

Common Diseases of Holly and Their Control

Introduction

Members of the genus *Ilex* or holly are landscape favorites throughout the United States. Popularity of this group stems from their diversity of leaf texture, fruit and foliage color, size, and their adaptation to a broad range of climatic conditions. When compared with other woody landscape plants, holly have relatively few serious diseases. Most diseases are more damaging in the nursery than in the landscape. In the landscape, pests such as spider mites, scale insects, and spittle bugs usually pose more of a threat to the health and beauty of holly than do diseases or plant parasitic nematodes. This publication discusses leaf spots and blight of holly and their management; root rot diseases of holly; and nematode pests of holly.

Leaf Spot And Blights Of Holly

A wide variety of fungi may cause leaf spot diseases on cultivated holly. In landscapes, the injury to holly may be unsightly but the plants are rarely harmed by these diseases. Often, damage is so light that it's hardly noticeable.

In container and field nurseries, considerable spotting of the leaves and subsequent defoliation often associated with leaf spots and blight diseases may greatly reduce the quality and market value of holly. Typically, outbreaks of leaf spot diseases

on most woody ornamentals like holly are associated with extended periods of wet, humid, cloudy weather in the spring and summer.

Cylindrocladium Leaf Spot

Cylindrocladium leaf spot, commonly on 'Burford', Japanese, American, and yaupon holly, is seen primarily on container stock in the Southeast. This disease may also be introduced into home landscapes on diseased container stock.

Symptoms first appear as tiny yellow (chlorotic) spots which later enlarge to circular spots with a tan to brown center and a purple-black border. Even a single spot may cause a diseased leaf to be prematurely shed by the plant. On badly defoliated holly, a shoot dieback may also occur.

In nurseries, apply a fungicide (See Table 1) every 10 to 14 days starting at bud break until all new growth matures. In landscapes, apply fungicides only to plants previously damaged by disease. Begin fungicide sprays at leaf-out and repeat every 10 to 14 days until shoot growth has stopped.

Anthracnose

The common holly hosts of anthracnose include English, Chinese, American, inkberry, and winterberry holly. Anthracnose may occur on holly in production nurseries and the landscape. Like *Cylindrocladium* leaf spot, this disease is seen most often on holly across the Southeast.

Circular to irregular blotches usually tan to brown appear on the leaves (Figure 1).

Numerous pink-orange, pin-head sized spore masses of the causal fungus, that appear dur-



Figure 1. Anthracnose on inkberry.

Table 1. Chemical Control Of *Cylindrocladium* Leaf Spot.

Fungicide	Rate Per Gallon	Rate Per 100 Gallon	Comments
thiophanate-methyl 3336 50W	1 Tablespoon	12-16 ounces 10-20 fluid	Begin sprays at leaf-out. Repeat every 10 to 14 days. Prune out diseased limbs.
3336 4.5F	—	ounces	
Halt 50W	1 Tablespoon	12-16 ounces	

ing humid weather inside the blotches, can easily be seen with the naked eye or a hand lens. A shoot dieback may also be seen on anthracnose-damaged 'Burford' holly.

Apply a recommended fungicide starting in late spring. Repeat sprays every 7 to 14 days as needed. Recommended fungicides are listed in Table 2. See

comments on management of foliar diseases below for other control suggestions.

Web Blight

Outbreaks of web blight or Rhizoctonia aerial blight are seen most often on rooted liners and container-grown dwarf cultivars of Japanese and yaupon holly, though liners of other hollies may

also be damaged. In general, holly cultivars with dense canopies that are jammed together are particularly sensitive to web blight. Warm to hot, humid weather patterns are essential for disease development. This disease only occurs on holly in landscapes during periods of unusually hot, wet weather.

Brown spots appear along the margin and base of the leaves. They rapidly enlarge into irregular brown to black blotches that may encompass the entire leaf. Mats of dead leaves usually cling to the damaged shoots. Blighting of the leaves usually starts on leaves closest to the ground and spread upwards through the canopy towards the shoot tips (Figure 2).

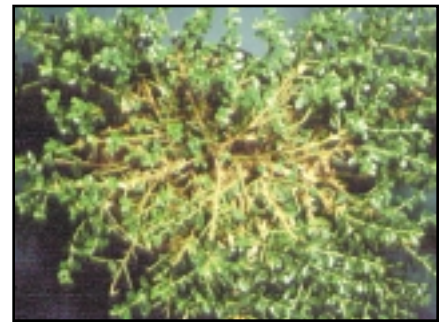


Figure 2. Web blight on Japanese holly cv 'Helleri'. (Courtesy of A. Windham, University of Tennessee).

