Dogwood Anthracnose (DA)

DA is a fungal infection caused by the pathogen, *Discula destructiva*. Typical dormant season symptoms include dead limbs, peeling bark, and/or epicormic shoots. After leaf out, typical symptoms include necrotic, distorted leaves and compromised flowering. The infection usually starts on lower leaves and progresses into twigs and branches. If left untreated, **most** trees continue to decline and eventually die.

The initial treatment for DA usually consists of foliar applications of the appropriate fungicides. Since it is the new growth that must be protected and the pathogen thrives in wet conditions, treatment **must** commence and continue throughout the spring vulnerability period. Sanitation (prompt removal of dead and/or dying material) is also vital since it serves as a fungal reservoir to infect new growth.

RTS uses an **organic** two-fungicide protocol consisting of copper and *Bacillus subtilis* (a helpful bacterium) applied via foliar spray to control DA. In WNC, the initial fungicide application typically occurs sometime in early April, followed by two more applications approximately 7-21 days apart. The exact timing depends on initial leaf expansion and the subsequent weather conditions.

Initially, 3 consecutive years of fungicidal treatment are recommended for the best results. Later, assuming appropriate cultural practices (sanitation, supplemental watering, fertilization, mulch & compost) are also instituted, the treatment frequency can usually be reduced.

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College of Agriculture, Food and Environment
Cooperative Extension Service

Plant Pathology Fact Sheet **PPFS-OR-W-06**

Flowering Dogwood Diseases

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Importance

The flowering dogwood (*Cornus florida*) is one of the most popular ornamental trees in Kentucky landscapes. Different cultivars, as well as different species and hybrids, offer a variety of flower and plant characteristics. Unfortunately, some common diseases can threaten the health of dogwood in both residential and commercial settings.

FIGURES 1 & 2. SPOT ANTHRACNOSE APPEARS AS REDDISH-PURPLE SPOTS ON BRACTS OF FLOWERING DOGWOOD.

Spot Anthracnose

Spot anthracnose spoils the beauty of flowering dogwoods by causing spotting and distortion of bracts ("petals"). Leaves, stems, and fruit can also become infected. Spot anthracnose is not considered detrimental to tree health.

Symptoms

Bracts ("petals")

Spots on bracts are reddish purple and may be as large as 1/10 inch in diameter (FIGURES 1 & 2). Affected bracts may result in disfigured flowers, and heavily infected flower buds may never open. Early blooming cultivars are more susceptible to spot anthracnose than late-blooming cultivars.

Leaves, fruit & stems

Leaf spots appear as circular or angular dark purple areas (FIGURE 3) usually less than 1/25 inch in diameter. Diseased leaf tissues often drop out, leaving holes or ragged edges within the spots. Severely infected leaves may be reduced in size or killed. Spots on fruit and stems may be dark and are often slightly raised.

FIGURE 3. SPOT ANTHRACNOSE SYMPTOMS ON DOGWOOD FOLIAGE.

Cause & Disease Development

Spot anthracnose is caused by the fungus *Elsinoe corni*. This pathogen overwinters in diseased shoots, releasing spores during spring bloom. Spores are carried by wind and splashing water to susceptible tissues.

Disease Management

Site selection

Dogwoods grow as understory trees in the forest and prefer partly shaded locations. In the landscape, dogwoods flourish in shaded locations with morning sun that allows moisture on foliage to evaporate early in the day.

Planting material selection

- Purchase healthy trees that are free of disease symptoms.
- Plant cultivars that have shown resistance to this disease (TABLE 1). Note that these flowering dogwood cultivars are susceptible:

  Rainbow, Cherokee Princess, Springtime, Barton White, Cloud 9, Dwarf White, Ozark Spring, Pink Beauty, Stoke's Pink, and Cherokee Daybreak.

TABLE 1. DOGWOOD CULTIVARS RESISTANT/TOLERANT TO SPOT ANTHRACNOSE.

