Alternaria Leaf Spot of *Schefflera arboricola*

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ABSTRACT

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A destructive leaf spot disease of the foliage plant *Schefflera arboricola* was incited by an *Alternaria* sp. that also incites a serious foliar disease of *Brassaia actinophylla*.

A destructive disease of dwarf schefflera (*Schefflera arboricola* (Hayata) Merrill), a popular foliage plant, frequently occurs in Florida nurseries. The disease causes lesions in the leaf blades, petioles, and stems, and young seedlings are severely defoliated. Affected plants are rarely killed, but the presence of lesions on mature plants lowers aesthetic quality and market value. The disease occurs in less than 10% of the plants in most nurseries, but severe outbreaks have occurred. In one nursery, more than 2,000 5-mo-old plants were unsalable because of the disease.

A disease of umbrella tree (*Brassaia actinophylla* Endl., previously *S. actinophylla* (Endl.) Harms) caused by *Alternaria* sp. was briefly described by Miller in 1957 (1). The symptoms reported for *B. actinophylla* did not coincide with those found in *S. arboricola*. However, evidence from preliminary observations suggested that the two diseases shared a common etiology. This report summarizes investigations on the etiology of the leaf spot in *S. arboricola* and the relation of this disease to that described in *B. actinophylla*.

MATERIALS AND METHODS

Isolations were performed on water agar, fresh potato-dextrose agar with 1% dextrose (PDA), acidified PDA (APDA) (4), and V-8 juice agar (V8A) (2). Leaves, petioles, and stems were washed with detergent water (approximately 1% Liqui-nox) or treated with a disinfesting solution (0.52% sodium hypochlorite + 10% ethanol) for 30 sec, then rinsed three times with sterile deionized water (SDW) before plating. Fungi that grew from diseased tissue were transferred by

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hyphal tips to test tube slants of V8A or PDA. Single-spore cultures of isolates used in the experimentation were established and maintained on V8A. Occasionally, conidia produced on diseased leaves incubated in moist chambers for 48–72 hr were transferred directly to APDA, and after germination hyphal tips were transferred and cultured as described above.

Growth response to temperature was determined by daily measurement of the radial growth of two isolates of the pathogen on five replicates of PDA in 9-cm-diameter petri dishes incubated for 7 days at 18, 21, 24, 27, 30, or 33 C.

Inocula for experiments were grown in 9-cm-diameter petri dishes containing V8A for 10–21 days 20 cm below continuous fluorescent lights (approx. 1.5 klux) or 12-hr photoperiods of ultraviolet light (Model F20T12/BL, Westinghouse Corp., Horseheads, NY). Culture under ultraviolet light became the preferred method because conidial production was high and mycelial growth was sparse. Ten milliliters of SDW was added to the plate, and the culture was gently rubbed with a flamed glass rod. The resulting conidial suspension was decanted into a sterile test tube and vigorously agitated with a vortex mixer for 30 sec before dilution and use. Concentrations of conidia applied to inoculate plants in different experiments ranged 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 approximately 1 ml of suspension. Each plant was turned 360° during inoculation such that four pumps of the sprayer were spaced equidistantly around the plant. Each plant was then enclosed in a plastic bag that was removed 24 hr later. The plants were maintained on a greenhouse bench in a randomized complete block design. Four to six single-pot replicates per treatment were used in each of four experiments. Each isolate was tested at least twice. Control plants received only SDW and were otherwise treated similarly. Mean daily temperatures in the greenhouse during experiments ranged from 21 to 31 C.

All test plants were 7–12 wk old at inoculation. Plants were grown in a steam-sterilized potting mix containing 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 in 12-cm-diameter pots (approximately 1 L). Subsequent fertilizer applications were top dressings of Osmocote at 8-wk intervals at the rate of 3.6 kg/m^3.

RESULTS AND DISCUSSION

Isolations were made from diseased leaves, petioles, and stems of *B. actinophylla* and *S. arboricola* found in eight south Florida production nurseries. Genera of fungi isolated included *Alternaria, Gloeosporium, Cladosporium,* and *Penicillium*. A large-spored *Alternaria* sp. that produced a red, diffusible pigment in agar substrates grew from 20–100% of the diseased tissue pieces plated and was the only organism consistently isolated from lesions in the two plant species at all locations. Conidia of this fungus produced on diseased leaves were easy to recognize and isolate. Other small-spored, long-chained *Alternaria* species were the next most frequent group of fungi isolated; three isolates from this group were selected for pathogenicity trials along with the red-pigmented isolates. Isolation attempts with healthy leaves did not yield any organism.

