

Identifying Tree Problems

Trees 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. Some of those factors include: 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 manage an unhealthy tree. This publication contains guidelines for identifying tree problems. It will help you examine your tree systematically, collect important background information, and find expert assistance, when necessary. As you read and encounter words used in plant diagnostics that may be new to you, use the “Terms Used to Describe Tree Problems” definitions on page 6 of this publication.

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 (infectious or biotic organisms vs. no infectious or abiotic factors) may produce similar symptoms.

Step 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: sugar maple, scientific name: *Acer saccharum*, cultivar ‘Legacy’). 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. A good resource to identify common trees of Iowa is available at the [forestry extension interactive key](http://www.extension.iastate.edu/forestry/iowa_trees/tree_id.html) (available at http://www.extension.iastate.edu/forestry/iowa_trees/tree_id.html)

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

Step 2. Examine the foliage (leaves or needles) for symptoms and signs.

- Are the leaves looking droopy, wilted or water deprived? (See Figure 29, vascular pathogens may be the cause)
- Do the leaves have holes or ragged edges?
- Are the leaf margins brown or scorched (See Figure 1)?
- Are leaves abnormally discolored (yellow, light green, brown, black) yellowing and chlorotic? (See examples of yellowing and chlorosis in Figures 2 and 20.)
- Are spots or bumps evident on the foliage, or blighting areas (See Figures 3, 4 and 5)?



Figure 1. Red oak with leaf scorch



Figure 2. Abnormal leaf color on pin oak

- Have some or all of the leaves fallen prematurely?
- Are the leaves deformed (cupped, twisted, etc.)? (See Figures 6 and 21)
- Are there insects, mites, webbing, excrement, or shed skins present? (see Figures 24 and 27)

The symptoms and signs mentioned above can be caused by a number of factors, including unusual or severe weather, 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.

Step 3. Examine the trunk and branches.

- Has the bark been injured by mowing equipment (Figure 8), vehicles, animals, or staking materials?
- Is there evidence of insect activity (holes through the bark or tunnels beneath the bark, see Figures 10, 11, 24 and 28)?
- Is there woodpecker or sapsucker damage to the bark?
- Are there any splits or cracks in the bark, and if so, on what side of the tree? Sunscald injury (normally on south/west side of trunk), frost, and lightning are all factors that can cause the bark to split or break apart (see Figure 11).

- 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 (i.e. wetwood/slime flux).



Figure 3. Tar spot on maple



Figure 4. Leaf blister on oak

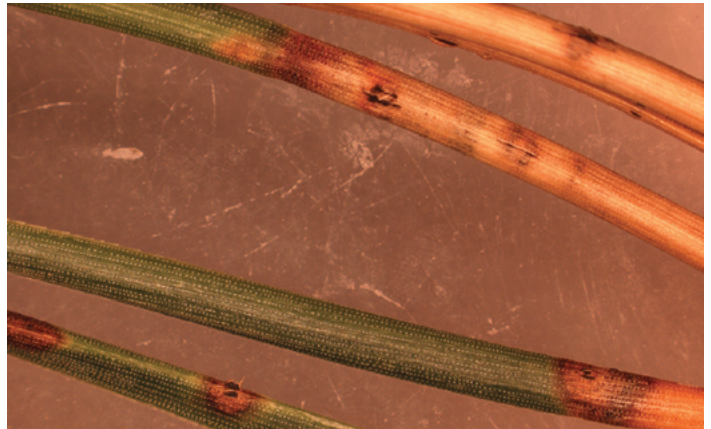


Figure 5. Needle blight on pine



Figure 6. Chemical injury



Figure 7. Hail damage on trunk



Figure 8. Mechanical damage (i.e. mower)

- Is there evidence of decay or hollowing of the trunk?
- Are fungal conks (i.e. mushrooms) protruding from the trunk, indicating possible internal wood decay (Figure 13)?
- Are cankers (i.e. dead bark area or sunken/discolored bark) evident on the branches or trunk (Figures 14 and 15)?

- Is the tissue beneath the bark discolored (tan or brown)? This may indicate winter injury.
- Does it show brown or green streaks on the sapwood (i.e. under the bark, see Figure 12)? This may indicate infection by a vascular wilt pathogen.



