

Diagnosing Tree Health Problems

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You can avoid most tree problems by planting the right tree in the right place and by providing proper care and protection from injury. While these measures can minimize stresses that lead to problems, it is not possible to avoid every threat to a tree's health.

The first step in solving a tree health problem is to correctly identify the problem and its cause. This publication will guide you through a systematic process for learning about the plant and its needs and weaknesses, observing signs and symptoms, and gathering information about factors affecting the tree's health. These factors include:

- biological factors (insects, disease, wildlife)
- environmental factors (weather, soil, air pollution)
- cultural factors (pruning, watering, fertilization)

Signs and symptoms

A *symptom* is a response by a plant to a pest or injury; visual evidence of a pest without its physical presence. A *sign* is the pest itself, or any part or product of the pest that can be seen on the plant. Drooping leaves, lack of fruit, or a decline in growth rate are *symptoms*. An insect, powdery mildew, or the fruiting body of a fungus are *signs*.

Know your plants

Problem diagnosis begins with identifying the species you are dealing with and knowing what is normal for that species. Yellow leaves are normal for some plants but a symptom of problems in others. Next, learn what specific needs or intolerances a species has. Are the planting site and care appropriate? Some problems may only be solved by moving a tree to a new site or replacing it with a species better suited for the site.

Inspect your trees regularly for signs or conditions that could lead to problems. Some disorders are not readily apparent, especially in the early stages, without close inspection. By the time a tree shows obvious signs of decline, it may be too late to save it. Closely monitoring your trees, their cultural needs, and the soil may allow you to address problems and pests before they damage the health of your trees.

Learn about common health problems

Learn what diseases and pests commonly affect this species in the area where it is planted, what symptoms they produce, and at what time of year. Most trees are affected by only a few diseases and insects and recognizing them makes your diagnosis easier. For example, red needles on a mature white spruce are often a symptom of spruce bark beetles. Knowing this will prompt you to look for signs that confirm or discount a diagnosis of beetle damage.

Assess signs and symptoms

Some problems are so common and widespread that diagnosis is fairly simple. For example, wilting during a drought may just indicate a need for water, which is easily remedied. However, most tree problems exhibit a set of characteristic symptoms, not just one. Failure to evaluate the full range of symptoms can lead to misdiagnosis or to treatment of the symptoms rather than the causes of the disorder.

Wilting can be from causes as varied as moisture stress, root injury, soil contamination, insect feeding, soil compaction, or fungal pathogens. Both drought and excessive fertilizer can cause leaf edges to turn brown, and either too much or too little water can cause leaves to turn yellow.

A single sign, such as an insect, does not necessarily mean that that organism is the main cause of the health problem. Some insects are beneficial, preying upon others that are damaging. Many insects and diseases, particularly those confined to leaf tissue, are aesthetic problems and do not, by themselves, compromise tree health. Accurate diagnosis is not based on a single symptom, but on a complete evaluation of the site, the tree, and its history.

Patterns of injury are also important clues. By noting patterns from tree to tree, within a tree, and within affected plant parts, you can narrow the field of suspected causes.

A tree may have more than one disorder and one problem may cause another. The most obvious symptoms may mask symptoms of the primary cause of the problem. There may be signs of an insect or disease but the underlying health problem may be due to site or cultural factors, such as poor drainage, improper planting or pruning, excessive fertilization, or simply having chosen the wrong species for the site.

Root and soil problems are among the leading causes of urban tree decline and death. Yet, such causes are easily overlooked because roots are hidden, and above ground symptoms can take years to develop. By the time the symptoms appear, the cause may no longer be apparent or easily associated with the symptoms. For example, soil compaction and grading, which often accompany construction, may not kill a tree until five or six years after the damage occurs.

Factors may also interact so that there is no single cause of the problem. Trees under stress due to poor site conditions or improper care are more susceptible to injury by insects or disease. A tree may not be seriously harmed by one stress factor, but several combined may cause its death. It is important to discern the underlying causes of the health problems to avoid superficial treatment or repeating problems in the future.

