Leaf Blight of Dogwood (*Cornus florida*) Caused by *Phytophthora parasitica*

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ABSTRACT

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A foliar blight of dogwood (*Cornus florida*) characterized by scattered, rapidly enlarging brown spots with gray-green borders was shown to be caused by *Phytophthora parasitica*, a pythiaceous fungus known to have an extensive host range. Symptoms developed after a period of heavy rains in a Florida nursery. Similar symptoms developed 3 days after inoculation of 1-yr-old seedlings with zoospores of *P. parasitica*.

In June 1980, after a period of rainy weather in Gainesville, FL, a foliar blight of container-grown dogwood (*Cornus florida* L.) was observed in a nursery the day after the cessation of rain. Isolations from naturally infected leaves consistently yielded a *Phytophthora* sp. Because there appears to be no report of a foliage blight of dogwood caused by *Phytophthora*, this study was undertaken to establish the pathogenic relationship of this fungus to dogwood foliage and to identify the *Phytophthora* sp.

MATERIALS AND METHODS

Naturally infected dogwood leaves were surface-disinfested with 0.1% sodium hypochlorite for 2 min, and pieces of excised leaf tissue were plated on a selective medium (PARP [2]) for pythiaceous fungi. The plates were incubated at room temperature (25 ± 2 C) in the dark for 48–72 hr and observed for colony development.

The fungus emanating from the excised leaf tissue was isolated and maintained in test tubes on potato-dextrose agar (PDA) at room temperature under natural light. The PDA was prepared from the broth of 200 g of freshly peeled, diced, and boiled Irish potatoes supplemented with 20 g of dextrose, 1 g of KH_2PO_4, and 18 g of Difco-Bacto agar and adjusted to 1 L with deionized water. The isolated fungus was also placed on V-8 juice agar and in V-8 broth for sporangium and chlamydospore production. The V-8 juice agar was also used for oospore formation in paired crosses with A_1 or A_2 compatibility types of *P. capsici, P. palmivora, P. parasitica*, and *P. parasitica* var. *nicotianae*. The V-8 juice broth was prepared by mixing 2.5 g of $CaCO_3$ in 177 ml of Campbell's V-8 juice and centrifuging for 3 min at a relative centrifugal force of 650 × *g*. To each 100 ml of supernatant, 400 ml of deionized water was added, resulting in a clear V-8 juice broth with a pH of about 6.0. Eighteen grams of Difco-Bacto agar per liter of medium was added for V-8 juice agar.

Cultures for zoospore production were initiated by adding a 5-mm-diameter disk from the growing edge of a culture of the dogwood isolate on V-8 juice agar to 15 ml of lima bean broth in petri plates. The broth was prepared by steaming 284 g of frozen baby lima beans in 500 ml of deionized water and adjusting the final volume to 2 L of medium with deionized water after filtering the beans. After 48 hr of incubation at 25 C, the broth was removed and the cultures were rinsed twice with sterile tap water to remove any residual broth and resuspended in a small quantity (about 10 ml) of sterile tap water in petri plates. The cultures were then incubated under continuous fluorescent light (General Electric F40 LW-RS-WMII at about 1,000 lux) for 48 hr. Zoospores were released by treating the sporangia in the cultures with chilled (10 C) sterile deionized water. Zoospores were filtered through 16 layers of cheesecloth to remove sporangia. A suspension of encysted zoospores was prepared for counting by placing a 5-ml sample in a test tube and agitating the suspension for 1 min on a vortex mixer. The zoospore inoculum concentration was determined using a standard hemacytometer from an average of six samples.

Three 1-yr-old dogwood seedlings (about 30 cm tall) were sprayed with a zoospore suspension in deionized water, and three others were sprayed only with deionized water as controls. Immediately after inoculation, all plants were enclosed in plastic bags and maintained at room temperature for 3 days. Two separate inoculation studies with a 6-mo interval between tests were conducted with this fungal organism. Inoculum density for the first pathogenicity trial was 1.5×10^5 zoospores per milliliter with 25 ml of the zoospore suspension applied per plant. For the second pathogenicity trial, an inoculum density of 2.3×10^5 zoospores per milliliter was used; 50 ml of the suspension was applied per plant.

RESULTS AND DISCUSSION

All inoculated plants that received zoospore suspensions at either concentration in the pathogenicity trials developed leaf blight within 3 days. No control plants developed leaf blight symptoms. Symptoms consisted of scattered, brown, water-soaked lesions with gray-green borders developing to

Fig. 1. Scattered distribution of lesions on blighted leaves of dogwood inoculated with 1.5×10^5 zoospores per milliliter of *Phytophthora parasitica* after 3 days incubation in a moist chamber.

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varying sizes (Figs. 1 and 2). Isolations from leaf lesions on PARP resulted in recovery of a *Phytophthora* sp. This isolate from dogwood was identified as *P. parasitica* Dastur (=*P. nicotianae* B. de Haan var. *parasitica* (Dastur) Waterh.) (8,10). Three single-zoospore isolates and three isolates obtained from inoculated dogwood seedlings, as well as the original isolate, all produced abundant sporangia and chlamydospores on V-8 juice agar and in V-8 broth. These isolates formed oospores on V-8 juice agar in paired crosses (4) with A_1 compatibility types of *P. parasitica* and *P. parasitica* var. *nicotianae*, but oospores were not produced with A_2 compatibility types of these fungi or with either compatibility type of *P. palmivora* or *P. capsici*.

Fig. 2. Brown, water-soaked leaf lesions with gray-green borders on dogwood caused by *Phytophthora parasitica*.

P. parasitica is well known for its extensive host range (1,9), and reports by Keim (3), Krober (5), and Kuske and Benson (6,7) attest to this pathogen's ability to overwinter successfully in soil and plant debris and its relative ease of dispersal. Given an ideal environment, particularly after periods of heavy, prolonged rains, this fungus is a potentially serious pathogen of dogwood and additional, heretofore unrecorded hosts, particularly as a blight-inducing pathogen.

The culture of *P. parasitica* isolated from dogwood was deposited in the American Type Culture Collection, Rockville, MD, as ATCC 52638 and in the Florida Type Culture Collection, Gainesville, as FTCC 999.

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