Sustainable Urban Landscapes

Diagnosing Tree Problems

by Paula Flynn and Mark Vitosh

Trees are a valuable part of our environment. They provide shelter and shade, help prevent erosion, and add beauty and monetary value to our property. Unfortunately, many factors can cause trees to become unhealthy and lose their aesthetic value or die: environmental stresses, site problems, animal injury, infectious diseases, and insect infestations. In many cases, more than one factor may be involved.

A correct diagnosis of the problem is the important first step in trying to save an unhealthy tree. This publication contains guidelines for diagnosing tree problems. It will help you examine your tree systematically, collect important background information, and find expert assistance, if necessary.

Examine the Tree

Take a systematic approach when examining a tree for possible problems. Look at the entire tree (foliage, trunk, branches), not just areas that seem to show a problem. Consider root problems as a possible source of above-ground symptoms. Yellow leaves, for instance, might be caused by root injury or high soil pH. Also, keep in mind that different agents may produce similar symptoms.

Step 1. Examine the foliage (leaves or needles).

- Do the leaves have holes or ragged edges?
- Are the leaf margins brown?
- Are leaves abnormally discolored (yellow, light green, brown, black)?
- Are spots or bumps evident on the foliage?
- Have some or all of the leaves fallen prematurely?
- Are the leaves deformed (cupped, twisted, etc.)?
- Are insects or mites present on the leaves?

The symptoms mentioned above can be caused by a number of factors, including weather damage, infectious disease, insect feeding, chemical injury, site-related stresses, and transplant shock. It is important to look for these symptoms as you collect background information.

Leaf scorch on maple

Abnormal leaf color on red maple

IOWA STATE UNIVERSITY
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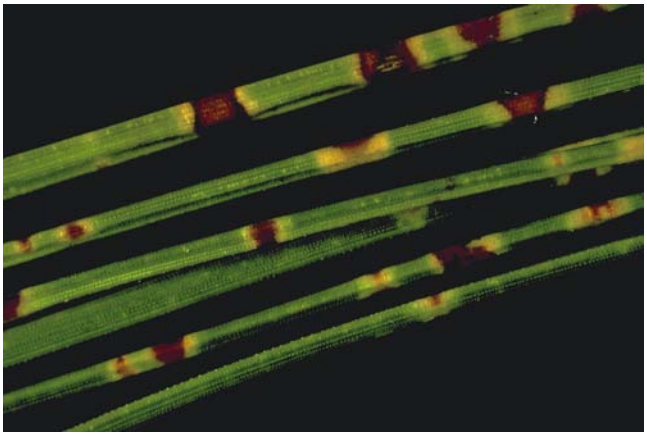
Ames, Iowa

SUL-3 | May 1997

Tar spot on maple

Leaf blister on oak



Needle blight on pine

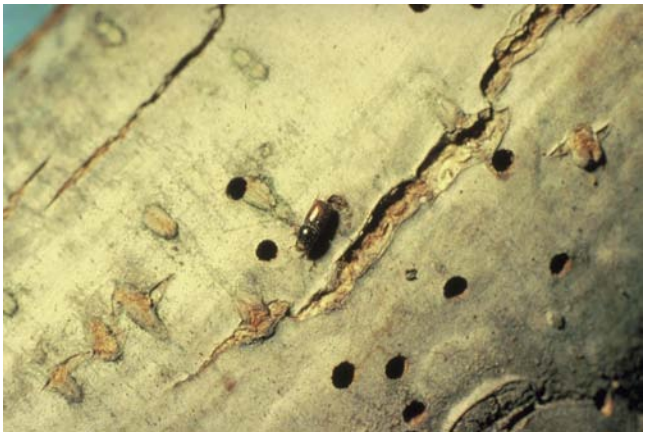
Herbicide damage on redbud

Step 2. Examine the trunk and branches.

• Has the bark been injured by mowing equipment, vehicles, animals, or girdling wires?
• Is there evidence of insect activity (holes, chewing marks, tunnels, etc.)?
• Are there any splits or cracks in the bark, and if so, on what side of the tree? Sunscald injury, frost, and lightning are all factors that can cause the bark to split or break apart.
• Has the tree been damaged by ice, hail, or wind?
• Is the tree in an exposed, windy location?
• Are any wet, sticky substances oozing from the bark? This may indicate an infection of the wood by bacteria.
• Is there evidence of decay or hollowing of the trunk?
• Are fungal conks protruding from the trunk, indicating possible internal wood decay?
• Are cankers evident on the branches or trunk?
• Is the tissue beneath the bark discolored (tan or brown)? This may indicate winter injury.
• Does it show brown or green streaks? This may indicate infection by a vascular wilt fungus.

