Occurrence of Diseases in Native Stands of Flowering Dogwood in North Alabama

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Luther Waters, Director Auburn University Auburn, Alabama

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OCCURRENCE OF DISEASES IN NATIVE STANDS OF FLOWERING DOGWOOD IN NORTH ALABAMA

A. K. HAGAN AND J. M. MULLEN

INTRODUCTION

Flowering dogwood *(Cornus florida),* which ranks among the most popular and widely cultivated trees in residential landscapes, is native to Alabama. Showy bracts, excellent fall color, and good adaptation to a variety of soils have made the flowering dogwood a favorite among Alabama homeowners.

Within the last two decades, the disease dogwood anthracnose has emerged as a serious threat to the health and beauty of both native stands and landscape plantings of flowering dogwood. First reported on flowering dogwood in New York in the mid- to late 1970s, this disease, which is caused by the fungus *Discula destructiva*, spread by the late 1980s into the Appalachian Mountains and nearby upland areas of northern Georgia and eastern Tennessee *(1,3,7,8,10).*

Symptoms of dogwood anthracnose first appear in mid-spring on the leaves as spots with tan to brown centers and a purple border (Figure 1). These spots can quickly expand in size until the leaves are blighted and killed *(3,7)* (Figure 2). Blighted leaves often cling to the tree until the following spring. As the disease progresse, twigs are often invaded by *D. destructiva* and killed (Figure 3). Several years after the first symptoms are seen, elliptical cankers form at the base of the dead twigs on the scaffold branches and trunk. On dying trees, numerous water sprouts or epicormic shoots often appear along the trunk (Figure 4). Typically, this disease begins on the lower limbs and gradually spreads up through the tree canopy. A survey conducted by the USDA Forest Service personnel during the winter of 1989-1990 showed that dogwood anthracnose had spread into native stands of flowering dogwood in National Forest-managed lands at selected locations in the northern third of Alabama *(8).* County-by-county data concerning the distribution and severity of this potentially fatal disease of flowering dogwood were, however, not generated.

Spot anthracnose, which is caused by the fungus *Elsinoe corni*, occurs wherever flowering dogwood are found and is reportedly most common in landscape

Hagan is a professor and Mullen is a diagnostician in the Department of Plant Pathology.

plantings on trees grown in full sun. Although this disease is thought to have little impact on tree health, bracts and sometimes the leaves of susceptible flowering dogwoods often are badly defaced or distorted *(9)* (Figures 5 and 6). Information concerning the occurrence of spot anthracnose in native stands of flowering dogwood in Alabama is not available.

Blighting of the bracts and flowers of flowering dogwood has been attributed to the disease Botrytis blight (Figure 7). Although the causal fungus, *Botrytis cinerea,* is a common and often destructive pathogen on annual and perennial flowers, this disease has rarely been reported on flowering dogwood in residential or commercial landscapes. As is the case with spot anthracnose, no information is available concerning the occurrence or distribution of Botrytis blight on flowering dogwood in Alabama.

SURVEY METHODS

Between mid-May and mid-June in 1991, 1992, and 1993, selected forest sites were surveyed by Alabama Agricultural Experiment Station personnel to determine the distribution and severity of leaf and bract diseases in native stands of flowering dogwood in Alabama. Survey sites, which are listed by county and location in Table 1, were located in Alabama state parks, national forests, national wildlife refuges, and community hunting lands in the northern half of Alabama (see map). Strip cruise plots containing six to 382 flowering dogwoods ranging in size from seedlings to mature trees were located along access roads as well as hiking and riding trails. The location of each plot was marked on U.S. Geological Survey (1:24000 scale) topographic maps and the approximate elevation noted. Although the majority of survey sites were visited each year, a few were checked only once. The foliage and bracts of each flowering dogwood noted within the plot area were examined for the characteristic symptoms of dogwood anthracnose, spot anthracnose, and Botrytis blight.

In 1992 and 1993, the severity of dogwood anthracnose was rated using a modified Miekle-Langdon scale: 0 = dead tree; 1 = 75 to 100% of leaves diseased with numerous epicormic shoots on the main trunk and severe limb dieback; 2 = 50 to 75% of leaves diseased with some epicormic shoot development and extensive shoot dieback; 3 = 25 to 50% of leaves diseased with some twig dieback; 4 = 1 to 25% of leaves spotted or blighted; 5 = tree healthy. In those same two years, the incidence of dogwood anthracnose, spot anthracnose, and Botrytis blight was expressed as a percentage of total number of trees examined. Bract and leaf samples collected from selected symptomatic trees were examined for the presence of the fruiting bodies and conidia of the causal fungi of these diseases.

