

**Boring Insects** are characterized by the tunnels they make in the wood of a tree as they eat through it. Because each kind has its own style and tunnel pattern, borers may be identified by their work even after they have left the scene. One example of borers is the termite (usually not serious in trees). Eventually most borers eat their way into a tree, making a round opening out of which they eject a characteristic substance called a frass, composed of semi-digested wood.

Trees infested with borers typically show a thinness of crown and a gradual or sudden decline in vigor. Conclusive symptoms are circular holes in the trunk or branches with frass and sometimes dripping sap, which forms a dark stain along the bark. Borer holes may be distinguished from other holes (such as those made by birds like the sapsucker) because they

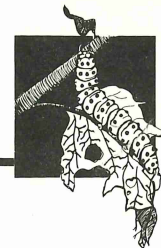
are deep, irregularly located, and usually made at an angle, indicating tunnels underneath. (Sapsucker holes are very shallow and made in even rows.) When borers eat a tree's heartwood or sapwood only, they cause mostly structural damage which weakens the tree. Their tunnels also provide entry for other insects and wood-rotting fungi. Borers that eat the inner bark and the cambium directly destroy the tree's vital parts and kill it quickly.

When present, borers may be directly attacked. When their tunnels are open, they may be impaled on a piece of wire. If they cannot be reached mechanically, they may be asphyxiated by poisonous gas or liquid.

***The method used for a particular insect problem will depend on the species involved, the extent of the problem, and a variety of other factors specific to the situation.***

As mentioned previously, always consult a professional if you have any doubt about the nature of the insect problem or the proper way to eliminate it.

## Insect & Disease Problems



Insects and diseases pose two of the most serious threats to your tree's health. As soon as you notice any abnormality in your tree's appearance, you must begin a careful analysis to gain an understanding of the problem. By examining the specific symptoms of damage and understanding their causes, you can make a reasonable diagnosis of the problem and select the proper treatment. When uncertain, or to confirm your suspicions, be sure to contact your local arborist, a tree care professional.

### The Nature Of Tree Health Problems

Basic elements that promote plant health include sufficient water, optimum temperature and light, and a proper balance of nutrients. Too much or too little of any of these elements can cause stress.

***Environmental stress is the primary cause of most plant health problems.***

Stress may be classified into two broad categories: acute and chronic. Acute stress, which can be caused by such things as improper pesticide sprays, or untimely frosts or freezes, occurs suddenly and causes almost immediate damage. Chronic stress takes a longer time to affect plant health, and may be a result of nutritional imbalance, improper soil pH, incorrect light intensity, or other factors. *To make matters worse, disease organisms and insects commonly attack an already stressed tree, adding further damage to the existing symptoms.* Provided that symptoms are

recognized early, there is usually enough time to correct imbalances caused by chronic stresses, making them easier to deal with than acute stresses. Often by the time an acute stress is apparent, the damage has already been done and the only thing left to do is learn from the experience and prevent it from happening again.

### Plant Diseases

Whether on trees, shrubs, or other plants, plant diseases require three things to develop:

- presence of a disease causing agent called a pathogen
- susceptibility to that particular pathogen
- environmental factors which can affect both the plant and the pathogen.

These three factors are subject to a great deal of variation, depending on the particular plant and pathogen involved. For example, genetic variability causes plants to respond differently to disease, just as it controls height variations, autumn color, and susceptibility to insect attack. Weather and soil conditions also have different effects on different plants.

Diseases can be classified into two broad categories:

- those caused by infectious or living agents
- those caused by non-infectious, or non-living agents.

Examples of infectious agents include fungi, viruses, and bacteria. Non-infectious diseases, which account for 70 to 90 percent of all plant problems in urban areas, can be caused by such factors as nutrient deficiencies, temperature extremes, pollutants, and fluctuations in



Developed by the International Society of Arboriculture, a non-profit organization supporting tree care research around the world and dedicated to the care and preservation of shade and ornamental trees. For further information, contact: ISA, P.O. Box 908, Urbana, IL 61801. © 1991 International Society of Arboriculture.

Printed on recycled paper.

INTERNATIONAL SOCIETY  
OF ARBORICULTURE





moisture. Factors of non-infectious diseases can often produce symptoms similar to those caused by infectious diseases; therefore it is essential to distinguish between the two in order to give proper treatment.

---

***Correct diagnosis of plant disease requires a careful examination of the situation and systematic elimination of possibilities by following a few important steps.***

---

**1 Accurately identify the plant.** Because infectious pathogens are mostly plant-specific, this information can quickly limit the number of suspected diseases.

**2 Look for a pattern of abnormality.** This can often provide key information regarding the cause of the problem. For example, if the affected plants are restricted to a walkway, road, or fence, the disorder could be a result of wood preservatives, de-icing salts, or other harsh chemicals.

