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PYTHIUM ROOT ROT OF SPATHIPHYLLUM

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Introduction

Spathiphyllum cultivars are in high demand as indoor plants and are especially popular in low-light landscape environments. Recently, an increase in available spathiphyllum cultivars has allowed the buyer to select from plants that tower 6 feet or more to dainty desk-top plants no more than 6 inches tall. Young plants are commonly started from seeds or from tissue-cultured plantlets. These young fragile plants are very susceptible to environmental fluctuations and root diseases.

Disease and Symptoms

Young plants of the spathiphyllum cultivar 'Tasson', received from a commercial nursery in 1986, had damping-off symptoms resembling those caused by *Cylindrocladium spathiphylli*, a known fungal pathogen on spathiphyllum. Diseased roots differed from typical *Cylindrocladium* infections by having brown root lesions instead of dark black lesions. Furthermore, the small black flecks common on petioles and larger roots infected with *Cylindrocladium* were absent.

Cause and Spread

A *Pythium* species was isolated from diseased 'Tasson', cultured, and identified as *Pythium splendens*. This fungus is commonly observed in Hawaii as a root-rotting organism of many ornamental and foliage plants such as brassaia, philodendron, leea, anthurium, and dendrobium. It is also known to parasitize crop plants such as alfalfa, papaya, tomato, cucumber, and others.

Pythium splendens was subsequently isolated in 1987 from spathiphyllum 'Silver Streak' with root rot and damping-off. Young tissue-cultured plants about 2 inches tall were dying, with more than 90 percent of the root system becoming necrotic in some plants. Extensive root rot of 'Silver Streak' is a clue that *P. splendens* is present, since 'Silver Streak' has been moderately resistant to *Cylindrocladium* infections in our previous studies.

While these symptomatic differences provide clues to the causal organisms, accurate diagnosis requires the culturing of suspect fungi from diseased tissue, followed by microscopic examination of fungal morphology. Either *P. splendens* or *C. spathiphylli*, or both, may be present on or within diseased spathiphyllum roots.

In pathogenicity tests, healthy plants of spathiphyllum 'Tasson' and 'Silver Streak' were inoculated with a spore suspension of *P. splendens*. Both became diseased, showing about 30 percent root rot in four weeks (Figs. 1 and 2). Root rots developed slowly on mature plants, resulting in weak, dull green to chlorotic, stunted plants of low vigor (Figs. 3 and 4). The disease is severe on very young spathiphyllum seedlings or plantlets. Complete root loss occurs as the fungus rapidly rots the limited root system of these tiny plants, resulting in a quick kill.

Pythium splendens produces spherical bodies called conidia (asexual or vegetative spores) that detach readily and help to spread the fungus (Fig. 5). Unlike most *Pythium* species, these structures of *P. splendens* do not release motile or swimming zoospores. Instead, they germinate by producing germ tubes that penetrate host tissue. The fungus also produces thick-walled sexual spores called oospores, which are formed only when two compatible mating types are present. Oospores enable the fungus to survive adverse conditions.

Nursery growers need to be concerned with conidial production as the means by which the fungus multiplies and spreads. Diseased plant tissue commonly contains large numbers of conidia, so movement of diseased plants into clean areas, or contact with diseased tissue, will disseminate the pathogen. Conidia are also spread by the use of contaminated media, pots, and tools, as well as by organisms such as snails and slugs. Spores of *P. splendens* are not airborne, but are easily dispersed in moving water. Spores are primarily contained in fragments of diseased tissue; water moving over bench tops, through irrigation systems, or splashing from pot to pot will disseminate them.

Moisture is essential for fungal reproduction, germination of fungal conidia and the

Fig. 1. Healthy roots of spathiphyllum 'Silver Streak'.

Fig. 2. Root rot of 'Silver Streak' caused by *P. splendens*.

continued growth of the germinated spore, penetration of the fungus into roots, and rapid root rot development. Frequent watering or overwatering creates conditions that favor the pathogen and enhance disease severity. *Pythium splendens* is an organism favored by warm temperatures and does well between 25 and 32°C (77–90°F).

Control

A program of strict sanitation or disease avoidance is essential for control of *Pythium* root rot. Because many foliage plants are started from tissue-cultured plants, seeds, or above-ground cuttings, obtaining disease-free planting material should be relatively simple. The sanitation process is then continued by growing these healthy plants in sterilized or pasteurized potting media and clean pots. Snails and slugs must be controlled. These organisms carry fungal spores on their bodies, ingest diseased plants, and are known to excrete living fungal spores. Failure to establish and maintain disease-free plants will mean continuing, costly efforts to attain only partial control of this problem.

As supplemental treatments, fungicide drenches with metalaxyl (Subdue 2E) or ethazol (Truban) should be helpful in dealing with low levels of *Pythium* root rot, but should not be relied on as a substitute for clean cultural practices.

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Fig. 3. Comparison of healthy control and diseased 'Silver Streak' four months after inoculation with *P. splendens*. New growth is stunted, and there is general chlorosis.

Fig. 4. Root rot and loss of older leaves on spathiphyllum four months after inoculation with *P. splendens*. A few healthy roots are white.

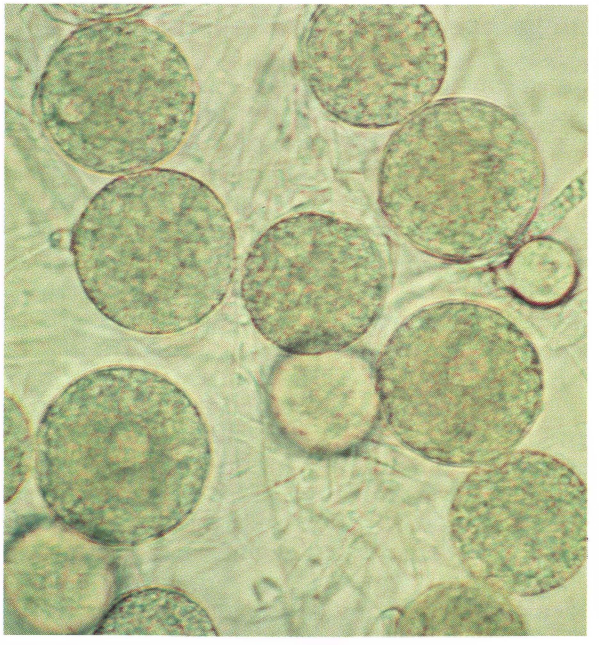

Fig. 5. Conidia of *P. splendens* from a pure agar culture. Magnification is 650X.

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