RESULTS

Although no numerical disease ratings were taken in 1991, observations concerning the occurrence and distribution of dogwood anthracnose at each site were recorded (Table 1). That year, heaviest leaf spot and blight symptoms were seen at elevations of 1,600 to 1,800 feet on flowering dogwood at one site in Monte Sano

State Park in Madison County and along several hiking trails in DeSoto State Park in DeKalb County. The twig and limb dieback, which is usually associated with severe disease outbreaks, was not observed but few of the trees at either park were free of symptoms of dogwood anthracnose. At both locations, smaller flowering dogwoods growing in heavy shade suffered the heaviest spotting and blighting of the leaves. At one site at Guntersville State Park in Madison County and along the Little River Canyon in DeKalb County, symptoms of dogwood anthracnose were seen on a few scattered trees. Elevation at both sites was approximately 1,100 to 1,200 feet. This disease was also found at an elevation of 1,000 feet on a single flowering dogwood at Buck's Pocket State Park in DeKalb County and Talladega National Forest in Cleburne County. Flowering dogwood at several other sites in the Talladega National Forest in Cleburne County as well as nearby Cheah State Park in Clay County were free of symptoms of dogwood anthracnose. Also, none of the trees checked in Wheeler State Park in Lauderdale County, Wind River State Park in Tallapoosa County, and Oak Mountain State Park were diseased.

In 1991, no observations concerning the occurrence of spot anthracnose and Botrytis blight were made.

For 1992, the survey area was broadened to include several additional counties in northwestern Alabama. At several survey sites, the incidence and severity of dogwood anthracnose were substantially higher as compared with levels seen in the previous year. At several state park or national forest sites in Madison, DeKalb, and Cleburne Counties, dogwood anthracnose damaged 81 to 100% of the flowering dogwoods examined (Table 1). Heaviest disease-related blighting of the leaves, shoot dieback, and epicormic shoot development, as indicated by a disease severity rating of 2.12, was noted in a stand of flowering dogwood at Monte Sano State Park in Madison County. At this and a Cleburne County site, mature flowering dogwoods, whose canopies were exposed to direct sunlight for much of the day, appeared to suffer far less damage than did trees in the shaded forest understory. Considerable leaf blight and shoot dieback were also observed on trees examined at several sites in DeSoto State Park and Little River Canyon in DeKalb County. In northeast Alabama, light to moderate spotting of the leaves was recorded at elevations of 600 to 1,000 feet at several additional forested sites in DeKalb, Cleburne, Clay, and Marshall Counties. In most instances, the percentage of diseased trees was quite low and damage was very minor. A single symptomatic flowering dogwood was noted along a trail in Bankhead National Forest in Lawrence County. Trees at two sites in Clay County were free of symptoms of dogwood anthracnose as were those examined in Tallapoosa, Shelby, Lauderdale, and Winston Counties.

Overall, the incidence of spot anthracnose and Botrytis blight was far below that recorded for dogwood anthrancose. In 1992, spot anthracnose and Botrytis blight were noted at six and three survey sites, respectively, as compared with 16 for dogwood anthracnose (Tables 1, 2). Across all 28 survey sites, incidence of spot anthracnose on 3,447 trees was 1.1% (Table 2). At a single site in DeSoto State Park, spot anthracnose was seen on the foliage of a number of trees growing

