

# Decline of Flowering Dogwood

Gene W. Wood<sup>1</sup>

## Introduction

To those who truly take note of the eastern hardwood forests, spring is ushered by the smiles and laughter of flowering dogwood. To them this lovely frivolity annually opens a new chapter in the life of the land. Can springtime in the Appalachians and Piedmont ever be adequately arrayed absent the pearls of dogwood blooms? Can fall ever really be fall without the dull reds of dogwood leaves contrasted with the clusters of brilliant red berries that delight the human eye and supplement the gastronomy of multitudes of wild mammals and birds? Could the future actually bring with it such an impoverished landscape and a sadness to those of us for whom dogwood has so richly decorated our memories? Probably!

About 10 years ago I started noticing what appeared to be an atypical number of diseased and dying flowering dogwood trees in the Upper Piedmont region of South Carolina. I sought information on the issue from Clemson University's forest pathologist at that time, Dr. Frank Tainer. Frank quickly informed me that the problem was a disease called dogwood anthracnose caused by the fungus *Discula destructiva*. The consensus of scientific opinions at the time was that the disease would largely be limited to the more northern latitudes and higher elevations of the mountains. However, in the mountains, the disease was expected to cause major losses in dogwood. I had no choice at the time but to accept the collective opinion of the experts even though I knew that the disease had spread at least 10 miles east of the mountains and was in my yard and in my woods.

Since that time, I have witnessed the continued range expansion of dogwood anthracnose and a dramatic decline in dogwood trees in the southern Appalachians

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<sup>1</sup> Professor Emeritus, Dept. of Forestry and Natural Resources, Clemson University, Clemson, SC; Consultant, Windwalker Horse Trails, Inc., Seneca, SC Contact: [gwwindwalker@gmail.com](mailto:gwwindwalker@gmail.com).

and Piedmont. A recent stroll through my own woods suggested that 50 – 75 percent of the dogwoods alive three years ago are now either dead or dying. On Clemson University's Clemson Experimental Forest where I do extensive amounts of trail work and riding it seems that at least half of the dogwood trees I encounter are either dead or dying. The continuing forest inventory data for the Clemson Forest have indicated declines in numbers of dogwood trees. An eventual paucity in numbers of dogwood trees throughout the Appalachians has been largely accepted as a *fact accompli*.

Is anyone paying attention to the disappearance of this fair maiden of the forest who during winter and summer is only a "wallflower," but whose beauty takes center stage in early spring and who is so notable in the annual finale of autumn? Will trail riders while taking a break or lazing over lunch during a spring ride someday audibly ponder "I wonder what happened to all of the dogwood we used to see?" Will new generations of riders who never experienced being welcomed to the forest by the beauty and warmth of dogwoods in spring bloom or fall seed ever miss them? Can the history of the landscape ever be adequately written when there is such a paucity in sensitivity to and appreciation for it?

### **History of The Disease**

Exactly where the fungus *Discula destructiva* originated is unknown. It is assumed to be an introduced organism because its original discoveries were near major ports of entry, Seattle in the West and New York in the East.

Describing the geographical range and spread of this disease, Craig R. Hibben reported the following: "The geographical range of dogwood anthracnose is alarmingly extensive for both its North American host trees. The disease first appeared in 1976 on the mountain dogwood in the Vancouver area of Washington State. Until 1981, its spread had been limited to that state, but by 1983 the disease was reported in Oregon and British Columbia, as well as in one county in Idaho. By 1994, dogwood trees in northern California were affected.

