New Leaf Spot Disease of *Calathea* and *Maranta* spp. Incited by *Drechslera setariae*

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ABSTRACT

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Drechslera setariae was identified as the causal agent of a new leaf spot disease on *Calathea* and *Maranta* spp. Leaf lesions on *Maranta* spp. were round to slightly irregular, 2–12 mm in diameter, and narrowly zonate, with a 2–3 mm chlorotic halo. Leaf spots on *Calathea* spp. were elongate to irregular, 2–16 mm in diameter, usually without zonation or chlorotic halo, and often vein-delimited. Isolates of *D. setariae* from *Maranta* and *Calathea* were cross-pathogenic and also pathogenic on species of *Ctenanthe* and *Stromanthe*, causing lesions ranging from necrotic flecks to lesions similar to those produced on *Calathea* spp.

The Marantaceae is a tropical American family of foliage ornamentals containing *Calathea* and *Maranta* spp., two genera grown commercially in Florida. Both genera contain species that tolerate low light intensities in the interiorscape. *Calathea* contains more cultivated species than *Maranta* (1,5) but is less widely grown in Florida, accounting for less than 1% of the statewide foliage production (7). *Maranta* spp. (commonly known as prayer plants) account for 3% of the statewide foliage production. Most *Maranta* spp. are grown in central Florida, accounting for 5% of all foliage ornamentals produced there (7).

Recent records of the University of Florida Extension Plant Disease Clinic at Gainesville include reports of a disease of *Calathea* and *Maranta* spp. caused by a *Drechslera* sp. Eleven such samples were received from several areas of Florida during 1978 and 1979. Leaf lesions on *Maranta* spp. were round to slightly irregular and narrowly zonate, with a 2–3 mm chlorotic halo. Lesions on *Calathea* spp. were elongate to irregular, sometimes with a narrower chlorotic halo but usually without zonation. Lesions on both hosts had diameters of 2–16 mm. A *Drechslera* (under = *Helminthosporium*) sp. has been reported to cause leaf spot on *Maranta* spp. (8), but no report was found of a similar disease occurring on *Calathea* spp.

This research was conducted to determine and identify the causal organism of these diseases and to report symptomatology on these two related ornamental plant genera. Pathogenicity of the causal organism on other horticulturally important genera within the Marantaceae was examined.

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MATERIALS AND METHODS

Diseased tissue was collected from *Calathea* and *Maranta* spp. grown commercially in central Florida. A fungus identified only as a *Drechslera* sp. was isolated from leaf lesions of *Calathea* and *Maranta* spp. processed through the University of Florida Extension Plant Disease Clinic. Isolates were recovered from *C. Bachemiana* E. Morr., *C. bella* (Bull) Regel, *C. musaica* (Bull) L. H. Bailey, *C. picturata* 'Argentea,' *C. roseo-picta* (Linden) Regel, *M. leuconeura* 'Kerchoviana' E. Morr. (green maranta), and *M. leuconeura* cv. *erythroneura* 'Bunting' (red maranta). Lesions excised from *Maranta* and *Calathea* spp. were surface-disinfested in 0.5% sodium hypochlorite for 3 min, then rinsed in sterilized distilled water (SDW) for 2 min. All lesions were plated onto Difco potato-dextrose agar acidified to pH 4.5 (APDA) and incubated for 5–8 days at 26–28 C under 12 hr of 2.8 klux fluorescent light. Hyphal tip transfers were made from each cultured isolate onto APDA slants. These axenic culture slants served as the sources of inoculum in subsequent studies.

All pathogenicity tests were conducted with 8- to 10-day-old cultures on APDA. Cultures were chopped and hand-agitated in a minimal volume of SDW. The resultant conidial suspension was filtered through two thicknesses of cheesecloth and standardized to 6×10^3 conidia per milliliter with a hemacytometer. Sprays of SDW served as a control for all inoculation studies. Conidial suspensions were spray-applied with an artist's airbrush. Inoculated plants were enclosed in polyethylene bags and incubated at 31–32 C for 16 hr in the dark. Pathogenicity tests were performed three times on green maranta and *C. roseo-picta* plants using the isolates cultured originally from these hosts. Three plants were inoculated with each isolate in each pathogenicity test.

