



What Ails Your Tree?

**TREE CITY USA®
BULLETIN**

No. **44**

Editor: Dr. James R. Fazio • \$3.00

*T*rees, like people, all eventually develop a condition we do not welcome. Often it is something minor and may go away on its own, like a mild cold in humans. Other times, the problem may be more serious and need urgent care. No one can become an expert in diagnosis from reading a bulletin, but this issue will help you know what to look for and how to communicate with professionals who can tell you how to help your tree – if, in fact, it does need help.

One of the first lessons learned by a freshman forestry student is that wildfires are not the greatest cause of tree loss in the forest. The greater culprits are insects and diseases.

In the urban forest, insect and disease pests vie with urban sprawl and construction for infamy as the top cause of tree mortality. Communities spend an enormous amount of money protecting their valuable, green infrastructure against these shade tree pests. For example, since the invasion of the Asian longhorned beetle in 1996, New York City and Long Island have spent between \$13 million and \$40 million per year in an attempt to control this destructive pest. Other control expenses, to say nothing of research and prevention costs, are almost incomprehensible.

To homeowners, not only are street and park trees important, but also those in the backyard. Collectively, we spend millions of dollars annually trying to protect these precious trees against pests. In some cases, it is a worthwhile investment. In others, it is a waste of money. How is one to know a serious threat from a harmless and temporary problem? And where does one turn for help?



Trying to determine the cause of poor tree health is not easy, but help is available.

Since it is impossible to identify all pest symptoms or what to do about them, experts suggest: (1) knowing enough about pests to narrow down the possible causes of damage, and (2) knowing who to contact and what information these authorities will need in order to help you.



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Some General Guidelines ...



Natural processes, such as the discarding of older needles on pine trees, may look like a disease problem but aren't.

ARE YOU SURE IT'S A PROBLEM?

Arborists and city foresters love to tell the tale of new homeowners who call in the fall worried about the “pine tree” on their property turning yellow and losing its needles. The tree, of course, turns out to be a larch, or tamarack, and it is perfectly normal for this species to turn yellow and shed its foliage each autumn. Similarly, it is quite common for the older needles of an “evergreen” tree to turn brown and fall off. These will be toward the trunk and usually on a part of the branch produced about three years ago. The lesson here is: before all else, know the species and read about it or check it against others of its kind elsewhere. This will help show what is “normal” and provide good clues if something really is amiss with your tree.

PRACTICE PHC

Plant Health Care, or PHC, is a specific method, or approach, to pest control. It is a systematic way of caring for trees and deciding when a pest is serious enough to require action. PHC begins with planting the right tree in the right place. It also prevents overreaction to minor diseases or infestations, and suggests the most highly targeted, least-toxic method for dealing with problems when they do occur. The keys to this commendable method are: (1) preventing problems, (2) learning to tolerate some insects and diseases and accepting the idea that these are a natural and ever-present part of the landscape, (3) monitoring or having an expert monitor your trees regularly to spot problems early, and (4) treating problems intelligently.

For more information about PHC, see page 8 or talk with a certified arborist.

THAT OUNCE OF PREVENTION ...

Tree health, like human health, is best cured through prevention. This is because when a tree is under stress, it is less able to fend off pests through natural chemical and physical reactions. A healthy, vigorous tree is the first line of defense against insects and diseases. In the world of trees, stress prevention means considering the following before selecting a tree to plant. Is the tree suitable for:

- The hardiness zone (average annual minimum temperature) in your area?
- Soil moisture at the planting site?
- The amount of sunlight available?
- Pests that are locally prevalent?
- Soil type (sand, clay, etc.) and pH (acidic or alkaline)?
- Air pollution, salt spray, wind or similar conditions?
- Amount of soil compaction or other human impacts expected?

