Diseases Caused by Fungi and Fungus-Like Organisms

First Report of Rubber Tree Wilt Caused by *Ceratocystis fimbriata* in China

K. C. Xu,¹ R. Q. Zhang,² J. Li,³ Xue Li,² J. Yang,^{2,†} and Q. Huang^{2,†}

¹ College of Pharmacy, Guizhou University of Traditional Chinese Medicine, Guiyang, 550025, Guizhou, China

² State Key Laboratory for Conservation and Utilization of Bio-Resources in Yunnan, Yunnan Agricultural University, Kunming, 650201, Yunnan, China

³ Sugarcane Research Institute of Yunnan Academy of Agricultural Sciences, Kaiyuan, 661699, Yunnan, China

Funding: Funding was provided by the National Natural Science Foundation of China (grant no. 31860522). Plant Dis. 106:1762, 2022; published online as <https://doi.org/10.1094/PDIS-11-21-2492-PDN>. Accepted for publication 29 December 2021.

The rubber tree (*Hevea brasiliensis*) is an important economic resource for the rubber and latex industry. During November 2013 and June 2016, rubber trees showing typical wilt symptoms were found in Mengla, Xishuangbannan, Yunnan, China (21°28'N, 101°33'E). Symptomatic trees initially exhibited wilting of foliage on individual branches, which spread to the whole canopy, followed by tree death. Dark-blue to black discoloration was observed in the inner bark and affected xylem, a grayish layer of fungal growth and occasional sporulation. The disease was detected on 20% of trees surveyed. The diseased tissues of three rubber trees were surface disinfected with 75% ethanol for 30 s and 0.1% HgCl₂ for 2 min, rinsed three times with sterile distilled water, plated onto potato dextrose agar (PDA), and incubated at 25°C. After 7 days, a fungus was consistently observed growing from the tissue. Three single-spore isolates were obtained. In culture, colonies reached 69 mm in diameter within 10 days; mycelium was initially white, becoming celadon. After 5 days of peritheciium formation, perithecia were black, globose (173.1 to 237.9 × 175.6 to 217.2 μm), and had a long black neck (507.3 to 794.1 μm). Ascospore with outer cell wall forming a brim, hat-shaped at the tips of ostiolar hyphae (3.43 × 5.63 μm). Cylindrical endoconidia (10.5 to 39.7 × 3.5 to 6.6 μm) were hyaline. Chains of barrel-shaped conidia (7.2 to 9.5 × 4.1 to 6.2 μm) were found. Aleuroconidia were ovoid or obpyriform, and smooth (10.2 to 14.1 × 8.4 to 10.6 μm). Morphological characteristics of

the fungus were consistent with the description of *Ceratocystis fimbriata* (Engelbrecht and Harrington 2005). Genomic DNA was extracted from isolates (XJm10-2-5, XJm8-2-5, XJm4) using the Chelex-100 method (Xu et al. 2020). The ITS region of rDNA was sequenced using the procedures of Thorpe et al. (2005). BLAST analysis of ITS sequence data (GenBank accessions KJ511488, KJ511485, KT963149) showed that the isolates were 100% homologous to isolates on *Punica granatum* and *Colocasia esculenta* from China (GenBank accessions KT963152, MH793673). Neighbor-joining phylogenetic analyses were performed using MEGA 6.06 based on ITS sequences. Analyses showed that all isolates were located in the same clade with all *C. fimbriata* with high bootstrap support. Therefore, the fungus was identified as *C. fimbriata* based on morphology and molecular evidence. Pathogenicity of *C. fimbriata* isolated from this study was tested by inoculation of 1-year-old pot-grown (3 liter) rubber tree seedlings. The soil of three seedlings was inoculated by drenching with 30 ml of spore suspension (2.0 × 10⁶ spores/ml). Three control plants were inoculated with 30 ml of sterile distilled water. The experiment was repeated three times. Plants were kept in a controlled greenhouse at 25°C and watered weekly. After inoculation for 1 month, all the isolates produced typical wilt symptoms, while control plants showed no symptoms. The original fungus was successfully reisolated from inoculated trees and identified as *C. fimbriata* following the methods described above. The pathogenicity assay showed that *C. fimbriata* was pathogenic to rubber trees. *C. fimbriata* was first reported on rubber tree in Brazil (Albuquerque et al. 1972; Silveira et al. 1985). To the best of our knowledge, this is the first report of *C. fimbriata* causing wilt of rubber tree in China. This contributes to understanding the diversity of this pathogen, which appears to be a significant threat to rubber trees in its ecosystem.

References:

- Albuquerque, F. C., et al. 1972. Page 125 in: Ocorrência do mofo cinzento (*Ceratocystis fimbriata*) da seringueira. IPEAN, Belém, PA, Brazil.
- Engelbrecht, C. J., and Harrington, T. C. 2005. Mycologia 97:57.
- Silveira, A. P., et al. 1985. Fitopatol. Bras. 10:281.
- Thorpe, D. J., et al. 2005. Phytopathology 95:316.
- Xu, K. C., et al. 2020. J. Gen. Plant Pathol. 86:322.

The author(s) declare no conflict of interest.

e-Xtra

Keywords: *Ceratocystis fimbriata*, rubber tree, wilt

[†]Indicates the corresponding authors.

J. Yang; yangjin-18@163.com, and Q. Huang; huangqiong88hs@163.com