**“Anthracnose was first reported on the flowering dogwood in 1983 in New York, Connecticut, Pennsylvania, and New Jersey. By 1987, the disease had spread north and south, to Massachusetts, Delaware, Maryland, Virginia, and West Virginia. By 1988, it was traced south, primarily along the Appalachian mountain range, and was discovered in high-elevation sites and cool, wet valleys in Georgia, North Carolina, and Tennessee. It was confirmed in Kentucky and Alabama in 1989, Ohio and the District of Columbia in 1990, New Hampshire in 1991, Rhode Island in 1992, Indiana, Vermont, and Michigan in 1993, and Missouri in 1994.”<sup>2</sup>**

Currently the Eastern Forest Environmental Threat Assessment Center reports the occurrence of dogwood anthracnose in all states east of the Mississippi River except for Wisconsin, Mississippi and Florida.<sup>3</sup> The USDA-Forest Service website [www.bugwood.org](http://www.bugwood.org) shows that in 1993 the disease was concentrated in the Mid-Atlantic States and the Appalachians (Fig. 1)<sup>4</sup>, the region in which it continues to have its greatest impact on the forested landscape.

Knight Cox, Manager of Clemson University’s Clemson Experimental Forest has just completed the analysis of the Continuous Forest Inventory (CFI) data that dates from 1961 to 2011. Two hundred permanent plots on the 17,500 ac forest are resurveyed every five years to build the CFI data base.

A summary for the dogwood data is shown graphically in Figure 2. It demonstrates that densities of dogwood (trees per acre) that were in the 2- inch and larger diameter classes increased from 1967 through 1997 and then began a precipitous decline from 45 trees/ac in 1997 to 19 trees/ac in 2011. This is a 58% loss of trees in these size classes in just 14 years. Correspondingly, the percentage of the 200 plots on which living dogwoods in these size classes occurred declined from 20% to just 11%. The timing of these changes corresponds well with the observations that

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<sup>2</sup> <http://www.mastergardenproducts.com/gardenerscorner/savedogwood.htm>

<sup>3</sup> <http://threatsummary.forestthreats.org/threats/threatSummaryViewer.cfm?threatID=38>