For a tree already planted, is it:

- Properly watered during dry periods?
- Mulched around the base of the trunk (about 2-4 inches deep and not touching the trunk)?
- Pruned regularly and properly to be free of deadwood and infected branches?
- Protected against trenches, compaction, and toxic substances throughout its root zone?
- Protected against cuts, nail holes, and similar damage to its bark?



Preventive measures taken when a tree is planted will help ensure its future health and longevity.

Narrowing Down the Problem

When you know your tree is ailing, the next step is to determine the cause. Whether you try to do this yourself with the help of reference books or plan to contact an expert, the job will be easier if you can determine the general nature of the problem. Narrowing the possibilities into one of three categories will speed diagnosis and help arrive at recommendations for treatment.

Note: The best pest detectives work systematically. That is, they carefully examine the tree part by part – leaves, branches, trunk, and roots. They also consider nearby activities present and past, including any trenching, sidewalk or other construction work, use of herbicides, and anything else that might affect a tree. Speed of decline is also noted, and whether only certain species of trees are affected, a group of different species in a limited area, or a single tree.

SYMPTOM:

An injury by, or a change in a tree's growth or appearance in response to, a damaging agent. Examples are wilting leaves, discoloration, etc.

SIGN:

The damaging agent (live insects or insect bodies), or a product produced by the pest (webs, mushrooms, entrance holes, etc.).

INSECTS

In some cases, identifying insect damage is easy. The insect will be present and you can obtain a sample or use a book to key out what is affecting the tree. More often, however, all you will have is some other sign or a symptom that the pest was there. Typically, this will be some form of damage such as leaves curled within a web, a waste product, holes in or under

the bark, a dead branch tip, and others.

In fact, depending on the damage, insects are often classified into groups such as defoliators, leaf curlers, leaf and stem sucking insects, and wood borers. A more useful list of symptoms and signs and their causal organisms may be found in *Insects That Feed on Trees and Shrubs*. Here is a modified summary that may be of help:



Twin tufts, or brushes, identify the tussock moth. Larvae feeding on conifers are a serious threat when cyclic populations boom.

Sign or Symptom	Possible Insect Causes
1. Chewed foliage or blossoms	• Gypsomoths, tussock moths, other caterpillars; sawfly larvae, beetles, grasshoppers, walkingsticks
2. Bleached, bronzed, silvered, flecked, or minced (lacey appearance) leaves	• Leafhoppers, lace bugs, plant bugs, thrips, aphids, psyllids, spider mites, leaf miners
3. Distorted plant parts (swelling, twisting, cupping)	• Thrips, aphids, gall makers, psyllids, eriophyd mites
4. Dieback of twigs or shoots; holes in bark or roots; wood dust, frass, gum, or pitch issued from holes	• Asian longhorned beetles and other wood borers, bark beetles, scaled insects, gall makers, root-feeding beetle larvae
5. Presence of insects or insect-related products: <ul style="list-style-type: none"> • Honeydew (sticky substance) and sooty mold • Fecal specks on leaves • Tents, webs, silken mats • Bags and cases • Spittle (white and foamy) • Cottony fibrous material • Pitch tubes (a mound of pitch with a hole in it) • Pitch or gum masses and sap flow 	<ul style="list-style-type: none"> • Aphids, soft scales, leafhoppers, mealybugs, psyllids, whiteflies • Lace bugs, thrips, some leaf beetles, plant bugs • Tent caterpillars, webworms, leaf tiers • Bagworms, case borers • Spittlebugs • Adelgids, mealybugs, flatids, some aphids, scales, whiteflies • Southern pine beetle and some other bark beetles • Larvae of certain moths, beetles, and midges

Narrowing Down the Problem *(continued)*

DISEASES

Identifying tree diseases can be difficult, and since some are spread by insects, it becomes a semantic swamp to decide whether the insect or the pathogen should be called the pest. According to Dr. Richard Harris and colleagues, a disease is “an abnormal plant response resulting from continued irritation or association with living organisms that become intimately associated with tissues of the host plant.”

