Diseases Caused by Fungi and Fungus-Like Organisms

First Report of *Colletotrichum fructicola* Causing Anthracnose on Indian Jujube (*Ziziphus mauritiana*) in Taiwan

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Funding: Funding was provided by Taiwan Council of Agriculture (104AS-10.8.2-PI-P1). Plant Dis. 106:1751, 2022; published online as <https://doi.org/10.1094/PDIS-06-21-1337-PDN>. Accepted for publication 16 November 2021.

Ziziphus mauritiana Lamarck, known as Indian jujube, is one of the most popular and delicious fruit crops in Taiwan. This crop is mainly planted in southern Taiwan, and its harvest provides fresh fruit. In March 2015, an anthracnose-like disease was observed on Indian jujube fruit (cv. Candied Date) planted in an orchard in the Yanchao District (22°46'33" N, 120°21'37" E) in Kaohsiung City. The disease was quickly distributed around the orchard after it rained, and it caused a great loss in fruit (around 40% of fruit infected). The diseased fruit would completely rot and lose its market value. Symptoms could be observed on all the developmental stages of fruit. On ripe fruit, symptoms were round, brown, and water-soaked lesions covered with salmon-colored spore masses. Four fungal isolates from diseased fruit in the same orchard were collected by single-spore isolation with hand-made glass needles. They were grown on potato dextrose agar (PDA) at 24 to 28°C with diffused light. All four strains produced white to gray, aerial, and cottony mycelia scattered with abundant salmon-colored conidial masses on the center of the colony on PDA. The conidia were hyaline, single celled, round cylindrical on both ends, thin walled, and the contents were guttulate. The sizes of conidia were 15.2 (13.0 to 17.5) × 5.0 (4.5 to 5.5) µm (length/width ratio = 3.03 µm, *n* = 40). DNA was isolated from JC1 and used for amplification of partial sequences of the internal transcribed spacer (ITS), glyceraldehyde-3-phosphate dehydrogenase (GAPDH), actin (ACT), β-tubulin 2 (TUB2), chitin synthase 1 (CHS-1), manganese-

superoxide dismutase (SOD2), and the intergenic region of the *apn2* and *MAT1-2-1* (ApMat) genes (Silva et al. 2012; Weir et al. 2012). A BLAST search against the NCBI database revealed that JC1 gene sequences (GenBank accession nos. MT197188 [ITS], MT199871 [GAPDH], MT199872 [ACT], MT199870 [TUB2], MT815918 [CHS-1], MT815919 [SOD2], and MT221653 [ApMat]) displayed 100.0, 100.0, 99.1, 100.0, 99.7, 99.5, and 99.8% nucleotide identity to the respective gene sequences of *Colletotrichum fructicola* ICMP 18581 (JX010165, JX010033, FJ907426, JX010405, JX009866, JX010327, and JQ807838). A conidial suspension (1×10^6 conidia/ml) was prepared from JC1 isolate of *C. fructicola* and inoculated by spraying it onto detached, ripe, healthy, nonwounded, and surface-disinfected jujube fruit (cv. Candied Date, *n* = 4). Four control fruit were sprayed with sterile water. They were kept in a moist chamber (>90% relative humidity, 24 to 28°C) for 24 h and maintained in the laboratory for an additional 5 days. The inoculated fruit initially showed small light-colored spots in 5 to 7 days, which eventually developed into brown, sunken, and water-soaked lesions 8 to 10 days after inoculation, similar to the symptoms in the orchard. *C. fructicola* was reisolated from symptomatic fruit showing similar morphological characteristics to those collected from the field, thus fulfilling Koch's postulates. No symptoms were observed on fruit treated with water, and no pathogen was reisolated. The experiment was performed twice. The JC1 isolate of *C. fructicola* with the identification number BCRC FU31437 has been deposited at the Taiwan Bioresource Collection and Research Center. This pathogen has been found in many plant species in various countries (Weir et al. 2012). To our knowledge, this is the first report of *C. fructicola* causing anthracnose in Indian jujube fruit in Taiwan and worldwide.

References:

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The author(s) declare no conflict of interest.

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Keywords: anthracnose, *Colletotrichum fructicola*, fungi, Indian jujube (*Ziziphus mauritiana*), pathogen detection, small fruits, Taiwan

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