

ICPB-XD 109, which was isolated from *Anthurium* sp., was more pathogenic to *Dieffenbachia* than the cultures isolated from *P. oxycardium*.

Successful control measures have not been established; the results of preliminary tests in commercial greenhouses, however, indicate that two applications of streptomycin at 100 ppm give adequate control of the disease.

In our greenhouse in Gainesville, where the humidity and temperature were appreciably lower than in commercial greenhouses and where the plants were wider spaced, the disease remained confined to leaves initially infected while the new growth remained free of leaf spots. Maintaining low humidity in greenhouses and

avoiding crowded growing conditions would undoubtedly help keep the disease incidence at low levels. However, in many nurseries these conditions are not met and in order to stimulate plant growth the beds are kept wet by intermittent mist sprayers while large numbers of plants are put together, in order to make maximum use of the available growing space.

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## DISTRIBUTION, PATHOGENICITY, AND TAXONOMY OF *CERCOSPORIDIUM BOUGAINVILLEAE*

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#### ABSTRACT

Based on recent taxonomic changes in the genus *Cercospora*, the causal agent of a serious leaf spotting disease of bougainvillea is now designated as *Cercosporidium bougainvilleae*, comb. nov. The fungus is characterized by dark brown to black stroma that are globose to subglobose, and up to 75 $\mu$  in diameter; pale to medium olivaceous conidiophores with moderately prominent conidial scars, straight or geniculate, and 59-148 x 3.5-7.0 $\mu$ ; and obclavate to obclavato-cylindric conidia that were very pale to medium olivaceous brown, with 3-9 slightly to moderately constricted septa, lightly echinulate and thickened walls, and 24-90 x 4.2-8.4 $\mu$ . Since

1963, more than 250 disease specimens have been examined from 72 widely separated locations in Florida. The disease is found south to the Florida Keys from a line approximately west-southwest from Ormond Beach to Inverness, except for a single occurrence in Gainesville. Observations show that bougainvillea varieties of the *Bougainvillea glabra* type, with glabrous leaves and short, straight spines, were mostly nonsusceptible or only slightly susceptible. Those of the *B. spectabilis* group, with pubescent leaves and recurved spines, vary from moderately to highly susceptible.

#### INTRODUCTION

*Cercospora bougainvilleae* Muntanola was described in 1957 on leaves of *Bougainvillea stipitata* Gris. collected at Quebrada de la Higuera, Tucumán, Argentina (3). In 1961, Ancalmo (1) found the fungus associated with leaf spotting and moderate defoliation of *B. glabra* Choisy plants in El Salvador, and Rao (4) described *Cercospora bougainvilleae* sp. nov. on leaves of *B. spectabilis* Willd. in Hyderabad State, India, in 1962. Sobers and Martinez (5) reported that *C. bougainvilleae* was found in the United States for the first time at Miami and Fort Myers, Florida, in 1962, and that during 1963 and 1964, more than 175 disease specimens were examined

from 59 widely separated communities in southern Florida. Pathogenicity of *C. bougainvilleae* was established for the first time to 10 varieties of bougainvillea, a control for the disease was presented, and it was suggested that based on descriptions of *C. apii* Fres., the type species of the genus, *C. bougainvilleae* was not a true *Cercospora*.

The purpose of this paper is (i) to reassess the taxonomic status of *C. bougainvilleae* based on work by Deighton (2), (ii) to report more recent information on the distribution of the pathogen in Florida, and (iii) to list additional susceptible bougainvillea varieties.

#### TAXONOMY OF THE PATHOGEN

*Cercosporidium bougainvilleae* (Muntañola) Sob. & Sey. comb. nov.

≡ *Cercospora bougainvilleae* Muntañola, Rev. Agr. Agron. 24: 81-88 (1957).

≡ *Cercospora bougainvilleae* P. N. Rao, Indian Phytopathol. 15: 114-122 (1962). (Homonym).

Leaf spots most circular to subcircular, up to 5 mm, visible on both surfaces, on the upper surface centers tan to white with occasional brown concentric zonations and raised reddish brown margins, frequently with a diffuse chlorotic areas around the lesion; on the lower surface centers tan to white with occasional brown concentric zonations, mostly without definite margins (Fig. 1). Caespituli amphigenous but more abundant on the lower surface, consisting of numerous dense olivaceous fascicles of conidiophores scattered over the lesion. Stroma globose to subglobose, dark brown to black, partially immersed in stoma, up to 75 $\mu$ , composed of medium olivaceous hyphal elements. Conidiophores pale to medium olivaceous, frequently paler at the tips, multiseptate, unbranched, straight or geniculate, variable in width, moderately prominent conical scars at irregular intervals, 59-148 x 3.5-7.0 $\mu$ . Conidia arise as blown-out ends of conidiophores, but under some conditions appear to arise by budding; very pale to medium olivaceous brown, obclavate to obclavato-cylindric, mostly curved, apices obtuse to subacute, rounded or abruptly tapered at the base with a slight but prominent hilum, 3-9 slightly to moderately constricted septa (mostly 5), walls thickened and lightly echinulate, 24-90 x 4.2-8.4 $\mu$ , average 63 x 5.4 $\mu$  (Fig. 2).