Table 2. Chemical Control Of Anthracnose.

Fungicide	Rate Per Gallon	Rate Per 100 Gallons	Comments
chlorothalonil			
Daconil 2787 4.17F	2 teaspoons	2 pints	Begin sprays in late spring and repeat every 7 to 14 days as needed. Prune out diseased limbs.
Daconil 2787 Ultrex	----	1.4 pounds	
thiophanate-methyl 3336 50W	1 Tablespoon	12-16 ounces	
3336 4.5F	----	10-20 fluid ounces	
3336 4.5F		10-20 fluid ounces	

Table 3. Chemical Control Of Web Blight.

Fungicide	Rate Per Gallon	Rate Per 100 Gallons	Comments
chlorothalonil			
Daconil 2787 4.17F	2 teaspoons	2 pints	Problem on container grown dwarf holly during summer months. Hot, pounds wet weather favors disease.
Daconil Ultrex	----	1.4	
Echo 90DF	----	1.25 pounds	Apply on 7 to 14 day schedule when weather patterns favor disease. Repeat as needed.
Thalonil 4.17F	2 teaspoons	2 pints	Add a spreader-sticker to wettable powder formulations.
Thalonil 90DF	----	1.25 pounds	
iprodione			
Chipco 26019 50W	----	1-2 pounds	
thiophanate-methyl 3336 50W	1 Tablespoon	12-16 ounces	
3336 4.5F	----	10-20 fluid ounces	
Halt 50W	1 Tablespoon	12-16 ounces	

When possible, space plants to improve air circulation. Avoid overhead watering in late afternoon or early evening. Begin preventive fungicide sprays in June. Repeat sprays every 7 to 14 days as needed or until night temperatures cool. To get good disease control, thoroughly wet the canopy, stems, and media surface with the fungicide spray. Recommended fungicides are listed in Table 3.

Botryosphaeria Canker

Botryosphaeria or bot canker is a found on nearly all cultivated species of holly including 'Foster', dahoon, Japanese, Chinese, inkberry, American,

and yaupon holly. Development of bot canker is often preceded by exposure of holly to unusually high or low temperatures or in combination with severe drought conditions. Holly in good physical condition are rarely damaged by this disease.

The first noticeable symptoms of this disease are yellowing and premature leaf drop of the leaves on girdled limbs along with a twig dieback. Cankers, often centered on a dead twig, usually appear as slightly shrunken and cracked patches of discolored bark. Tissues below the canker face turn brown and this discoloration often extends several inches above and below the canker margin. Cankers may continue to expand until the diseased limb is girdled, thereby killing all parts of the plant above the canker.

Stress-related dieback diseases such as bot canker can largely be avoided by following proper establishment and maintenance practices. Preferably, new plantings of holly should be installed in the fall. Amend the soil prior to planting according to soil test recommendations to correct any mineral or pH deficiencies. Always set holly so that the root ball sits at or just slightly above the soil level, not below. On poorly drained soils or sites prone to flood, plant holly on raised beds. Mulch around hollies with well-rotted sawdust, pine straw, or an aged bark to hold moisture in the soil and to avoid mechanical injury to the limbs and trunk by mowers and weed trimmers. Water new and established plants according to need, especially during extended periods of hot, dry weather. Prune discolored or wilted branches back to green wood as they appear. No fungicides are recommended for the control of bot canker on holly.

Sphaeropsis Knot

Sphaeropsis knot occurs on holly primarily in Florida and to a lesser extent in other southeastern states. In Florida, this disease is found most often in landscape and native stands of American and dahoon hollies. Other hollies known to have been damaged by this disease in Florida landscapes and container nurseries include the Chinese holly, Japanese holly, yaupon, and 'Foster' holly.

Symptoms of Sphaeropsis knot range from localized swelling of young twigs to knobby galls on the larger branches. Also, clusters of stunted, sometimes leafless shoots or witches broom may be seen. Leaves on galled branches often turn yellow and drop. A dieback of the defoliated branches often follows.

Propagating cuttings from diseased holly is a common method of spreading this disease. Before taking any cuttings, inspect stock plants to make sure that they are free of symptoms. Do not take cuttings from diseased holly. After each cut, dip the pruning knives or shears in alcohol or a similar disinfectant. In the landscape, prune diseased limbs well below any galls or swellings. When establishing new plantings of susceptible hollies in Florida and nearby states, inspect incoming plants for typical symptoms and return any diseased hollies. No fungicides are currently labeled for the control of Sphaeropsis knot on holly.

