A Foliar Blight of Ming Aralia Caused by *Alternaria panax*

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ABSTRACT

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The ornamental foliage plant *Polyscias fruticosa* was shown to be a new host to *Alternaria panax*. The fungus *A. panax* is the cause of a serious leaf spot disease umbrella tree and dwarf schefflera.

The Ming aralia, *Polyscias fruticosa* (L.) Harms, is an ornamental plant highly valued for its fine-textured foliage and accent quality in landscape and interior designs based on oriental themes. Like most other ornamental foliage plants, the Ming aralia is only a small component of the total industry production, but for some nurseries it is one of the principal crops. A leaf blight disease has been endemic in Florida foliage plant nurseries producing that plant and has resulted in severe leaf spotting and subsequent defoliation when conditions favored disease outbreak. Nurserymen have recognized this disease for several years, and an *Alternaria* sp. has been suspected as the causal agent (6). The etiology of the disorder, however, has not been reported previously. The study reported here was initiated to determine the etiology of the disease.

MATERIALS AND METHODS

Isolations were made by using water agar (WA), potato-dextrose agar with 1% dextrose (PDA), acidified PDA (APDA) (5), and V-8 juice agar (V8A) (3). Leaves were agitated in a disinfesting solution (0.52% NaOCl + 10% ethanol) for 30 sec and then rinsed three times with sterile deionized water (SDW) before plating. Fungi that grew from diseased tissue were transferred by hyphal tips to test tube slants of V8A or PDA. Single-spore cultures of isolates used were established from those cultures and maintained on V8A. Occasionally, diseased leaves were incubated in moist chambers for 48–72 hr and the conidia produced on them were transferred directly to APDA. After conidial germination, hyphal tips were transferred and cultured as described.

All test plants were 7–12 wk old at inoculation. Plants were grown in 12-cm-diameter pots (about 1-L volume) containing a steam-sterilized potting mix composed of peat moss, cypress tree shavings, sand, and perlite (7:5:2:5, v/v) amended with 5.8 kg of dolomite, 3.6 kg of Osmocote (14-14-14 resin-coated fertilizer), and 0.9 kg of Micromax per cubic meter. Subsequent Osmocote applications to the potting mix surface were made at 8-wk intervals at the rate of 3.6 kg/m^3. Test plant species were Ming aralia (*P. fruticosa*), umbrella tree or schefflera (*Brassaia actinophylla* Endl.), and dwarf schefflera (*Schefflera arboricola* (Hayata) Merrill).

Isolates of the fungus, two each from Ming aralia, umbrella tree, and dwarf schefflera, were tested for pathogenicity on Ming aralia. Umbrella tree and dwarf schefflera were inoculated with isolates from Ming aralia. Each isolate was tested at least twice on the indicated plant species.

Inocula for experiments were grown in 9-cm-diameter petri dishes containing V8A for 10–21 days. The dishes were maintained 20 cm below continuous fluorescent lights (about 1.5 klux) or under 12-hr photoperiods of ultraviolet (UV) light. Culture under UV light became the preferred method because conidial production was high and mycelial growth was sparse. SDW (10 ml) was added to the plates, and the cultures were rubbed gently with a flamed glass rod. The resulting conidial suspensions were decanted into sterile test tubes and vigorously agitated with a vortex mixer for 30 sec before dilution and use. Plants were inoculated with conidia at concentrations ranging from 1.0×10^3 to 1.0×10^4/ml.

Conidial suspensions were applied to the plants in a mist with a hand-operated, trigger-action sprayer. Each pump of the sprayer applied about 1 ml of suspension. Each plant was turned 360° during inoculation so that the 4 ml of the suspension was equidistantly spaced around the plant. Each plant was then enclosed in a plastic bag, which was removed 72 hr later. Control plants received only SDW but were otherwise treated similarly. The plants were maintained on a greenhouse bench in a randomized complete block design. Four to eight single-pot replicates per treatment were used in each of five experiments. Mean daily temperatures in the greenhouse during experiments ranged from 21 to 31 C.

RESULTS AND DISCUSSION

Isolations were made from plants found in three nurseries and one home yard in southern Florida. *Gloeosporium* spp. and small-spored, long-chained *Alternaria* spp. were occasionally encountered in isolations from necrotic tissue. A large-spored *Alternaria* sp. that produced a red diffusible pigment in agar substrates grew from 20 to 100% of the diseased tissue pieces plated from blighted Ming aralia plants at all locations. Conidia of the large-spored *Alternaria* sp. were produced abundantly on infected leaves incubated in moist chambers.

The last-mentioned fungus was identified as *A. panax* Whetzel, according to the recent clarification of the species by Simmons (4). On V8A, conidia of isolate

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81-4 averaged 54 μm in length (range: 30–75 μm); 23.8 μm in width (range: 16.5–30.8 μm); and 23.4 μm beak length (range: 7.5–37.3 μm). Isolates of *A. panax*, previously referred to as *Alternaria* sp. and shown to cause serious leaf spot diseases in umbrella tree and dwarf schefflera (1), were selected for comparison with isolates from Ming aralia in pathogenicity experiments.