Figure 9. Sapsucker damage in horizontal pattern

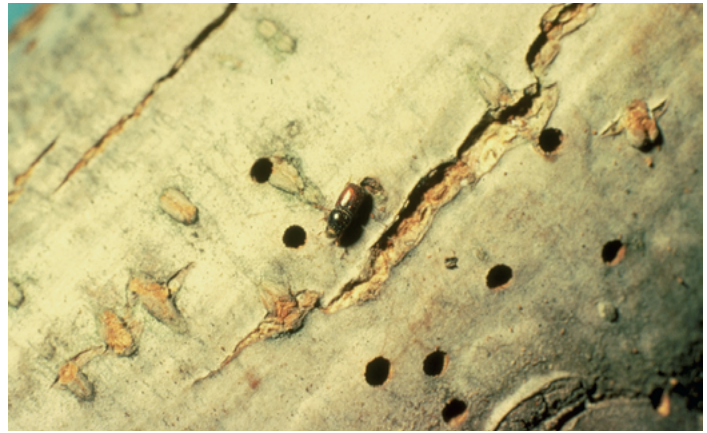


Figure 10. Beetle exit holes



Figure 11. Sunscald injury and insect exit holes on trunk



Figure 12. Vascular discoloration (center and right twig)



Figure 13. Fungal conk protruding from trunk

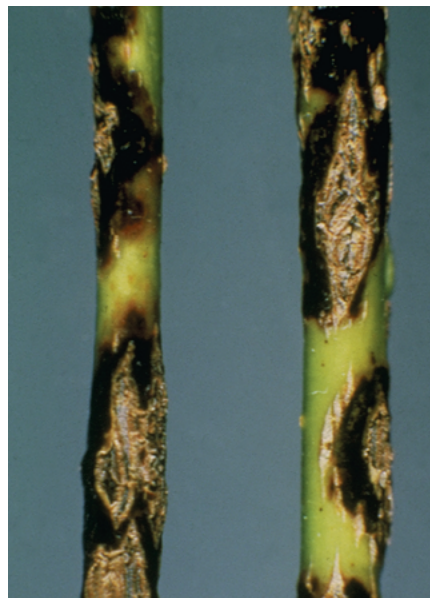


Figure 14. Branch canker



Figure 15. Trunk canker

Step 4. Consider the roots.

- Was the tree planted too deep (Figure 16)?
- Has physical injury to the roots taken place, such as construction injury within the last 3 to 8 years?
- Has there been any trenching to bury a phone or utility line nearby?
- Has the soil grade been changed or has the soil been compacted near the tree recently (Figure 17)?
- Has there been an addition of a patio, road, sidewalk, or new building in the last 5 years (Figure 19)?
- Have any flowers, shrubs, or trees been planted nearby or under the tree recently?
- 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 surrounding soil or grass?
- Are de-icing salts used on roads and walks nearby?
- Is there visual evidence of stem girdling roots (Figure 18)?
- Is turf growing over the tree roots?

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



Figure 16. Tree planted too deeply, trunk collar buried



Figure 17. Grade change around tree



Figure 18. Stem girdling roots



Figure 19. Tree decline caused by new construction

Collect Other Useful Background Information

1. 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 related to too much or not enough water.

2. 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?

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

The presence of similar symptoms on different species suggests a general environmental or chemical factor could be responsible for damage or decline.



Figure 20. Normal fall needle drop on pine

4. 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 (see Figure 21).

5. 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.

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

Is the problem evident over the entire tree, just the upper or lower branches, one large branch, the main trunk, etc.? Are their specific patterns? Are the leaves/needles browning from the edge inward or from the inner portion of the leaf/needle to the edge? Is the tree showing die back or decline (i.e. thinning branches) in the crown (top of tree)? Are the symptoms on branches starting on the inside of the branch toward the tip or from the tip inward? Are the symptoms just on the lower or upper branches of the tree?

7. 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.)



Figure 21. Frost damage on leaves

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. 2005. *Diseases of trees and shrubs*. Cornell University Press.

Johnson, W. T., and Lyon, H. H. 1991. *Insects that feed on trees and shrubs*. Cornell University Press.

