

DISEASES OF TREES AND SHRUBS

C.C. Powell
Professor of Plant Pathology
The Ohio State University

Let's begin by trying to understand what we hope to gain from a basic session on diseases of trees and shrubs. Here are some simple realities:

- 1) There are thousands of trees and shrubs used in landscapes in the midwest.
- 2) There are thousands of infectious and non-infectious problems (diseases) that can occur on these plants. Table one lists some particularly common ones.
- 3) No one wants any of these problems.
- 4) Therefore, you all want to know what can do about your sick _____
(You fill in the blank!)

To proceed on how to solve plant disease problems, we need to think first about diagnosis. To solve a problem, we must first diagnose the problem correctly. Diagnostics is a three part problem solving exercise. It consists of the original perception of the problem, attempts to determine the causes of the problem, and planning of the solutions to the problem. Too often we cannot see the entire plant nor visit the site. We may have only a piece of the plant, such as a leaf or twig, or perhaps a description of the problem. Nevertheless, we are expected to solve the problem.

Thus, the "art" of diagnosis includes the assembling of clues, sort of like detective work. It involves asking good questions, and good observation. Diagnosis is an ordered thinking process which proceeds from a need for an answer through to a plan to solve the problem. Table Two is a guide to help you in such an ordered thinking process.

Note that the final stage of diagnosis is the derivation of a plan of action. There are two helpful concepts I want to pass on to you to help you become more skillful in this area.

First of all, most of the problems of trees and shrubs in the landscape result from noninfectious diseases, caused by environmental or weather induced stresses occurring singly or in combination. In many cases, stress is not defined precisely when dealing with health. But this does not make it less important as a concept. Stress often results from too much or not enough of "a good thing". Remember that a healthful environment for plants in the landscape contains many elements that occur in ranges or degrees. Either too much or too little light, temperature or water can become stressful.

Good environmental awareness can help you recognize and solve stress problems more easily. When confronted with an unhealthy plant, your first job should be to identify chronic stresses, even though you already might have noted the presence of a particular acute stress, such as an infectious disease or insect pest. Put yourself in the place of the plant. You might want to investigate the soil water situation, light or temperature extremes, or the soil aeration and compaction conditions. Remember that stresses are apt to

occur in combinations. They may be additive in their effect. For instance, soil dryness does not become stressful until temperatures climb. Such situations often have been called disease complexes.

Pathogenic organisms such as fungi or bacteria commonly attack and infect a plant that has been stressed and may already show symptoms of a noninfectious disease condition. When the pathogen is involved, the health imbalance and stress of infectious disease are added to that of the previously existing noninfectious disease. Actinopelte leaf spot of oak or Cytospora canker of spruce are good examples.

The importance of this concept is that management of stress can do a lot toward the management of infectious as well as noninfectious disease problems. Of course, this is not always true. There are some disease organisms that are so pathogenic that they will attack even vigorously growing and reasonably healthy plants. Fireblight of crabapple would be a good example of this sort of disease.

The second general concept that is important in increasing your ability to derive solutions to tree and shrub diseases is to know that plant disease results from three elements that occur together in time and space. These three elements are a host plant that is susceptible to disease, a pathogen (usually a fungus attacking the plant), and an environment that favors the interaction of the host and the pathogen. Plant disease control programs involve attention to host plants, pathogens and environments. Removing or preventing any of the three elements needed for disease development will control the disease. There are many such disease management strategies.

Understanding the basic strategies for managing plant disease will aid in understanding how the various disease controlling practices discussed in the following paragraphs really work. Mistakes will be made by merely memorizing the procedures given. Plant disease can be controlled only by careful attention to the host, the pathogen or the environment favoring their interaction.

Now let's look at some common diseases of trees and shrubs in the midwest. For each of the diseases selected, note how the description includes both specific and non-specific symptoms. Note also how the remedy or preventions include various types of the basic strategies mentioned above.

Verticillium Wilt and Dieback

Description

Wilting and yellowing of foliage is followed by premature defoliation. One limb of the tree may be affected first. Gradual dieback may be apparent. Yellow-brown, brown, black or greenish-black streaks may be found in outer rings of wood of infected branches.

Remedy or Prevention

Severely infected trees will have to be removed. Trees with one infected branch should have the branch removed and the tree fertilized and watered during dry spells. Use resistant plant types if replanting is needed.

Leaf Scorch and Branch Dieback

Description

These non-infectious stress diseases can result from many causes. The most common causes are winter damage, cankers or injuries, as well as, poor root function coupled with high temperatures and moisture shortage. Scorched leaves are brown around the edges and sometimes between the veins. Leaf yellowing and drooping may occur in late summer. Dieback and decline is often mistaken for Verticillium wilt. No wood streaking is present, however.