#### SPECIMENS EXAMINED

##### Specimen in Herb. IMI

On *Bougainvillea glabra*. Cocoa Beach, Florida, May 1963, E. K. Sobers. Det. M. B. Ellis as cogeneric with *Berteromyces* (IMI 100407).

##### Specimens in Herb. CUP

On *Bougainvillea glabra*. Santa Tecla, El Salvador, Feb. 1960, Oscar Ancalmo. Det. C. Chupp as *Cercospora bougainvilleae* (41688).

On *Bougainvillea glabra*. Cocoa Beach, Florida, March 1963, E. K. Sobers. Tentatively det. C. Chupp as *Helminthosporium bougainvilleae* (41068).

#### DISTRIBUTION

Since 1962, when the disease was discovered in Miami, Florida, the number of leaf specimens examined and attributed to *C. bougainvilleae* has risen to more than 250. The disease is now found in 72 communities in 25 of 31 counties south of a line from Daytona Beach in the east, to Inverness in the west, or approximately within

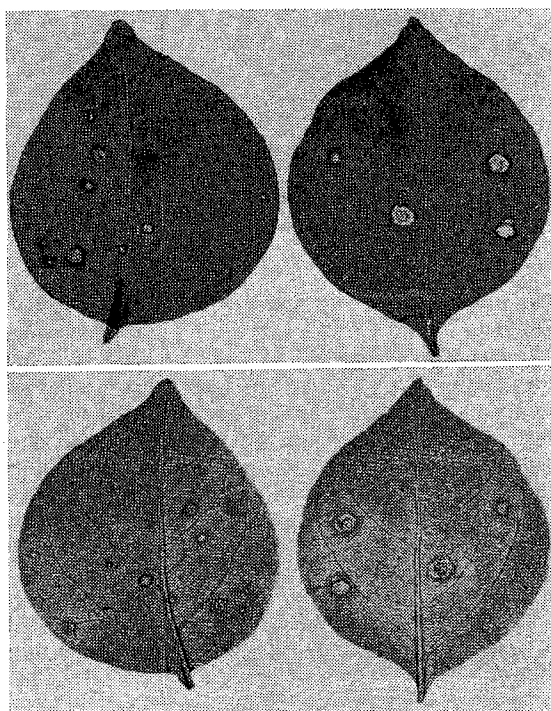


Fig. 1.—Lesions on leaves of bougainvillea caused by *Cercosporidium bougainvilleae*.