A number of Iowa State University publications concerning tree care or tree problems are available at the [ISU Extension Store](https://store.extension.iastate.edu) (<https://store.extension.iastate.edu>). Selected publications include:

[Scale Insects on Ornamental Landscape Plants \(ENT 0040\)](https://store.extension.iastate.edu/Product/2169)
<https://store.extension.iastate.edu/Product/2169>

[Community Tree Planting and Care Guide \(HORT 3054\)](https://store.extension.iastate.edu/Product/5096)
<https://store.extension.iastate.edu/Product/5096>

[Common Diseases of Conifers in Iowa \(PM 1528\)](https://store.extension.iastate.edu/Product/5005)
<https://store.extension.iastate.edu/Product/5005>

[Anthracnose of Shade Trees \(PM 1280\)](https://store.extension.iastate.edu/Product/4635)
<https://store.extension.iastate.edu/Product/4635>

[Guidelines for Selecting Trees \(RG 702\)](https://store.extension.iastate.edu/Product/5741)
<https://store.extension.iastate.edu/Product/5741>

[Understanding the Effects of Flooding on Trees \(SUL 1\)](https://store.extension.iastate.edu/Product/6187)
<https://store.extension.iastate.edu/Product/6187>

[Understanding Decline in Trees \(SUL 2\)](https://store.extension.iastate.edu/Product/6188)
<https://store.extension.iastate.edu/Product/6188>

[Managing Storm-Damaged Trees \(SUL 6\)](https://store.extension.iastate.edu/Product/6192)
<https://store.extension.iastate.edu/Product/6192>

[Topping: Tree Care or Tree Abuse? \(SUL 7\)](https://store.extension.iastate.edu/Product/6193)
<https://store.extension.iastate.edu/Product/6193>

[Oak Wilt - Identification and Management \(SUL 15\)](https://store.extension.iastate.edu/Product/6624)
<https://store.extension.iastate.edu/Product/6624>

[Verticillium Wilt of Woody Plants \(SUL 16\)](https://store.extension.iastate.edu/Product/12187)
<https://store.extension.iastate.edu/Product/12187>

[Common Problems of Ash Trees \(SUL 21\)](https://store.extension.iastate.edu/Product/1482)
<https://store.extension.iastate.edu/Product/1482>

Contact your county extension office. Some offices have local or regional specialists that can help you with your tree problems.

The **Plant and Insect Diagnostic Clinic** supported by the National Plant Diagnostic network (NPDN), the Integrated Pest Management (IPM) Program at Iowa State University, ISU Extension and Outreach and with the collaboration of the Departments of Plant Pathology, Entomology, and Horticulture, is a laboratory for diagnosing plant problems and diseases. Representative samples with detailed background information may be submitted to the clinic. A fee is assessed for this service. Visit the [clinic website](https://clinic.ipm.iastate.edu) for current services, submission form and fees at clinic.ipm.iastate.edu.

The **Hortline** is a call-in service provided by ISU Extension and Outreach 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 515-294-3108.

Terms Used to Describe Tree Problems

Anthracnose. A type of sunken and or/discolored lesions on leaf, stem, or fruit lesions (Figure 22).

Bleeding. Sap flowing from a wound, in some cases with a distinctive red tone.

Blight. General and rapid death of leaves, branches, twigs, or flower parts (Figure 23).

Blister. Swollen, raised area on a leaf or other plant part (Figure 4).

Bronzing. A yellow or golden discoloration of leaves caused by a very high density of tiny spots or speckles that coalesce.

Canker. A localized wound or dead and discolored area on the bark, often sunken (Figures 14 and 15).

Conk. A fungal structure, usually formed by wood rot fungus, that commonly extends from the bark in a shelllike fashion (Figure 13).

Chlorosis. Abnormally yellow leaf tissue (Figure 2).

Decline. Plants growing poorly, often with small, discolored leaves; some defoliation and dieback may be present (Figure 19).

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 (Figure 10).

Fecal specks or Frass. Small, dark, shiny drops of dried excrement from insects on the surface of leaves or fruit; also known as varnish spots (Figure 24).