TABLE 1. DISTRIBUTION AND SEVERITY OF DOGWOOD ANTHRACNOSE ON FLOWERING DOGWOOD IN NORTH ALABAMA

County	Location	Elevation	1992 No. trees	1992 No. diseased trees	1992 % diseased trees	1992 Disease rating[1]	1993 No. trees	1993 No. diseased trees	1993 % diseased trees	1993 Disease rating
Blount	Rickwood Cavern SP[2]	900	43	0	0	5	ns[3]			
Calhoun	Rabbittown, Talladega NF	900	ns				108	78	72	3.91
Cherokee	Little River Canyon	1,200	ns				89	89	100	2.37
Clay	Chinnabee Trail, Talladega NF	1,200	84	0	0	5	ns			
Clay	Chinnabee Trail, Talladega NF	800	47	0	0	5	ns			
Clay	Cheaha SP, Talladega NF	1,200	94	0	0	5	ns			
Clay	Able Gap, Talladega NF	800	87	2	2.3	4.98	116	4	3.4	4.96
Cleburne	Coleman Lake, Talladega NF	1,200	155	149	96	3.52	166	153	92	3.62
Cleburne	Brymer Mountain, Talladega NF	1,000	127	19	15	4.84	124	38	31	4.57
Dekalb	Little River Canyon	1,200	66	60	91	3.41	106	103	97	3.31
Dekalb	Little River Canyon	1,000	70	60	86	4	ns			
Dekalb	Nature Trail, DeSoto SP	1,600	179	152	85	3.5	170	165	97	2.54
Dekalb	Rhododendron Trail, DeSoto SP	1,800	127	127	100	2.58	143	142	99	2.01
Dekalb	Rhododendron Trail, DeSoto SP	1,600	186	151	81	3.56	ns			
Dekalb	Picnic Area, Buck's Pocket SP	1,100	44	7	16	4.81	ns			
Dekalb	High Bluff Trail, Buck's Pocket SP	1,000	41	24	58	4.19	44	26	59	4.25
Dekalb	Sauty Creek Trail, Buck's Pocket SP	900	ns				44	13	30	4.63
Etowah	Lookout Mountain	800	ns				56	7	13	4.88
Jackson	Skyline Wildlife Management Area	1,600	ns				71	70	99	2.38
Jefferson	Botanical Gardens	600	ns				78	0	0	5
Lauderdale	Wheeler SP	600	122	0	0	5	126	0	0	5

[1]Disease severity was evaluated on each tree using a modified Miekle-Langdon scale: 0 = dead tree; 1 = 75 to 100% of leaves diseased with numerous water sprouts; 2 = 50 to 75% of leaves diseased with extensive twig dieback; 3 = 25 to 50% of leaves diseased with light dieback; 4 = 1 to 25% of leaves diseased; 5 = healthy tree

[2]SP = State Park, NF = National Forest, NWR = National Wildlife Refuge, CP = City Park [3]ns = not surveyed this year

TABLE 1, CONTINUED. DISTRIBUTION AND SEVERITY OF DOGWOOD ANTHRACNOSE ON FLOWERING DOGWOOD IN NORTH ALABAMA

County	Location	Elevation	No. trees	No. diseased trees	% diseased trees	Disease rating[1]	No. trees	No. diseased trees	% diseased trees	Disease rating
			1992				1993			
Lawrence	Trail223H, Bankhead NF	900	104	1	1	4.98	ns			
Lawrence	Bankhead NF	900	ns				102	0	0	5
Lawrence	Logging Road, Bankhead NF	1,000	72	0	0	5	ns			
Lawrence	Sipsey Wilderness, Bankhead NF	900	108	0	0	5	ns			
Limestone	Wheeler NWR	600	ns				29	0	0	5
Madison	Monte Sano SP	1,700	382	382	100	2.12	201	201	100	1.42
Madison	Green Mountain, Huntsville CP	1,300	ns				266	242	91	3.44
Marshall	Nature Trail, Guntersville SP	1,100	116	43	37	4.54	198	95	48	4.45
Marshall	Luckskillet Trail, Guntersville SP	700	305	18	6	4.72	122	27	22	4.89
Marshall	Cascade Trail, Guntersville SP	800	72	2	3	4.86	ns			
Marshall	Bevil Trail, Guntersville SP	800	99	3	3	4.84	ns			
Marshall	Guntersville CP	600	ns				79	10	13	4.88
Shelby	South Rim Trail, Oak Mountain SP	1,000	140	0	0	4	ns			
Shelby	Double Oak Trail, Oak Mountain SP	800	179	0	0	5	315	0	0	5
Shelby	Peavine Trail, Oak Mountain SP	1,000	ns				62	0	0	5
Shelby	Nature Tail, Oak Mountain SP	600	ns				133	0	0	5
St. Clair	St. Claire Community Hunting Area	800					141	0	0	5
Winston	Sipsey Wilderness, Bankhead NF	600	6	0	0	5	ns			
Winston	Houston Rec. Area, Bankhead NF	600	92	0	0	5	ns			
Winston	Bankhead NF	800	ns				83	1	1	4.98
Total trees			3,147	1,200	38.1		3,190	1,464	45.9	