<sup>4</sup> <http://www.forestryimages.org>

DISTRIBUTION OF DOGWOOD ANTHRACNOSE  
IN THE  
EASTERN UNITED STATES  
March 5, 1993

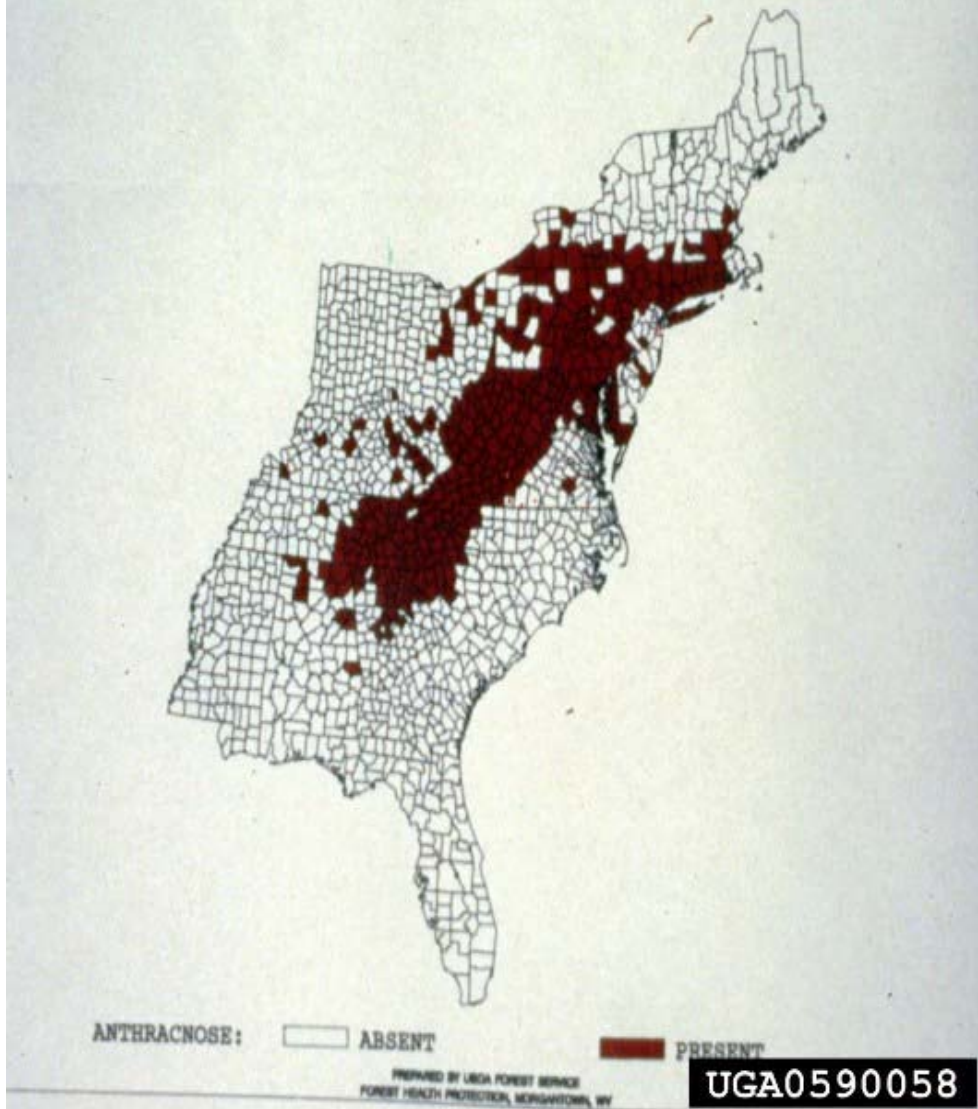
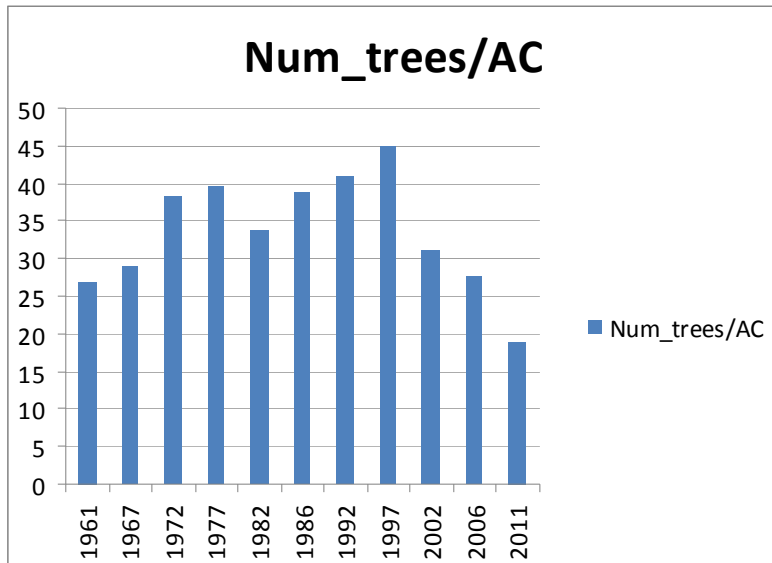


Figure 1. Focal region of dogwood anthracnose in the eastern United States.<sup>3</sup>



**Figure 2. Graph of changes in dogwood densities (trees/acre) on the Clemson Experimental Forest, Clemson, SC from 1961 to 2011. (Graph and data courtesy of Mr. Knight Cox, Manager, Clemson Experimental Forest, Clemson University, Clemson, SC.)**

dogwood anthracnose was causing significant mortality in forests of the southern Blue Ridge Range in the mid-1990s and since then has spread into the foothills and Upper Piedmont region.

### **Disease Symptoms**

Dogwood anthracnose is described in the internet literature primarily by land grant university Extension Service horticulturists. The strong interests among horticulturists is because the only current economic use of the species is as an ornamental tree. The USDA-Forest Service recognizes the problem ([www.bugwood.org](http://www.bugwood.org)), but very little has been written about in a forest context.