Figure 22. Anthracnose lesions in sycamore



Figure 23. Fire blight on pear

Gall. A swelling or overgrowth of plant tissue; may be caused by insects, mites, fungi, bacteria, or other organisms (Figures 25 and 26).

Gallery. A collection or pattern of small tunnels radiating from a single source, such as is made by certain insects (Figure 28).

Girdling roots. Roots that are tightly coiled around the trunk of a tree, above or below ground (Figure 18).

Honeydew. A sticky fluid rich in sugars, excreted by 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 (Figure 3).

Lesion. A localized area of discolored, diseased tissue (Figure 22).

Necrosis. Death of plant cells, usually resulting in darkening of the tissue (Figure 23).

Pustule. A small, blister-like swelling.

Rot. Decay or decomposition of tissue.



Figure 24. Insect frass and sooty mold on branch



Figure 25. Galls on leaves

Rust. A disease, caused by a fungus, that gives a “rusty” appearance to a plant (Figure 30).

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.

Scorch. Browning of leaf margins or tips (Figure 1).

Shot-hole. A symptom produced by the dropping out of the dead center of a leaf spot, leaving a hole in the leaf (Figure 31).

Signs. The actual agent causing the symptoms. Examples are pathogen structures or insect bodies and their products. Often magnification is needed to observe signs.

Sooty mold. A dark, usually black fungus growing on honeydew secreted by insects, and producing a soot-like covering on leaves, stems, and fruit (Figure 24).

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 (Figure 27).



Figure 26. Gall on branch



Figure 27. Insect tent

Tunnel. Linear holes within wood produced by beetle larvae or moth caterpillars as they feed (Figure 28).

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 (Figure 29).



Figure 28. Emerald ash borer (EAB) tunnels or galleries

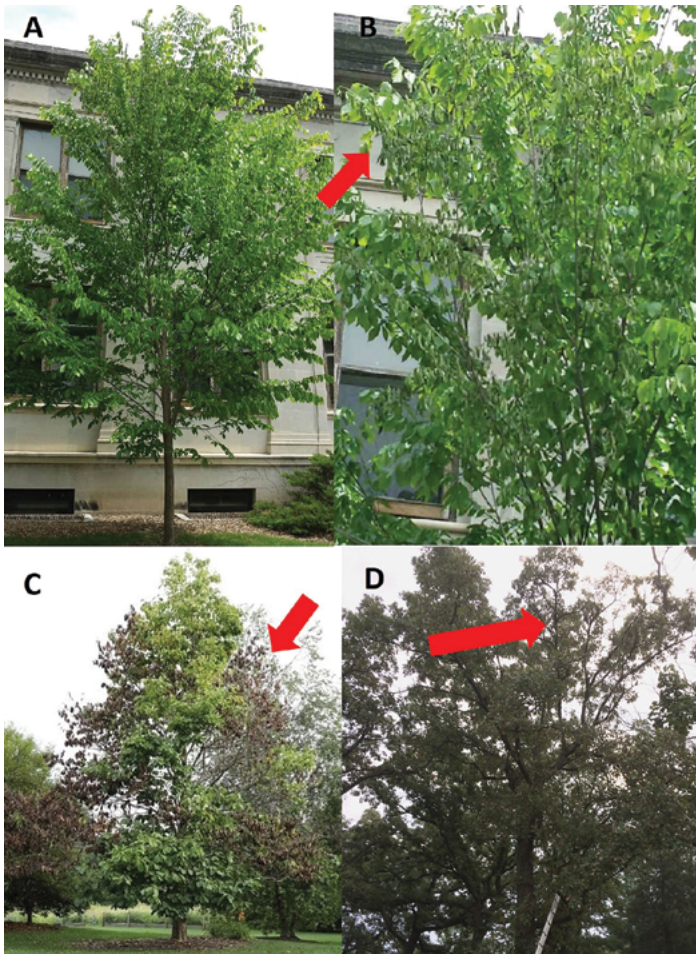


Figure 29. Wilt symptoms in elm (A and B), magnolia (C), oak trees (D)

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.



Figure 30. Rust on leaves, note yellow/ orange structures



Figure 31. Shot hole on leaves

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