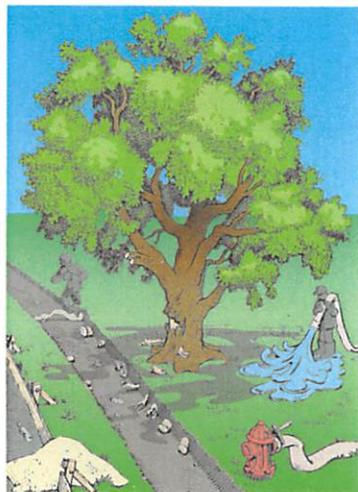


Insects and diseases can threaten tree health. As soon as you notice any abnormality in your tree's appearance, you should begin a careful examination of the problem. By identifying the specific symptoms of damage and understanding their causes, you may be able to diagnose the problem and select an appropriate treatment.

Stress

Plant health requires sufficient water and light, and a proper balance of nutrients. Too much or too little of any of these environmental elements may cause plant stress.

Trees deal with environmental stresses, such as shading and competition for water and nutrients, by adjusting their growth and development patterns to reflect the availability of the resources. Although trees are adapted to living in stressful conditions in nature, many times the stresses they experience in the landscape are more severe than they can handle and may make them more susceptible to certain insects and diseases.

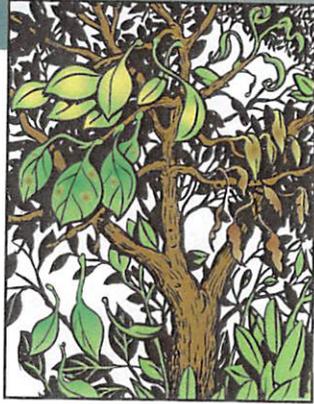


Diagnosis

Correct diagnosis of plant health problems requires a careful examination of the situation.

- 1. Accurately identify the plant.** Many insects and diseases are plant-specific. This helps limit the list of suspected diseases and disorders.
- 2. Look for a pattern of abnormality.** Compare the affected plant with other plants on the site, especially those of the same species. Non-uniform damage patterns may indicate insects or diseases. Uniform damage over a large area (perhaps across several plant species) usually indicates disorders caused by such factors as physical injury, poor drainage, chemical damage, or weather.
- 3. Carefully examine the landscape.** The history of the property and adjacent land may reveal many problems. Most living pathogens take a relatively long time to spread throughout an area, so if a large percentage of plants becomes affected virtually overnight, a pathogen or insect is probably not involved.
- 4. Examine the roots.** Brown- or black-colored 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.** Wounds caused by weather, fire, mechanical damage, or animals can provide entrances for pathogens and wood-rotting organisms. Large defects may indicate a potentially hazardous tree.
- 6. Note the position and appearance of affected leaves.** Dead leaves at the top of the tree are often 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.



Leaf appearance assists in diagnosing disease.

Diseases

Three things are required for a disease to develop:

- a pathogen (the disease-causing agent)
- a plant susceptibility to that particular pathogen
- an environment suitable for disease development

Plants vary in susceptibility to pathogens. Many disease-prevention programs focus on the use of pathogen-resistant plant varieties. Diseases can be classified into two broad categories:

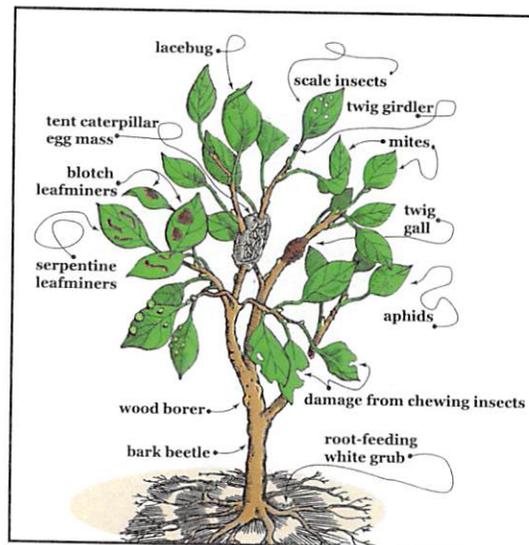
- Infectious: transmittable diseases caused by microscopic living agents
- Non-infectious: non-transmittable diseases that are inherited or the result of non-living agents

Examples of infectious agents include fungi, protozoa, viruses, and bacteria. Non-infectious diseases, which account for the majority of plant problems in urban areas, can be caused by such factors as compacted soil, nutrient deficiencies, temperature extremes, vandalism, pollutants, and fluctuations in moisture. Non-infectious disorders often produce symptoms similar to those caused by infectious diseases; therefore, it is essential to distinguish between the two to determine proper treatment options.

Insects

Some insects can cause injury and damage to trees and shrubs. In many cases, however, the insect problem is secondary to problems brought on by a stress disorder or pathogen.

It is important to remember that most insects are beneficial rather than destructive. They 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 that help with diagnosis.





Chewing insects eat plant tissue such as leaves, flowers, buds, roots, and twigs. Damage by these insects is often defined by uneven or broken margins on the leaves, skeletonization of the leaves, and leaf mining. Chewing insects include beetle adults or larvae, moth larvae (caterpillars), and many other groups of insects. The damage they cause (leaf notching, leaf mining, leaf skeletonizing, etc.) will help in identifying the pest insect.

Sucking insects insert their beak (proboscis) into the tissues of leaves, twigs, branches, flowers, or fruit and then feed on the plant's juices. Some examples of sucking insects are aphids, mealy bugs, thrips, and leafhoppers. Damage caused by these pests is often indicated by discoloration, drooping, wilting, leaf spots (stippling), honeydew, or general lack of vitality in the affected plant.

Boring insects spend time feeding beneath the bark of a tree as larvae. Some borers kill twigs and leaders when adults feed or when eggs hatch into larvae that bore into the stem and subsequently develop into adults. Other borers, such as bark beetles, mate at or near the bark surface, and adults lay eggs in tunnels beneath the bark.

Treatment

The treatment method used for a particular insect or disease problem will depend on the species involved, the extent of the problem, and a variety of other factors specific to the situation and local regulations. Always consult an ISA Certified Arborist if you have any doubt about the nature of the problem or the proper treatment method to use.

