A Foliar Disease of Anthurium Seedlings Caused by Aphelenchoides fragariae

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ABSTRACT

Aphelenchoides fragariae causes a foliar blight of anthurium seedlings which is often lethal in young plants. The nematode also invades and destroys anthurium seeds planted on infested medium. The Hawaiian tree fern, *Cibotium chamissoi,* which is used as a planting medium, is thought to be the source of inoculum. Prevention of the disease is possible by hot water treatment of planting medium and by following good sanitary practices in the nursery.

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Anthurium andraeanum Lind. has been grown in Hawaii for many years for export as cut flowers to the U.S. mainland. Cultivars are propagated asexually from side shoots. Recently anthurium growers have developed a potted-plant industry. Seeds are usually germinated in flats on the surface of shredded logs of the Hawaiian tree fern, *Cibotium chamissoi* Kaulf. When the seedlings reach a height of 50.8-76.2 mm (2-3 in.) they are transplanted to individual pots where they are allowed to develop for several mo before shipment. The nurseries are outdoors and exposed to rain and ambient temp and humidity, except as this is modified by a sarancloth canopy. In one nursery, a foliar blight of unknown etiology destroyed most of the seedlings.

Microscopic examination of necrotic lesions showed that nematodes were constantly associated with this disease. Specimens examined by S. A. Sher were identified as *Aphelenchoides fragariae* (Ritzema Bos., 1891) Christie, 1932.

Symptoms of the disease have been observed only on seedlings; mature plants propagated asexually for the cut-flower industry are apparently free of this disease. Examination of tissue sections demonstrated that *A. fragariae* occurs as an endoparasite on anthurium leaves. Lesions usually appear near the midvein first and gradually enlarge. Margins of the lesions are temporarily restricted by veins, but eventually the entire leaf may become necrotic and the leaf abscise. The disease is particularly severe in very young seedlings which usually succumb to the infection. Older seedlings are more likely

to survive. The extent of spread between seedlings in an infested flat and the rate of lesion development and leaf abscission is greatly enhanced by wet conditions. The nursery where the disease has been found is located in an area experiencing 3,175 mm (125 in) annual rainfall and 100% relative humidity (RH) for several hr each night. Movement of *A. fragariae* from one plant to another is known to be dependent upon a film of moisture on the plant surface (5), thus conditions in the nursery are conducive to disease development throughout many mo of the year.

Inoculation experiments to prove pathogenicity were conducted at 100% RH and ca. 24 C. Using the transmission technique reported by Raabe and Holtzmann (3), initial experiments consisted of attaching diseased leaves to healthy ones covered with a film of water. Pieces of healthy leaves were attached to test plants as controls. Lesions developed on inoculated leaves of seedlings within 7-10 days, whereas leaves of mature plants remained healthy. Subsequent inoculation experiments consisted of placing 10-20 nematodes on filter paper disks or small cubes of polyurethane sponges and attaching these to test plants in the manner previously used to prove pathogenicity of another foliar nematode (2). For the check, paper disks or sponges were saturated with water used for extracting nematodes from diseased leaves. Before placing the water on the disks or sponges it was examined microscopically to determine that nematodes were not present. These check plants remained healthy throughout the experiment. Young succulent leaves on inoculated seedlings developed lesions in ca. 7-10 days, whereas symptoms usually were not evident on older leaves for several more days. Inoculated leaves of mature plants remained healthy.

A. fragariae also parasitized anthurium seeds. Seeds were invaded and destroyed when planted on the surface of tree fern medium on which infested seedlings previously had been grown. Microscopic examination of the seeds revealed that they were filled with nematodes. Seeds remained healthy when germinated on other media or on infested tree fern medium that had been heated in hot water.

The original source of inoculum was not determined but tree fern stumps, which were collected from the forest and untreated except for shredding, were considered a likely reservoir. Although it is not known whether the Hawaiian tree fern is a host of *A. fragariae,* other ferns in Hawaii are known to be susceptible to this nematode (4) including one unidentified species which developed as volunteer plants on tree fern medium. However, the frequency of infection or at least the population level in the tree fern must be very low because seed-trapping experiments and examination of leaves did not result in recovery of *A. fragariae* from tree ferns collected in the forest. The original anthurium seed source was found to be free of nematodes. Moreover, seeds remained healthy when germinated on other media in the same nursery.

In vivo thermotherapy treatments, which have been used to eradicate *A. fragariae* (1), were hampered by burning injury to seedlings. Roots were much more sensitive than leaves. At 46.6 C, roots were severely injured after 8 min, although in all cases new roots eventually developed. Young leaves showed evidence of burning after 8-12 min at 46.6 C, whereas older leaves were not damaged. Many infested leaves were freed of nematodes after submersion in water for 8 min at 46.6 C; after 12 min, all leaves were consistently free of viable nematodes.

A chemotherapy experiment was conducted with Nemacur, ethyl-4-(methylthio)-m-totyl isopropyl phosphoramidate. Infected plants were sprayed to run-off at rates of 2.8, 4.2, and 5.6 ml of Nemacur per 3.8 liters (1.0 gal) of water. Control plants were sprayed with water. Treated plants were air-dried for 2 hr and then held at 100% RH. At periodic intervals for several wk, samples of lesions were examined microscopically for evidence of viable nematodes. Only the lowest rate failed to eradicate all nematodes.

In general, prevention appears to be the most feasible means of controlling this disease. This involves hot water treatment of planting medium and employing sanitary practices necessary to avoid transmission from infected to healthy plants in the nursery.

LITERATURE CITED

1. GUBA, E. F., and C. J. GILGUT. 1938. Control of the begonia leaf-blight nematode. Mass. Agric. Exp. Stn. Bull. 348:1-12.
2. HOLTZMANN, O. V. 1968. A foliar disease of tuberose caused by Aphelenchoides besseyi. Plant Dis. Rep. 52:56.
3. RAABE, R. D., and O. V. HOLTZMANN. 1965. A foliar nematode in Hibiscus. Phytopathology 55:478-479.
4. SHER, S. A. 1954. Observations on plant-parasitic nematodes in Hawaii. Plant Dis. Rep. 38:687-689.
5. THORNE, G. 1961. Principles of Nematology. McGraw-Hill, New York. 553 p.