Remedy or Prevention

Investigate and attempt to correct the root stresses present. Vertically mulch to open the soil, increase aeration, improve water penetration and improve drainage. Water deeply once a week during dry spells. Pruning may be helpful to improve the root-shoot balance. Add plant fertilizers only if soil tests indicate shortages, imbalances or pH problems. Protect cold sensitive plants from winter wind. Be sure soil is moist in the fall.

Chlorosis or Yellowing

Description

This condition can occur in response to many types of environmental stresses, diseases, or pest infestations. Leaves will be smaller than normal. The yellowing may be general or only between the major veins of the leaf. One branch or the entire plant may be affected. In later stages or during droughts, leaf scorch, wilt and leaf drop may occur.

Remedy or Prevention

If the condition has resulted from a nutritional imbalance, fertilization with "trace" minerals and/or addition of materials to alter soil acidity (the pH) may help. Vertically mulch to relieve soil compaction if needed. Water deeply once a week during dry spells but only if the soil has dried to moderate levels within the fibrous root growth areas. Control root-damaging insects with appropriate soil insecticides. Check for spider mites and treat appropriately. Correct excessive soil wetness if this is suspected to be the cause of the problem. Recently planted material can be lifted and replanted more shallowly with abundant well-drained and aerated fill beneath the root ball. Check for girdling or twisted roots at the crown of the plant and remove small ones. Mulch or take other measures to prevent injuries to the plant at the soil line.

Cankers, Tip and Twig Blights

Description

The infections are definite areas that vary in color from the surrounding healthy bark. The tissue in these areas may be sunken or swollen. When cankers girdle the twig or branch, the end of the branch dies. Small bumps, fruiting bodies of the fungus, are often seen in the canker. These may produce an ooze of orange, white, black or brownish spores during rainy weather.

Remedy or Prevention

Prune out cankers and cankered branches or twigs. Do not prune during warm, rainy weather. Reshaping of the plant may be necessary if many or twigs branches are removed. Fertilize to increase plant vigor and to encourage new growth and quickly close pruning wounds. Water during dry weather. Fungicide treatments are not effective preventives or curatives.

Anthracnose Blights

Description

Irregular tan or brown areas are found on the leaves, especially along the margins and major veins of the leaf blade. The condition usually is noticed in late spring on lower parts of the plant. Deformation and twisting of leaves often results from infections that occurred during bud break and leaf expansion in the spring. The blight is commonly found on ash, white oak, maples and sycamore, particularly when such plants are growing in damp, cool places. On sycamores, fall infections can cause dead branch tips. Frost injury, herbicide damage and leaf scorch are often mistaken as anthracnose infection. Examine affected leaves closely for fungal fruiting bodies or threads of fungal growth within or near the edge of browned areas.

Remedy or Prevention

Rake and burn fallen leaves and plant debris. Fertilize if needed and root irrigate deeply during dry spells to maintain vigor and promote refoilation of the plant. Avoid overhead irrigations on or near affected plants, especially at night or late in the day. Prune away surrounding shade-producing vegetation to promote dry air movement over the affected plants. Spray with a properly labeled fungicide during bud break in the spring.

Leaf Spots and Blights

Description

Several fungi cause spotting and blighting on many ornamentals. Symptoms vary according to the specific fungus and host involved. Most notable among this group are black spot of rose, Entomosporium leaf spot on English hawthorn, Didymellina leaf spot on iris, brown spot on pine and Alternaria leaf spots on many plants. Leaf spotting fungi require repeated episodes of water on leaf surfaces for infection to occur. Most can become serious as a result of splashing water for spread of spores from leaf to leaf. They commonly begin on the lower leaves of the plant and spread upwards.

Remedy or Prevention

The best control for leaf spotting fungi is to avoid splashing water from overhead irrigations. If this cannot be done, irrigate early in the day so the plants dry as quickly as possible. Maintain plant vigor. Grow resistant cultivars. Also, chemicals can be sprayed on the plants where labels permit this use. Use the fungicides preventively, before the first symptoms appear. Know plants in which to expect leaf spots. Repeated applications of fungicides at intervals suggested on labels will be necessary, especially if the diseases are well developed prior to the first application and damp weather persists.

Powdery Mildews

Description

White, powdery spots appear on leaves, stems, flowers or buds. If the infection is widespread, the entire leaf blade may be covered with a thin, white fungal growth. Some mildew fungi affect older leaves first such as on lilacs, zinnias or chrysanthemums. Others affect newer shoots such as on roses or crabapples. When new shoots are affected, leaf curling and shoot stunting and twisting may be severe.