Plants used in pathogenicity trials were grown from tip cuttings (*Maranta* sp.) or root divisions (*Calathea* sp.). Cuttings were rooted in Canadian peat moss under 20 klux light at 24–30 C in a greenhouse. Rooted cuttings and root divisions were grown in a steam-pasteurized potting medium of soil, Canadian peat moss, and perlite (2:1:1, v/v). Osmocote 18-6-12 was applied at a rate of 3 g/12.7-cm-diameter container. These plants were grown in a greenhouse as described above.

The minimal incubation period was determined by inoculating green maranta plants with 1×10^4 conidia per milliliter and incubating the plants for 4, 6, 8, 12, and 16 hr. All plants were dried with forced air at the conclusion of the incubation period and returned to the greenhouse to await symptom development. This experiment was repeated once.

Four fungal isolates, two from *Calathea* spp. and two from *Maranta* spp., were used to determine host specificity. Isolates tested were obtained from *C. roseo-picta, C. zebrina* Binotii Hort. ex L. H. Bailey, green maranta, and red maranta. Plant species tested were: *C. roseo-picta, Ctenanthe Kummerana* (E. Morr.) Eichl., *Ctenanthe Lubbersiana* (E. Morr.) Eichl. ex Petersen, green maranta, red maranta, and *Stromanthe amabilis* (Linden) E. Morr. (= *Calathea* sp. 'Burle Marx'). The genera *Ctenanthe* and *Stromanthe* were included because they are in the Marantaceae and are grown commercially in Florida. *Ctenanthe* spp. were propagated from tip cuttings and *Stromanthe* sp., from root divisions. Inoculations were performed as described above on two to four plants per host species per test. Host specificity tests were performed twice.

RESULTS

Fungal isolates from *Calathea* and *Maranta* spp. used in this study were identified as *Drechslera setariae* (Sawada) M. B. Ellis. (= *Bipolaris setariae* (Saw.) Shoemaker = *Helminthosporium setariae*

Sawada; teleomorph: *Cochliobolus setariae* (Ito & Kuribayashi) Drechslera ex Dastur). Key morphological characteristics included the following: 1) conidiophores did not arise from stromatal tissue, were mid-brown to olivaceous, rarely branched, and proliferated sympodially; 2) holoblastic conidium formation from conidiogenous cells was tretic; 3) mature conidia were slightly curved to straight and mid-golden brown, lacked a protruding hilum, and germinated bipolarly, with terminal cells frequently paler than intercalary cells; and 4) mean conidial dimensions were 85 μm (range 60.9–139.2 μm) long × 14.9 μm (range 11.6–17.4 μm) wide with 8 (range 6–11) pseudosepta. These characteristics best fit the descriptions of *D. setariae* published by M. B. Ellis (3) and E. S. Luttrell (6). The fungal identification was confirmed by E. S. Luttrell.

Lesions developed in all pathogenicity tests on all plants inoculated with each of seven fungal isolates. No leaf spots developed on control plants in any test. *D. setariae* was the only fungus reisolated from symptomatic tissue. Infection points were evident 48 hr after inoculation. Lesions began to expand 4–5 days after inoculation and reached maximum size in 10–14 days on green maranta and in 14–21 days on *C. roseo-picta*. Lesions on green maranta (Fig. 1) had a 2–3 mm chlorotic margin, whereas on *C. roseo-picta*, chlorotic margins, when present, were typically 1 mm wide. Mature lesions on green maranta were 2–12 mm in diameter, golden tan, and narrowly zonate. White centers gave mature lesions a frogeye appearance. Young lesions on *C. roseo-picta* (Fig. 2) were elongate to irregular, dark brown, and often parallel-sided because of vein delimitation. Mature lesions on *C. roseo-picta* were 2–16 mm in diameter, dark brown, and wedge-shaped but lacked the zonation and white centers typical of lesions on green maranta.

