

Root and butt Diseases

Root is the main portion of the plant, any infection in root will affect whole plant.

Impacts of diseases Individual trees :

Root diseases are responsible for large losses of forests.

1. Reduced growth
2. Reduced fecundity
3. Plant death
- 4- impact on ecosystem
- 5- impact on timber production

How to identify root diseases

Root diseases can be detected by many symptoms including:

Foliar yellowing and thinning of the crown

Undersize of cone.

Reduced tree height

And decay of the lower trunk

Also can be identified by many signs like:

Mushrooms, conks and white mycelial fans,

Fomes Root Rot

Causal agent : *Fomes fomentarius*

Hosts: birch, poplar, cotton, oak, willow, maple, hickory, alder and conifers

Symptoms :

- 1- May have small, yellowing leaves or dead branches depending on the extent of decay
- 2- In cross section, the wood at the center of the trunk is white, mottled, soft and crumbly

silvery-grey to brown, fungal fruiting bodies across arise along the stem; often near a pruning wound, crack or other wound

Conks (tinder fungus)



Horse hoof fruiting body along the stem



Infection of the tinder fungus cause heartwood decay at the trunk base



Control

- 1- Pruning out the infected branch well beyond the infection
- 2- Removing fruiting bodies to stop the spores from affecting other trees and it will help prevent the spread of the disease.
- 3- Avoid mechanical injuries to potential hosts.
- 4- Culling infected trees may prevent the fungus from spreading.
- 5- Ensures that trees are sufficiently watered.

Ganoderma root rot

Causal agent : *Ganoderma* spp. , such as *G. applanatum* .

Host :

It affects native tree species such as acacias, eucalypts, aspen, beech, oaks, elms, ash and some conifers such as Douglas Fir.

Symptoms :

1- Trees affected by fungus rot may exhibit yellowing, wilting, or undersized leaves and dead branches.

2- The pathogen infect the roots and lower trunk of trees. They attack the lower heartwood, and at advanced stages damage the structural integrity of the host tree, often resulting in windthrow.

symptoms



The first sign of the disease is the formation of a varnished red brown fruiting body with a white edge and shiny on the lower trunk



Control :

1- Proper planning and Proper tree maintenance. Subsequent good cultural practices (fertilizing, watering, pruning, etc.) will help to maintain the health and vigor of any tree.

2- Avoid damage to tree trunks and roots. Even small wounds can allow infection by decay fungi.

3- As soon as possible, remove trees that exhibit conks on the lower trunk and exposed root areas.

Armillaria Root Rot

The causal agent: *Armillaria spp.*

Hosts: Balsam, Birch, Spruce, Maple,
Poplar, Oak, Cedar and pines

Symptoms:

1- The pathogen invades the roots and crown, eventually girdling the crown region and destroying the entire root system.

2- The first symptoms of *Armillaria* root rot are poor growth or dieback of shoots, small yellowing leaves, and premature leaf drop.

3- Flat, white sheets of fungal growth can be found between the bark and the wood at the base of infected trees.

4- The most positive sign is the production of clusters of honey-colored mushrooms at the base of the tree near the soil line.

5- Yellowing and eventual browning of needles.



Fruiting body of Armillaria



Rhizomorphs are commonly associated with infection. Rhizomorphs are often attached to infected roots, but they may also be attached to the surface of uninfected roots



Control:

1- avoiding excessive irrigation which cause tree vigour to decline.

2- Avoid re-planting at a location from which a diseased tree has been removed, since Armillaria root rot can persist for many years.

3- The use of disease tolerant or resistant species that are from a local seed source and are well adapted to the site.

4- reducing tree stress because armillaria grows from root to root contact between adjacent hosts

5- Provide adequate moisture in a well-drained soil to maintain vigor and resistance to infection.

Phytophthora Root Rot

Causal agent:

The soil fungus *Phytophthora cinnamomi*.

Hosts

All tree types at all stages.

Symptoms:

- 1- Young feeder roots become black and brittle and die. In advanced stages, only remnants of the root system remain.
- 2- Trunk base may discolor .
- 3- Above-ground symptoms vary between tree species, but generally include reduced tree vigor and growth, yellowing or chlorosis of leaves, and eventual collapse or death of the tree.
- 4- in conifers the needles become brown and die.

ROOT SYMPTOMS



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Root collar decay and trunk base discoloration



Symptoms of phytophthora on above ground parts



Control :

1- Reduce root contact

2- Treatment with the chemical control .

Root Knot Nematode

Causal agent :

Meloidogyne spp.

Heterodera spp.

Globodera spp .

Symptoms

- 1- Root knots or galls.
- 2- Stunted Plant and Roots
- 3- Swollen Root Tips
- 4- Increase in Lateral Roots
- 5- Premature Wilting
- 6- Leaf Yellowing (Chlorosis)



Chlorotic pine seedlings in beds heavily infested by nematodes.



Slash pine seedlings show galls on their taproots caused by root-knot nematodes (*Meloidogyne* spp.).



Control :

1- To confirm the presence of nematode damage, root and soil samples should be tested.

2- Fumigate the soil before seeding to control nematodes in forest nurseries. Methyl bromide is one of the most effective soil fumigants and provides excellent control in most nurseries.

3- Avoid movement of infected roots, infested soil, or contaminated equipment into areas where susceptible hosts will be planted.

4- Treatment with the chemical control .

Laminated root rot

Phellinus werii

Hosts:

Fir species

Spruce

Hemlock

Larch

Giant sequoia

yew

symtoms

Dacayed roots have broken close to the root collar leaving only stubs



broken off a tree at stump height is a characteristic laminated decay symptom



Crown symptoms

The main symptoms of laminated root rot on tree crown are

- 1- smallish cones
- 2- reduced terminal growth
- 3- short branchlets
- 4- fewer than normal needles.



Tree bases may be made hollow at stump height by the pathogen



sign

Some time a light brown fruiting body of the pathogen can be visible on the infected tree stems near the root.



sign

Cream or yellow to cinnamon colored mycelium is found on the outer bark of roots



Control of the disease

- ❖ Removing stumps.
- ❖ Spacing.
- ❖ Resistant variety.
- ❖ Biological control (*T. harzianum*).
- ❖ Chemical control using fumigant (chloropicrin, methylisothiocyanate, vapam and vorlex).

There are many important and destructive diseases of root including:

- ❖ Annosus root rot
- ❖ Black stain root rot
- ❖ Root and butt rot