The causes of what most people recognize as disease are a myriad of species of fungi, bacteria, and viruses. It often requires laboratory analysis to determine the specific causal agent, but the nature and location of symptoms and signs can provide valuable clues. Here are some common examples:

FOLIAGE DISEASES

These are usually caused by fungi. Sometimes the name of the disease is descriptive enough to make it the likely suspect.

Powdery mildew, apple scab, oak leaf blister, anthracnose, tar spot, needle cast, sooty mold, needle, and tip blight.

VASCULAR DISEASES

Organisms in this category get into the tree cells that transport water. They disrupt the movement of water and nutrients and cause severe moisture stress that results in wilted leaves and, sometimes, twig dieback.

Wilts include Dutch elm disease and oak wilt. Vascular bacterial diseases include elm yellows, lethal yellowing of coconut palms, ash yellows, and leaf scorch.

CANKER DISEASES

“Cankers” are symptoms that appear as the localized death or deformation of bark and wood, sometimes in telltale patterns. The causes are fungi, some highly infectious and others more passively opportunistic that find a break in the bark that lets them in.

Strumella canker, beech bark disease, chestnut blight, butternut canker, cytospora canker, and nectria canker.



The common nectria canker is sometimes called “target canker” because of the pattern of wood created as the tree responds to an internal fungus.

RUSTS

Basidiomycetous fungi are the cause of these diseases. They are parasitic and usually require two different species of hosts to complete their life cycles. Symptoms vary and include cankers, galls, and leaf spots.

White pine blister rust, fusiform rust, cedar-apple rust, and ash rust.

ROOT ROTS

Caused by soil-borne fungi that are difficult to detect. Sometimes decline of tree vigor is the only clue; other times mushrooms, the fruiting bodies of the fungi, give them away (but not all mushrooms indicate root rot!).

Armillaria root rot (shoestring root rot), annosum root rot, phytophthora root, and crown rot.

BACTERIAL DISEASES

Single-cell organisms that reproduce by cell division and are visible only by the symptoms that result from their presence.

Crown gall, fire blight, and wetwood of elm (also vascular bacterial diseases).

VIRUSES

Even smaller than bacteria, viruses spread by nematodes, insects, and propagation. They are usually evident by mottled or mosaic patterns on leaves and distorted or stunted leaf or branch growth.

Apple mosaic, poplar mosaic, prunus necrotic ringspot, and prune dwarf.

MISTLETOES

These are parasitic plants that actually produce seeds and have leaves, but they draw their nutrition from host plants.

True mistletoe, dwarf mistletoe, and dodder.

OTHER PESTS

Space does not allow an inventory of all the threats to tree health. Symptoms from causes other than insects or pathogens are often difficult to decipher and are frequently mistaken or overlooked. Don't be fooled. When trying to sort out the clues, be sure to look at the site occupied by the tree and learn something of the history of activities around it. Consider such things as:



Insects or pathogens sometimes take the blame for human-caused injuries. These withering leaves are the reaction to herbicide drift from a nearby application.

NATURAL CAUSES

- ✓ Environmental problems like soil that is too dry or too wet (perhaps caused by a change in drainage or grading). See Tree City USA Bulletins No. 4 and 5.
- ✓ Soil chemical deficiencies (inadequate nitrogen or a missing trace element). See Bulletin No. 5.
- ✓ Lightning. See Bulletin No. 2.
- ✓ Rodents, nematodes (tiny, parasitic round worms).

HUMAN CAUSES

- ✓ Chemicals in the soil (including gas line leaks and de-icing salt) or adrift in the air. See Bulletin No. 32.
- ✓ Soil compaction, severed roots, construction activities. See Bulletins No. 5, 7, 20, and 35.
- ✓ Planting errors, including inappropriate selection, girdling (circling) roots, planting too deep, and failure to remove planting stakes and guy wires. See Bulletin No. 19.
- ✓ Lawnmower or weed cutter damage, vandalism. See Bulletin No. 14.