**3 Carefully examine the land.** Factors to observe include:

- land contour
- history of the property
- number of species affected
- percentage of injured plants in the area

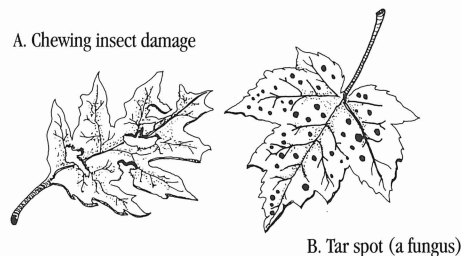
Land contour can be a significant contributor to plant disease, since low or poorly drained areas are ideal for the development of root rot induced by a variety of water molds. The history of the property and adjacent land may reveal many problems such as herbicides applied to agricultural lands or sanitary landfills whose gas can drift several hundred feet and damage plants.

The number of species affected may also help to distinguish between infectious pathogens that are more plant-specific as compared to chemical or environmental factors that affect many

different species. Most living pathogens take a relatively long time to spread throughout an area, so if a large percentage of plants become diseased virtually overnight, a pathogen is probably not involved.

**4 Examine the roots.** Note their color: brown or black roots may signal problems. Brown roots often indicate dry soil conditions or the presence of toxic chemicals. Black roots usually reflect overly wet soil or the presence of root-rotting organisms.

**5 Check the trunk and branches.** Examine the trunk thoroughly for wounds, as they provide entrances for cankers and wood-rotting organisms. Such wounds may be caused by weather, fire, lawnmowers, rodents, and a variety of other environmental and mechanical factors. You can avoid extensive decline by removing branch stubs and pruning out cankered limbs.



**6 Note the position and appearance of affected leaves.** Dead leaves at the top of the tree are usually the result of environmental or mechanical root stress. Twisted or curled leaves may indicate viral infection, insect feeding, or exposure to herbicides. The size and color of the foliage may tell a great deal about the plant's condition, so make note of these and any other abnormalities.

**7 Think about current and past management practices.** Sometimes a plant's current problem is actually a result of something that happened to it much earlier. Changes in grade,

the use of pesticides, or nearby construction work may all contribute to tree problems.

---

***Armed with information from this careful examination, you can now consult a plant disease reference or expert and make a diagnosis of the problem.***

---

## **Insect Problems**

Insects can cause considerable damage to trees and shrubs. By defoliating trees or sucking out their sap, insects retard their growth, weakening and sometimes killing them. By boring into the trunk and branches, they interfere with sap flow and weaken the tree structure to a point where it may be easily blown over by the wind. Insects may also carry disease by providing an entry way for fungi, bacteria and viruses.

*It is important to remember, however, that some insects are beneficial rather than destructive; they may help with pollination or act as predators of more harmful species. Therefore, killing all insects without regard to their kind and function can actually be detrimental to tree health.*

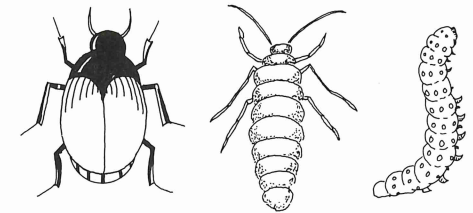
Insects may be divided into three categories according to their method of feeding: chewing, sucking, and boring. Insects from each group have characteristic patterns of damage which will help you determine the culprit and the proper way to get rid of it.

Always consult a tree care expert if you have any doubt about the nature of the insect problem or the proper way to eliminate it.

**Chewing Insects** eat plant tissue such as leaves, flowers, buds and twigs. Indications of damage by these insects is often seen by uneven or broken margins on the leaves or other affected plant parts. A few examples from this

large insect category are:

- beetles and their larvae (grubs)
- webworms
- bagworms
- larvae of moths and sawflies (caterpillars).



Because these insects ingest plant material, they may be killed by spraying plants with a stomach poison either during active feeding or before insects appear. Such poisons normally take effect 24 to 48 hours after application. These chemicals are also typically poisonous to humans, which means that they must never be used when there is any possibility of children chewing or eating sprayed leaves or fruits.

**Sucking Insects** insert a special beak into the tissues of leaves, twigs, branches, flowers, or fruit and then suck out the plant's juices. Some typical examples of sucking insects are aphids, mealy bugs, thrips and leaf hoppers. Damage caused by these pests is often indicated by:

- discoloration
- drooping
- wilting
- general lack of vigor in the affected plant.

Because sucking insects do not eat the outer surfaces of plants, they are not affected by stomach poisons. Contact poisons, which directly hit an insect's body and kill by burning, asphyxiation, or paralysis, must be used. These poisons must be applied when insects are present, and often will need to be re-applied if insects reappear.