Table 2. Influence of fertilizer level on severity of fungal leaf spot of Areca palm (*Chrysalidocarpus lutescens*).

Osmocote 19-6-12 (g/pot)	Mean leaf spot severity[z] Test 1[y] 3-19-81 to 8-31-81	Test 2[y] 3-27-82 to 10-18-82	Test 3[x] 6-8-82 to 1-26-83	Test 4[y] 9-10-82 to 2-1-83	Test 5[x] 9-10-82 to 2-1-83
1.0	—	—	2.1	2.1	3.1
1.8	2.9	3.1	—	—	—
3.0	—	—	3.2	—	—
3.5	2.3	2.5	—	—	—
5.0	—	—	2.9	2.6	2.3
5.3	2.9	2.2	—	—	—
7.0	3.3	2.0	3.3	—	—
9.0	—	—	2.8	2.4	2.8
11.0	—	—	2.4	—	—
13.0	—	—	—	2.2	2.6
Significance[w]	%TrSS	%TrSS	%TrSS	%TrSS	%TrSS
Linear	33.4*	94.5**	75.4**	F=ns	13.3ns
Quadratic	49.4*	5.4ns	0.1ns		33.8*
Cubic	17.2ns	0.1ns	16.2*		52.9**
Residual	—	—	8.3ns		—

[z]Mean leaf spot rating for 15 pots (3 plants each) was rated as follows: 1 = no lesions, 2 = 1-20 lesions, 3 = 21-40 lesions, 4 = 41-75 lesions, and 5 = 76 or more lesions with some shredding of leaf tips.
[y]Test performed in a greenhouse.
[x]Test performed in a shadehouse.
[w]Regression analyses were performed on tests with significant differences between treatments as determined by an F test. The analyses are given as the percentage of the treatment sum of squares (%TrSS) for which each term accounts, followed by the significance level of the corresponding F value denoted as follows: ** = 0.01, * = 0.05, and ns = not significant.

trolling the light and temperature under which plants are produced would aid in determining the host response to fungal infection. Akai and Mori (1) showed that the ratio of N to K was important in severity of helminthosporium blight of rice. Similarly, Lam and Lewis (7) found that while increasing N increased drechslera leaf spot of ryegrass, increasing either P or K decreased disease severity. Since our tests employed a constant ratio of N to K to P these potential effects could not be evaluated. Until such time as these factors are investigated, control should be based on maintaining healthy plants by minimizing host stresses and exposure to the pathogens. Chemical control of this disease has been successful when a preventative program is used even under conditions which expose plants to overhead irrigation and rainfall (3). The corner stone of Areca palm leaf spot control should be prevention of infection through a combination of cultural and chemical means.

Acknowledgements

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Literature Cited

1. Akai, S. and S. Mori. 1953. Studies on Helminthosporium blight of rice plants. II. Relation of the combination-ratio of nitrogenous and potassium fertilizers to the susceptibility of rice plants to Helminthosporium blight. Memoirs College Agr., Kyoto Univ. No. 69:1-12.
2. Chase, A. R. 1982. Dematiaceous leaf spot of *Chrysalidocarpus lutescens* and other palms in Florida. Plant Dis. 66:697-699.
3. Chase, A. R. and R. T. Poole. 1982. Suggestions for chemical control of Areca palm leaf spot. Florida Foliage 8(12):35.
4. Conover, C. A. and R. T. Poole. 1974. Influence of shade, nutrition and season on growth of *Aglaonema, Maranta* and *Peperomia* stock plants. Proc. Trop. Reg. Amer. Soc. Hort. Sci. 18:283-287.
5. Conover, C. A. and R. T. Poole. 1981. Influence of light and fertilizer levels and fertilizer sources on foliage plants maintained under interior environments for one year. J. Amer. Soc. Hort. Sci. 106:571-574.
6. Gallasch, H. 1974. Effect of nutrition on the incidence of *Drechslera incurvata* leaf spot of coconuts. Papua New Guinea Agr. J. 25(3,4): 38-50.
7. Lam, A. and G. C. Lewis. 1982. Effects of nitrogen and potassium fertilizer application on *Drechslera* spp. and *Puccinia coronata* on perennial ryegrass (*Lolium perenne*) foliage. Plant Pathol. 31:123-131.
8. Poole, R. T. and C. A. Conover. 1975. Media, shade and fertilizer influence production of the Areca palm, *Chrysalidocarpus lutescens* Wendl. Proc. Fla. State Hort. Soc. 88:603-605.
9. Poole, R. T. and C. A. Conover. 1977. Influence of fertilizer source and level on growth and foliar content of *Philodendron oxycardium* and *Chrysalidocarpus lutescens*. Proc. Fla. State Hort. Soc. 90:314-316.

