SECTION 5
PATHOLOGY AND NEMATOLOGY

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Some Characteristics of *Tubakia dryina* Isolated from Water Oak

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Georgia

Nature of Work: Early defoliation of water oaks *(Quercus nigra)* has been observed during August for several years in Georgia. Twig and branch dieback, perhaps attributed to drought or other stresses, is commonly seen. Symptoms on the oak leaves are tiny dark spots, which become roughly circular, and later enlarge surrounded by chlorotic halos. The spots often coalesce to form irregular blotches. The blotches frequently follow leaf veins. Some leaves become chlorotic. Pycnothyria fruiting structures) of a fungus form on diseased leaves in concentric rings or scattered. Our isolation, inoculation and identification have confirmed that the symptoms were caused by *Tubakia dryina* and the premature defoliation could be caused by *Tubakia dryina,* a fungus formerly known as *Actinopelte dryina* (Sutton, 1973). Fungi in the genus Tubakia have been associated with foliar diseases of various oaks and other deciduous trees, but the pathogenicity of the fungi was not confirmed until 1990. Munkvold & Neely (1990) reported that excised leaves of a. *alba, Q. rubra, Q. robur, Q. velutina, Q. imbricaria, Q. falcata* var. *pagodaefolia, Q. palustris* developed necroses when inoculated with *T. dryina.* Conidia of *T: dryina* germinated on excised oak leaves and germ tubes formed appressorium-like structures. Munkvold & Neely (1991) gave the detailed development of *T. dryina* and formation of pycnothyrium on host tissue. This paper presents results of conidial germination and fungicide inhibition studies on the growth of *T. dryina in vitro.*

An isolate (OL-1) of *T. dryina* was obtained from diseased water oak leaves. Subcultures of the fungus were increased for two weeks on PDA medium to obtain conidia. The conidia were washed with sterile distilled water and filtered with sterile cheesecloth to obtain conidial suspensions of 2.5 x 105 spores/ml. The conidial suspensions were atomked onto 2% water agar plates. Conidia atomized plates were placed in each incubator at temperatures of 10, 15, 20, 25, 30, and 35°C. Five plates were removed from each incubator after 6(6 hr. light), 12(8 hr. light), and 24 hr. (12 hr. light) and held in refrigerator at 0° C to stop conidial germination. Germination was determined by microscopic observation of at least 150 spores on each of 5 plates for each incubation period at each temperature. A spore was considered germinated if the length of the longest germ tube exceeded half the width of the spore.

Ornalin (vinclozolin), Daconil (chlorothalonil), Kocide (copper hydroxide), Bayleton (triadimephon), Benlate (benomyl) and Fungo (thiophanate-

methyl) fungicides were mixed with autoclaved PDA medium at 50°C. The concentrations of each fungicide were as follows: Ornalin 0.6g/LPDA (.08 oz/gal, Daconil 1 .8g/LPDA (.24 oz/gal, Kocide 1.2g/LPDA (.16 oz/gal, Bayleton 0.1 5g/LPDA (.02 oz/gal, Benlate 0.6g/LPDA (.08 oz/gal, and Fungo 0.79ml/LPDA (.11 oz/gal. Eight mm diameter plugs of OL-1 cultures (1 week old) were placed in the center of each fungicide and nonamended plate. The diameters of growth of OL-1 on 8 plates of each medium were measured after 3, 6, 9, and 12 days incubation at 25° C.

Results and Discussion: Conidia of OL-1 isolate of *T. dryina* from water oak germinated over a wide temperature range. The incubation periods influenced germination; higher percentages for longer periods. The optimum germination temperature range is 20-30°C (Fig. 1), although isolates could vary in this characteristic.

All six fungicides tested were inhibitory to *T. dryina* (Fig. 2). Benlate and Fungo were 100% inhibitory. Ornalin and Daconil were less inhibitory and the longer the incubation period, the less the inhibition.

Jones & Holcomb (1978) mentioned two isolates of *T. dryina* did not form microconidia from Louisiana hardwoods. The isolate OL-1 forms both macrospores and microspores. Most microspores do not germinate. The sizes of macrospores are not quite uniform. The smaller ones sometimes do not germinate. This could be one of the reasons that conidia of isolate OL-1 did not attain 100% germination. It was noted that different isolates of *T. dryina* varied greatly in colony characteristics such as color, size and shape. This variation among isolates also may cause different conidial germination rates. Kim & Wagner (1977) reported in an abstract that the macroconidia on oak leaves failed to germinate below 5°C or above 37°C. Munkvold & Neely (1991) recorded conidial germination of 2% after 6h, 53% after 12h, and 54% after 24h on the surface of inoculated excised leaves. Our results confirm that *T. dryina* conidia germinate over a wide temperature range.

No control of the oak leaf spot disease has been reported. These fungicide inhibition studies of *7: dryina* are an effort to ascertain fungicidal activity. Although Benlate and Fungo resulted in 100%inhibition of *T. dryina* growth in vitro, we cannot say definitely if they will be effective in controlling the disease under field conditions. Ornalin and Daconil might be expected to be less effective for disease control since their inhibition rate was lower.