Management Of The Foliar Diseases Of Holly

In the landscape, provide effective protection from most leaf spot and blight diseases by

- timely surface watering,
- maintaining recommended soil fertility and pH,
- choosing an adapted holly cultivar as well as proper plant maintenance and spacing.

To minimize the length of time the foliage remains wet, water hollies in both landscapes and nurseries with overhead sprinklers between 1 and 7 am or at midday. If a serious leaf spot and blight should occur, collect and destroy the fallen leaves. Fungicides are rarely needed to protect holly in landscape plantings from leaf spot and blight diseases.

In container nurseries, dwarf Japanese and yaupon holly need to be spaced out to allow air circulation and speed evaporation of water on leaf surfaces. Fertility and watering practices detailed above will help control these diseases in container-grown holly. Also, fungicides often must be applied to protect rooted cuttings and container-grown Japanese and yaupon holly through the spring and summer months from web blight. Recommended fungicides are listed in the above tables.

Root Rot Diseases Of Holly

Root rot diseases may heavily damage holly in the nursery. With the exception of low areas prone to flooding, they are rarely a problem in landscapes on well-maintained holly. Two of the more common root rot diseases of holly are described in this publication.

Thielaviopsis Black Root Rot

Black root rot occurs most often on cultivars of Japanese holly as well as the Blue or Meserve (*I. x meserveae*) holly and inkberry (Figure 3).



Figure 3. Black Root Rot on Japanese holly cv 'Helleri'. (Courtesy of A. Windham, University of Tennessee).

This disease has also been occasionally seen on yaupon and American holly. Black root rot is most prevalent in container nurseries but may also be moved into the landscape on diseased hollies. Distribution of this disease is nearly nationwide.

Symptoms of black root rot include yellowing of the leaves followed by a noticeable slowing of plant growth, early leaf drop, and twig dieback. Black bands or rings can be seen along the length of the normally white to buff colored feeder roots. As the disease progresses, much of the root system will darken and die.

Cuttings of Japanese and other root-rot susceptible hollies

must be rooted in new containers or flats in a soilless pine bark medium. Some peat-based commercial mixes may be contaminated with the causal fungus, *Thielaviopsis basicola*. Recycled containers must be thoroughly washed and disinfected prior to their reuse. Discard old potting media. In the nursery, preventive fungicide drenches should be routinely applied to cultivars of Japanese, Blue, and other black root-rot susceptible hollies. See Table 4 for recommended fungicides.

Prior to establishing new plantings of holly, pull several plants from their containers and

check the roots for typical symptoms of black root rot. Reject shipments of diseased or poor quality plants. Should black root rot be diagnosed in established plantings, remove the damaged plants and install disease resistant hollies or other woody plants. Cultivars of Japanese holly susceptible to this disease are 'Hoogendorn', 'Nigra', 'Green Cushion', 'Mobjack Supreme', 'Hetzii', and 'Helleri'. The holly cv. 'Blue Maid' may be the most susceptible of the Blue or Meserve holly cultivars to this disease. Other trees susceptible to black root rot are catalpa, American elm, and black locust.

Table 4. Chemical Control Of Black Root Rot.

Fungicide	Rate Per Gallon	Rate Per 100 Gallons	Comments
thiophanate-methyl 3336 50W	1 Tablespoon	12-16 ounces	Soil drench. Apply monthly.
3336 4.5F	----	10-20 fluid ounces	
etr Diazole + thiophanate-methyl Banrot 40W	----	6-12 ounces	Soil drench. Apply in enough water to saturate soil or potting media. Irrigate immediately. Retreat every 4 to 12 weeks.
Banrot 8G	----	1 pound/cu.	Dry Soil Media Mix. Retreat yd. media after 4 to 12 weeks as needed with a recommended fungicide drench.
metalaxyl + thiophanate-methyl DRENCH PAK	----	1 pkg. 3336 + 1 pkg. Subdue II	At Seedling: Mix 1 gallon of stock solution per 100 gallons of drench solution. Agitate gently. Apply 0.5 to 1 pint of solution per square foot of bench or bed area at 21 to 28 day intervals as needed.
		1.5 pk. 3336 + 1 pkg. Subdue II	At Transplanting: Apply 1 to 2 pints of solution per square foot of bench or bed area and repeat at 21 to 28 day intervals as needed. Agitate gently.