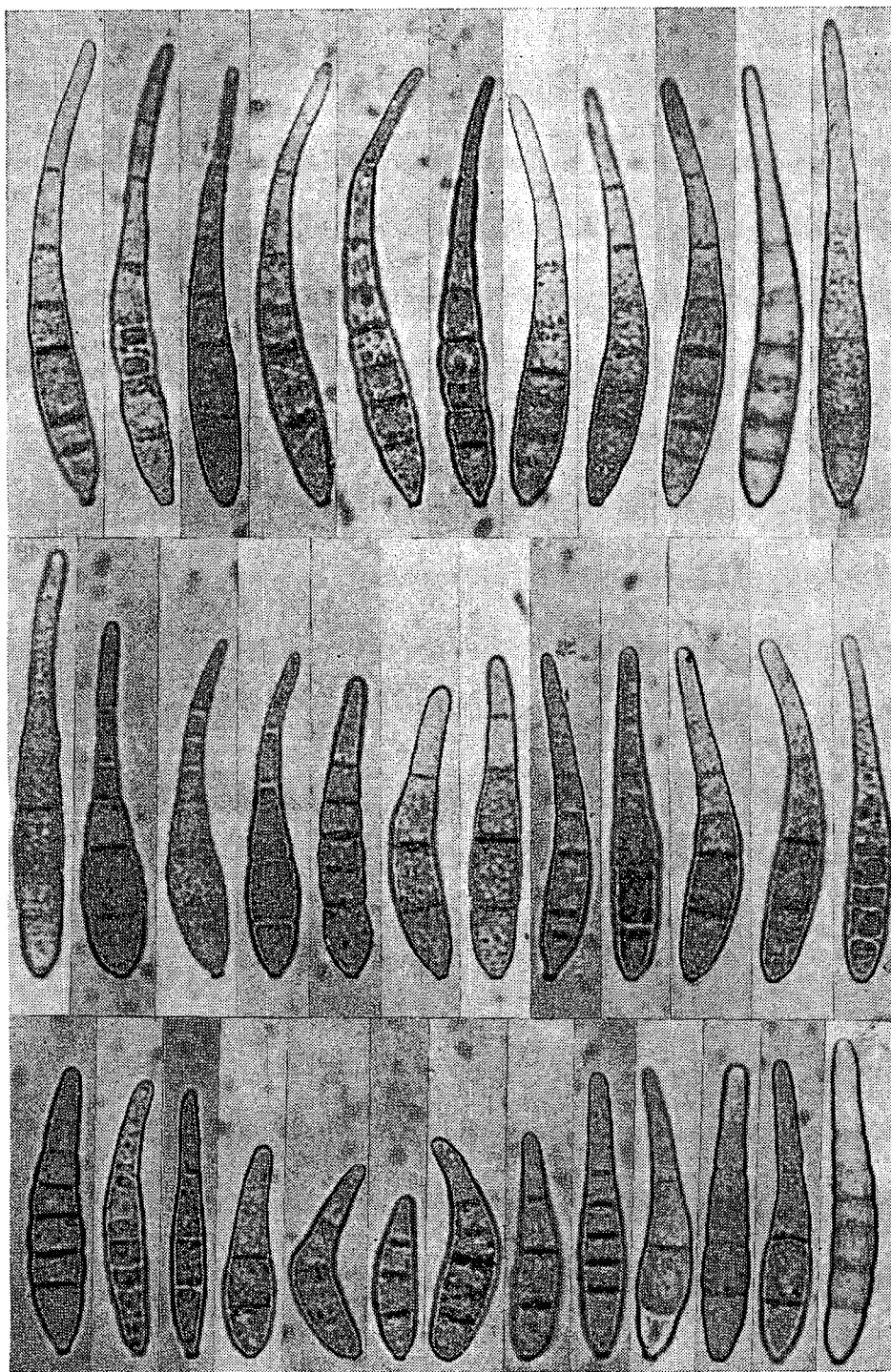


Fig. 2.—Representative conidia of *Cercosporidium bougainvilleae*.