Significance to Industry: Recognition of this tree disease and its symptoms is important for the nurserymen to better understand the biologi-

cal stresses associated with growing trees in urban environments. More research is needed before specific recommendations can be made to lessen the impact of the disease.

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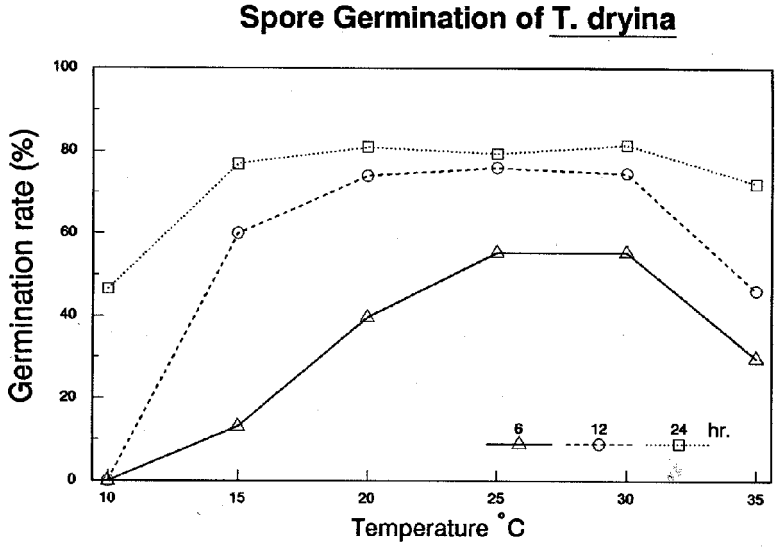

Fig. 1. Percentage germination of Tubakia dryina conidia after 6, 12, and 24 hrs. incubation on 2% water agar at specific temperatures. This isolate (OL-1) was isolated from water oak leaf in Georgia.

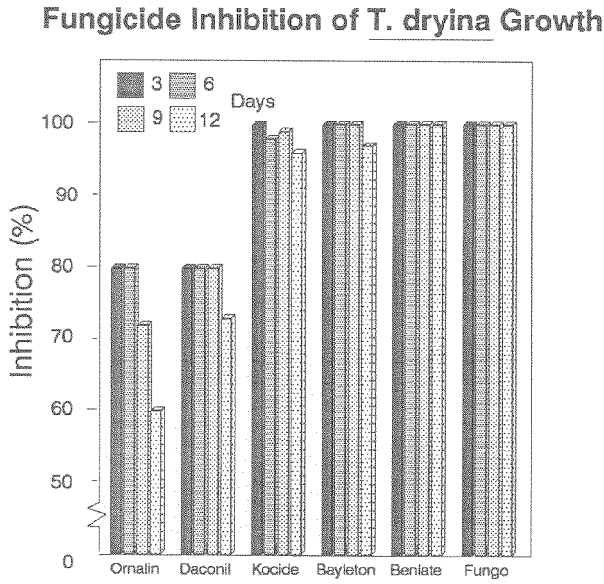

Fig. 2. Fungicide inhibition percentage of Tubakia dryina growth in vitro after 3, 6, 9 and 12 days incubation on fungicides and PDA mixture at 25°C. This isolate (OL-1) was from water oak in Georgia.

Tomato Spotted Wilt Virus on Bedding Plants in South Georgia

John M. Ruter and Ron D. Gitaitis
Georgia

Nature of Work: Tomato spotted wilt virus has become a major threat to agronomic and horticultural crops in the southeastern United States. Outbreaks of tomato spotted wilt virus have occurred on greenhouse crops and bedding plants in recent years, resulting in severe losses.

Tomato spotted wilt virus has a large host range of over 550 species in 62 different plant families (3). The disease can infect a variety of plants, including both monocots and dicots, ornamental plants, vegetables and many weed species. The lettuce serotype of tomato spotted wilt virus (TSWV-L) has been a problem in south Georgia, particularly in peanuts, peppers, tobacco and tomato transplants. The impatiens serotype (TSWV-I) which has damaged floricultural crops in other states was recently discovered in Georgia (Ruter and Gitaitis, unpublished data). Therefore, this study was conducted to 1) determine if bedding plants in south Georgia

were infected, and 2) if infected, with which serotype (TSWV-L or I).

Plants from bedding plant growers and public landscapes in five south Georgia counties (Coffee, Colquitt, Grady, Harris and Tift) were sampled April through June, 1991. Detection of infected plants was determined by enzyme-linked immunoabsorbent assay (Agdia, Inc., Elkhart, Ind.) using replicated whole leaf tissue samples.