Pythium And Phytophthora Root Rot

Pythium and Phytophthora root rots are common diseases of a wide range of woody ornamentals, including most kinds of holly. Generally, Phytophthora root rot is much more damaging in container nurseries than the landscape. Pythium root rot can cause plant loss in both the nursery and the landscape. Development of both diseases is often favored by a poorly drained potting medium or a compacted, poorly drained clay or silt soil. Plant loss may be particularly high in landscape beds where water tends to stand for several hours after watering. Planting too deep and over mulching may also contribute to disease development.

Symptoms of these two diseases and black root rot are similar. Typically, yellowing of the leaves, particularly at the shoot tips, early leaf drop, slowed plant growth, and twig dieback are seen at early stages of these diseases. Later, one or more limbs may wilt and dieback to the main trunk and a brown to black streaks of dead tissue may extend from one area of rotted roots to the damaged limb (Figure 4). Often, the root sys-



Figure 4. *Phytophthora* rot and crown rot on blue holly.

tem will continue to disintegrate until the plant dies.

Holly grown under a combination of heat and/or moisture stress are much more sensitive to root rot diseases than are well maintained, vigorous plants. Always choose hollies that are adapted to the local climate and soil conditions. Root rot diseases are often introduced into the landscape on diseased container plants. To avoid introducing these diseases, purchase hollies with white healthy roots and good foliage color. Pythium and Phytophthora root rot are often more prevalent on wet-natured soils. Planting holly and other shallow-rooted shrubs on raised beds is strongly suggested in areas with poorly drained, wet-natured soils. Also, amending landscape beds with plenty of aged pine or hardwood bark will help suppress root rots. Planting too deep is an open invitation for Pythium or Phytophthora root rot. Fertilizing according to soil test recommendations will maintain vigor, thereby reducing the susceptibility of holly to root rot.

Root rot outbreaks in home and commercial nurseries can often be traced to pathogen contaminated potting media or diseased liners. Take cuttings from healthy plants and root them in aged bark or heat sterilized soil in clean containers on raised benches. Never reuse potting media or containers. Rooting holly in ground beds is discouraged. Discard diseased cuttings and container plants.

In the nursery, fungicide drenches should be applied for the control of root rot disease on susceptible holly cultivars from the time cuttings are rooted until finished container-grown plants are shipped (Table 5). Preventive fungicide applications are rarely needed to control any root rot disease of holly in the

landscape. Fungicides will not kill root rot fungi that have already invaded root tissues but will prevent them from attacking healthy roots. See Extension Circular ANR-571, "Phytophthora Root Rot on Woody Ornamentals" for more information on recommended management practices and fungicide use guidelines.

Table 5. Chemical Control Of Pythium And Phytophthora Root Rot.

Fungicide	Rate Per 100 Gallons	Comments
etridiazole Truban 5G	10 ounces/cu. yd.	Dry Soil Mix. Broadcast: Rate media 6-8 pounds per 1,000 square feet of bed area.
etridiazole + thiophanate-methyl Banrot 40W	6-12 ounces	Soil Drench. Apply with enough water to saturate soil or medium. Irrigate immediately. Retreat every 4 to 12 weeks.
Banrot 8G	1 lb./cu. yd. media	Dry Soil Mix. Retreat after 4 to 12 media weeks with a recommended fungicide drench as needed.
fosethyl-AL Aliette WDG	0.4 to 0.8 lb. 2.5-5.0 lb. 0.5-0.8 lb./cu. yd.	Soil Drench. Reapply every 30 days as needed. Foliar Spray. Reapply every 30 days as needed. Dry Soil Mix. Use only on well rooted media plants. Treat as needed with a recommended fungicide after 30 days.
metalaxyl Subdue 2E	1-4 fluid ounces 2-5 fluid ounces	Soil Drench. Apply every 2 to 3 months as needed. Soil Drench on Established Plants in Landscape. Broadcast or band with enough water to cover root zone. After application, irrigate with 1/2 inch water if rain does not occur within 7 days.
Subdue 2G	62-125 ounces 4-12.5 oz./cu. yd. media	Broadcast. Covers 1000 sq. ft. of bed area. Repeat at 2 to 3 month intervals as needed. Dry Soil Mix or Incorporated. Thoroughly mix and irrigate with enough water to wet root zone. Retreat as needed after 2 to 3 months.
propamocarb Banol 67S metalaxyl + thiophanate-methyl DRENCHPAK	25 fluid ounces 1 pkg. 3336 + 1 pkg. Subdue II 1.5 pkg. 3336 + 1 pkg. Subdue II	Soil Drench. Repeat at 3 to 4 month intervals. At Seeding: Mix 1 gallon of stock solution per 100 gallons of drench solution. Agitate gently. Apply 0.5 to 1 pint of solution per square foot of bench or bed area at 21- to 28-day intervals as needed. At Transplanting: Apply 1 to 2 pints of solution per square foot of bench or bed area and repeat at 21- to 28-day intervals as needed. Agitate gently.

