Occurrence of Dogwood Anthracnose, Spot Anthracnose, and Botrytis Blight in Native Stands of Flowering Dogwood in North Alabama[1]

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Abstract

In North Alabama, dogwood anthracnose (*Discula destructiva*) was the most common and damaging disease identified in stands of native flowering dogwood (*Cornus florida*). In the spring of 1992 and 1993, this disease was observed at 59% and 64%, respectively, of the forest and park sites surveyed. Highest incidence and severity of dogwood anthracnose was recorded in the Appalachian Mountains and adjoining foothills of the Piedmont at elevations of 372 to 558 m (1200 to 1800 ft) in the northeastern corner of Alabama near Georgia and Tennessee. At selected sites in Cherokee, Cleburne, DeKalb, Jackson, and Madison Counties, approximately 90% to 100% of the trees examined displayed diagnostic symptoms of dogwood anthracnose. Extensive blighting of the leaves, shoot dieback, epicormic shoot formation, and sometimes tree death were noted. Lower levels of anthracnose damage were recorded on trees in several additional counties in northeast Alabama. Survey results indicate that this disease has not spread onto flowering dogwood in other counties in North Alabama. Spot anthracnose (*Elsinoe corni*) and Botrytis blight (*Botrytis cinerea*) were found far less frequently and at fewer locations on flowering dogwood than dogwood anthracnose. Typically, damage attributed to either disease was unobtrusive and of little threat to tree health.

Index words: *Cornus florida*, *Discula destructiva*, *Elsinoe corni*, *Botrytis cinerea*, disease.

Species used in this study: Flowering dogwood (*Cornus florida* L.).

Significance to the Nursery Industry

Within the last decade, dogwood anthracnose has emerged as a significant threat across the South to the health and beauty of flowering dogwoods in production nurseries as well as residential and commercial landscapes. Results of this survey show that this disease has spread into native stands of flowering dogwood along the Appalachian Mountains and adjoining foothills in northeast Alabama. The most extensive damage to flowering dogwoods was seen on trees growing under partial to full shade at elevations above 372 m (1200 ft). The appearance of symptoms on trees at elevations down to 186 m (600 ft) indicate that this disease potentially could spread through rural and urban landscapes plantings of flowering dogwood across much of the northern half of Alabama. On native flowering dogwood, the occurrence of spot anthracnose and Botrytis blight generally was much lower than that of dogwood anthracnose. Survey results confirmed previous observations that establishment of flowering dogwood on shaded sites is an effective control for spot anthracnose.

Introduction

Flowering dogwood (*Cornus florida* L.), which ranks among the most popular and widely cultivated trees in residential landscapes, is native to Alabama as well as the majority of states east of the Mississippi river. Showy bracts, excellent fall color, and adaptation to a variety of soils and habitats have made the flowering dogwood a favorite among homeowners and landscape professionals.

Within the last two decades, 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 had 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, which can quickly expand in size until the leaves are blighted and killed (3, 7). As the disease progressively worsens over a period of years, the causal fungus *Discula destructiva* Redlin invades the shoots. An elliptical canker usually forms at the base of the dead shoots on the scaffold branches and trunk. Later, numerous water sprouts or epicormic shoots appear along the trunk. A survey conducted by the USDA Forest Service during the winter 1989–1990 showed that dogwood anthracnose was present in native stands of flowering dogwood on National Forest-managed lands in north Alabama (8). County-by-county data detailing the distribution and severity of this destructive disease was, however, not reported.

Spot anthracnose, which is caused by the fungus *Elsinoe corni* Jenkins and Bitanc., occurs wherever flowering dogwoods are found and is reportedly most common in landscape 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). 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. Although the causal fungus *Botrytis cinerea* Pers.:Fr. is a common and often destructive pathogen of annual and perennial flowers, damage to flowering dogwood in residential or commercial landscapes apparently is so minor that this disease is usually ignored. As is the case with spot anthracnose, no informa-

[1]Received for publication on December 10, 1999; in revised form May 1, 2000.

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tion is available concerning the occurrence of Botrytis blight on flowering dogwood in Alabama.

Determining the range, incidence, and severity of dogwood anthracnose in native stands of flowering dogwood was the primary objective of this project. The occurrence of spot anthracnose and Botrytis blight was concurrently assessed on those same trees.