Trees respond in different ways to lightning. Sometimes almost instant death occurs and sometimes the wound is invaded by fungi leading to death years later. This tree suffered little more than a lasting scar.



Human error causes many tree problems, especially in the urban landscape. This tree's roots were paved over and it's now suffering.

The 10 Most Unwanted Pests

A panel of urban forestry experts from throughout the U.S. were asked for their opinions on the 10 insects and diseases most threatening to America's community trees. Here are the results of that poll, along with actions you can take. In all cases, the best prevention and remedy includes keeping trees healthy by watering during periods of drought and by following other good tree care practices.

#1: ASIAN LONGHORNED BEETLE

By far the most dreaded, invasive threat in recent times. This wood borer, with a body more than an inch long, was introduced in New York City from China in 1996 and quickly spread to Chicago and several other cities. It prefers maples, elms, and willows, and its boring is lethal to any tree it infests. Signs include $\frac{3}{8}$ - to $\frac{3}{4}$ -inch diameter holes in trunks and branches.

Action: Immediately report any sign of this insect to your city or state forester.

#2: GYPSY MOTH

This defoliating pest has now spread to the Gulf and West Coasts from Boston where it was introduced in 1869 from France. Infestations are cyclic, with long periods of moist weather resulting in a population boom of a natural virus that kills the moth's larvae.

Action: Individual trees can be protected with bands of burlap or sticky products wrapped around the trunk about 4 feet above ground. Destroy caterpillars that hide under the burlap. Apply sticky products to tape or other material, not directly to the tree. Various insecticides are also available, including Bt, a bacteria that kills only caterpillars.

#3: DUTCH ELM DISEASE

Introduced on logs from Europe in the 1920s, this is a vascular-clogging fungus that is transported by elm bark beetles. Wilting and browning of branch tips are often the first noticeable symptom.

Action: Promptly remove infected trees. Preventive and therapeutic fungicide injections are also available from arborists.

#4: EMERALD ASH BORERS AND OTHER BORERS

As a group, these insects take a toll on birch trees (particularly when stressed by lack of moisture), locusts, lilacs, willows, ashes, oaks, and others. Emerald ash borers and their damage are examples.

Action: Prevention is best. Systematic insecticides are available at garden stores.

#5: ANTHRACNOSE

A group of fungi that cause dieback and sometimes death to various species such as flowering dogwoods, sycamores, oaks, and maples.

Action: Rake and destroy leaves of infected trees. Preventive fungicides are available at garden stores.

#6: OAK WILT

Once a tree is infected with this fungus, it is unlikely to recover. A wilting of the leaves is the unwelcome symptom.

Action: Remove trees that die from the disease. After removal, debark, chip, or otherwise treat the trees to prevent the production of spore mats under the bark. Avoid wounding trees and do not prune from February through June. Professionally applied injections can treat or prevent this disease, and root barriers can help prevent spread from infected trees.

#7: SCALE INSECTS

A group of insects ranging from those that are white and fuzzy to some that look like tiny oysters to still others that are as large as peas and look like tortoise shells. They suck the life juices from leaves and inner bark, eventually weakening or killing the tree.

Action: Horticultural oil, insecticidal soap, and other sprays are available from garden stores.

#8: CANKERS

These result from a variety of causes that deform bark or stems, often killing part of the tree or creating a weak point subject to breaking under the stress of wind or an ice load.

Action: Prune affected limbs, and keep trees healthy.

#9: BARK BEETLE

White to reddish pitch tubes or reddish boring dust are the signs that indicate adult bark beetles are trying to overcome the tree's natural defenses and penetrate the bark. If penetration is successful, eggs are laid and the next spring hatching larvae burrow and eat their way through the inner bark, killing the tree. This group of pests includes the southern pine beetle, western pine beetle, and spruce beetles.

Action: Salvage logging, cutting and burning, and chemical treatment are options. Contact your local or state forester.