Resources

- Contact your local Cooperative Extension Service agent for help in diagnosing and treating tree problems.
- For information on urban forestry and tree care, or a free copy of *Plant a Tree: Alaska's Guide to Tree Selection, Planting & Care*, contact:

Alaska Community Forestry Program
550 W. Seventh Ave., Suite 1450
Anchorage, AK 99501-3566
(907) 269-8465 or 269-8466
www.dnr.state.ak.us/forestry

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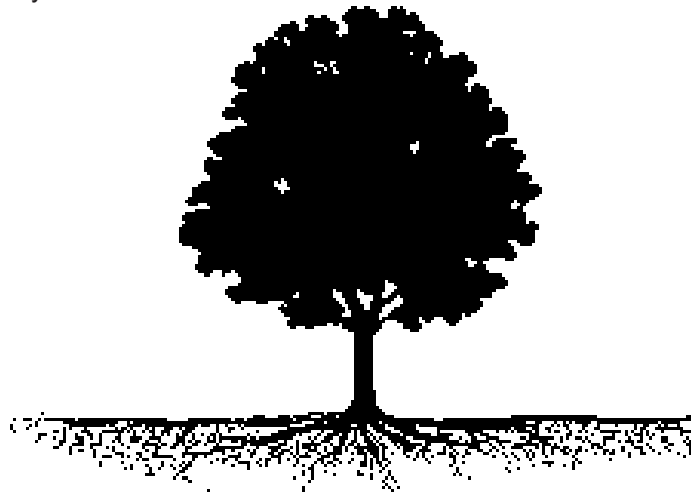
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Diagnosing Tree Health Problems

Check List

When diagnosing tree problems, consider the following factors. Your notes on these questions will help you or a specialist arrive at a diagnosis. Note the date of your inspection.

√ Plant Data

- What is the species and cultivar?
- What is the age and size of the tree?
- How long has the tree been growing at this site?
- Has growth been normal the last several years?
- Has cultural work, such as pruning, fertilizing, pesticide application, or supplemental watering been done? When?

√ Signs and Symptoms

- How long have you noticed the symptoms?
- Does only one tree display these symptoms or do others of the same species have similar symptoms?
- Do other species in the vicinity have the same symptoms?
- What part of the tree is affected?
 - all of it, only one side, only the top or bottom?
 - leaves, roots, trunk, or branches?
 - entire branches or only the ends?
 - only the new growth or only the older growth?
 - flowers or fruits?
- Did symptoms develop suddenly or gradually?
- Did symptoms progress from
 - inside of tree to outside / from outside to inside?
 - from top to bottom / from bottom to top?
- Is there a pattern to the location of the symptoms on the tree? For example, are they on the side of the tree that receives the most direct sunlight or wind, or the side that faces a street or other feature?

√ Leaves

- Are the leaves normal in appearance and size?
- Are leaves
 - discolored, distorted, twisted, or curled?
 - dead around the edges?
 - wilted or drooping?
- Do they have spots, holes, bumps, or growths?
- If leaves are missing, do they appear to have been dropped by the tree or chewed or cut by an insect?
- Did leaves turn brown or black suddenly? Did they change to fall colors and/or drop prematurely?

√ Trunk and Branches

- Are there holes, cracks, cankers, conks, or signs of decay on the trunk or branches?
- Are there swollen, sunken, or discolored areas?
- Do you see signs of damage from lawn mowers, weed trimmers, snow plows, pets, or wildlife? Is there twine or wire tied around the trunk or a branch?
- Is sap or other material oozing from the tree? What color is it? Is there sawdust or frass (reddish/brown boring dust) at the base of the tree?
- If the bark is loose, remove a small section and look at its underside and the wood underneath. Do you see discolored wood, shoestring-like strands, insect galleries (curvy grooves)? Is there an unusual odor?
- Does the trunk flare normally where it enters the ground? Are there branches emerging from the ground or other signs that the tree is planted too deeply or that the grade has been changed?
- Try to move the trunk if the tree is not too large. Does the root ball move back and forth?
- Are there suckers emerging from the base of the trunk, or water sprouts from below the affected part of the tree?