Table 1. Pathogenicity of *Alternaria panax* in *Polyscias fruticosa, Brassaia actinophylla,* and *Schefflera arboricola*

Isolate	Source	No. of trials	No. of replicates with symptoms/no. inoculated		
			P. fruticosa[a]	*B. actinophylla*[b]	*S. arboricola*[b]
80-49E	*P. fruticosa*	1	4/4	4/4	...
80-25G	*P. fruticosa*	1	3/4	4/4	...
81-4	*P. fruticosa*	2	7/8	8/8	8/8
81-3	*P. fruticosa*	2	8/8	8/8	8/8
81-2	*S. arboricola*	2	8/8	8/8	7/8
81-1	*B. actinophylla*	2	8/8	8/8	8/8
Control		3	1/12	0/12	0/8[c]

[a] Single-plant replicates.
[b] Two to five seedlings per replicate.
[c] Two trials.

Fig. 1. Defoliation followed blight of *Polyscias fruticosa* (right) inoculated 10 days earlier with *Alternaria panax*. Healthy plant (left).

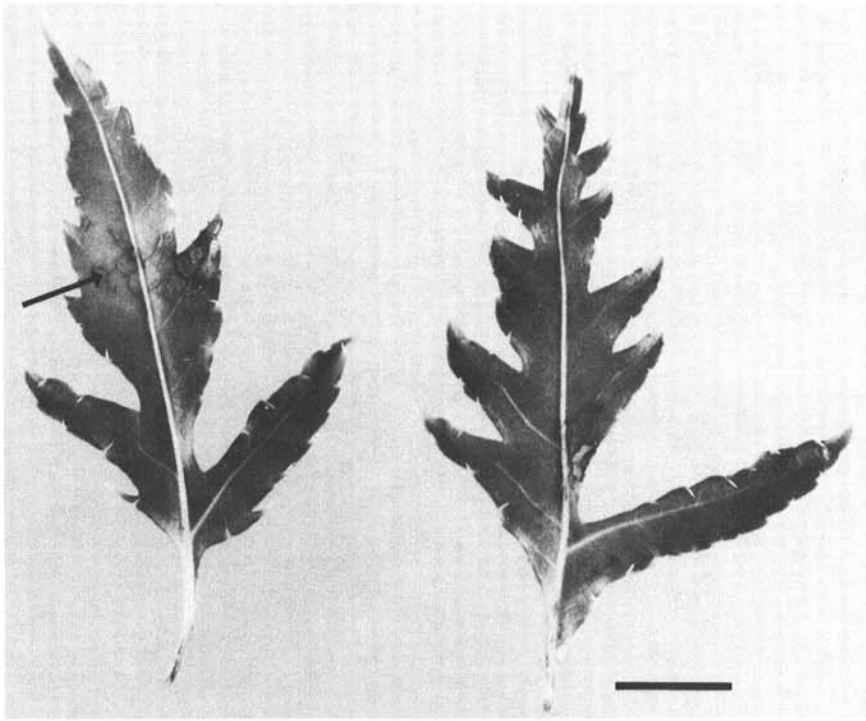

Fig. 2. Lesions in leaflets of *Polyscias fruticosa* caused by *Alternaria panax* often advance irregularly along veins (arrow). Bar = 1 cm.

All isolates were pathogenic to Ming aralia (Table 1). The isolates induced symptoms identical to those observed in naturally infected plants (Fig. 1). There were no obvious differences in virulence among isolates, and isolates from Ming aralia were also pathogenic to umbrella tree and dwarf schefflera. All attempts to isolate the fungus from inoculated plants yielded *A. panax*. Except for one replicate in one experiment, none of the control plants developed symptoms in any experiment, and the pathogen could not be recovered from tissue of plated control leaves.

Symptoms in Ming aralia were first apparent 48–72 hr after inoculation as dark, water-soaked spots, about 0.5 mm in diameter. The lesions enlarged in irregular patterns, frequently along veins (Fig. 2). Abscission of infected leaflets began within 5 days after inoculation and continued for about 2 wk. Leaflet abscission occurred with and without extensive necrosis of the leaflets and often with only a single lesion. The manner in which pathogenesis induces extensive leaflet abscission is not known.

The symptoms induced by the Ming isolates in umbrella tree and dwarf schefflera were identical to the symptoms in naturally infected plants and to the symptoms induced by isolates from the latter two plant species in previous experiments (1).

The results provide the first documented evidence that *A. panax* causes a leaf spot and blight of Ming aralia. Only four other hosts of *A. panax* have been reported (1,2,7), and all are members of the Araliaceae. The umbrella tree, often referred to as schefflera, is the most extensively produced of the three species. Two and sometimes all three species are found in the same nursery. Showing that all three species are susceptible to the fungus is an important step toward improving management of the diseases caused by *A. panax* in the foliage plant industry of southern Florida.

The disease is most prevalent in plants grown under a shade cloth or an overhead sprinkler irrigation. Field observations indicate that nutrient stress may also increase disease severity. Effective chemical control of the disease in Ming aralia has not been reported, but studies for this purpose are being initiated.

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