Phytophthora Stem Rot of *Aphelandra squarrosa*

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ABSTRACT

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Phytophthora parasitica was isolated from *Aphelandra squarrosa* cv. Dania showing symptoms of wilt, vascular necrosis, stem rot, and collapse. Wounded and unwounded *Aphelandra* and *Saintpaulia ionantha* (African violet) inoculated with the fungus showed typical symptoms of *Aphelandra* collapse; *P. parasitica* was reisolated from both plants.

Aphelandra squarrosa Nees (zebra plant) is a popular plant grown for its brightly contrasting foliage and yellow flower spike. It is subject to leafspot caused by *Corynespora cassiicola* (Berk. & Curt.) Wei (5) and to stem galls incited by *Kutilakesa pironii* (perfect stage = *Nectriella pironii* Alfieri & Samuels) (1), although neither disease has seriously affected commercial production of *Aphelandra*.

During the late summer of 1980, a stem rot of *A. squarrosa* cv. Dania was noted in the stock beds and production areas of several commercial greenhouses. Production losses in one nursery were as high as 50%. Plants were in varying stages of collapse and showed wilting, blistering of the stem epidermis, and a black, mushy rot beginning at the juncture of the stem and soil. The rot rapidly progressed into basal leaf petioles, occasionally into leaf blades, and eventually the plants collapsed. The purpose of this research was to identify the causal agent of *Aphelandra* stem rot.

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MATERIALS AND METHODS

Root, stem, and petiole sections (5 mm^2) from diseased *Aphelandra* were surface disinfested for 2 min in 0.5% sodium hypochlorite; rinsed in sterile deionized water; and plated on fresh potato-dextrose agar (PDA), 1.5% water agar amended with streptomycin sulfate at 60 μg/ml, and two selective pythiaceous media (PVP, PVPH) (9,10). Plates were incubated at 24 C in the dark for 5 days before they were examined for fungal and bacterial growth. Isolation was attempted on three occasions from different groups of plants in one nursery to determine the extent of the disease. Pure cultures of a pythiaceous fungus were established by hyphal tip transfer to fresh PDA slants incubated at 24 C for 7 days and then maintained at 15 C.

Preliminary inoculations were performed with *Aphelandra* cuttings rooted in steam-sterilized soil medium consisting of Canadian peat, cypress shavings, and pine bark (2:1:1 by volume). The medium was amended with 6 kg of Osmocote (14:14:14) slow-release fertilizer, 4 kg of dolomite, and 1 kg of Perk (micronutrient source manufactured by Agrico Chemical Co., Chicago, IL) per cubic meter of mix. Inoculum consisted of mycelial disks (3 mm diam) cut from the advancing edge of colonies grown on fresh PDA plates in the dark at 24 C for 5 days. Agar disks from a fresh, uninoculated PDA plate were used to inoculate control plants. A 1-cm-long cut parallel to the stem was made with a sterile scalpel in the stem of each plant 3 cm above the soil line. One disk was placed into each cut and sealed with a strip of Parafilm 2 cm wide. Three plants for each treatment were maintained at optimum growth conditions in a greenhouse for observation. Because many *Aphelandra* growers also produce African violets, *Saintpaulia ionantha* (Wendl.), 10 of these plants were also inoculated with the fungus and 10 with PDA. African violet leaves rooted by a grower were transferred to the above potting medium and grown to a 10-cm height before inoculation. Each test was performed three times.

A second series of experiments was conducted to determine the ability of the fungus to infect unwounded plants of both species. Plants were grown in the manner described above for 3 wk before inoculation. Cultures grown on fresh PDA plates in the dark at 24 C for 5 days were blended in a Waring Blendor at low speed for 15 sec at the rate of one plate per 100 ml of sterile deionized water. Inoculum for the control treatment was prepared in the same manner using fresh, uninoculated PDA plates. Two slits were made in the soil on opposite sides and 3 cm from the stem of each of five plants of each species for each treatment. Twenty milliliters of the mycelial-PDA slurry or the uninoculated PDA slurry were added to each slit. Slits were filled with surrounding soil that was watered lightly. Plants were grown in a greenhouse for 1–4 wk. The test was repeated twice.

Isolations from plants in all experiments were made by excising stem and root tissue from the advancing edge of a lesion with a sterile scalpel, surface disinfesting the tissue for 2 min in 0.5% sodium hypochlorite, rinsing in sterile deionized water, and plating on PVPH medium. Plants were incubated for 5–7 days at 24 C in the dark before examination.