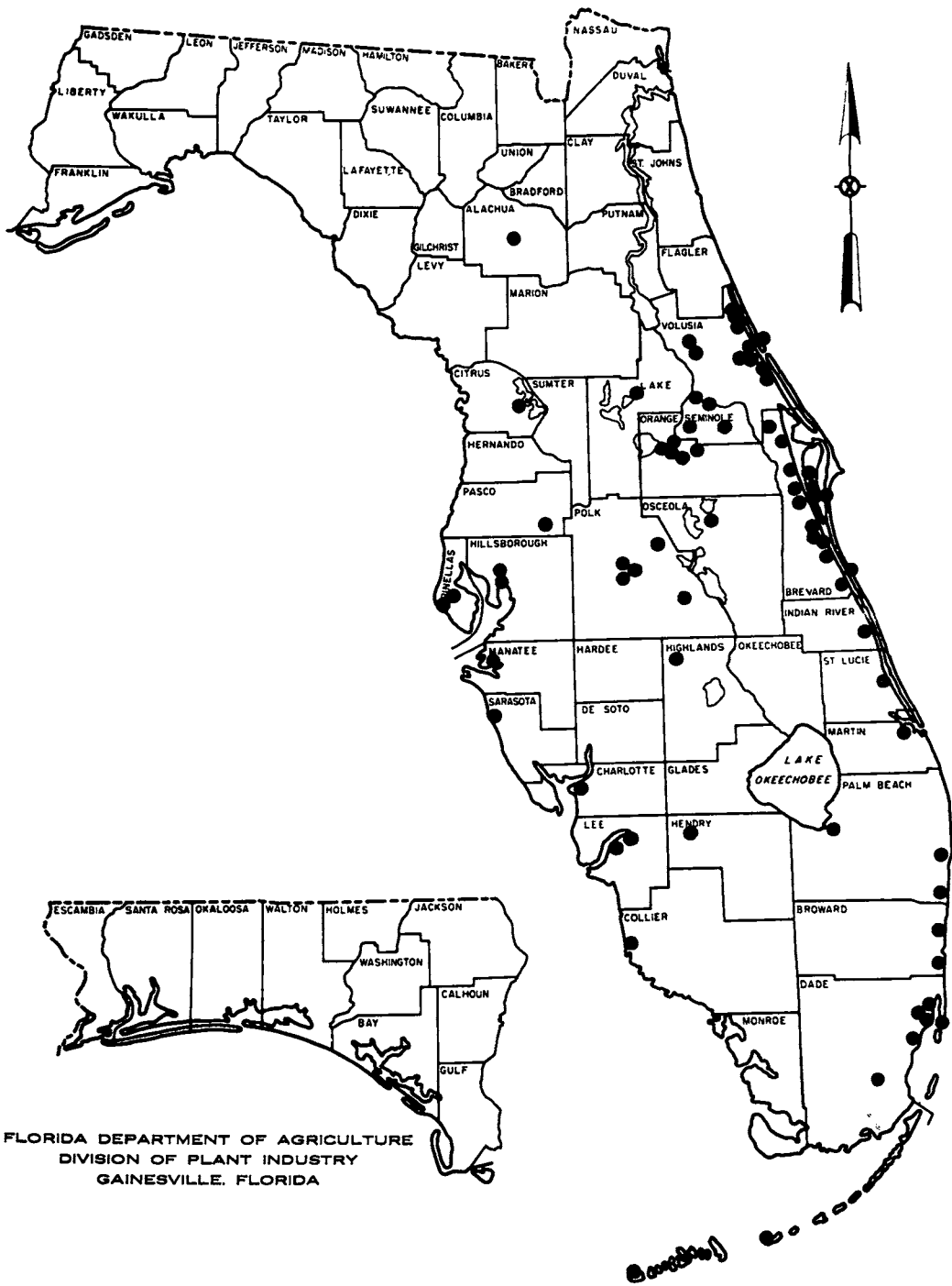


Fig. 3.—Distribution of *Cercosporidium bougainvilleae* in Florida by community.

the limits of growth of bougainvillea in the state. The single occurrence of the disease in Gainesville was on a plant brought into the city from a south Florida nursery, and it is assumed from an area where the disease occurred. More than 75 percent of the disease specimens were received from eight east coast counties (Fig. 3), with Brevard and Volusia counties accounting for slightly more than 60 percent of all specimens, and representing approximately 33 percent of the communities in which the disease is now found. It is also observed that the disease was more prevalent in areas of greatest population, although disease incidence in Brevard and Volusia counties seems to be significantly higher.

Other than the known distribution in the United States, the disease has been identified on *B. glabra* in El Salvador, on *B. spectabilis* in Hyderabad State, India, and on leaves of *B. stipitata* in Tucumán, Argentina.

#### HOSTS

It was previously suggested (5) that bougainvillea varieties with glabrous leaves and relatively short, straight spines (*B. glabra* group) varied from nonsusceptible to resistant, that varieties with pubescent leaves and recurved spines (*B. spectabilis* group) were moderately

susceptible, and that forms in which leaf and spine characteristics were not distinctively of one or the other type (Crimson Lake group), were moderately to highly susceptible to attack by *C. bougainvilleae*.

Eight previously unreported bougainvillea hosts have been found. Afterglow, a variety much like Golden Glow, was highly susceptible to *C. bougainvilleae*; Panama Pink, a parent of the highly susceptible Hugh Evans variety, was moderately susceptible; Crimson Lake Jr., Mrs. Butt, and Orange King of the Crimson Lake group, were moderately susceptible; Rosa of Catalina, a *B. spectabilis* type and a parent of Marg Bacon, was moderately susceptible; and Paper Flower and Four-O'clock, both of unknown parentage, were moderately susceptible. This makes a total of 17 varieties of bougainvillea grown in Florida that are moderately to highly susceptible to *C. bougainvilleae*.

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## FLOWERING OF GARDENIAS AS AFFECTED BY PHOTOPERIOD, CYCOCEL AND B-9

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#### ABSTRACT

Experiments were initiated during 1965 and 1966 to determine effect of photoperiod and levels

of Cycocel and B-9 on flowering of *Gardenia jasminoides* 'Veitchii' and 'Glazeri'. Data were taken on number of flowers and date of 50% bloom.

Short day photoperiods of 9 hours duration for 4 or 6 weeks were necessary to obtain highest flower counts. Increasing duration of short day treatments from 4 to 8 weeks linearly decreased time to date of 50% bloom with 'Veitchii'.

Flowering was increased 75 to 100% by application of Cycocel during both years' experiments, while B-9 increased flowering only during 1965. In the 1966 experiment, B-9 delayed flowering when compared with Cycocel by an average 5½ days.