Flowering dogwood *Cornus florida*	**Oriental dogwood** *Cornus kousa*	**Dogwood hybrid** *C. florida* X *C. kousa*
Cherokee Brave Cherokee Chief Cherokee Sunset Plena Weaver's White Welch's Bay Beauty	National Milky Way Select	Stellar Pink

Cultural practices

- Prune dogwoods and surrounding plant material to increase air circulation.
- Avoid use of overhead sprinklers that wet foliage.
- Prune and destroy dead branches as they occur; prune trunk sprouts in autumn.
- Rake and destroy fallen leaves and petals.

Fungicides

- Preventative fungicides may be warranted in the case of valuable dogwoods or if infected trees are nearby; fungicides will not cure already-infected plant tissues.
- Fungicides should be applied beginning at bud break in spring and continued biweekly until weather becomes warmer and drier; thorough coverage is essential.
- Contact a local county Extension office for specific fungicide recommendations.

DOGWOOD ANTHRACNOSE

Dogwood anthracnose can be prevalent in native dogwood populations in Kentucky forests, as well as in landscapes where dogwoods grow in shaded locations. This aggressive disease can result in tree death. Dogwood anthracnose is not to be confused with dogwood spot anthracnose (discussed previously) or shade tree anthracnose (affects other shade trees, but not dogwood).

Symptoms

Leaves

Foliar symptoms initially develop on lower branches and then progress upward. Small, circular spots with purple borders (FIGURE 4) enlarge into irregularly-shaped tan blotches along leaf margins (FIGURES 5 & 6) and veins; entire leaves may be killed. Blighted leaves often cling to branches even after normal leaf drop in autumn.

FIGURE 4. DOGWOOD ANTHRACNOSE BEGINS AS SMALL CIRCULAR SPOTS WITH PURPLE BORDERS.
FIGURE 5. LEAF SPOTS ENLARGE TO FORM LARGE BLOTCHES ALONG LEAF MARGINS.
FIGURE 6. LESIONS MAY EXTEND ALONG LEAF VEINS (PHOTO SHOWS CHEROKEE DAYBREAK, A VARIEGATED CULTIVAR).
FIGURE 7. BRANCH CANKERS APPEAR AS DARK BROWN DISCOLORED AREAS BENEATH BARK.

Twigs, branches & trunk

Twig and branch infections (FIGURE 7) occur through wounds or through succulent shoots. When shoot dieback reaches tree branches or trunks, cankers form at the point of intersection. Cankers appear as sunken areas with dark-brown discolored areas beneath bark. Infection of epicormic shoots produced from dormant buds on stressed or declining trees may also lead to trunk cankers. Tree death usually results when multiple cankers girdle the main stem.

Cause & Disease Development

The pathogen, *Discula destructiva*, overwinters in diseased plant material on trees and on the ground in leaf litter. Fungal spores are released in spring and carried by wind-driven rain or splash. Spread also occurs when infected trees are transplanted from the wild or when infected nursery stock is introduced to a new area. Dogwood anthracnose is favored by wet, rainy weather and prolonged leaf wetness.

Disease Management

Site selection

Dogwoods grow as understory trees in forests and prefer partly shaded locations. In the landscape, dogwoods flourish in shaded locations with morning sun that allows moisture on foliage to evaporate early in the day.

Planting material selection

- Purchase healthy trees that are free of disease symptoms.
- Do not transplant dogwood trees from forests.
- Select dogwood cultivars with tolerance or resistance to dogwood anthracnose (TABLE 2), especially when planting in high-risk sites (e.g. heavy shade or nearby diseased dogwoods).