[1]Disease severity was evaluated on each tree using a modified Miekle-Langdon scale: 0 = dead tree; 1 = 75 to 100% of leaves diseased with numerous water sprouts; 2 = 50 to 75% of leaves diseased with extensive twig dieback; 3 = 25 to 50% of leaves diseased with light dieback; 4 = 1 to 25% of leaves diseased; 5 = healthy tree
[2]SP = State Park, NF = National Forest, NWR = National Wildlife Refuge, CP = City Park [3]ns = not surveyed this year.

Clockwise from left:
Figure 1. Typical leaf spot symptoms of dogwood anthracnose on leaves of flowering dogwood.

Figure 2. At later stages of this disease, extensive blighting of the leaves may be seen.

Figure 3. Once the causal fungus invades the twigs and scaffold branches, a large portion of the tree canopy may die.

Clockwise from above:
Figure 4. On severely dogwood anthracnose-damaged trees, numerous water sprouts or epicormic shoots appear on the tree trunk.

Figure 5. Spotting and distortion of the leaves are common symptoms of spot anthracnose.

Figure 6. Spotting and distortion of the bracts are the most noticeable symptoms of spot anthracnose on flowering dogwood.

Figure 7. Large, spreading leaf spot that is associated with Botrytis blight on flowering dogwood.

along the north rim of the Little River Canyon in light shade to full sun. This disease was never found at this or any other survey site on trees growing under heavy shade. On the other hand, the occurrence of Botrytis blight, which was noted only on 0.1% of trees examined, was limited to heavily shaded areas (Table 2). Usually, the brown, spreading leaf lesions associated with this disease developed where senescing bracts had fallen on the leaves.

In 1993, sites in Calhoun, Etowah, Madison, Jackson, Limestone, Cherokee, and St. Clair Counties were added to the dogwood survey while several other sites, particularly in the Bankhead National Forest, were deleted. The health of flowering dogwoods continued to deteriorate at several sites in northeast Alabama, particularly those at higher elevations in DeKalb and Madison Counties (Table 1). As indicated by a disease rating of 1.42, many of the understory trees examined at Monte Sano State Park in Madison County were either dead or close to death. Extensive blighting of the leaves and limb dieback was recorded within the canopy of nearly all of the large flowering dogwoods, even those growing in full sun. Although nearly all the trees checked in a nearby Huntsville City park (elevation 1,300 feet.) were diseased, damage on the majority of those flowering dogwoods was limited to light to moderate spotting of the foliage. In Dekalb County, declines in tree health similar to those found at Monte Sano State Park were seen on flowering dogwood on Lookout Mountain at several sites in DeSoto State Park and along the north rim of the Little River Canyon. Widespread blighting of the leaves, limb dieback, epicormic shoot growth, and some tree mortality were also noted on flowering dogwood on forested sites in northern Jackson County near Tennessee and the south rim of the Little River Canyon in Cherokee County.

At most of the remaining survey sites in northeast Alabama, particularly those at lower elevations, tree damage was generally limited to light to moderate blighting of the foliage and some limb dieback (Table 2). In the Talladega National Forest, disease levels on flowering dogwood progressively declined from Rabbittown in the northeast to Able Gap in the southwest. Similar declines in disease were seen on flowering dogwood checked at the Lookout Mountain sites in Marshall and Etowah Counties, which are southwest of stands of heavily damaged trees on that same mountain at higher elevations in nearby Cherokee and DeKalb Counties. At two sites above Lake Guntersville in Marshall County, light spotting of leaves was seen on a handful of trees. Low levels of dogwood anthracnose, which were noted at two sites in Bucks Pocket State Park were similar to those seen in the previous year. As was the case in 1992, dogwood anthracnose was confirmed at one site in the Bankhead National Forest in 1993 on only a single flowering dogwood tree in Winston County. No anthracnose-damaged dogwoods were found at survey sites along the Tennessee River in Lauderdale, Limestone, and Madison Counties. In addition, flowering dogwoods inspected at sites in Jefferson, Shelby, St. Clair, and Tallapoosa Counties were also free of this disease.

