas fir (*Pseudotsuga menziesii*)	• galls develop at tips of spruce branches in spring • residual galls from previous years stay on tree, resemble cones • discoloration and distortion of Douglas fir needles • nymphs enclosed in new galls; seen if gall is cut open • galls that crack open once dried (in summer) release adults	• prune out small affected areas, especially before galls crack open • introduce predator beetles
eastern spruce gall adelgid ***Adelges abietis*** DESCRIPTION: This adelgid does not do excessive damage in the PNW. Because galls are at the base of new growth, there is occasional stem breakage.	several spruce species, but in PNW- Norway spruce (*Picea abies*)	• small galls (resemble pineapples) develop at base of new growth in spring • galls can weaken stems, so may see breakage after storms • nymphs enclosed in new galls; seen if gall is cut open	• prune out small affected areas, especially before galls crack open • introduce predator beetles