RESULTS

A pythiaceous fungus was readily and consistently isolated from symptomatic portions of the plant but not from asymptomatic tissue above the rot nor from the apparently healthy roots. Stem tissue was sectioned and the vascular system was blackened as far as 1 cm from the advancing edge of lesions. The fungus was identified as *Phytophthora parasitica* Dastur (11).

Aphelandra plants that were wound-inoculated with mycelial disks of *P. parasitica* showed symptoms of stem rot, petiole rot, and collapse within 5 days of inoculation (Figs. 1 and 2). The vascular system of the stems was necrotic, but roots of inoculated plants appeared healthy. Uninoculated plants remained healthy and free of symptoms throughout the test. *P. parasitica* was reisolated from stem sections of inoculated plants but not from control plants or from roots of any plants.

Similar results were obtained in the test using African violets. Seventy-five percent of plants that were wound-inoculated with *P. parasitica* wilted and collapsed within 2 wk of inoculation. Infection began in petioles of lower leaves and progressed into the crown of the plant. Uninoculated plants remained free of symptoms throughout the test. *P. parasitica* was reisolated from stems of all inoculated plants but not from control plants or from roots of any plant.

When plants were inoculated through the soil, unwounded *Aphelandra* and African violets both showed symptoms typical of the disease within 1 wk of inoculation; 60% of each species died within 30 days. Symptoms ranged in severity for African violets from two to three rotted leaves to plant death; for *Aphelandra*, symptoms ranged from slight wilt to death. About 30% of the inoculated African violets and *Aphelandra* developed root rot. *P. parasitica* was reisolated from root or stem tissue of all inoculated plants regardless of symptom severity. Uninoculated plants of both species remained healthy and free of symptoms throughout the study, and *P. parasitica* could not be isolated from them.

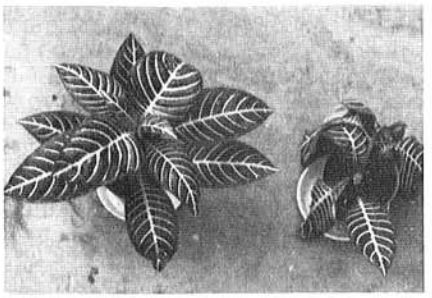

Fig. 1. *Aphelandra squarrosa*: healthy plant (**left**); diseased plant (**right**), showing typical symptoms of collapse 5 days after inoculation with *Phytophthora parasitica*.

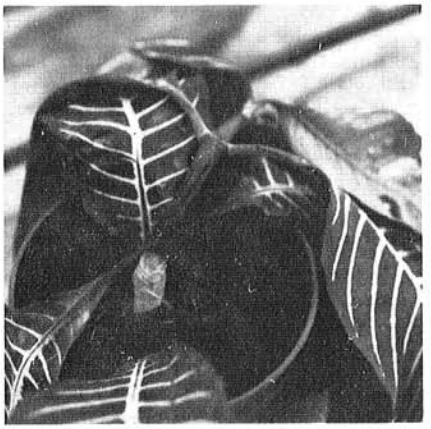

Fig. 2. Close view of *Aphelandra squarrosa*, showing wilt; rotting of stem, petiole, and blade; and plant collapse after inoculation with *Phytophthora parasitica*.

DISCUSSION

These experiments establish *P. parasitica* as the causal organism of *Aphelandra* stem rot, a previously undescribed disease of *A. squarrosa* cv. Dania. Isolates of *P. parasitica* from *Aphelandra* were also pathogenic to African violets.

P. parasitica causes serious diseases of many foliage plants, including *Brassaia actinophylla* Endl. (Schefflera) (12), *Cordyline terminalis* (L.) Kunth. (Ti plant) (8), *Peperomia obtusifolia* (L.) A. Dietr. (7), *Philodendron scandens oxycardium* Schott (heartleaf philodendron) (6), *Pilea* sp. Lindl. (Moon Valley plant) (4), *Saintpaulia ionantha* (African violet) (3), and *Schlumbergera truncata* (Haw.) K. Schum. (Christmas cactus) (2). This is the first report of *P. parasitica* causing a serious disease of *Aphelandra*.

Possible chemical controls were not evaluated; however, considerable literature has reported the efficacy of metalaxyl in controlling *Phytophthora* spp. (6). Until a compound is registered for use on *Aphelandra*, standard cultural control practices should be used. Many of the naturally infected *Aphelandra* showed advanced stem rot but no root rot, possibly indicating transmission by water splashing. Irrigation mats did not appear to influence disease spread in one nursery in which inoculum pressure was high. Where inoculum pressure is less severe, these mats and other forms of irrigation that reduce water splashing could aid in disease control. Special attention should be paid to the use of pathogen-free stock, pots, and potting media by which diseases of this nature are easily introduced.

ACKNOWLEDGMENT

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