Across all 1993 survey sites, the occurrence of spot anthracnose and Botrytis blight in native stands of flowering dogwood, which was similar to levels seen in the previous year, was again very low (Table 2). Incidence of spot anthracnose and

Botrytis blight on all flowering dogwood inspected at the 28 survey sites was 0.3% and 1.5%, respectively. In 1993, spot anthracnose and Botrytis blight were found at a total of four and nine survey sites, respectively. The highest number of spot anthracnose and Botrytis blight-damaged dogwoods was recorded at a partially shaded lake-front site in Wheeler State Park in Lauderdale County (Table 2).

SUMMARY

Dogwood anthracnose was the most common and destructive of the three foliar diseases recorded during the spring of 1991, 1992, and 1993 in native stands of flowering dogwood in northeastern Alabama. Incidence and severity of this disease peaked on flowering dogwood in the Appalachian Mountains and uplands of the adjoining Piedmont region. Native stands of flowering dogwood hardest hit by this disease were located in Calhoun, Cherokee, Cleburne, DeKalb, Jackson, and Madison Counties. By 1993, numerous flowering dogwoods at several survey sites, as indicated by disease ratings below 3.0, had suffered extensive foliar blighting, limb dieback, or had succumbed to dogwood anthracnose (Table 2). Also, disease incidence figures, which often ranged between 90 and 100% at these sites, have clearly demonstrated the widespread distribution of dogwood anthracnose in this region of Alabama. Disease incidence and severity quickly declined at sites southwest of a line running diagonally from Huntsville in Madison County to Wedowee in Randolph County.

Outside of the extreme northeastern corner of Alabama, the incidence of dogwood anthracnose in native stands of flowering dogwood was extremely low. Over the survey period, only two very lightly diseased trees were found at the upland sites in the Bankhead National Forest in northwest Alabama. In 1991, Forest Service personnel also found at least one diseased tree during a survey of the Bankhead National Forest as well as along the Natchez Trace in Lauderdale County *(8)*. A single tree was also identified in Birmingham near Legion Field. Dogwood anthracnose was not found at any of the survey sites in the Tennessee River Valley west of Huntsville. Throughout the survey period, trees in Blount, Jefferson, Shelby, St. Clair, and Tallapoosa Counties were also free of this disease.

Previous surveys in other southeastern states have suggested that dogwood anthracnose is most damaging in both forest and landscape settings at elevations above 3,000 feet *(1)*. Damage has been found on flowering dogwood at lower elevations but was usually less severe *(1)*. On the other hand, Chellemi *et al. (2)* showed that elevation had only a minor influence on the incidence of dogwood anthracnose. In areas of Alabama where this disease was already well established, foliar blighting and limb dieback was more intense at 1,200 to 1,700 feet than at lower elevations. Severe foliar blighting, limb dieback, and in some cases tree death were recorded at all sites in the Little River Canyon, Coleman Lake in the Talladega National Forest, DeSoto State Park, Skyline Wildlife Management Area, and particularly at Monte Sano State Park. At Buck's Pocket State Park, disease intensity was considerably lower at elevations below 1,000 feet than at higher elevations in nearby DeSoto State Park. Similar observations concerning the re-

Location of survey sites in Alabama.