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A NEW DISEASE OF DIEFFENBACHIA MACULATA (LODD.) G. DON "CAMILLE": LEAF SPOT CAUSED BY COLLETOTRICHUM GLOEOSPORIOIDES (PENZ.) SACC. DURING TRANSIT AND ITS CONTROL BY THE APPLICATION OF FUNGICIDES

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Abstract. In vitro **isolations from naturally infected dieffenbachia with leaf spot symptoms resulted in the consistent recovery of** Colletotrichum gloeosporioides. **Typical leaf spot symptoms were observed in experimentally inoculated dieffenbachia leaves with a pure culture of the fungus. The lesions were initially water soaked, surrounded by a yellow halo which later turned brown to black with small black pustules. The size of the lesion in the center of the leaf was 1 to 2 inches in diameter, whereas, near the margin it was variable in size.** Colletotrichum gloeosporioides **was reisolated from the inoculated leaves. Disease development was favored by temperatures of 24°C, darkness, and mechanical injury of the leaf. Foliar applications of mancozeb (Manzate 200 80W) 1.5 lb./100 gal, vinclozolin (Ornalin 50W) 1 lb./100 gal, and Zyban 75W (thiophanate methyl & zinc ion + maneb complex), 1.5 lb./100 gal, were evaluated for leaf spot control and it was found that mancorzeb was the best chemical.**

Different species of dieffenbachia can commonly be found in commercial and private foliage plantings. Many of

the commercially available varieties are derived from 2 major species of *Dieffenbachia: D. sequine* (Jacq.) Schott and *D. maculata* (1). Leaf spot caused by *Colletotrichum* sp. has been reported on *D. picta* Schott (*D. maculata*) in Sweden (2) but, to our knowledge, not in the United States. Leaf spot of *D. maculata* 'Camille' was first observed on the leaves of potted plants that were shipped via truck. When the plants were packed in the shipping containers no leaf spot was visible, however, upon arrival leaf spots were present on the foliage. The lesions were initially water soaked and surrounded by a yellow halo, which later turned brown to black with small black pustules (Fig. 1). The size of the lesion in the center of the leaf was 1 to 2 inches in diameter whereas near the margin it was variable in size (Fig. 2). In this study, we report the consistent isolation of *C. gloeosporioides* from naturally infected leaves, the reproduction of leaf spot symptoms on dieffenbachia inoculated with the cultured organism, reisolation of the same organism from symptomatic leaves, and the evaluation of several fungicides for disease control.