Results and Discussion: Plants testing positive for TSWV-I and L are shown in Table 1. Approximately 7% of the total number of samples tested positive for TSWV-I while 6% tested positive for TSWV-L. This report confirms the presence of TSWV-I in Georgia. TSWV-I has previously caused economic losses to floricultural crops in North Carolina. Three plants not previously known to be infected with TSWV were found in this study *(Gazania, Tithonia* and *Viola).* It could not be determined from this study whether plants testing positive from the landscape had been infected in the greenhouse before being transplanted into the landscape.

Significance to Industry: Greenhouse operations in south Georgia were found to have plants infected with TSWV. TSWV has been described as "the most devastating virus the greenhouse industry has ever known" (1). TSWV symptoms include chlorotic or necrotic lines, blotches, and rings as well as petiole, stem and veinal necrosis. Symptoms may vary between species, cultivars, time of year and plant age. TSWV is currently being spread throughout the United States and Canada by the shipment of infected plant material and plants infested with thrips. TSWV is vectored by thrips, with the Western flower thrip being most common. Thrips are known to be a major pest of ornamentals in Georgia (2). Growers should adopt appropriate cultural and chemical management programs to prevent the spread of TSWV to other greenhouse plants and the public landscape.

Literature Cited

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Table 1. Plants testing positive for the impatiens serotype (TSWV-I) and lettuce serotype (TSWV-L) of tomato spotted wilt virus in south Georgia.

TSWV-I
Catharanthus roseus (L.) G. Don
Chrysanthemum leucanthemum L.
Digitalis purpurea L.
Eustoma grandiflorum (Raf.) Shinn.
Gerbera jamesonii H. Bolus ex. Hook.
Gomphrena globosa L.
Impatiens wallerana Hook. f. 'New Guinea'
Petunia x hybrida Hort. Vilm-Andr.
Phlox divaricata L.
Phlox drummondi Hook.
TSWV-L
Ageratum houstonianum Milly
Gazania spp. L.
Tithonia rotundifolia (Mill) S.F. Blake
Viola x Wittrochiana Gams.
TSWV I & L
Impatiens wallerana Hook.
Nicotiana alata Link and Oho.

Chemical Control of Spot Anthracnose of Dogwood

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Alabama

Nature of Work: Spot anthracnose of flowering dogwood, Cornus florida, is caused by the fungus Elsinoe corni. This disease is the most commonly occurring foliar disease of flowering dogwood. The fungus attacks the leaves, flower bracts, berries and young stems. Symptoms on the leaves and bracts include small (1/16-1/25 inch diameter) circular lesions with reddish purple margins and often a tan or grey center. Severely affected leaves become distorted and tattered in appearance.

These evaluations were initiated to determine the efficacy of several experimental compounds and labeled fungicides for the control of spot anthracnose of dogwood.

1991. White seedling dogwoods were potted in 3 gal. containers in February. The potting medium was milled pine bark and peat moss (3:1 by volume) amended with 6 lbs limestone, 2 lbs gypsum, and 1.5 lbs Micromax per yd^3. Osmocote 17-7-12 was incorporated at the rate of 14 lbs per yd^3. Fungicides were applied at 7 day intervals from May 28 through July. Treatments were applied with a CO_2 pressurized sprayer to run-off. Plants were placed under overhead impact sprinklers in a randomized complete block design with 6 single plant replicates. Nine fungicide treatments were evaluated for disease control (Table 1). Disease severity was rated June 30 using the following scale: 1 = no disease, 2 = 25%, 3 = 50%, 4 = 75%, 5 = 100% of new foliage diseased.

1992. White seedling dogwoods were potted and treated similarly to the 1991 test except that 6 fungicides were applied at 14 day intervals and evaluated for disease control on May 23 using the Horsfall and Barratt rating system: 1 = 0, 2 = 0-3, 3 = 3-6, 4 = 6-12, 5 = 12-25, 6 = 25-50, 7 = 50-75, 8 = 75- 88, 9 = 88-94, 10 = 94-97, 11 = 97-100, 12 = 100% of new growth diseased.

Results and Discussion: The results indicate all fungicide treatments were effective in reducing severity of spot anthracnose on dogwood foliage. In both years, similar control was observed with all fungicides evaluated (Table 1 and Table 2). During the 1992 tests, control was achieved using a 14 day spray interval.

Significance to Industry: Spot anthracnose of flowering dogwood can be controlled in the nursery with several labeled fungicides. Although Daconil is not labeled specifically for spot anthracnose control, it is labeled for use

on dogwood and both formulations tested provided good control of the disease. Finally, from the 1992 results it is apparent that a 14 day spray interval was adequate to control the disease under low disease pressure.

Table 1. Evaluation of fungicidal treatments for control of spot anthracnose of dogwood, 1991.

Fungicide	Rate/100 qal	Disease/Severity
Daconil 2787 4.17 F	2 pt	1.5
Daconil 2787 4.17 F	4 pt	1.3
Daconil 2787 WDG	1.25 lb	1.4
Daconil 2787 WDG	2.5 lb	1.2
ASC 66791	32 oz	1.3
ASC 66791	64 oz	1.6
Rally 40W	5 oz	1.6
Benlate 50W	8 oz	1.4
Folicur 3.6F	4.5 fl oz	1.6
Non-sprayed Control	- -	2.8
LSD (P=0.05)		0.6

Table 2. Evaluation of fungicidal treatments for control of spot anthracnose of dogwood, 1992.