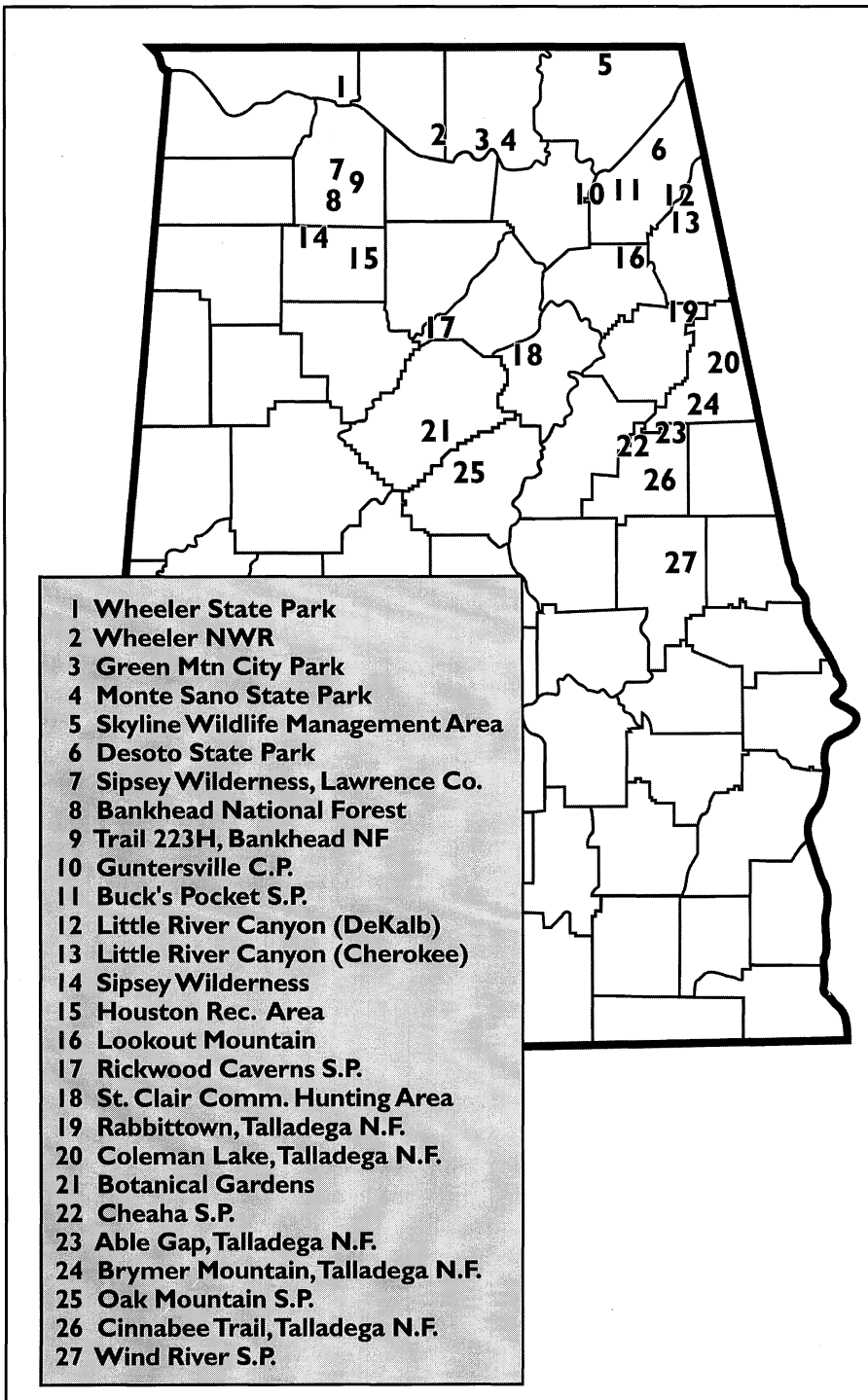

TABLE 2. INCIDENCE OF SPOT ANTHRACNOSE AND BOTRYTIS BLIGHT ON FLOWERING DOGWOOD IN NORTH ALABAMA

County	Location	No. trees	Trees w/SA[1] %	Trees w/BB[2] %	No. trees	Trees w/SA %	Trees w/BB %
		1992			1993		
Blount	Rickwood Cavern SP[3]	43	2.3	0	ns[4]		
Calhoun	Rabbittown, Talladega NF	ns			108	0.9	0
Cherokee	Little River Canyon	ns			89	0	0
Clay	Chinnabee Trail, Talladega NF	84	0	0	ns		
Clay	Chinnabee Trail, Talladega NF	47	0	0	ns		
Clay	Cheaha SP, Talladega NF	94	0	0	ns		
Clay	Able Gap, Talladega NF	87	0	0	116	0	0
Cleburne	Coleman Lake, Talladega NF	155	0	0	166	0.6	0
Cleburne	Brymer Mountain, Talladega NF	127	0	0	124	0	0.8
Dekalb	Little River Canyon	66	0	0	106	0	0
Dekalb	Little River Canyon	70	0	0	ns		
Dekalb	Nature Trail, DeSoto SP	179	0	0	170	0	0
Dekalb	Rhododendron Trail, DeSoto SP	127	0	0	143	0	0
Dekalb	Rhododendron Trail, DeSoto SP	186	13.4	0	ns		0
Dekalb	Picnic Area, Buck's Pocket SP	44	0	0	ns		0
Dekalb	High Bluff Trail, Buck's Pocket SP	41	0	0	44	0	0
Dekalb	Sauty Creek Trail, Buck's Pocket SP	ns			44	6.8	2.3
Etowah	Lookout Mountain	ns			56	0	0
Jackson	Skyline Wildlife Management Area	ns			71	0	0
Jefferson	Botanical Gardens	ns			78	0	3.8
Lauderdale	Wheeler SP	122	0	1.6	126	3.2	15.9
Lawrence	Trail223H, Bankhead NF	104	0	0	ns		
Lawrence	Bankhead NF	ns			102	0	2.9
Lawrence	Logging Road, Bankhead NF	72	0	0	ns		
Lawrence	Sipsey Wilderness, Bankhead NF	108	1.9	0	ns		
Limestone	Wheeler NWR	ns			29	0	0
Madison	Monte Sano SP	382	0	0	201	0	0
Madison	Green Mountain, Huntsville CP	ns			266	0	0
Madison	Wheeler NWR	ns			18	0	0
Marshall	Nature Trail, Guntersville SP	116	0	0	198	0	0
Marshall	Luckskillet Trail, Guntersville SP	305	0.3	0	122	0	4.1
Marshall	Cascade Trail, Guntersville SP	72	0	0	ns		
Marshall	Bevil Trail, Guntersville SP	99	1	0	ns		
Marshall	Guntersville CP	ns			79	0	3.8
Shelby	South Rim Trail, Oak Mountain SP	140	0	0	ns		
Shelby	Double Oak Trail, Oak Mountain SP	315	0	0.6	315	0	1.1
Shelby	Peavine Trail, Oak Mountain SP	ns			62	0	0
