Diseases Caused by Fungi and Fungus-Like Organisms

First Report of *Fusarium concentricum* Causing Shoot Blight on *Podocarpus macrophyllus* in China

Dong Qin,^{1,2} Yanyan Jiang,³ Rui Zhang,³ Emran Ali,⁴ Junwei Huo,^{1,2} and Yonggang Li^{3,†}

¹ College of Horticulture and Landscape Architecture, Northeast Agricultural University, Harbin 150030, P.R. China

² National-Local Joint Engineering Research Center for Development and Utilization of Small Fruits in Cold Regions, Northeast Agricultural University, Harbin 150030, P.R. China

³ College of Agriculture, Northeast Agricultural University, Harbin 150030, P.R. China

⁴ Department of Plant Pathology, University of Georgia, Tifton, GA 31794, U.S.A.

Funding: This study was funded by National Key R&D Program of China (2018YFD1000200) and Academic Backbone Project of Northeast Agricultural University (20XG04). Plant Dis. 106:768, 2022; published online as <https://doi.org/10.1094/PDIS-07-21-1490-PDN>. Accepted for publication 16 August 2021.

Podocarpus macrophyllus (Thunb.) D. Don is used in many fields, including landscape, medicine, and forest interplanting. In July 2019, shoot blight was observed on *P. macrophyllus* at three nurseries in Harbin, China. Approximately 15% of plants had symptoms of the disease, which included rapid, synchronized death of leaves on individual branches. Eventually the whole plant wilted. Leaves and stems turned dark blue to brown. Ten infected vascular tissue samples from 10 individual plants were surface disinfested in 0.5% NaOCl for 5 min, rinsed three times in sterile distilled water, and cultured on potato dextrose agar (PDA) amended with 50 µg/ml of streptomycin at 26°C. Six similar fungal isolates from 10 samples were isolated and subcultured. Single-conidium isolates were generated with methods reported previously (Leslie and Summerell 2006). Colonies on PDA consisted of densely floccose aerial hyphae with light yellow and pinkish pigments. Microconidia were oval to obovoid or allantoid, 3.8 to 11.8 µm in length and 2.8 to 4.6 µm in width, mostly nonseptate on carnation leaf agar. Macroconidia were naviculate-to-fusiform slender, 24.9 to 57.2 µm in length and 2.8 to 4.5 µm in width, three- to five-septate, with a beaked apical cell and a foot-shaped basal cell. According to these morphological characteristics, all isolates were

identified as *Fusarium* spp. (Aoki et al. 2001). Genomic DNA was extracted from a representative isolate LHS1. The internal transcribed spacer regions (ITS), translation elongation factor 1- α gene (*TEF-1 α*), and β -tubulin (*TUB2*) gene were amplified using the primers ITS1 and ITS4 (Yin et al. 2012), EF1-728F/EF1-986R (Carbone and Kohn 1999), and T1/Bt2b (Glass and Donaldson 1995), respectively. DNA sequences of LHS1 were deposited in GenBank (accession nos. MT914496 for ITS, MT920920 for *TEF-1 α* , and MT920921 for *TUB2*, respectively). MegaBLAST analysis of the ITS, *TEF-1 α* , and *TUB2* sequences indicated 100, 97.7, and 100% similarity with *Fusarium concentricum* isolate CBS 450.97 (accession no. MH862659.1 for ITS, MT010992.1 for *TEF-1 α* , and MT011040.1 for *TUB2*, respectively). To determine pathogenicity, *P. macrophyllus* plants were grown in 10-cm pots containing a commercial potting mix (5 plants/pot). At the 10- to 12-leaf stage, 10 healthy plants (2 pots) were inoculated by spraying 5 ml of a conidial suspension (4×10^6 spores/ml) onto every plant. Ten plants treated with sterile distilled water served as a control. The test was repeated twice. All plants were placed in a humidity chamber (>95% relative humidity, 26°C) for 48 h after inoculation and then transferred to a greenhouse at 22/28°C (night/day). All inoculated wilted with leaves and stems turned dark blue to brown 15 days after inoculation. No symptoms were observed on the control plants. The fungus was reisolated and confirmed to be *F. concentricum* according to morphological characteristics and molecular identification. To our knowledge, this is the first report of *F. concentricum* on *P. macrophyllus* in world. The disease caused a large number of plants to wilt and die, seriously impacting the ability of the horticulture industry to produce *P. macrophyllus*. Although this pathogen causes leaf and shoot blight symptoms, it is not clear if the pathogen is also a vascular wilt disease. The occurrence of the new disease caused by *F. concentricum* highlights the importance of developing management strategies to protect *P. macrophyllus*.

References:

- Aoki, T., et al. 2001. Mycoscience 42:461.
- Carbone, I., and Kohn, L. M. 1999. Mycologia 91:553.
- Glass, N. L., and Donaldson, G. C. 1995. Appl. Environ. Microbiol. 61:1323.
- Leslie, J. F., and Summerell, B. A. 2006. The *Fusarium* Laboratory Manual. Blackwell Publishing, Victoria, Australia.
- Yin, J., et al. 2012. Ann. Appl. Biol. 160:191.

The author(s) declare no conflict of interest.

e-Xtra

Keywords: *Fusarium concentricum*, *Podocarpus macrophyllus*, wilt

[†]Indicates the corresponding author.
Y. G. Li; neulyg@126.com