Fungicide	Rate/100 gal	Disease/Severity
Daconil 2787 4.17 F	2 pt	2.3
Daconil 2787 4.17 F	4 pt	2.0
Daconil WDG	1.25 lb	1.5
Daconil WDG	2.5 lb	2.0
Rally 40W	5 oz	1.7
Folicur 3.6F	4.5 fl oz	1.3
Non-sprayed Control	- -	5.2
LSD (P=0.05)		1.5

Distribution and Severity of Dogwood Anthracnose on Dogwood in Alabama

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Alabama

Nature of Work: Dogwood anthracnose caused by (Discula destructiva) is a common and destructive disease of flowering dogwood (Cornus florida) across the Northeast as well the the Appalachian Mountains and associated uplands of the Southeast (2,3). In Alabama, this disease has been found in Jackson, Lauderdale, Lawrence, Lee, and Winston counties (1,4). No information on disease severity from any site was reported. A survey of Alabama State Parks and National Forests in northeastern and northcentral Alabama was conducted during May and June of 1991 and 1992 to determine the distribution and severity of dogwood anthracnose on native dogwood in forest settings.

Dogwoods found along one or more hiking trails, usually at different elevations, at each site were examined for symptoms of dogwood anthracnose. Disease occurrence and severity at each site were recorded. In 1992, disease severity was assessed on each tree by a modified Miekle-Langdon scale: 0=dead tree, 1=75-100% of leaves diseased with numerous epicormic shoots (water sprouts) on the main trunk, 2=50-75% of leaves diseased, some epicormic shoot development, and extensive shoot dieback, 3=25-50% of leaves diseased with some twig dieback, 4=1-25% of leaves diseased, 5=tree free of symptoms (2). No assessments were made in 1991. Leaf samples from selected symptomatic trees were examined for the presence of Discula destructiva.

Results and Discussion: In 1991, extensive leaf spot and blight were seen on the majority of dogwoods examined in Monte Sano State Park (S.P.). in Madison County (Co.) and Desoto S.P. in Dekalb Co. Widespread limb dieback and tree death were not observed in either park, but few healthy trees were found. Symptoms were less severe on dogwoods exceeding 15 ft in height than on smaller trees. Elevation at the sites surveyed in both parks was approximately 1600 to 1700 ft. Some light spotting and blighting of the leaves was seen on a few scattered trees in Gunterville S.P. in Marshall Co. and along the rim of the Little River Canyon in Dekalb Co. at an elevation of approximately 1000 ft. Dogwood anthracnose symptoms were not found on trees at elevations of 600 to 700 ft just above the Tennessee River in Lake Guntersville S.P. A single dogwood with typical leaf spot symptoms was found in the Shoal Creek District (northern) of the Talladega National Forest (N.F.) in Calhoun Co. However, no diseased trees were seen on nearby national forest land on Duggar or Brymer Mountains in the Shoal Creek Ranger District of the Talladega N.F.

in Cleburne Co. Dogwoods at several sites in Cheaha S.P. in Clay Co. were also free of this disease. Also, trees on lake front trails in Wheeler S.P. in Lauderdale Co. and Wind River S.P. in Tallapoosa Co. as well as valley (600 ft) and mountain (1100 ft) trails in Oak Mountain S.P. in Shelby Co. were not damaged by dogwood anthracnose.

In 1992, a noticeable increase in the severity and occurrence of dogwood anthracnose was seen in several parks in northeast Alabama and the Talladega N.F. Light to moderate shoot dieback along with the typical leaf spot and blight were noted on numerous dogwoods in Monte Sano S.P. and Desoto S.P. damaged the previous year by D. destructiva. On a few dogwoods, death of all lateral limbs was accompanied with development of numerous epicormic shoots or water sprouts from the main trunk. Again, tall, mature dogwoods with canopies exposed to direct sunlight suffered less from this disease than shaded trees in the forest understory. Considerable leaf blight and limb dieback were observed on dogwoods at two sites along the Little River Canyon and one site (Coleman Lake) in the Shoal Creek Ranger District of the Talladega N.F. Of greatest concern was the apparent spread of dogwood anthrancose to new stands of previously healthy trees. Dogwoods at several sites in Lake Guntersville S.P. at elevations ranging from 600 to 1000 ft. showed the light leaf spot often associated with early stages of this disease. Similar symptoms were also seen on dogwoods at Buck Pocket S.P. in Marshall/Dekalb Co., one site in Bankhead N.F. near the border between Lawrence/Winston Co., and two sites on Brymer Mountain and one on Horseblock Mountain in the Shoal Creek Ranger District of the Talladega N.F. in the southwestern corner of Cleburne Co. Trees at two sites south and west of Cheaha S.P. in the Talladega Ranger District of the Talladega N.F. in Clay Co. were healthy as were all trees examined in Wind River S.P, Oak Mountain S.P, Wheeler S.P. and three sites in the Bankhead N.F. (Sipsey Wilderness) in Winston and Lawrence Co.