#10: HEMLOCK WOOLLY ADELGID

This pest was introduced in 1927 and is destroying hemlocks throughout the eastern U.S. It does its damage by sucking plant sap at the base of the needles, eventually causing the tree to lose vigor, drop its needles, and die.

Action: Horticultural oil, insecticidal soaps, and other sprays are commercially available to protect individual trees.

How to Get Help for Your Trees



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Lots of folks will be willing to guess about what ails your tree, but sources of competent diagnosis are somewhat limited. It pays to seek them out and use them, including getting the best recommendation for the least expensive and environmentally safest treatment.

COOPERATIVE EXTENSION

Within the public sector, the best place to seek help is your county extension agent. These individuals work locally but are associated with the state land grant college. If you live in an urban area, a convenient alternative may be to directly contact the forestry extension specialist at the land grant college. These are usually located at the university that houses the agriculture college in your state. Examples include Penn State University, University of Nebraska–Lincoln, and University of California–Davis. Under provisions of the Morrill Land Grant College Act of 1862 (to stimulate agricultural education) and the Smith Lever Act of 1914 (which established the Cooperative Extension System), this helpful educational arm exists in every state. In most cases, forestry specialists can help you identify the cause of a tree ailment or provide advice to your local extension agent.

MASTER GARDENERS

This volunteer program is sponsored by Cooperative Extension to help local people grow better trees and gardens. In return for training by professionals, the volunteers must provide a certain number of community service hours. Their projects often include plant health clinics and answering questions from the public, including help with diagnosing tree pest problems.

COMMERCIAL TREE CARE COMPANIES

Some tree care companies have Plant Health Care specialists who will monitor your trees regularly, diagnose problems, and provide or recommend treatment. The Davey Tree Expert Company, for example, offers two options: (1) A local representative will work with you and provide free diagnosis if Davey performs the treatment, or (2) You can ask a Davey scientist questions at the company's website (davey.com).

OTHER ASSISTANCE

State foresters and other professionals in the green industry can identify common problems but may not be



Specialists qualified to accurately diagnose what's wrong with your tree can be found through county extension agents and other tree professionals.

set up for the complex analyses required, particularly for many diseases. When a major pest erupts in an area, workshops are often sponsored locally and should be attended. There are also some self-help books listed at arborday.org/bulletins.

WHAT TO SUBMIT

If you correspond with an expert about your tree problem, remember that the more information you can provide and the better the sample you can send, the easier it is to receive an accurate diagnosis. For the best results, first make contact by phone and ask for submittal information.

Other Sources of Information

PLANT HEALTH CARE

For more information about the meaning and application of PHC to control pests with minimum impact on the environment, contact the Arbor Day Foundation for Tree City USA Bulletin No. 37 "PHC – What It Means To You." Related publications are available from the International Society of Arboriculture at isa-arbor.com.

A key proponent for least-toxic pest control methods is The Bio-Integral Resource Center. You can receive a free catalog of helpful publications by visiting its website at birc.org.

There are many sources of environmentally friendly commercial products, particularly for controlling pests on fruit trees. For example, you can obtain the catalog, *Gardens Alive!* at GardensAlive.com.

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The Tree City USA program is sponsored by the Arbor Day Foundation in cooperation with the U.S. Forest Service and National Association of State Foresters. To achieve national recognition of being named a Tree City USA, a town or city must meet four standards:

- Standard 1: A tree board or department
- Standard 2: A tree care ordinance
- Standard 3: A community forestry program with an annual budget of at least \$2 per capita
- Standard 4: An Arbor Day observance and proclamation

Each recognized community receives a Tree City USA flag, plaque, and community entrances signs. Towns and cities of every size can qualify. Tree City USA application forms are available from your state forester, or the Arbor Day Foundation at arborday.org/treecity, or your state forestry agency.



FOR MORE INFORMATION ...

For more suggestions about determining what ails your tree, please visit arborday.org/bulletins and click on Bulletin No 44.

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