Table 2. Dogwood cultivars resistant/tolerant to dogwood anthracnose

Flowering dogwood *Cornus florida*	Oriental dogwood *Cornus kousa*	Dogwood hybrid *C. florida* X *C. kousa*
Appalachian Spring	Julian Milky Way Milky Way Select Steeple	Aurora Celestial Constellation Galaxy Red Steeple Ruth Ellen Sellar Pink Star Dust

Cultural practices

- Water during dry periods to reduce drought stress.
- Prune dogwoods and surrounding plant material to increase air circulation.
- Avoid use of overhead sprinklers that wet foliage.
- Maintain a 2- to 4-inch layer of organic mulch (e.g., wood chips) over the root zone to help maintain soil moisture and reduce competition from grasses and ground covers.
- Avoid mechanical injuries, such as poor pruning cuts and those caused by lawn mowers or string trimmers.
- Diagnose and treat insect and other disease problems appropriately.
- Prune and destroy dead branches as they occur; prune trunk sprouts in autumn.
- Rake and destroy fallen leaves in autumn.
- Test soil pH and maintain pH at 5.5 to 6.8 to reduce stress.

Fungicides

- Preventative fungicides may be warranted in the case of valuable dogwoods or if infected trees are nearby; fungicides will not cure already-infected plant tissues.
- Fungicides should be applied beginning at bud break in spring and continued biweekly until weather becomes warmer and drier; thorough coverage is essential.
- Contact a local county Extension office for specific fungicide recommendations.

Powdery Mildew

Powdery mildew can threaten the beauty of dogwoods in commercial and home landscapes. It may also be troublesome in nurseries, particularly on seedling trees. It may appear on plantings in open areas, as well as in heavily shaded sites. While not lethal, powdery mildew weakens trees, slows growth, and reduces flower production, especially under high disease pressure.

Symptoms & Signs

White, powdery fungal growth (consisting of mycelia and spores) on foliage is the distinguishing feature of powdery mildew (Figure 8). Later in the season, tiny dark specks (fungal fruiting bodies called chasmothecia; formerly called cleistothecia) may appear embedded in the mildew. Infected new growth turns gray and dull (Figure 9) prior to development of visible powdery fungal growth;

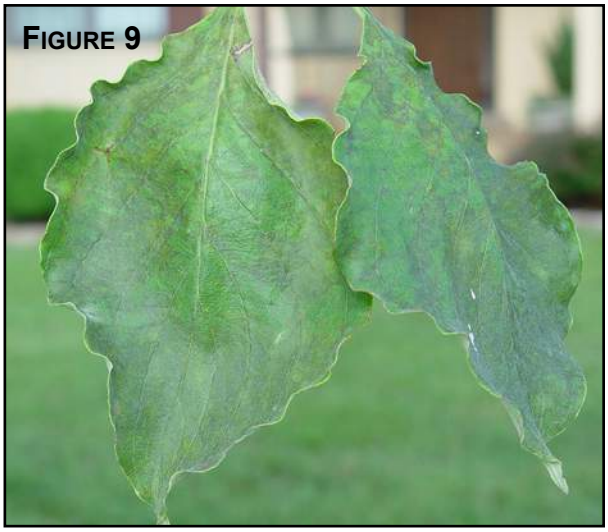

Figure 8. The presence of a white powdery fungal growth (mycelia and spores) is indicative of powdery mildew.
Figure 9. New growth infected with the powdery mildew pathogen appears dull and grayish with slight distortion prior to the development of visible fungal growth.

leaves become slightly distorted. Older leaves develop reddish or purplish irregular blotches on upper surfaces. Scorching of leaf tips and edges may also occur.

Cause & Disease Development

Two different fungi cause powdery mildew in dogwood: *Erysiphe pulchra* (formerly known as *Microsphaera pulchra*, asexual stage *Oidium* sp.) is the most prevalent, while *Phyllactina guttata* (formerly known as *P. corylea*, asexual stage *Ovulariopsis* sp.) is less common. Both pathogens cause similar symptoms and both require similar environmental conditions in order for disease to develop. High humidity is essential for infection, but the fungi are not dependent upon leaf wetness for infection and spread. Asexual spores (conidia) are spread by air currents throughout the growing season. The powdery mildew fungi overwinter as resilient survival structures (chasmothecia/cleistothecia) in buds, bark crevices, and fallen plant debris.

Disease Management

Resistant cultivars

Select dogwood cultivars with tolerance or resistance to powdery mildew (Table 3). Note that flowering dogwood (*Cornus florida*) cultivars Rainbow and Cherokee Daybreak, and red-twig dogwood (*Cornus sericea*) are susceptible; Cornelian cherry dogwood (*Cornus mas*) is resistant.