In summary, dogwood anthracnose apparently is spreading southwest down the Appalachian Mountains and associated uplands in Alabama. Survey results indicate that this disease is largely confined to the northeastern corner of the state and is most damaging at elevations above 1500 ft. Of greatest concern is the appearance of dogwood anthracnose in forested areas at elevations much lower, particularly in Lake Guntersville S.P., than those normally associated with disease outbreaks. At those sites where the disease was well established in 1992, moderate limb dieback and some tree mortality were seen. Tree mortality is likely to worsen as disease severity intensifies over a wider area.

Significance to Industry: Dogwood anthracnose threatens the health and beauty of flowering dogwood in forested areas of northeast Alabama. Producers of field and container grown dogwoods in this section of the state should be aware of distribution and importance of this disease as well as its potential impact on the marketing of flowering dogwood.

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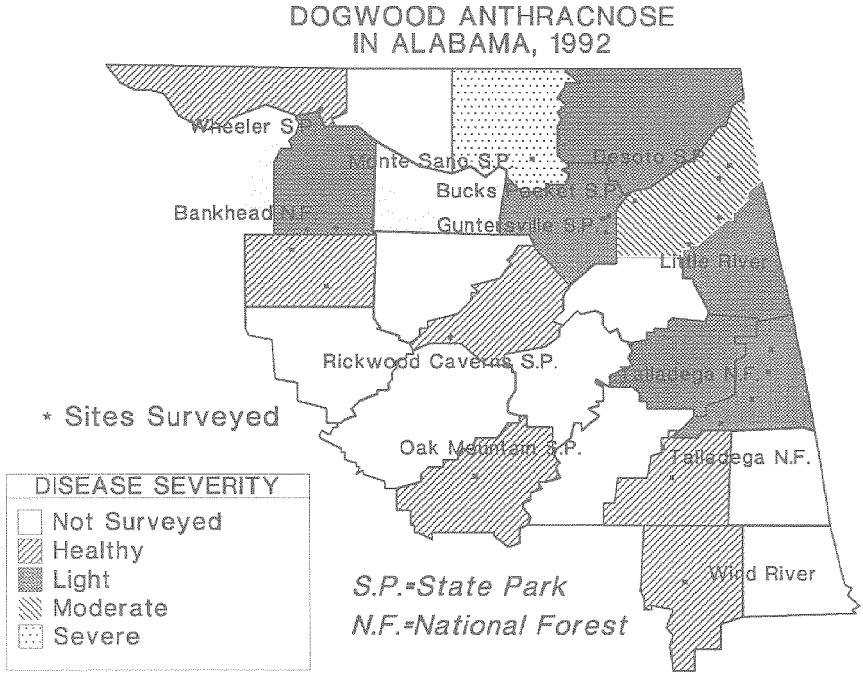
Table 1. Severity of dogwood anthracnose in state parks and national forests in Alabama.

Site	County	Disease Rating
Wind River S.P.	Tallapoosa	5.0
Oak Mountain S.P.	Shelby	5.0*
Rickwood Cavern S.P.	Blount	5.0
Bankhead N.F.		
Houston Recreation Area	Winston	5.0
Trail 223H	Lawrence/Winston	4.9
Logging road off Road 249	Lawrence	5.0
Sipsey Trail 208	Lawrence	5.0
Sipsey Trail 200	Winston	5.0
Wheeler S.P.	Lauderdale	5.0
Monte Sano S.P.	Madison	2.1
Lake Guntersville S.P.	Marshall	4.7*
Buck's Pocket S.P.	Marshall/Dekalb	4.5*
Desoto S.P.	Dekalb	3.2*
Little River Canyon	Dekalb	3.7*
Talladega N.F.		
Brymer Mountain	Cleburn/Calhoun	4.8*
Coleman Lake	Cleburn	3.5
Lake Cinnabee	Clay	5.0
Able Gap	Clay	4.9
Cinnabee Silent Trail	Clay	5.0

*Figures average of two or more sites for that location.



DNA Amplification Fingerprinting of Dogwood Anthracnose Fungi

R. N. Trigiano, G. Caetano-Anolles, B. J. Bassam, K. R. Weaver, M. T. Windham and P. M. Gresshoff
Tennessee

Nature of Work: Discula destructiva Redlin sp. nov. has been recently described as the causal organism of dogwood anthracnose (4). However, a number of other species of fungi are frequently isolated from symptomatic tissues and among these is an undescribed species of Discula. Conidia of these two species of Discula are morphologically similar, but the growth characteristics in culture are vastly different (5). Koch's postulates, i.e. isolation, establishment of disease symptoms on the host plant, and reisolation from typical diseased tissues, has been completed using both species (Windham, unpublished). Therefore, it appears that the disease may be caused by either species of Discula.