Materials and Methods

Between mid-May and mid-June in 1991, 1992 and 1993, forested sites were surveyed to determine the range, incidence, and severity of leaf and bract diseases in native stands of flowering dogwood *(C. florida*) 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 the state (Fig. 1). Strip cruise plots containing 6 to 382 flowering dogwoods ranging in size from yearling to mature trees were usually located near access roads as well as hiking and riding trails. The location of each strip plot was marked on U.S. Geological Survey (1:24000 scale) topographic maps and the approximate elevation noted (Table 1). Although the majority of sites were visited each year, a few were surveyed only once.

In 1991, the leaves and bracts of each flowering dogwood noted within the plot area were examined for the occurrence and severity of dogwood anthracnose alone. In 1992 and 1993, severity of dogwood anthracnose was visually rated using a modified Miekle-Langdon scale where 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 shoots and extensive twig dieback; 3 = 25 to 50% of leaves diseased with some twig dieback; 4 = 1 to 25% of leaves diseased; 5 = tree healthy. Simultaneously, the incidence of spot anthracnose and Botrytis blight was assessed. Due to the very low incidence of both of these diseases, disease severity ratings were not collected.

Incidence of each disease is 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.

Fig. 1. Location of survey sites in Alabama.

Results and Discussion

Although no numerical disease ratings were taken in 1991, observations concerning the occurrence and distribution of dogwood anthracnose at each of 12 sites were recorded. Heaviest spotting and blighting of the leaves were seen at elevations of 496 to 558 m (1600 to 1800 ft) on flowering dogwood in Monte Sano State Park in Madison County and along several nature trails in DeSoto State Park in DeKalb County. Although twig and limb dieback typically associated with severe disease outbreaks were not observed, few of the trees at either park were free of dogwood anthracnose. At both parks, smaller flowering dogwoods growing in heavy shade suffered the worst spotting and blighting of the leaves. At one site at Guntersville State Park in Marshall County and Little River Canyon in DeKalb County, symptoms of dogwood anthracnose were seen on a few scattered trees. Elevation at both sites was approximately 341 to 372 m (1100 to 1200 ft). This disease was also noted at an elevation of approximately 300 m (1000 ft) on a single flowering dogwood in Buck's Pocket State Park in DeKalb County and in the Talladega National Forest in Cleburne County. Flowering dogwood at several other sites in the Talladega National Forest in Cleburne County and in nearby Cheaha State Park in Clay County were free 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 had been damaged by this disease.

For 1992, the survey area was broadened to include several additional counties in northwest Alabama. Overall, characteristic symptoms of dogwood anthracnose were found on flowering dogwood at 16 of the 27 locations visited. At some survey sites, the incidence and severity of dogwood anthracnose was substantially higher than levels seen in the previous year. At several locations in Madison, DeKalb, and Cleburne Counties, incidence of dogwood anthracnose ranged from 81 to 100% of the trees examined (data not shown). The worst leaf blight, shoot dieback, and epicormic shoot formation, as indicated by a disease severity rating of 2.12, was recorded for flowering dogwood at Monte Sano State Park in Madison County (Table 1). At this and a

Table 1. Distribution and severity of dogwood anthracnose on flowering dogwood in North Alabama.