Shelby	Nature Tail, Oak Mountain SP	ns			133	0	0
St. Clair	St. Claire Community Hunting Area	ns			141	0	0

[1]SA=spot anthracnose. [2]BB=botyrtis blight. [3]SP = State Park, NF = National Forest, NWR = National Wildlife Refuge, CP = City Park. [4]ns = not surveyed this year.

TABLE 2, CONTINUED. INCIDENCE OF SPOT ANTHRACNOSE AND BOTRYTIS BLIGHT ON FLOWERING DOGWOOD IN NORTH ALABAMA

County	Location	No. trees	Trees w/SA[1]	Trees w/BB[2]	No. trees	Trees w/SA	Trees w/BB
		1992			1993		
Tallapoosa	Wind River SP	163	0.6	0	179	0	1.1
Winston	Sipsey Wilderness	6	0	0	ns		
Winston	Houston Rec. Area, Bankhead NF	92	8.7	1.1	ns		
Winston	Bankhead NF	ns			83	0	10
Total trees		3,147			3,190		

[1]SA=spot anthracnose. [2]BB=botyrtis blight. [3]SP = State Park, NF = National Forest, NWR = National Wildlife Refuge, CP = City Park. [4]ns = not surveyed this year.

lationship of dogwood anthracnose to elevation were made in Guntersville State Park in Marshall County as well as the Wheeler National Wildlife Refuge, Green Mountain City Park, and Monte Sano State Park in Madison County. Failure to find this disease at higher elevations in the southern half of the Talladega National Forest, Cheah State Park, and Oak Mountain State Park is due entirely to the fact that these sites were outside the range of dogwood anthracnose at the time of this survey.

In other states, the worst foliar blighting and tree mortality were observed on flowering dogwood growing under heavy shade on both forested and landscape sites *(3,4)*. Erbaugh *et al. (5)* recently confirmed that low light intensity greatly enhanced the severity of dogwood anthracnose. In Alabama, symptom severity and tree mortality was also highest on understory flowering dogwood growing on heavily shaded sites. Where disease incidence was high, particularly at Monte Sano and DeSoto State Parks, damage was always much lower on trees growing in partial to full sun than on those found under heavy shade.