These two species of Discula can usually be distinguished on the basis of cultural characteristics, albeit individual colonies that possess intermediate attributes have been isolated. Furthermore, these species may be typified by their ability to enzymatically oxidize gallic acid (5) and by isozyme

analyses (Trigiano and Gerahty, unpublished data). Although morphological and physiological attributes are invaluable and extensively employed in fungal taxonomy, they assess the expression of phenotypic qualities that are flexible, highly variable and subject to change depending on ambient conditions. Therefore, these parameters may not be accurate or reliable for assessing taxonomic relationships.

Advances in molecular techniques have provided a means to accurately identify individuals or groups of isolates regardless of phenotypic variation. DNA amplification fingerprinting (DAF) is a procedure that can produce detailed and characteristic profiles of individuals (2). It involves amplifying certain genomic DNA sequences using a short arbitrarily defined oligonucleotide primer. Primers as short as five bases have been used to produce polymorphic amplification profiles from DNA of viral, bacterial, fungal, plant and human origin. DAF has been successfully employed to identify individuals and groups of closely related organisms (2).

The intent of this investigation was to characterize the two species of Discula that incite dogwood anthracnose using DAF and to assess genetic variability of isolates from different geographical regions.

Eight isolates of D. destructiva and three isolates of Discula species (see Table 1) were grown in 25 ml of Potato-Dextrose-V8 juice liquid medium (PDV8) for 5-7 days at 18C with 16 hr/day light provided by cool-white fluorescent tubes (60-75 $\mu mol/m^2/sec$). Mycelia were isolated onto Whatman #l filter paper and frozen at -70C. Genomic DNA was isolated using the methods of Yoon et al. (6) and amplified using the oligonucleotide primers CCGAGCTG (8.7d), CGAGATG (7.7a), and AGCTG (5.5b) according to the methods of Caetano-Anolles et al. (2). Amplified DNA products were separated on 5% polyacrylamide gels and visualized using a silver stain (1). DAF profiles were generated at least five times for each of the fungal isolates included in the study.

Results and Discussion: DAF patterns for D. destructiva isolates from different geographical regions were identical when primers 8.7d or 5.5b were used. Only one polymorphism, an additional high molecular weight band, was observed in profiles of isolate TN-l (D. destructiva) generated by primer 7.7a (Figure 1). The lack of variation in DAF profiles of D. destructiva isolates may indicate that the fungus was recently introduced into North America as postulated by Hibben and Daughtrey (3). Differences between isolates of the undescribed Discula species were more common, although profiles were also highly conserved. DAF patterns produced for each species of Discula using the same primer were significantly different (Figure 1). These preliminary experiments indicate that although the genome of widely geographically distributed isolates of the same species of Discula is highly conserved, the genetic constitution of the two species is dramatically different. Additional primers and isolates of both fungi will be incorporated into future studies to confirm these initial findings.

Significant to Industry: Data will indicate how isolates of the disease

organisms are related and determine how the pathogens are changing with respect to time and location. This information could be useful for designing control strategies and disease management practices.

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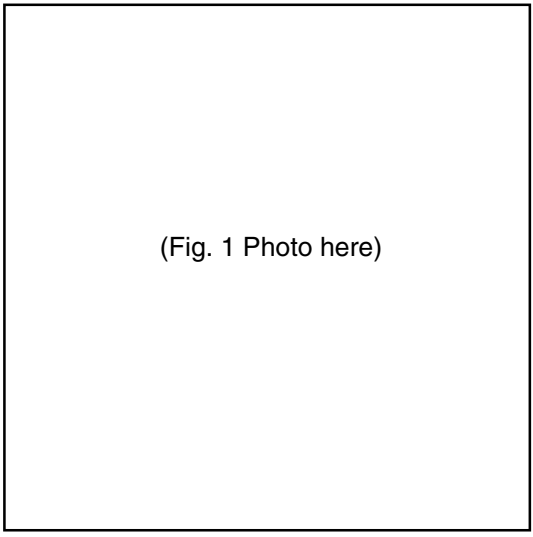
Table 1. Discula destructiva and Discula sp. isolates.

Species	Code	Host	Source
D. destructiva	GA-1	Cornus florida	F. Hendrix
	MA-I	C. kousa	D. Brown
	MA-II	C. kousa	D. Brown
	MD-I	C. florida	M. Windham
	NY-322	C. florida	M. Daughtery
	SC-101	C. florida	S. McElreath
	TN-I	C. florida	D. Brown
	TN-13	C. florida	J. Parham
Discula species	NC-2	C. florida	J. Knighton
	NY-326	C. florida	M. Daughtery
	VA-17b	C. florida	J. Knighton

Figure 1. DAF profiles of two Discula species generated using the 7.7a primer. Lanes 1 and 2 are profiles of the undescribed Discula species isolates VA-17b and NY-326 respectively; Lanes 3-6 are profiles of D. destructiva isolates TN-I, SC-101, MD-I and MA-I respectively. DAF patterns for the Discula species isolates are similar and differences are denoted by arrowheads; compare only lanes 1 and 2. All profiles for D. destructiva isolates (lanes 3-6) are identical except for the additional high molecular weight fragment in lane 3 (TN-I) indicated by an arrowhead. Differences between profiles of the two species are indicated by arrows (compare lanes 1 and 2 to 3-6). Note: not all differences are indicated.