√ Roots

- Are roots circling or pressing against the base of the tree? Carefully dig down several inches to see if the roots are spreading out from, or circling, the tree.
- Do the roots appear to be healthy or are they rotten or discolored? Are there abundant root hairs?
- How much room do roots have to grow and spread?
- Was the burlap or container removed from around the roots when the tree was planted?

√ Flowers and Fruits

- Is production abnormally heavy or light? Are flowers or fruit rotting, shriveling, or falling off prematurely?
- Are there abnormal growths or spots on fruit?

√ Insects

- If there are insects, where on the tree are they located? Are there many or few? Describe them.

✓ Site Features and History

- Is the tree located in a sunny or shady spot? Is it in a protected site or exposed to the wind?
- Is the tree in a low area where frost or poor drainage may be a problem? Is it on a mound or steep slope where moisture may not be retained adequately?
- Are there downspouts, exhaust vents, or other features nearby that might affect the tree?
- Is snow stored near the tree? Is salt or other deicer used near the tree?
- Is pavement, building rubble, or other debris buried on the site?
- What type of surfaces surround the plant—grass or other ground covers, mulch, pavement, or pathways?
- Is mulch more than four inches deep or piled against the trunk?
- Does the soil have a normal appearance and smell? Describe its texture and density.
- Is the soil's pH level appropriate? Are adequate nutrients available to the tree? A soil or foliar test are needed to assess available nutrients.
- Is the soil dry, moist, or soggy? Carefully, dig down six to eight inches, is moisture uniform with depth? Does water stand on the site after a heavy rain?
- Has the weather been unusual in recent years, such as extremely high or low temperatures, early or late frosts, droughts, long rainy spells, floods, ice storms, high winds, heavy or light snowfall?
- Has the site been disturbed in the past six years by construction; installation of utilities, a driveway or sidewalk; or changes in groundwater flow?
- Has there been a change in grade (level of soil) over the roots in the past six years? If grade was raised, by how much and with what kind of fill?
- Has paint, oil, or any other substance been poured onto the ground near the tree?
- Have pesticides been applied to the soil, lawn, or to nearby plants?

Collecting and Handling Samples

If you find insects or symptoms that you are unable to identify, you may take or send samples to the Alaska Cooperative Extension Service for identification.

Send a good representative of the problem, with samples that show a continuum of symptoms, if possible. Also send a sample of healthy material. Include an adequate amount as the diagnostician may need to destroy samples in order to examine them. Pack specimens carefully so they can withstand rough treatment.

Packing

Fruit, needles, or stems: Sprinkle lightly with water and wrap in newspaper. Pack in a box or other container in which the specimen will not be damaged. Do not ship in plastic bags.

Leaves: Press leaves between pages of newspaper until fairly dry. Place between several sheets of flat cardboard or stiff paper. Do not ship in plastic bags.

Conks or mushrooms: Ship immediately or air-dry thoroughly and then ship.

Larvae and other soft-bodied insects: Ship in a small screw-top vial or bottle of rubbing alcohol. Use permanent ink, not a ballpoint pen, for labels inserted in vials. Seal vial well and pack in a box with newspaper or tissue to reduce its movement in the box.

Pupae and hard-bodied insects: Ship in vials of alcohol or in small boxes. Place specimens between layers of tissue paper and pack in a box so that there is little movement of the specimen. Do not pack insects in cotton.

Adult moths, butterflies, fragile insects: Place between folds of paper, pack in tissue paper, and send in a box.

Identifying Samples

Label each specimen and code it or include adequate information so that it can be connected to the written material describing it. Include the following:

- description of symptoms you noted—they may not be as obvious when sample arrives,
- where and when specimen was collected,
- description of tree (age, species, and appearance),
- general site conditions,
- collector's opinion of the problem.

Shipping

• Ship samples as soon as possible. If delayed, store them in a refrigerator.

• Put your name, address, and telephone number, and the destination address inside the shipping container. Put written material in a bag separate from the samples.

• Mark on the container, "Fragile. Handle with care. Insect/disease specimens enclosed—for scientific use only—no commercial value."

Take specimens to your district Cooperative Extension Service office or send to:

Cooperative Extension Service
2221 E. Northern Lights Blvd.
Anchorage, Alaska 99508-4143
786-6300