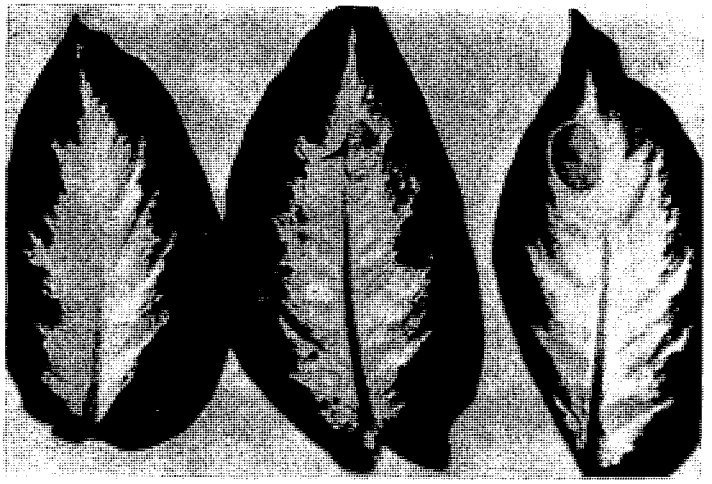

Fig. 1. Dieffenbachia leaves: Left to right—healthy, experimentally inoculated with *Colletotrichum gloeosporioides*, naturally infected with *C. gleosporioides*.

Materials and Methods

Samples of infected leaves were obtained from several places. Affected areas were excised, washed, surface sterilized in 0.52% sodium hypochlorite solution for 1 min, and rinsed in sterile water. The tissue was then plated, using sterile techniques, onto potato dextrose agar (PDA, Difco) and King's medium B in petri plates and incubated at 30-32°C for 5 days in the dark. Isolated organisms were identified and transferred onto PDA plates and maintained at 7°C until use. Pathogenicity of the isolated fungus was tested on healthy dieffenbachia 'Camille'. All test plants were 10-16 wk old at the time of inoculation and were grown in high (2,500 ft-c) or low (1,000 ft-c) light. Plants were grown in 6-inch diameter pots containing a steam sterilized potting mix composed of peat moss and cypress shavings (201-mix, Peace River Peat, Bartow, FL 33830) amended with 9.2 lb. dolomite and 1.85 lb. super-phosphate/yd^3.

The plants were experimentally inoculated with a pure culture of *C. gloeosporioides*. A conidial suspension was prepared by the addition of 0.34 fl. oz of sterile distilled water to the plates and the mycelium was rubbed gently with a sterile rubber spatula. The resulting conidial suspensions were decanted into a sterile beaker and conidial counts were made using a hemacytometer. The suspension for all studies was adjusted to 3.4 x 10^4 conidia per fl. oz and applied to mechanically injured and non-injured leaves in a mist with

Fig. 2. Dieffenbachia leaf with leaf spot caused by *Colletotrichum gloeosporioides*.

a hand-operated, trigger-action sprayer. The control plants were sprayed with water only. After inoculation, half the plants were placed on a bench in the greenhouse (24-32°C and 1000 ft-c). The other half were put in shipping containers (24°C and no light) and placed in the laboratory. All plants were examined for symptoms after 7 days. Reisolation of the pathogen was performed using previously described methods and PDA medium. This test was repeated 3 different times with 4 plants per treatment.

Chemical treatments were applied as foliar sprays to run-off with a hand-held sprayer and included mancozeb (Manzate 200 80W) 1.5 lb./100 gal of water, vinclozolin (Ornalin 50W) 1 lb./100 gal of water, and Zyban 75W 1.5 lb./100 gal of water. Chemical applications were made immediately after inoculation of the test plants and the test was repeated 3 different times with 3 plants per treatment.

Results and Discussion

Isolations from naturally infected tissue resulted in the

recovery of *C. gloeosporioides* from 95% of the leaf spots sampled from each of 2 different sources. In pathogenicity studies, *C. gloeosporioides* originally isolated from naturally infected dieffenbachia, caused leaf spots only when the plants had received mechanical damage and were held at 24°C with no light (Table 1). The plants held in the greenhouse and the untreated checks showed no leaf spot. In every attempt *C. gloeosporioides* was reisolated from symptomatic leaves that were experimentally inoculated. Application of mancozeb at 1.5 lb./100 gal of water provided 100% control of leaf spot. Zyban and Vinclozolin provided only a 30% reduction in leaf spot (Table 2). No symptoms of phytotoxicity were observed with any of the chemicals tested.