County	Location	Elevation m	Elevation ft	No. trees	No. diseased trees	Disease severity rating[z]	No. trees	No. diseased trees	Disease severity rating[z]
				1992			1993		
Blount	Rickwood Cavern SP[y]	279	900	43	0	5	ns		
Calhoun	Rabbittown, Talladega NF	279	900	ns[x]			108	78	3.91
Cherokee	South Rim, Little River Canyon	372	1,200	ns			89	89	2.37
Clay	Chinnabee Trail, Talladega NF	372	1,200	84	0	5	ns		
Clay	Chinnabee Trail, Campground, Talladega NF	248	800	47	0	5	ns		
Clay	Cheaha SP, Campground, Talladega NF	372	1,200	94	0	5	ns		
Clay	Able Gap, Talladega NF	280	900	87	2	4.98	116	4	4.96
Cleburne	Coleman Lake, Talladega NF	372	1,200	155	149	3.52	166	153	3.62
Cleburne	Pinhoti Trail, Brymer Mountain, Talladega NF	310	1,000	127	19	4.84	124	38	4.57
Cleburne	N.F. Rt. 531 x 523, Talladega NF	341	1,100	76	12	4.84	ns		
Dekalb	North Rim, Little River Canyon	372	1,200	66	60	3.41	106	103	3.31
Dekalb	North Rim, Little River Canyon	310	1,000	70	60	4	ns		
Dekalb	Nature Trail, DeSoto SP	495	1,600	179	152	3.5	170	165	2.54
Dekalb	Rhododendron Trail, DeSoto SP	558	1,800	127	127	1.58	143	142	2.01
Dekalb	Rhododendron Trail, Canyon, DeSoto SP	495	1,600	186	151	3.56	ns		
Dekalb	Picnic Area, Buck's Pocket SP	341	1,100	44	7	4.81	ns		
Dekalb	High Bluff Trail, Buck's Pocket SP	310	1,000	41	24	4.19	44	26	4.25
Dekalb	Sauty Creek Trail, Buck's Pocket SP	280	900	ns			44	13	4.63
Etowah	Lookout Mountain	248	800	ns			56	7	4.88
Jackson	Skyline Wildlife Management Area	495	1,600	ns			71	70	2.38
Jefferson	Botanical Gardens	186	600	ns			78	0	5
Lauderdale	Wheeler SP	186	600	122	0	5	126	0	5
Lawrence	Trail 223H, Bankhead NF	279	900	104	1	4.98	ns		
Lawrence	Bankhead NF	279	900	ns			102	0	5
Lawrence	N.F. Rt. 249, Bankhead NF	310	1,000	72	0	5	ns		
Lawrence	Trail 208, Sipsey Wilderness, Bankhead NF	279	900	108	0	5	ns		
Limestone	Wheeler NWR	166	540	ns			29	0	5
Madison	Monte Sano SP	527	1,700	382	382	2.12	201	201	1.42
Madison	Green Mountain, Huntsville CP	403	1,300	ns			266	242	3.44
Madison	Wheeler NWR	186	600	ns			18	0	5
Marshall	Nature Trail, Guntersville SP	341	1,100	116	43	4.54	198	95	4.45
Marshall	Luckskillet Trail, Guntersville SP	217	700	305	18	4.72	122	27	4.89
Marshall	Cascade Trail, Guntersville SP	248	800	72	2	4.86	ns		
Marshall	Bevil Trail, Guntersville SP	310	1,000	99	3	4.84	ns		
Marshall	Guntersville CP	186	600	ns			79	10	4.88
Shelby	South Rim Trail, Oak Mountain SP	310	1,000	140	0	5	ns		
Shelby	Double Oak Trail, Oak Mountain SP	248	800	179	0	5	315	0	5
Shelby	Peavine Trail, Oak Mountain SP	310	1,000	ns			62	0	5
Shelby	Nature Trail, Oak Mountain SP	186	600	ns			133	0	5
St. Clair	St. Claire Community Hunting Area	248	800				141	0	5
Tallapoosa	Wind River S.P.	166	540	163	0	5	179	0	5
Winston	Sipsey Wilderness, Bankhead NF	186	600	6	0	5	ns		
Winston	Houston Rec. Area, Bankhead NF	160	520	92	0	5	ns		
Winston	Bankhead NF	248	800	ns			83	1	4.98
Total trees				3,386	1,212		3,387	1,464	

[z]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.

[y]SP = State Park, NF = National Forest, NWR = National Wildlife Refuge, CP = City Park.

[x]ns = not surveyed this year.