Nematode Pests Of Holly

Nematodes are microscopic worms that feed on the feeder root system of plants. Generally, damaging populations of these pests are limited to sandy or sandy loam soils. Several species of the root-knot and ring nematode are known to attack Chinese and Japanese holly. Serious nematode damage on holly is rarely seen in the landscape, though some damage is sometimes seen on field-grown holly. Generally, container-grown holly will be largely free of damaging nematodes.

Typical symptoms of nematode injury such as yellowing of the leaves, slowed growth, and poor response to fertilizers or irrigation usually don't appear until the roots have been badly damaged. Damage related to poor soil fertility, improper plant establishment, drought, and similar disorders can easily be mistaken for nematode injury. On root-knot damaged holly, numerous, small galls or swellings will appear on the feeder roots (Figure 5).



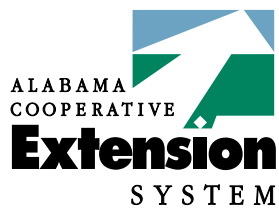
Figure 5. Galls produced by root-knot nematode on roots of Japanese holly cv 'Helleri'. (Courtesy of R. Jones, North Carolina State University).

Often, established hollies will tolerate some nematode damage without any noticeable injury to the plant.

In the landscape, a little planning will go a long way towards minimizing the risk from nematodes. Since damaging nematodes are most likely to occur in the soils of old vegetable gardens, a nematode assay should be run on soil from these areas before any plants are established. Before planting any field for balled and burlapped (B&B) holly production, a nematode soil assay should be run. If root-knot or lesion nematode are found in landscape beds, plant a holly cultivar resistant to that nematode. In field nurseries, do not plant holly in those fields known to be infested with damaging nematodes.

The yaupon and 'Burford' Chinese holly are resistant to the ring nematode while cultivars of the Japanese holly are not. The 'Burford' Chinese holly is, however, sensitive to attack by the southern root-knot nematode, the most common nematode pest of vegetables and ornamentals. The reaction of other hollies to plant parasitic nematodes is largely unknown. Additional watering, mulching, and fertilizing to need may improve the health and restore the beauty of nematode-damaged plants. Adding compost to landscape beds may also help plants recover from nematode damage. Severely stunted plants will rarely respond to better care and should be replaced with a nematode resistant plant. See Extension Circular ANR-689, "Nematode Pests of Flowers and Woody Plants," for more information on nematode resistant woody plants.

Holly fanciers and nursery operators should not propagate holly in non-sterile field soil. Preferably, holly cuttings should be rooted in a bark mix using the same precautions already described under *Pythium* and *Phytophthora* root rot control. If field soil is used, make sure that it has been heat or steam sterilized. Avoid rooting cuttings in ground beds, regardless whether or not the soil can be sterilized.



ANR-1087

Austin Hagan, *Extension Plant Pathologist*, Professor, Entomology and Plant Pathology at Auburn University

Use pesticides **only** according to the directions on the label. Follow all directions, precautions, and restrictions that are listed. Do not use pesticides on plants that are not listed on the label.

The pesticide rates in this publication are recommended **only** if they are registered with the Environmental Protection Agency and the Alabama Department of Agriculture and Industries. If a registration is changed or cancelled, the rate listed here is no longer recommended. Before you apply any pesticide, check with your county Extension agent for the latest information.

Trade names are used **only** to give specific information. The Alabama Cooperative Extension System does not endorse or guarantee any product and does not recommend one product instead of another that might be similar.

For more information, call your county Extension office. Look in your telephone directory under your county's name to find the number.

Issued in furtherance of Cooperative Extension work in agriculture and home economics, Acts of May 8 and June 30, 1914, and other related acts, in cooperation with the U.S. Department of Agriculture. The Alabama Cooperative Extension System (Alabama A&M University and Auburn University) offers educational programs, materials, and equal opportunity employment to all people without regard to race, color, national origin, religion, sex, age, veteran status, or disability.

UPS, 7M32, **Reprinted Feb 2000**, ANR-1087