Identification of Cornus species Resistant to Dogwood Anthracnose

D.A. Brown, M.T. Windham, and R.N. Trigiano
Tennessee

Nature of Work: Seven species of Cornus and one cultivar of C. kousa were tested for dogwood anthracnose resistance. Plants of C. alternifolia, C. amomum, C. controversa, C. florida, C. kousa, C. kousa 'chinensis', C. mas, and C. sericea were grown in five gallon containers and transported to Ozone, TN (elevation 512 m) on 17 May, 1991. This site was selected because of the high incidence of dogwood anthracnose in the native dogwood population. Trees of each species were placed under the canopies of flowering dogwoods exhibiting severe symptoms of dogwood anthracnose. The trees were arranged in a randomized block design with five replications.

Disease development in the experimental trees was monitored weekly using a pictorial diagram of a modified Horsfall-Barratt scale (1). Disease severity ratings were converted to percent diseased leaf area using conversion tables developed by Redman et al (2). Samples of symptomatic leaf tissue were harvested and infection by Discula sp. was confirmed in the laboratory. Trees were returned to Knoxville on 27 July 1991 for detailed examination of both symptomatic and asymptomatic tissues.

Results and Discussion: Discula destructiva Redlin sp. Nov. was isolated from many lesions on leaves of the various Cornus species. The disease response of the different species included in the evaluation can be divided into two groups: susceptible (Fig. 1) and resistant (Fig. 2). Although the line of C. kousa used in this study was rated as resistant, the line of C. kousa 'Chinensis' used in this study appeared to be as susceptible to the disease as C. florida. From this study, we conclude that many genetic lines within a species should be tested for resistance before a Cornus species should be designated as resistant. This study will be repeated in 1992 at three locations.

Significance to Industry: Genetic lines of four Cornus species were identified as being resistant to dogwood anthracnose. However, because of the variation observed in resistance between lines of Cornus kousa, nurserymen will not know if different genotypes within a Cornus species are resistant to dogwood anthracnose until that line has been screened for resistance.

Literature Cited

1. Horsfall, J.G. and Barratt, R.W. 1945. An improved grading system for measuring plant disease. Phytopathology 35:655 (abstr.).

2. Redman, C.E., King, E.P., and Brown, I.F., Jr. 1969. Tables for conversion of Barratt-Horsfall rating scores to estimate mean percentages. Mimeo, unnumbered. Elanco Products Co., Indianapolis, IN.

Fig. 1. Disease severity ratings for Cornus species that were classified as susceptible to dogwood anthracnose.

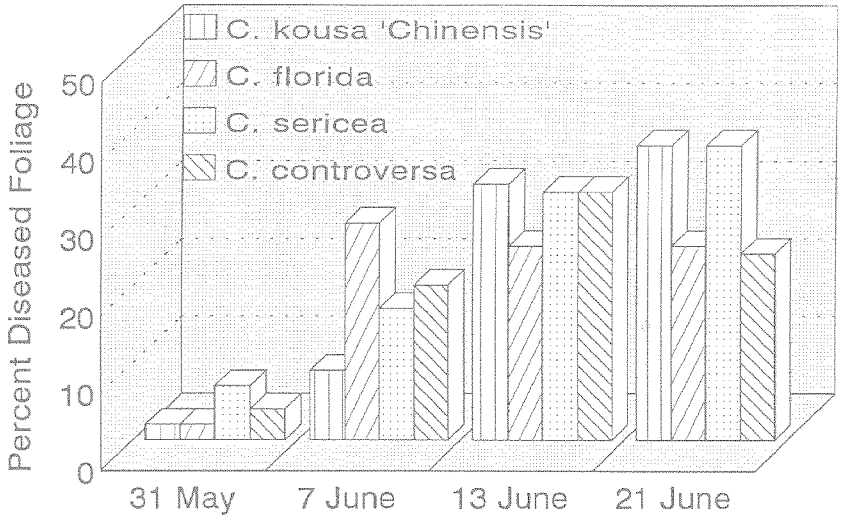
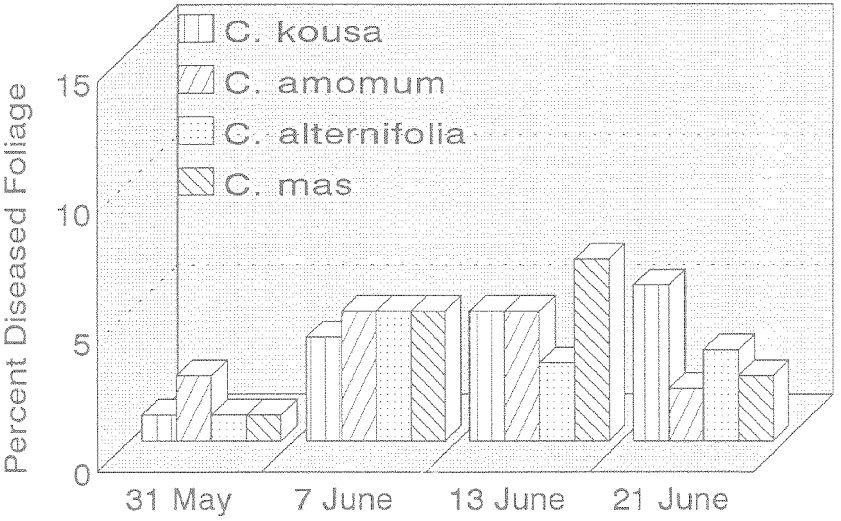