Cleburne County site, mature flowering dogwoods, whose canopies were exposed to direct sunlight for much of the day, suffered far less damage than did the trees in the forest understory. Considerable leaf blight and shoot dieback was also observed on trees at both DeSoto State Park and Little River Canyon in DeKalb County. At sites in Clay, Cleburne, DeKalb and Marshall Counties, light to moderate spotting of the leaves was recorded at elevations ranging from 186 to 310 m (600 to 1000 ft). In most instances, incidence of dogwood anthracnose in these counties was quite low and damage to any individual tree was minor. Along a trail at a single site in the Bankhead National Forest in Lawrence County, a single symptomatic flowering dogwood was found. Trees at two Clay County sites 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 in 1992 was far below that recorded for dogwood anthracnose. That year, spot anthracnose and Botrytis blight was noted at 6 and 3 survey sites, respectively, as compared with 16 for dogwood anthracnose (Tables 1 and 2). Across all 27 survey sites, incidence of spot anthracnose on 3386

trees examined was 1.1% (Table 2). At a single site in DeSoto State Park, spot anthracnose was seen on a number of trees (13.4%) growing 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 reported 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 survey while several others, particularly in the Bankhead National Forest, were deleted. A total of 28 sites were included in the 1993 survey. 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 in Monte Sano State Park were either dead or had suffered heavy damage. At that same location, extensive blighting of the leaves and limb dieback was recorded on nearly all of the large flowering dogwoods, even those growing in full sun. Although nearly all the flowering dogwoods checked for symptoms in a nearby Huntsville City park (elevation 403 m [1300 ft]) were diseased, damage on the majority of those trees was limited to light to moderate spotting of the leaves. In Dekalb County, a decline in tree health similar to that found at Monte Sano State Park was observed at several sites on Lookout Mountain in DeSoto State Park and along the north rim of the Little River Canyon. Extensive blighting of the leaves, shoot dieback, formation of numerous epicormic shoots, and some tree mortality was also noted on flowering dogwood on forested sites in northern Jackson County just south of the Tennessee border and along the south rim of the Little River Canyon in Cherokee County.

At most of the remaining survey sites at lower elevations in northeast Alabama, tree damage was generally limited to light to moderate blighting of the foliage and some shoot dieback (Table 2). In Cleburne County, disease levels on flowering dogwood progressively declined from Rabbittown in the northeast to Able Gap in the southwest. Similar declines in disease intensity were seen along Lookout Mountain at sites in Marshall and Etowah County, both of which are southwest of stands of heavily damaged trees in nearby Cherokee and DeKalb Counties. At two sites near Lake Guntersville in Marshall County, light spotting of leaves of a handful of trees was seen. At two sites in Buck's Pocket State Park, dogwood anthracnose damage levels were as low as those seen in the previous year. In 1993, Dogwood anthracnose was confirmed on a single tree at one site in the Bankhead National Forest in Winston County. No anthracnose-damaged dogwoods were found at survey sites along the Tennessee River in Lauderdale, Limestone, and Madison Counties. Also, flowering dogwoods inspected in forest and park sites in Jefferson, Shelby, St. Clair, and Tallapoosa Counties were also free symptoms.

Across all 1993 survey sites, spot anthracnose and Botrytis blight levels in native stands of flowering dogwood were similar to those seen in 1992 (Table 2). Incidence of spot anthracnose and Botrytis blight on all trees at the 28 survey sites was 0.3% and 1.5%, respectively. That year, spot anthracnose and Botrytis blight was found at a total of 4 and 9 survey sites as compared with 18 of 28 total survey sites, respectively for dogwood anthracnose. At a shaded lakefront site in Wheeler State Park in Lauderdale County, symptoms of Botrytis blight were noted on 15.9% of flowering dogwoods (Table 2). Damage to any individual tree was, however, minimal. Highest incidence of spot anthracnose recorded in 1993 was noted on 6.8% of the trees growing in a partially shaded area near Sauty Creek in Buck's Pocket State Park.

Dogwood anthracnose was the most common and damaging of the three foliar diseases recorded during the spring of 1992 and 1993 in native stands of flowering dogwood in northern Alabama. Incidence and severity of this disease peaked on trees in the Appalachian Mountains and adjacent foothills of the Piedmont region. Stands of flowering dogwood hardest hit by this disease were located in Calhoun, Cherokee, Cleburne, DeKalb, Jackson, and Madison Counties. By 1993, disease intensity figures at survey sites in these counties which were below 3.0, indicated that numerous trees had suffered extensive foliar blighting, dieback of the shoots and scaffold limbs, or had succumbed to dogwood anthracnose (Table 2). Disease incidence, which often ranged between 90 and 100% at these sites, clearly demonstrated the widespread distribution of dogwood anthracnose in northeastern Alabama. Dogwood anthracnose incidence and severity quickly declined at sites southwest of a line running diagonally from the city of Huntsville in Madison County to the town of Wedowee in Randolph County.

