

## CANKER AND DIEBACK DISEASES OF WOODY PLANTS

Canker diseases are common, widespread, and destructive on a wide range of woody plants. They may cause dieback of twigs and branches (Figure 1), or they can structurally weaken a plant until it breaks over in the wind or during an ice storm. Cankers also slow the normal healing of wounds and provide entry for wood decay or wilt producing fungi and other organisms.

Canker and dieback diseases are most common and conspicuous on trees and shrubs under stress from any of the following: transplant shock, an excess or deficiency of water, prolonged exposure to extremely high or low temperatures, sudden hard freezes in mid- to late fall or spring, summer or winter sunscald, frost cracks, nutritional imbalances, extensive defoliation, soil compaction, changes in the soil grade, mechanical injuries (such as hail, wind, a heavy ice or snow load, fire, lawn mowers, construction equipment or vehicles, or rodents), pruning wounds, root rot, insect borers, nematodes, dogs, or improper digging, storage, and shipping. Cankers are also common in nurseries and plantations where the plants are grown closely together.

### Symptoms

A canker is a localized diseased area or lesion in the bark of a woody plant and often results in an open wound. Starting as a definitely marked dead area, usually round to oval or elongate in shape, a canker may enlarge and girdle the twig, branch (limb), or trunk. Nearly all canker pathogens are wound parasites. The death of the bark and underlying cambium tissue is usually associated with a dead bud, branch stub, or twig, or with some type of mechanical injury and extends radially from the wound. When the water conducting tissue (xylem) is killed or blocked, the most prominent symptom is a gradual or rapid wilting, withering, and dieback starting at the shoot tip and progressing down the branch — all of this being a secondary effect of the girdling canker some distance below. The leaves on affected parts are often smaller than normal, first pale green then yellow or brown, curled, and sparse. Large or multiple trunk cankers may result in severe girdling and subsequent death of the affected tree or shrub. When a



Figure 1. *Phomopsis* canker damage on Russian Olive. Note dieback of twigs.

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canker forms on the trunk near the soil line, it is called crown canker or collar rot (Figure 5).

Cankers may develop as conspicuous, slightly sunken or flattened areas of bark (Figures 2 and 3), or as inconspicuous diseased areas that cannot be detected by examining the bark surface. The diseased bark of conspicuous sunken cankers often cracks within or at the margins, exposing the wood beneath (Figures 3 and 4). In other cankers, such as those caused by species of *Nectria*, *Urnula* (*Strumella*) (on oaks), and *Eutypella* (on maples), swollen ridges of callus form a targetlike area (Figure 6). On woody plants with light-colored bark, diseased bark that does not become depressed may turn some shade of brown or black (Figures 7 and 8). Such cankers are conspicuous because of their abnormal color. Inconspicuous cankers usually appear as brown to black diseased areas just under the bark when the thin stromata or outer bark is cut away (Figure 5). Many canker diseases caused by fungi are indicated by raised, speck-sized or larger, dark fruiting bodies (pycnidia, perithecia, stromata acervuli) in the diseased bark (Figure 1). Many fruiting bodies break through the bark and are seen as dark spots or bumps. Oozing of gum, resin, or sap is a common sign of certain cankers (Figure 8).

## Cause

Most cankers are caused by fungi although a few affecting fruit and nut trees are caused by bacteria, especially by species of *Erwinia*, *Pseudomonas*, and *Xanthomonas*, viruses, and other types of pathogens. The host pathogen relationships and the pathogenicity of numerous species of these fungi have not been thoroughly investigated. Many of the fungi are known to be only weak or secondary pathogens. Some have both perfect (sexual or telomorph) and imperfect (asexual or anamorph) states, which may or may not be present at the same time on the same plant. Thus, there is undoubtedly some duplication in the list of host plants for many of the genera. Other minor host plants, especially shrubs, could be added to many of the genera.

## Disease Cycle

Most canker forming fungi overseason as vegetative mycelium or fruiting bodies in diseased and dead wood. They often grow in the bark of living trees or shrubs and on dead wood both on the standing plant and on the ground.

## PERENNIAL CANKERS

A canker producing fungus enters through a mechanical wound in the bark (such as a branch stub or mowing bruise) and invades and kills the bark, commonly during a dormant period. At the same time, the host plant attempts to limit invasion by the fungus by producing a layer of callus cells around and over the edge of the invaded tissue, but the fungus invades the callus tissue during the next dormant period. The host then forms new callus tissue. This cycle of invasion by the fungus and formation of callus tissue by the plant may be repeated for several years. The extent and shape of the resulting canker is determined by the growth of the pathogen and the amount of callus formation. The extent and shape of the resulting canker is determined by the growth of the pathogen and the amount of callus formation.

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Figure 2. Smooth or bark patch of white oak. *Aleurodiscus* fungus is confined to dead bark and causes no damage to tree.