Remedy or Prevention

Plant sensitive plants in a sunny location and do not crowd them. Prune away surrounding shade-producing vegetation. Avoid overhead irrigation late in the day or at night. At the first sign of disease, spray regularly with a properly labeled fungicide.

Rust Diseases

Description

Orange to reddish-brown spots or lesions will form on leaves, twigs or fruit. Sometimes galling and disfigurement will be associated with the infections. In midsummer, infections on some plants will produce cup-like structures or tubular growths that will produce great numbers of orange spores.

Remedy or Prevention

Resistant cultivars are available in some cases. Avoid overhead irrigations late in the day or night. Prune away shade-producing vegetation. Rake and burn fallen leaves and plant debris. Spray regularly during infection periods with a properly labeled material. Rust infection generally occurs several weeks before symptoms are seen, during damp and cool weather.

Crown Gall

Description

Infected plants do not flower or grow well. Galls form on the roots, at the crown or at the point of grafting. Galls on aerial stems may be found on some plants. The size of the galls can vary from marble-sized to baseball-sized.

Remedy or Prevention

Remove and burn severely infected plants. Replant with resistant plant types. Keep plants vigorous with fertilizer and water. There are no chemical controls.

Scab Diseases

Description

Olive green to black spots form on leaves. Leaves turn yellow and fall prematurely in late June or early July. Small, round, dark areas that become corky are found on the fruits. Most commonly affected plants are crabapples and pyracantha. Other plants in the Rosaceae family are susceptible as well.

Remedy or Prevention

Rake and burn infected fallen leaves in the fall. Plant resistant varieties. Apply fungicide sprays at regular intervals and be sure to obtain good coverage.

Fire Blight

Description

A sudden wilting, dying, and browning or blackening of new shoots. Leaves on these shoots die and hang. Ends of branches appear burned and may be bent over in a "shepherd's crook". Plants in the Rosaceae family (crabapples, euonymus, pear, etc.) are susceptible.

Remedy or Prevention

Remove infected branches by breaking them off 8 to 12 inches below the diseased tissue. Avoid excess nitrogen fertilizer and overhead irrigations. Plant resistant varieties. Chemical sprays are available, but are not very effective.

Table One. Common Diseases of Landscape Plants

<u>Disease</u>	<u>Common Host Plants</u>
Powdery Mildews	Deciduous azaleas, English oaks, lilacs, roses, stocks, zinnias, many others.
Rusts	Asters, hollyhocks, Washington hawthorns, crabapples, snapdragons, roses, birches, chrysanthemums, 2-needled pines.
Cankers	Poplar, Russian olive, chestnut, mountain ash, birch, dogwoods, sweetgum, spruce, plum, many others.
Anthracnose	Sycamore, oaks, maples, ash, hickory.
Leafspots	English hawthorns, Rhododendron, holly, roses, dogwoods, horsechestnut, buckeye, English ivy, pachysandra.
Scab	Crabapples, pyracantha.
Branch blights	Junipers, crabapples, 2-needled pines, oaks, pachysandra, vinca, rhododendron, pieris, lilac, cotoneaster.

Table Two: A Guide for Use in Proceeding thru a Diagnosis

1. Correct Perception of Plant Problems

Exactly what symptoms are being observed? Make a list.
Which are non-specific? Which are specific?
Can you detect a sequence of symptoms (time sequence)?
2. Fine Tuning Perception to Determine Possible Causes
 - A. Knowledge and experience-
Name of plant? Does this plant have any special environmental needs? Any particularly common problems?
 - B. Time-
Cultural or use history for the specific plant in question. How long have symptoms been present?
 - C. General view-
Association of condition with the site. Any obvious environmental problems? Is entire planting affected? section of the planting? Is more than one plant type affected?
 - D. Specific (close-up) view-
Where on plant is damage evident (upper leaves, lower leaves, right side, left side, etc.)? Are all plant parts healthy or not healthy (roots included!)? Any outside lab work needed?
 - E. Possible reasons for symptoms-
Make a list of all possible reasons, no matter how far-fetched.
 - F. Most probable reasons for symptoms-
An examination of the list you just made.
Do not think you have to get down to one reason.
Get more data - soil tests, lab examinations, outside opinions.
3. Deriving a solution to the problem
 - A. List all possible solutions - short term, long term.
 - B. Throw out those that are impractical or not cost-effective.
 - C. Discuss remainder with co-workers and clients.
 - D. Compile a prescription and carry it out completely.