Outside of northeast Alabama, incidence of dogwood anthracnose in native stands of flowering dogwood was extremely low or the disease was absent. Over the survey period, only two trees with a few lightly spotted leaves 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 in the Bankhead National Forest as well as along the Natchez Trace in Lauderdale County (8). Dogwood anthracnose was also confirmed on a single tree in a residential neighborhood in Birmingham near Legion Field. Dogwood anthracnose was not found at any of the survey sites in the Tennessee River Valley west of Huntsville. Also, trees on forested and park sites in Blount, Jefferson, Shelby, St. Clair and Tallapoosa Counties were found to be free of this disease.

Previous surveys in other southeastern states indicate that dogwood anthracnose is most damaging in both forest and landscape settings at elevations above 920 m (3000 ft) (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) reported 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 372 to 558 m (1200 to 1800 ft) than at lower elevations. At these elevations, severe foliar blighting, shoot dieback and some tree death was recorded at 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, where the elevation ranges from 217 to 310 m (700 to 1000 ft), disease intensity was considerably lower than those at higher elevations in nearby DeSoto State Park. Similar observations concerning the relationship of dogwood anthracnose to elevation were made in Guntersville State Park in Marshall County

Table 2. Incidence of spot anthracnose and botrytis blight on flowering dogwood in North Alabama.

County	Location	No. trees	Trees w/SA[z] %	Trees w/BB[y] %	No. trees	Trees w/SA %	Trees w/BB %
		1992			1993		
Blount	Rickwood Cavern SP[x]	43	2.3	0	ns[w]		
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, Campground, 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	Pinhoti Trail, Brymer Mountain, Talladega NF	127	0	0	124	0	0.8
Cleburne	N.F. Rt. 531 x 523, Talladega NF	76			ns	0	0
Dekalb	North River, Little River Canyon	66	0	0	106	0	0
Dekalb	North River, 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, Canyon, DeSoto SP	186	13.4	0	ns		
Dekalb	Picnic Area, Buck's Pocket SP	44	0	0	ns		
Dekalb	High Bluff Trail, Buck's Pocket SP	41	0	0	44	0	0
Dekalb	Sauty Creek Trial, 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	Trail 223H, Bankhead NF	104	0	0	ns		
Lawrence	Bankhead NF	ns			102	0	2.9
Lawrence	N.F. Rt. 249, Bankhead NF	72	0	0	ns		
Lawrence	Trail 208, 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	179	0	0.6	315	0	1.1
Shelby	Peavine Trail, Oak Mountain SP	ns			62	0	0
Shelby	Nature Trail, Oak Mountain SP	ns			133	0	0
St. Clair	St. Claire Community Hunting Area	ns			141	0	0
Tallapoosa	Wind River SP	163	0.6	0	179	0	1.1
Winston	Sipsey Wilderness, Bankhead NF	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		3,386			3,190		

[z]SA = spot anthracnose.

[y]BB = botrytis blight.

[x]SP = State Park, NF = National Forest, NWR = National Wildlife Refuge, CP = City Park.

[w]ns = not surveyed this year.

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, Cheaha State Park and Oak Mountain State Park is due entirely to the fact that these sites were at the time of this survey outside the range of dogwood anthracnose.

In other states, heaviest foliar blighting and tree mortality was observed on flowering dogwood growing on both heavily shaded forest 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 higher, particularly in Monte Sano and DeSoto State Park, on understory flowering dogwood than on nearby trees in full sun.

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 and its foothills into landscape plantings in the cities of Gadsden and Huntsville. Disease incidence and severity, which peaks near Alabama's border with Georgia and Tennessee, declines sharply as the distance of survey sites from the borders of these two states increased. Although continued spread of this disease into forests, land-

scapes, and possibly nurseries 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 been largely confined to the Appalachian Mountains and the adjacent Piedmont region (1, 3). Spread of this disease from cooler upland areas into 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 may suppress 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 disease at any specific survey site usually was quite low. 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 considered 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 are rarely necessary.

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