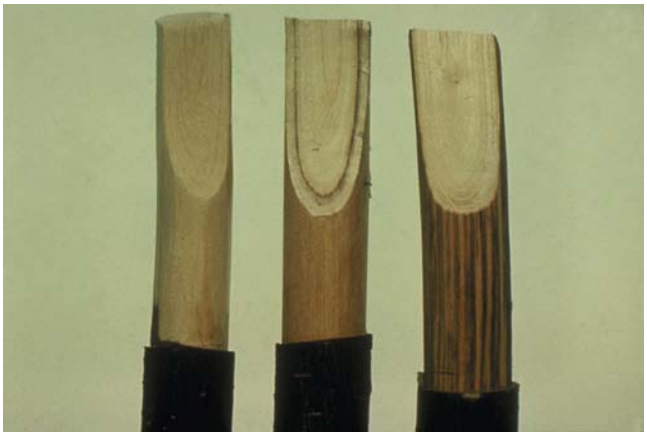
Mower damage on trunk

Sapsucker damage in horizontal pattern



Beetle exit holes

Sunscald injury and insect exit holes on trunk



Vascular discoloration (center and right twig)

Fungal conk protruding from trunk

Branch canker

Trunk canker

Step 3. Consider the roots.

• Was the tree planted too deeply?
• Has physical injury to the roots taken place, such as construction injury?
• Has there been any trenching to bury a phone or utility line nearby?
• Has soil grade or nearby terrain been changed?
• Has nearby soil been compacted by extensive foot traffic or machinery?
• Has there been an addition of a patio, road, sidewalk, or new building nearby?
• Have any flowers, shrubs, or trees been planted nearby or under the tree?
• Is plastic or other impermeable fabric used around the tree?
• Has the soil been excessively wet or dry?
• Has there been a change in the level of the water table?
• Is the site poorly drained? Does water stand after rains?
• Have any chemicals been applied to the soil?
• Are de-icing salts used on roads and walks nearby?
• Is there visual evidence of girdling roots?
• Is healthy turf growing over the tree roots?

Many of the situations described above can cause damage and could be linked to tree decline.

Tree planted too deeply

Grade change around tree

Girdling root

Addition of asphalt around base of tree

Collect Other Useful Background Information

1. What type of tree is it?

Each species has its own characteristic insect or disease problems. If possible, find out the specific variety or cultivar of the tree (e.g., common name: green ash, scientific name: *Fraxinus pennsylvanica,* cultivar 'Patmore'). This will help determine if the tree is adaptable to Iowa and the site conditions. Trees planted out of their hardiness range and optimum growing conditions often show poor growth and vigor. Stressed trees are less able to resist insect and disease attack.

The typical characteristics of a healthy tree must be known in order to determine if it is showing symptoms of decline.

2. What is the approximate age or tree size?

Knowing the approximate age of the tree can be helpful. Often, certain problems are associated with a particular stage of a tree's life. It also is helpful to know how long the tree has been in the present site. Newly transplanted trees, for instance, often show stress symptoms.

3. What kind of care is the tree receiving?

Has the tree been watered or fertilized? How often and how much? Have chemicals been used on or near the tree (herbicides, insecticides, or fungicides)? Has the tree been topped or pruned heavily in the last few years? Do pets urinate on or near the tree frequently?

4. Is there evidence of injury to other surrounding plants?

The presence of injury symptoms on different species suggests a general environmental or chemical factor is responsible for damage or decline.

5. Have there been untimely frosts or freezes?

Late-spring frosts or sudden exposure to freezing temperatures can result in wilting, blackening, or death of newly emerging growth. Low temperatures early in the fall also can damage buds, twigs, and branches that have not "hardened" sufficiently before winter.

Normal fall needle drop on pine

Frost damage on leaves

6. When did the symptoms first appear?

How quickly did the problem develop? Has the trouble occurred in previous years? Some insect and disease problems show up at certain times of the year, or during certain weather-related events.

7. What portion of the tree is showing the problem?

Is the problem evident over the entire tree, just the upper branches, one large branch, the main trunk, etc.?

8. What is the soil type (clay, sandy, etc.)?

Certain tree species perform best on particular soils.

Once the tree has been examined and background information considered, you may be able to make a diagnosis of the problem with a reasonable degree of confidence. As you consider the questions listed, you should be able to systematically eliminate many possibilities. With information and observations you can consult references. (A list of terms describing various plant symptoms follows. Knowing these terms can assist you when looking through published information.)

Where to Go for Assistance

Diagnosis of a tree problem can be complex. Even with detailed background information and close examination of the tree itself, the cause(s) of the problem may not be known. Laboratory assistance may be necessary to confirm a tentative diagnosis. A number of avenues are available for assistance.

References

Many books on infectious diseases, insect problems, and environmental stresses of trees are available from bookstores or a library. Selected references include:

Sinclair, W. A., Lyon, H. H., and Johnson, W. T. 1987. *Diseases of trees and shrubs.* Cornell University Press. 575 pp.

Johnson, W. T., and Lyon, H. H. 1988. *Insects that feed on trees and shrubs.* Cornell University Press. 556 pp.