Overall, dogwood anthracnose appears to be spreading in a southwesterly direction through the Talladega National Forest towards the Birmingham metropolitan area as well as along Lookout Mountain into Gadsden. Disease incidence and severity, which peaked near Alabama's border with Georgia and Tennessee, declined sharply as the distance of the survey sites from the borders of these two states increased. Although continued spread of this disease across the northern half of Alabama is likely, the rate of spread and damage potential is difficult to predict. In Virginia, North Carolina, South Carolina, and Georgia, disease outbreaks have, however, been largely confined to the Appalachian Mountains and Piedmont region *(1,3)*. Spread of this disease from the cooler upland areas into the hotter forest and landscape plantings in the coastal plain region of these four states has been slow. A similar distribution pattern will likely be repeated in Alabama's coastal plain where hot summer weather should suppress secondary disease spread and further reduce the risk of damaging outbreaks of dogwood anthracnose.

On the other hand, the impact of spot anthracnose and Botrytis blight on the health and vitality of flowering dogwood in Alabama's forests was minimal. Both

diseases were distributed throughout north Alabama but incidence of either of these diseases at any specific survey site usually was minimal. As has been previously noted *(6),* the occurrence of spot anthracnose was restricted to trees growing in partial to full sunlight. Flowering dogwoods found in moderate to heavy shade were consistently free of this disease. In fact, planting flowering dogwood on partially to heavily shaded sites is among the most effective controls for spot anthracnose in residential and commercial landscapes. Like dogwood anthracnose, development of Botrytis blight was largely limited to trees in partial to heavy shade. Typically, symptoms were seen shortly after bract fall and only a few, scattered leaves on any given tree were damaged. As a result of the sporadic occurrence of Botrytis blight, specific control measures for this disease rarely need to be implemented.

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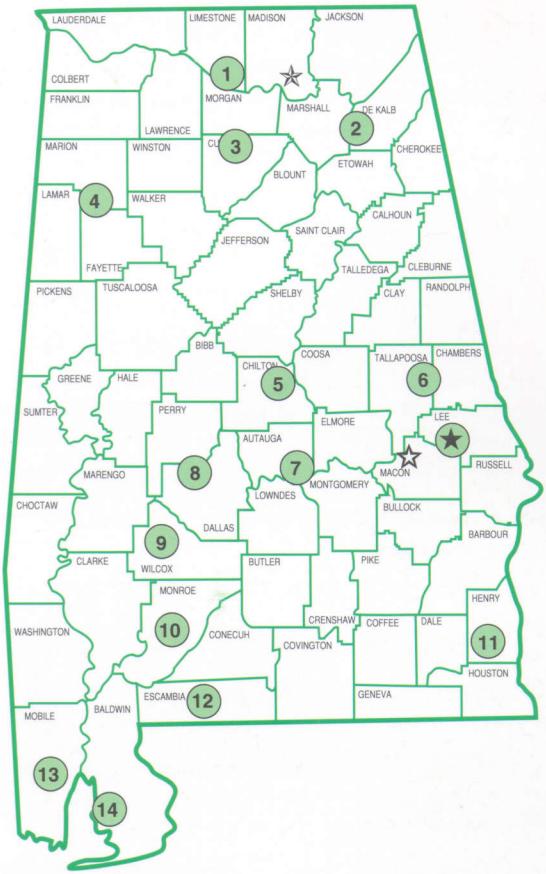
AUBURN UNIVERSITY

With an agricultural research unit in every major soil area, Auburn University serves the needs of field crop, livestock, forestry, and horticultural producers in each region in Alabama. Every citizen of the state has a stake in this research program, since any advantage from new and more economical ways of producing and handling farm products directly benefits the consuming public.



Research Unit Identification

★ Main Agricultural Experiment Station, Auburn.
✯ Alabama A&M University
☆ E. V. Smith Research Center, Shorter.

1. Tennessee Valley Research and Extension Center, Belle Mina.
2. Sand Mountain Research and Extension Center, Crossville.
3. North Alabama Horticulture Station, Cullman.
4. Upper Coastal Plain Research Station, Winfield.
5. Chilton Area Horticulture Station, Clanton.
6. Piedmont Research Station, Camp Hill.
7. Prattville Experiment Field, Prattville.
8. Black Belt Research and Extension Center, Marion Junction.
9. Lower Coastal Plain Research Station, Camden.
10. Monroeville Experiment Field, Monroeville.
11. Wiregrass Research and Extension Center, Headland.
12. Brewton Experiment Field, Brewton.
13. Ornamental Horticulture Station, Spring Hill.
14. Gulf Coast Research and Extension Center, Fairhope.