All authors describe the symptoms of the onset of the disease as first showing up in the foliage with leaf spots, and leaf blight followed by lower branch dieback and

then cankers on the trunk of the tree , especially at the base of infected branches. Figure 3 shows the lesions on a leaf as “tan spots with reddish-purple margins.” Figure 4 shows the leaves wilting and dying as a result of the infection. Figure 5 shows the lower dead branches and epicormic branching on a tree in an advanced stage of the disease.

The anthracnose fungus survives winter dormancy in infected leaves, twigs and tree limbs. Structures that produce the fungal spores erupt through the bark and on the underside of infected leaves. These spores are transferred to new leaves, flowers, and fresh woody growth by rain water. The infection spreads down the petioles of leaves and into newly developed twigs. From there it spreads into tree limbs or the main tree trunk where it causes cankers which disrupt the flow of water and nutrients. As the cankers develop at the base of limbs, the limbs die. Sufficient development of cankers on the tree trunk eventually kill the tree in about three years.

Anthracnose spreads to the greatest extent and has its most severe impacts in cool, wet spring and fall periods. However, it can spread during cool, wet periods of summer. Dogwood is very shallow rooted and thus susceptible to severe drought. It seems likely that the tree is made more susceptible to the disease when it has been weakened by either prolonged summer or winter droughts, especially winter drought that extends well into early spring. The extensive droughts of the last two decades may partially explain what appears to be a substantial increase in the rate of decline in dogwood in the southern Appalachians and southern Piedmont.



**Figure 3. Leaf lesions appear as tan spots with reddish-purple margins (photo provided by Dr. George Hudler, Cornell University).<sup>5</sup>**

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<sup>5</sup> [http://plantclinic.cornell.edu/FactSheets/dogwood anthracnose/dogwood%20anthracnose.htm](http://plantclinic.cornell.edu/FactSheets/dogwood%20anthracnose/dogwood%20anthracnose.htm)





**Figure 4. Withering and dying leaves infected with dogwood anthracnose. (Photo from M. Daughtrey, *Diseases of Woody Ornamentals and Trees*. APS Press.)<sup>6</sup>**

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<sup>6</sup> [www.umassgreeninfo.org/fact\\_sheets/diseases/dogwood\\_anthracnose.pdf](http://www.umassgreeninfo.org/fact_sheets/diseases/dogwood_anthracnose.pdf)





**Figure 5. Lower branch dieback and epicormic branching of an anthracnose infected dogwood. (USDA-Forest Service, Northeastern Area NA-GR-18)<sup>7</sup>**

### **Prevention and Treatment**

**While horticulturists warn homeowners against transplanting wild dogwood trees from forested areas to their lawns as a measure for prevention of spread from the forest to domestic landscapes, there are no known measures for prevention of spread within and between forested areas. In lawn care situations, the disease might**

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<sup>7</sup> [www.na.fs.fed.us/spfo/pubs/howtos/ht\\_dogwd/ht\\_dog.htm](http://www.na.fs.fed.us/spfo/pubs/howtos/ht_dogwd/ht_dog.htm)

be suppressed by adequate mulching around trees and the use of fungicide sprays. None of this is practical at the forested landscape level.

The best that we can hope for is that there will be some dogwoods that are naturally resistant to the anthracnose fungus and that the progeny of these trees might one day repopulate the forest. However, at this point, such a possibility is only a hope and has no basis in scientific data documentation.

### Summary

Dogwood anthracnose is caused by the fungus *Discula destructiva*. It infects both the mountain dogwood of the Pacific Northwest and flowering dogwood in the East. This fungus is highly virulent and spread throughout most of the eastern hardwood forest in less than 20 years. Its effects in forests appear to be most intense in the Appalachian and Piedmont geographical regions.

The decline in populations of dogwood in the eastern hardwood forests appear to be already substantial and are likely to be dramatic as time goes on. No practical preventive measures or treatments at the forest landscape level are available to land managers. It is hoped that there will be some individual trees in the forest that have a natural resistance to the fungus and that these trees will produce progeny that will continue the species, even if in greatly diminished numbers and densities from those of the mid-twentieth century.