

First Report of *Ceratocystis* Wilt on `Ōhi`a (*Metrosideros polymorpha*)

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`Ōhi`a (*Metrosideros polymorpha* Gaudich.) is Hawai'i's most common and widespread native tree, occurring from sea level to 2500-m elevation in both dry and wet forests and on substrates ranging from 50 to 4 million years in age (Friday and Herbert 2006). It is the most ecologically important native Hawai'ian tree, defining native forest succession and ecosystem function over broad areas, providing critical habitat for rare and endangered native bird and insect species, and exemplifying the strong links between native Hawai'ian culture and the islands' environment (Dawson and Stemmermann 1990). Within the past 5 years, extensive `ōhi`a mortality has been observed in the Puna District of Hawai'i Island in previously healthy trees growing in undisturbed forest settings. Affected trees exhibit rapid, synchronized death of leaves on individual branches that eventually spreads to the entire canopy. Dark-brown to black discoloration can be seen in the woody xylem of affected trees. Five branch samples from two trees displaying characteristic symptoms were collected in February and June 2014 from Leilani Estates subdivision (19°28' N, 154°55' W). A fungus that produced perithecia and formed olive-brown cultures on 10% V8 agar was consistently isolated from infected tissue. After 14 days, the perithecia were black, globose, 143 to 275 × 110 to 264 µm, and possessed a long, black neck (660 to 880 µm). Ascospores were hat-shaped, hyaline, and 5.7 to 8.6 × 2.7 to 4.3 µm. Hyaline, cylindrical endoconidia (14.3 to 38.6 × 2.9 to 4.3 µm) were found. PCR amplification and sequencing of the ITS region of rDNA were carried out for one isolate, P14-1-1. BLAST analysis of the sequence data (GenBank Accession No. KP203957) showed that the isolate was 98.9% homologous (525/531 nt) to *Ceratocystis fimbriata* (KC493164, derived from CBS115167). Strain KC493164 and others with 100% homology were collected from *Syngonium* spp. in Hawaii, Florida, Brazil, and Australia (Thorpe et al. 2005). Based on these morphological and molecular characteristics the fungus was identified as *C. fimbriata* (Engelbrecht and Harrington 2005). Pathogenicity was tested on 1- to 2-year-old *M. polymorpha* seedlings as follows. Eight healthy plants were wounded with a scalpel ~50 cm above the soil level. Two filter-paper disks soaked in a 10⁶-spore/ml suspension was inserted in a stem flap and wrapped with parafilm. Control plants were inoculated with filter disks soaked in sterile water. The treated plants were incubated at 24°C with 12-h light in a humid chamber. Wilt symptoms were observed on 7 of 8 plants within 17 to 36 days. As the disease progressed, leaves withered, died, and remained attached to the plant. Plant death occurred around 100 days. Internal discoloration was observed in the main stem. *C. fimbriata* was successfully reisolated and identified morphologically from the infected seedlings. All control plants remained healthy. To our knowledge, this is the first report of *C. fimbriata* causing disease in *M. polymorpha*. This pathogen poses a serious threat to Hawai'i's flagship native tree species whose loss would be catastrophic for the diversity, structure, and function of Hawai'i's remaining native forests and the services they provide.

References:

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