Figure 3. *Cytospora* canker of poplar kills thousands of poplar each year (IL Nat. Hist. Survey)..



Figure 4. *Kaskaskia* canker of honeylocust kills newly planted and large established trees (IL Nat. Hist. Survey).

## ANNUAL CANKERS

Cankers contain little or no callus and increase rapidly during a single season. Branches or even entire trees, especially young ones, may be girdled in one growing season. Most are caused by fungi that attack stressed or weakened plants. Most canker fungi are restricted to invasion of bark tissues. Some, however, colonize both the bark and the underlying xylem tissue. Stem diseases that result from a simultaneous canker and wood decay are called canker rots.

Canker fungi usually produce their fruiting bodies in recently killed bark. The spores produced by these fruiting bodies serve as inoculum for new infections, which occur mostly during wet or damp weather. The spores (mainly conidia and ascospores) are spread primarily by air currents, splashing rain, and contaminated pruning and shearing tools; a few are spread by contaminated insects and birds. The spores may ooze out of fungus fruiting bodies in long tendrils or cirrhi (Figure 9) during wet weather.



Figure 5. *Phytophthora* crown canker of azalea. Bark has been removed to show dark discoloration of wood (IL Nat. Hist. Survey).



Figure 6. *Nectria* canker on sugar maple stem.

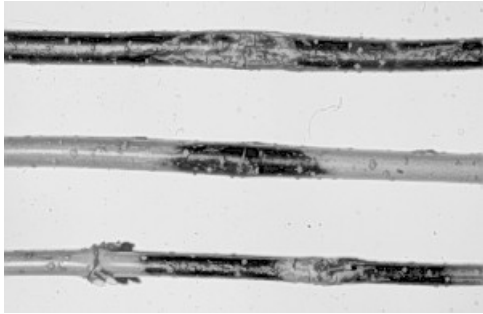


Figure 7. *Botryosphaeria* cankers on yellow twig dogwood stems. Disease can be devastating when plants under stress (IL. Nat. Hist. Survey).



Figure 8. *Botryosphaeria* canker on sweetgum trunk. (IL Nat. Hist. Survey).



Figure 9. Chestnut blight canker.

## Control

1. Grow only species and varieties or cultivars of trees and shrubs that are well adapted to the area and site. Plant only vigorous, disease free nursery stock. Resistant species and cultivars are available for certain types of canker diseases. Grow somewhat tender species in sheltered locations. Plant at the proper depth in a large hole, well spaced apart, in fertile well drained soil of the proper soil reaction (pH).
2. If cankers are confined to the twigs or branches, carefully remove the affected part(s), including all dead and discolored wood, pruning several inches **behind** any sign of disease. Remove and burn, or haul away with the trash, all affected parts when first noticed. Avoid leaving branch stubs. Pruning cuts should be made as flush with the branch or trunk as possible leaving the "collar" that surrounds the base of the branch. Do not prune when the bark is wet; this helps to spread the causal fungus. Where possible, the pruning tools should be sterilized between cuts by swabbing with 70 percent rubbing alcohol or freshly prepared liquid household bleach (one part bleach in five parts of clean water).
3. Some trunk cankers, if less than halfway around the tree, can often be successfully removed by careful surgery of diseased bark and underlying discolored wood. Surgically remove serious girdling roots above and below the soil line. This work is best done by a licensed and experienced arborist.
4. Treat all bark and wood injuries promptly. Cut away all loose or discolored bark. Remove splintered wood. Clean, shape, and smooth the wound into a streamlined oval or ellipse with rounded tips and its long axis oriented vertically. Then swab the wound surface liberally with an antiseptic such as 70 percent alcohol or shellac. The use of commercial wound (tree) paints and dressings is **not** recommended. Their effect is largely cosmetic.
5. Keep woody plants vigorous through (a) proper applications of a balanced fertilizer in mid to late autumn or early spring, (b) thorough soaking of the soil to a 12 inch depth every 10 days during hot, dry periods, (c) pruning, and (d) winter protection. Loosen compacted soil and any pavement or soil fill and apply a loose organic mulch. The trunk of young, thin barked trees should be wrapped with

sisalkraft paper, special tree wrapping paper, or other appropriate material prior to winter. Follow cultural practices suggested by University of Illinois Extension horticulturists.

6. Avoid all unnecessary bark wounds. Keep the trunk base as dry as possible and free of grass, weeds, or other debris that might attract rodents.
7. Make timely applications of a suggested insecticide to keep the feeding of defoliating insects, borers, and other wood attacking pests at a minimum. Follow recommendations of University of Illinois Extension entomologists.
8. There are no general fungicides that can be routinely applied to woody plants to control canker diseases.
9. Avoid chemical injuries. Apply herbicides, other pesticides, salt, fertilizers, and other chemicals strictly according to label directions.