In vitro isolation, pathogenicity and reisolation studies show that *C. gloeosporioides* was the causal agent of the leaf spot of *D. maculata* 'Camille'. In this test, conditions required for symptom expression were leaf injury, temperatures of 24°C, and darkness with all occurring during the packing and shipping process. Plants grown under high or low light were equally susceptible to *C. gloeosporioides* infection (Table 1). This leaf spot could be mistaken for symptoms of bacterial leaf spot, however, no bacteria were recovered in any of our in vitro isolation studies. Microscopic examination of the leaf spots also did not show any bacterial ooze.

Table 1. Inoculation of dieffenbachia with *Colletotrichum gloeosporioides* isolated from infected leaves[y].

Previous growth conditions	Type of incubation	Leaf injury: Spray inoculation	Leaf injury: No inoculation	No injury, spray inoculation	Untreated check
High light (2,500 ft-c)	greenhouse	—[z]	—	—	—
Low light (1,000 ft-c)	greenhouse	—	—	—	—
High light	shipping container	+	—	—	—
Low light	shipping container	+	—	—	—

[y]Four plants were tested in each treatment and the test was repeated 3 times.
[z]+ indicates the presence of typical leaf spot; — indicates the absence of leaf spotting.

Table 2. Evaluation of Mancozeb, Zyban and Vinclozolin as foliar sprays for the control of dieffenbachia leaf spot.

Treatment[y]	Rate (lb./100 gal)	Plants with leaf spot symptoms (%)[z]: Leaf injury, inoculation, fungicide	Leaf injury, fungicide	Leaf injury, inoculation	Untreated check
Mancozeb	1.5	0	0	100	0
Zyban	1.5	66	0	100	0
Vinclozolin	1.0	66	0	100	0

[z]Three plants were evaluated in each of 3 tests.
[y]All chemicals were applied immediately after inoculation.

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Literature Cited

1. Bailey, L. H. and E. Z. Bailey. 1976. Hortus third. Macmillan Publ. Co., Inc., New York.
2. Karnestam, E. 1976. Infection by *Colletotrichum sp.* on *Dieffenbachia picta*. Vaxskyddnotiser 40:164-165.

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HOST RANGE AND PATHOGEN SPECIFICITY STUDIES OF CYLINDROCLADIUM SPATHIPHYLLI[1]

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Additional index words. Cylindrocladium floridanum, Rumohra adiantiformis, Spathiphyllum spp.

Abstract. **Selected species and cultivars of spathiphyllum were tested for resistance to root and petiole rot incited by** Cylindrocladium spathiphylli **Schoulties, El-Gholl, & Alfieri. Of these, only** Spathiphyllum floribundum **(Lind. & Andre) N. E. Br. exhibited a high degree of resistance against infection and showed no visible symptoms of foliar distress. Microbiological assays of roots of the resistant** S. floribudum **indicated some infection by** C. spathiphylli **at high inoculum levels. Regarding other species of the family Araceae, 0 of 9 selected aroids were affected by high inoculum levels of the pathogen. The pathogen was able to persist at very low levels in the soil mix in the presence of the non-affected aroids and in the absence of any plant. None of the other 8 species of** Cylindrocladium **that were tested affected spathiphyllum. Leatherleaf fern,** Rumohra adiantiformis **(G. Forst.) Ching was found to be a foliar host of** C. spathiphylli.

Beginning in 1978 and continuing to the present, several nurseries in Florida have incurred serious economic losses from a root and foliar disease of various species of spathiphyllum (3, 5, 6, 7). This disease is caused by *Cylindrocladium spathiphylli* (8). Because chemical control is not entirely effective (3) and because the disease is highly ruinous to plants, growers of affected spathiphyllum often have to move their present growing operation to pathogen-free and distant locations in the nursery or not grow spathiphyllum (3, 7). With these limited options, several questions arise. Is genetic resistance available? Are hosts other than spathiphyllum affected? Does the pathogen persist in nursery soil mixes in the absence of a suitable host? This study,

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