A number of university bulletins concerning tree care or tree problems are available from your local county Extension office or from Extension Distribution, 119 Printing and Publications, Iowa State University, Ames, IA 50011. Selected bulletins include:

Pm-1591	*Community tree planting and care guide*
Pm-1528	*Common diseases of conifers in Iowa*
Pm-1280	*Anthracnose of shade trees*
Pm-482	*Oak wilt*
SUL-2	*Tree decline*
Pm-1542	*Tips for providing plant and insect samples to ISU*
IC-417	*Insect galls on trees and shrubs*
IC-415	*Scale insects on ornamental plants*
SUL-1	*Understanding the effects of flooding on trees*
Pm-1371	*Topping: Tree care or tree abuse?*

University Services

Your **local county Extension office** can assist you with tree questions or direct you to the appropriate ISU specialist.

The **Plant Disease Clinic,** supported by Extension and the Department of Plant Pathology, is a laboratory for diagnosing plant diseases. Representative samples with detailed background information may be submitted to the clinic through your local Extension office or directly to the Plant Disease Clinic, 323 Bessey Hall, Iowa State University, Ames, IA 50011. There is a $10 charge per sample.

The **Hortline** is a call-in service provided by Extension and the Department of Horticulture. It furnishes answers to questions regarding vegetables, lawn care, house plants, trees and shrubs, fruits, and flowers. The Hortline number is 1-515-294-3108.

The **Insect Diagnostic Clinic** is operated by Extension and the Department of Entomology. Samples are diagnosed free of charge. Submit samples through your local Extension office or mail directly to Extension Entomology, Insectary, Iowa State University, Ames, IA 50011.

Terms Used to Describe Tree Problems

Anthracnose—a type of fungal disease characterized by leaf, stem, or fruit lesions.

Bleeding—sap flowing from a wound.

Blight—general and rapid death of leaves, branches, twigs, or flower parts.

Blister—swollen, raised area on a leaf or other plant part.

Bronzing—a yellow or golden discoloration of leaves caused by a very high density of tiny spots or speckles resulting from sap feeding by pests such as spider mites.

Canker—a localized wound or dead and discolored area on the bark, often sunken.

Conk—a fungal structure, usually formed by wood rot fungus, that commonly extends from the bark in a shelflike fashion.

Chlorosis—abnormally yellow leaf tissue.

Decline—plants growing poorly, often with small, discolored leaves; some defoliation and dieback may be present.

Defoliation—loss of foliage; either leaf drop or disappearance of leaf tissue by chewing damage.

Dieback—progressive death of twigs or branches, beginning at their tips and advancing toward their base.

Emergence holes—randomly scattered, small, round holes through bark that connect to tunnels made by wood boring beetles inside wood.

Fecal specks—small, dark, shiny drops of dried excrement from insects on the surface of leaves or fruit; also known as varnish spots.

Frass—plant debris, usually wood fragments, mixed with excrement produced by an insect.

Gall—a swelling or overgrowth of plant tissue; may be caused by insects, mites, fungi, bacteria, or other organisms.

Gallery—a collection or pattern of small tunnels radiating from a single source, such as is made by certain bark beetles.

Girdling roots—roots that are tightly coiled around the trunk of a tree, above or below ground.

Honeydew—a sticky fluid rich in sugars, excreted from the anus of certain insects such as aphids, scales, mealybugs, and whiteflies.

Leaf mining—damage within a leaf caused by an insect that lives inside the leaf and feeds between the upper and lower surfaces; may be a winding, narrow tunnel or an irregular blotch.

Leaf spot—a well-defined dead area on a leaf.

Lesion—a localized area of discolored, diseased tissue.

Necrosis–death of plant cells, usually resulting in darkening of the tissue.

Pustule—a small, blister-like swelling.

Rot—decay or decomposition of tissue.

Rust—a disease, caused by a fungus, that gives a "rusty" appearance to a plant.

Scab—roughened, crustlike areas on the surface of fruit, leaves, tubers, etc., usually slightly raised or sunken and cracked, giving a scabby appearance.

Skeletonization—results from the feeding pattern of certain leaf-feeding insects; only the leaf veins remain and the material between the veins is missing.

Anthracnose on sycamore

Fire blight on pear

Insect frass on branch

Scorch—browning of leaf margins or tips.

Shot-hole—a symptom produced by the dropping out of the dead center of a leaf spot, leaving a hole in the leaf.

Sooty mold—a dark, usually black fungus growing on honeydew secreted by insects, and producing a soot-like covering on leaves, stems, and fruit.

Symptom—visible response of a plant to a disease or insect (e.g., leaf yellowing or browning, spots on leaves, wilt, etc.).

Tent—a structure of silk constructed by leaf-feeding caterpillars.

Tunnel—linear holes within wood produced by beetle larvae or moth caterpillars as they feed.

Web—see "tent."

Wilt—loss of rigidity and drooping of plant parts, generally caused by a disturbance in the water-conducting tissues (xylem) of a tree.

Window-paning—results from the feeding pattern of certain leaf-feeding insects; similar to skeletonization in that the material between the veins has been eaten, leaving the veins, but also leaving a thin translucent layer of the upper or lower epidermis.

Witches' broom—a cluster of small twigs arising from the same point on a branch or trunk.

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Gall on branch

Insect tent

Insect tunnels or galleries