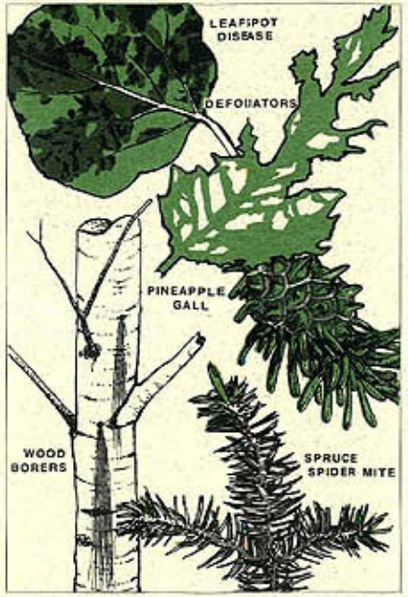
What's wrong with my tree?



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Many people ask the question, "What's wrong with my tree?" The tree may have reduced growth and vigor, show physical injury, a change of foliage color, have external resin or sap flow, or have top dieback. They will want to diagnose the problem or be able to describe the symptoms to a tree expert so that a remedy can be prescribed. Accurate tree diagnosis is sometimes very difficult, and even the best advice may be only an educated guess. Accurate diagnosis is often difficult in urban areas because the planted sites usually have been disturbed with introduced soils and surface compaction; have a disturbed drainage pattern; and may have had various noxious materials added (e.g., salts, herbicides, etc.) that have contaminated the soils. These variables, combined with the effects of planting sites selected in relation to buildings, fences, cement walls and roadways, all impose changes and influences on tree root growth pattern and nutrient uptake.

Belowground influences are often difficult to predict, diagnose, or identify because their affects are transferred through the root system. Aboveground injuries caused by insects, diseases, air pollutants, or climatic factors are more readily recognized. For most homeowners, however, a systematic approach to tree examination will help to pinpoint the problem, or at least reduce the number of possible causes. Detailed observations and a knowledge of recent soil treatments and weather records can be helpful.

Symptoms, Damage, and Causal Agents

Planting-related problems. Survival of newly planted trees depends upon selection of healthy plant materials suited to the area, proper planting techniques and adequate postplanting care. Newly planted trees may suffer transplant shock as they adjust to the new environment. Little new growth, some branch dieback, or chlorotic (abnormally yellow) leaves may occur for 1–2 years until the root system becomes well established. Proper planting depth, good soil and suitable location, seasonal timing, and a regular watering schedule help to minimize transplant shock.

Noninfectious (abiotic) damage agents. Abiotic (nonliving) agents such as temperature extremes; mineral and nutrient deficiencies; water supply; chemical substances in the soil, water, and air; transplant shock; and mechanically induced injuries are all classed as noninfectious agents because the damage they cause does not spread from one tree to another. These agents may often weaken the tree, enabling living agents such as fungi, insects, or bacteria to gain entry and cause further weakness or death.

Trees suffering from the influence of nonliving agents may be diagnosed as having reduced growth of buds, shoots, branches, leaves, or needles; yellow, brown, or mottled foliage; or dead foliage and branch tips. Most tree problems transferred through the soil and roots, however, cause delayed and gradual effects that can usually be observed over more than one season. Road deicing salts and soil sterilants absorbed through the root system will cause a browning of the foliage (for example on pine and some other tree species) or a rust-purple color on spruce, often in one season. The symptoms may occur initially on the lower branches and on one side of the tree because of a concentration gradient in the soil, then later advance to other parts of the tree.

A sudden, sharp drop in temperature in winter may initiate a frost crack on the lower stem of some deciduous trees, and less commonly on coniferous trees. In the prairie provinces, late spring frosts are a common occurrence and can cause dieback in late April or May (e.g., cedars and junipers), delayed flushing (bud bursting), or death of newly flushed shoots and leaves on many introduced and native tree species. Summer drought may cause top dieback of birch and premature leaf fall. Winter burn (sun exposure) and drying result in the death and desiccation of the foliage of many conifers; affected needles may turn brown in the spring, often on the south or west side of trees and on portions of stems exposed above the snow level. Symptoms of nutrient deficiency mimic many other diseases but are most commonly expressed as reduced growth, abnormal leaf discolorations, browning, or mottling.

Infectious (biotic) damage agents. A large number of native and introduced infectious fungal and bacterial diseases as well as insect and mite pests attack trees in the prairie provinces. Many of these are easily recognized by the typical injury they cause, the tree species with which they are associated, the life stage causing the injury, and to some extent seasonal appearance. These biotic (living) agents may develop on weakened or infected trees and spread to adjacent trees.

Systemic infections caused by Dutch elm disease (a fungal parasite) and fire blight (a bacterium) initially cause wilt symptoms and browning of foliated branches, and gradually progress to kill an entire tree. Dutch elm disease infects only elms while fire blight infects mountain-ash, crab apple, pear, and other fruit trees. Silver leaf, a fungal disease of many fruit tree species, can be diagnosed by the silvery sheen of the foliage and the presence of fungal fruiting structures on the lower stem. A group of rust fungi such as the pine stem rusts cause cankered infections on the stems or woody galls (western gall rust) on stems and branches. Another fungal disease, *Hypoxylon* canker, infects the stems of trembling aspen, killing the trees after 4–6 years. Various other fungal pathogens attack the leaves and needles, causing a variety of symptoms on different tree species that include lesions, blotches, and discolorations (e.g., spruce needle rust, pine needle casts, and aspen leaf spot diseases).

Most insect defoliators feed in the larval or caterpillar stage and use leaves (forest tent caterpillar and cankerworms) or buds and needles (spruce budworm and yellow-headed spruce sawfly) as their food source. Sucking insects such as aphids may cause a yellowing of foliage, distorted, rolled, or discolored leaves (wooly elm aphid), or pineapple-like galls (spruce gall aphids) on spruce twigs, or secrete a sticky honeydew. Faded, older needles with fine silk webbing on spruce and other conifer foliage may suggest high populations of the spruce spider mite. Holes in the bark or stems of trees, often with associated resin flow and sawdust, indicate the presence of bark beetles, wood borers, or carpenter ants. Wilted or dying new leader growth of young spruce trees may denote attack by terminal weevils.

Examination Procedure and Diagnostic Assistance

When diagnosing their tree for various ailments or assessing its general health, people should examine all tree parts carefully from the root collar base to the buds and foliage, especially during the summer growth period. They should make note of any feeding or damage symptoms and associated insects or fungi; foliage discoloration and its location on the tree; branch or twig kill; and the recent growth pattern of buds, shoots, and foliage. If the damage appears to originate aboveground they should try to define the symptoms as clearly as possible. Once the examination is complete, there are several good color-illustrated books, brochures, and tree pest leaflets available to assist the homeowner with identifying most of the common insect, disease, or other damage causing agents in the prairie provinces. Injury that originates belowground may be difficult to diagnose, but possible causal agents can often be identified. A confirmed diagnosis may, however, require additional analysis of soil, foliage, or nutrients. If the problem cannot be adequately diagnosed by the homeowner, the symptoms on the tree should be accurately noted and samples of suspected causal agents and injury taken to a tree expert.

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Text: H.F. Cerezke
Illustration: D. Lee

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Forestry Canada
Northwest Region
Northern Forestry Centre
5320 – 122 Street
Edmonton, Alberta
T6H 3S5

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