Four isolates (two from each plant species) of the large-spored, red-pigment-producing *Alternaria* sp. were each tested twice, and all were pathogenic to *B. actinophylla* and *S. arboricola* (Table 1). Inoculated plants consistently developed symptoms identical to those observed in naturally infected plants. Nearly all leaves of inoculated plants developed lesions, and 30–60% of the infected leaves abscised. The pathogen was always reisolated from infected tissue, and there were no obvious differences in virulence among isolates regardless of origin. No disease resulted from inoculation with isolates of the small-spored *Alternaria* sp.

Symptoms in leaves of *S. arboricola* were first apparent 48–72 hr after inoculation as dark, water-soaked, approximately 1-mm-diameter spots. The lesions became necrotic and tan and enlarged to 2–5 mm in diameter. A chlorotic halo often surrounded the lesions (Fig. 1). The symptoms in *B. actinophylla* appeared similar to those in *S. arboricola* during early development. However, lesions in *B. actinophylla* frequently became dark brown and enlarged up to 5 cm or more in diameter (Fig. 1). Abscission of a large proportion of infected leaves occurred in both plant species during 4 to 15 days following inoculation.

The pathogen grew best at 24 and 27 C. Cultures on PDA had a light gray to black fluffy mycelium. Conidia were dark brown, usually produced singly, and more abundant on V8A than on PDA. Conidia averaged 76.9 × 23.8 μm on V8A. Research on speciation of the

Table 1. Frequency of disease following artificial inoculation with *Alternaria* sp.

Isolate	No. of trials	Disease frequency[a] *Schefflera arboricola*	*Brassaia actinophylla*
80-10-1A[b]	2	10/10	10/10
80-12[c]	2	10/10	10/10
81-1[c]	2	7/8	8/8
81-2[b]	2	8/8	8/8
Control	4	0/18	0/18

[a]Number of plants with symptoms/number inoculated.
[b]Isolated from *S. arboricola*.
[c]Isolated from *B. actinophylla*.

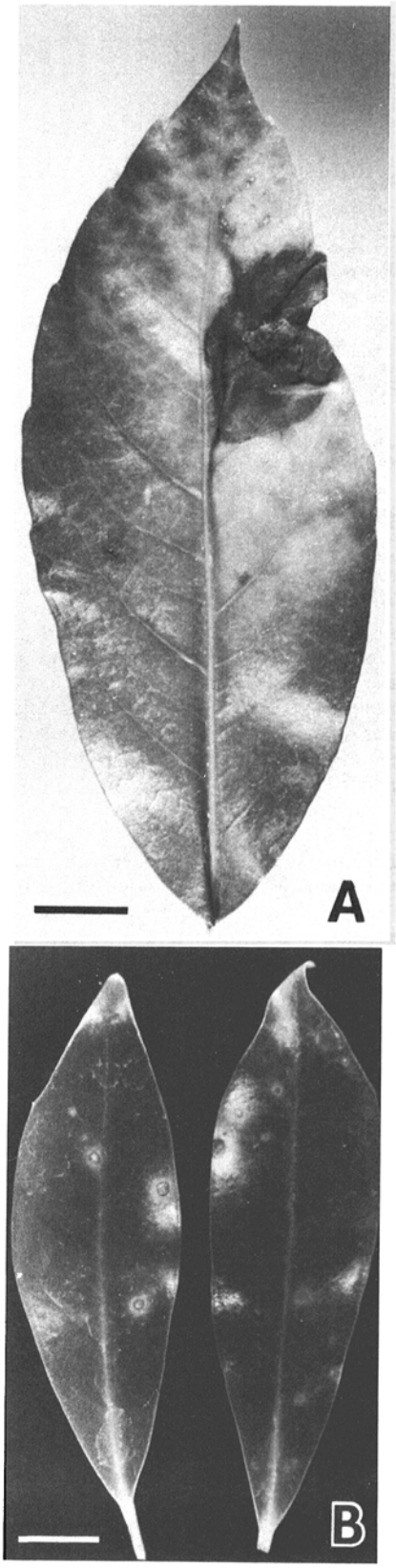

Fig. 1. Alternaria leaf spot in **(A)** *Brassaia actinophylla* and **(B)** *Schefflera arboricola*. Calibration bar = 3 cm in A and 1 cm in B.

pathogen is continuing.

Control of the disease has been achieved in *B. actinophylla* with chlorothalonil (3). Fungicides with a spectrum of activity similar to that of chlorothalonil should provide control for the disease in the dwarf schefflera.

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