Fig. 2. Disease severity ratings for Cornus species that were classified as resistant to dogwood anthracnose.



Effect of Tree Placement on Dogwood Anthracnose Severity

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Nature of Work: Dogwoods at Lookout Mountain, TN and in Cherokee National Forest (Polk County, TN) were examined for dogwood anthracnose symptoms and reproductive potential. At Lookout Mountain, only trees located in full sunlight or full shade in an urban environment were used in this study. All trees in Cherokee National Forest were in a forest environment. For each tree, disease severity, site aspect, and elevation were recorded. Disease severity was estimated using the Miekle-Langdon scale where 5 = healthy tree, 4 = < 25% diseased foliage, 3 = < 50% diseased foliage, 2 = < 75% diseased foliage, 1 = ≤ 100% diseased foliage and o = dead tree.

Results and Discussion: In Cherokee National Forest, dogwood trees located at higher elevations were more severely impacted by dogwood anthracnose than were trees at lower elevations (Fig. 1). In plots located at less than 1,500 ft, plot aspect had an significant affect on disease severity. At higher elevations, the disease was so severe that aspect effects on disease severity were less apparent, but still statistically significant.

At Lookout Mountain all trees used in this study were located at sites where the elevation ranged between 1,640 and 2,050 ft. Trees located in full sunlight were less affected by dogwood anthracnose than trees in full shade (Fig. 2). In addition, trees located on south to west facing slopes had less severe dogwood anthracnose symptoms than did trees on north to east slopes. When comparing disease severity of trees separated by aspect at both locations, trees in urban areas at Lookout Mountain were less severely impacted by dogwood anthracnose than trees in forest environments at similar elevations in Cherokee National Forest. Higher humidity levels encountered in forested areas, in areas of higher elevation, and/or in shaded urban areas may prolong dogwood foliage wetness and explain why trees in these areas are more likely to be severely-impacted by dogwood anthracnose.

Significance to Industry: In areas where dogwood anthracnose epidemics are known to occur, disease severity can be lessen by planting trees in full sun and on south to west facing slopes.

Fig. 1. Effect of plot aspect and elevation on anthracnose symptom severity (estimated with Mielke-Langdon Scale) in Cherokee National Forest. Means are for 10 trees in 14 plots for each elevation class. Bars represent standard error of the mean.

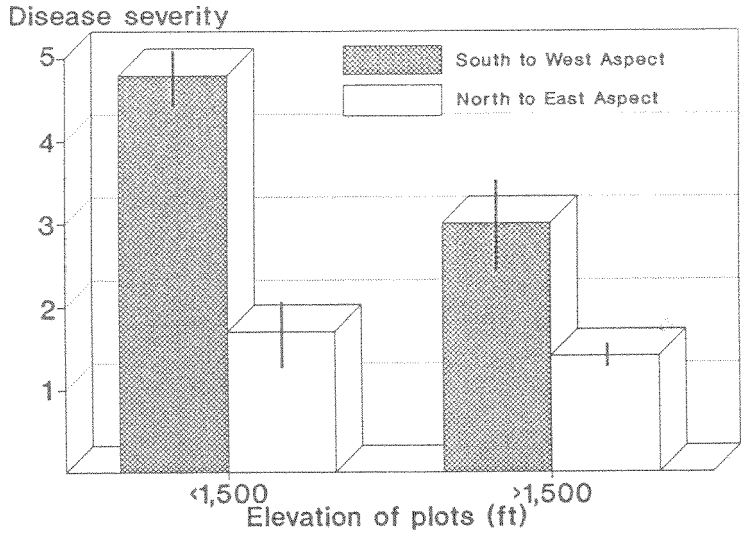

Fig. 2. Effect of tree placement and aspect on anthracnose disease severity (estimated with Mielke-Langdon scale). Means are for 10 trees in each of 5 plots at Lookout Mtn., TN. Bars represent standard error of the mean.