The minimal incubation period of *D. setariae* on green maranta was 6 hr. Leaf spots were assessed only on leaves that were fully expanded at the time of inoculation. Some leaf spots appeared after the 4-hr incubation period but only on leaves that were unrolling from around the bud. Emerging leaves typically form a hollow cylinder that can retain moisture, and *D. setariae* was found sporulating amphigenously from leaf lesions under conditions of high relative humidity.

Isolates of *D. setariae* from *Maranta* and *Calathea* spp. were pathogenic on green maranta, red maranta, and *C. roseo-picta*. Symptoms produced on *Maranta* and *Calathea* spp. by isolates of *D. setariae* recovered from either genus were similar. In addition, fungal isolates from *Calathea* and *Maranta* spp. were pathogenic to *Ctenanthe Kummerana, Ctenanthe Lubbersiana,* and *S. amabilis*. Lesions on *S. amabilis* were similar to those on *Calathea* sp., being round to irregular and 3–12 mm in diameter, with a 1–2 mm band of chlorosis. Leaf spots on *Ctenanthe Kummerana* were round, 2–8 mm in diameter, and light brown but had no other distinguishing characteristics. Lesions on *Ctenanthe Lubbersiana* were round to elongate necrotic flecks and 1–2 mm in diameter, with narrow chlorotic halos.

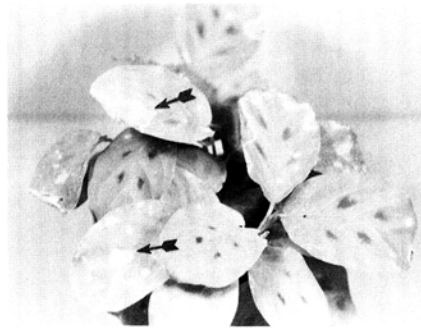

Fig. 1. Leaf spots (light-colored areas, arrows) on *Maranta leuconeura* 'Kerchoviana' 16 days after inoculation with *Drechslera setariae*. Such damage occurs naturally and prevents the sale of green maranta plants.

Fig. 2. Natural infection of *Calathea roseo-picta* (arrows) by *Drechslera setariae*.

DISCUSSION

Serious disease outbreaks have occurred in *Calathea* and *Maranta* spp. in recent years in Florida nurseries. The fact that *D. setariae* infects both genera may explain the frequency and severity of the epidemics, since both genera may be grown in the same nurseries. *D. setariae* infects two species of *Maranta*, at least five species of *Calathea*, two species of *Ctenanthe,* and one species of *Stromanthe*. Recent reports of *D. setariae* causing diseases on rose (*Rosa* spp.) and chrysanthemum (*Chrysanthemum* spp.) (4) and on areca palm (*Chrysalidocarpus* sp.) (2) have broadened the known host range of the fungus. Further cross-pathogenicity studies may provide useful information regarding disease control measures. If areca palm and *Maranta* and *Calathea* spp. are susceptible to the same isolates of the fungus, then physical separation of these plant species may reduce disease problems.

The overhead irrigation these foliage crops receive provides moisture on the leaf surface necessary for infection by *D. setariae*. High relative humidity and condensation within greenhouses during winter and spring provide moisture on leaves, thus producing conditions favorable for infection by the fungus. Also, the growth of these plant species promotes foliar infection. New leaves begin rolled in a tight cylinder as they are produced from the bud. These rolled leaves can retain water effectively from irrigation or condensation and thus are highly vulnerable to infection by the fungus. Until nursery plant production methods are modified, strict schedules of fungicide application must be utilized to minimize severity of this foliar disease. At present, foliage plant growers are using the fungicide chlorothalonil (Daconil 2787) to control the disease on *Maranta* spp.

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