Table 3. Dogwood cultivars resistant/tolerant to powdery mildew

Flowering dogwood *Cornus florida*	Oriental dogwood *Cornus kousa*	Dogwood hybrid *C. florida* X *C. kousa*
Appalachian Joy	Milky Way	Aurora
Cherokee Brave	Milky Way Select	Constellation
Jean's Appalachian Snow	National	Celestrial
Karen's Appalachian Blush		Stellar Pink
Kay's Appalachian Mist		Stardust

Cultural practices

- Avoid practices that stimulate rapid growth or succulent growth, which encourages powdery mildew infections. These include excessive nitrogen fertilizer, heavy pruning, and excessive irrigation.
- Follow good cultural practices, such as:
  - > Apply organic mulch over the root zone.
  - > Prune out dead branches.
  - > Improve air movement and light penetration by thinning and pruning nearby vegetation.

Fungicide applications

- Fungicides protect healthy leaves from infection, but they will not cure leaves that are already infected.
- Contact a local county Extension agent for currently recommended fungicides.

Other Fungal Leaf Spots

Several other fungi cause spotting on foliage of dogwood. The fungus *Septoria cornicola* is the most common, causing angular grayish spots with dark purple margins (Figure 10). Other fungi, including *Cercospora, Phyllosticta*, and *Pestalotia*, occasionally cause leaf spotting as well. Fungal leaf spot diseases are most common during wet seasons and in moist, shaded locations.

Figure 10. Septoria leaf spot causes angular spots with dark purple margins to form on infected leaves.

Disease Management

- Rake and destroy infected leaves in autumn.
- Preventive fungicide sprays applied at bud break may be warranted if disease has been severe the previous year, and if the specimen is valuable. Contact a local county Extension agent for currently recommended fungicides.

Additional Resources

Dogwood disease management information

- Fungicides for Management of Landscape Woody Ornamental Diseases (PPFS-OR-W-14) http://plantpathology.ca.uky.edu/files/ppfs-or-w-14.pdf
- Homeowner's Guide to Fungicides (PPFS-GEN-07) http://plantpathology.ca.uky.edu/files/ppfs-gen-07.pdf
- Landscape Sanitation (PPFS-GEN-04) http://plantpathology.ca.uky.edu/files/ppfs-gen-04.pdf
- Woody Plant Disease Management Guide for Nurseries and Landscapes (ID-88) http://www2.ca.uky.edu/agcomm/pubs/id/id88/id88.pdf
- IPM for Select Deciduous Trees in Southeastern US Nursery Production http://wiki.bugwood.org/IPM_book
- Powdery mildew of dogwoods: Current Status and Future Prospects http://apsjournals.apsnet.org/doi/pdf/10.1094/PDIS-93-11-1084

Other problems common to dogwood

- How Dry Seasons Affect Landscape Plants (6 MB) (ID-89) http://www2.ca.uky.edu/agcomm/pubs/id/id89/id89.pdf
- Insect Borers of Trees and Shrubs (ENT-43) http://www2.ca.uky.edu/entomology/entfacts/entfactpdf/ent43.pdf
- Leaf Scorch and Winter Drying of Woody Plants (PPFS-OR-W-17) http://plantpathology.ca.uky.edu/files/ppfs-or-w-17.pdf
- Stress & Decline in Woody Plants (9 MB) (ID-50) http://www2.ca.uky.edu/agcomm/pubs/id/id50/id50.pdf
- Transplant Shock: Disease or Cultural Problem? (1.7 MB) (PPFS-OR-W-19) http://plantpathology.ca.uky.edu/files/ppfs-or-w-19.pdf
- Tree Wounds—Invitations to Wood Decay Fungi (3 MB) (PPFS-OR-W-01) http://plantpathology.ca.uky.edu/files/ppfs-or-w-01.pdf
- Dogwoods for American Gardens https://extension.tennessee.edu/publications/Documents/PB1670.pdf

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