Diseases Caused by Fungi and Fungus-Like Organisms

First Report of *Fusarium solani* Species Complex Causing Root Rot of Loquat (*Eriobotrya japonica*) in China

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The sequences of the other two isolates R2 and R5 in this paper have been submitted to GenBank under the following accession numbers: *EF-1α* (GenBank nos. MT948146 and MT948147), *RPB1* (GenBank nos. MT948148 and MT955594), and *RPB2* (GenBank nos. MW233051 and MW233053).

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Loquat (*Eriobotrya japonica*), a native fruit tree to China, is a popular edible fruit with medicinal properties (Badenes et al. 2013). A 2016 to 2019 field survey of ~13,000 loquat trees in two orchards in Chongqing and Fujian provinces showed about 5 to 10% root rot disease incidence. The disease symptoms included leaf yellowing, wilting, rotting of main root, and cracking of lateral roots, eventually leading to defoliation and death. To determine the causative agent, diseased roots from six trees were collected, washed in tap water, cut into 2- to 3-mm pieces, and disinfected for 3 min in 75% (v/v) EtOH. After rinsing in sterilized water, the root pieces were soaked in 10% NaClO (w/v) for 5 to 10 min, rinsed thrice in sterile water, and plated on potato dextrose agar (PDA). After 7 days of incubation at 25°C, individual spores were collected from the fungal colonies and replated. Single-spore cultures growing on PDA gave rise to woolly-cottony, cream-white colored aerial mycelium and a yellowish pigmented mycelium. The average colony growth rate was 8.6 mm/day ($n = 3$). Microscopic observation of the mycelium revealed septate and hyaline hyphae and long cylindrical monophialides. Macroconidia were moderately curved, stout, three to four septate, measuring 20.79 to 48.70 $\times$ 4.16 to 10.14 μ m ($n = 50$). Microconidia produced from

long phialides were kidney-shaped, zero to two septate, and 5.72 to 17.28 $\times$ 2.29 to 6.51 μ m ($n = 50$) in size. The mycelial characteristics and reproductive structures of the isolates fit the morphological description of *Fusarium* sp. (Summerell et al. 2003). To confirm this identification, translation elongation factor (*EF-1α*), RNA polymerase I beta subunit (*RPB1*), and RNA polymerase II beta subunit (*RPB2*) regions of the genome were PCR amplified from three separate isolates (R2, R4, and R5) using EF1/EF2, RPB1-Fa/G2R, RPB2-5f2/7cR, and RPB2-7cF/11aR primer pairs (O'Donnell et al. 2010) and sequenced. BLASTn comparison of the *EF-1α* (MT976167), *RPB1* (MT967271), and *RPB2* (MW233052) regions from isolate R4 showed 99% identity with the *EF-1α* (GU170620, 675/676 bp), *RPB1* (KC808270, 1,543/1,545 bp), and *RPB2* (MK4419902, 1,637/1,638 bp) sequences of *Fusarium solani* species complex (FSSC) in GenBank database. The same species level identification was also found using *FUSARIUM-ID* and *FUSARIUM-MLDT* databases. Two-year-old seedlings ($n = 3$) of two different cultivars, 'Hunanzaoshu' and 'Huabai No. 1', growing in pots indoors at 25 to 27°C were inoculated by drenching the soil with a conidial suspension of isolate R4 (40 ml, 10⁶ conidia/ml obtained from 6- to 10-day-old cultures). Control plants ($n = 3$) were inoculated with sterilized water. At 20 days after inoculation (DAI), the leaves of inoculated plants became chlorotic and wilted, defoliated over time, and by 53 DAI 91.67% of plants died. The taproot and lateral roots of inoculated plants appeared brown to black in color, and most lateral roots died and decomposed at 53 DAI, whereas the control plant roots remained healthy. All control plants remained symptomless. Based on morphological and molecular characters (*TEF-1*, *RPB1*, and *RPB2*), the reisolated pathogen from diseased plants was identical to the R4 isolate used for inoculation and the disease assays were repeated thrice. FSSC was recently reported to cause fruit rot disease on loquat in Pakistan (Abbas et al. 2017). Identifying FSSC as a disease agent in Chinese loquat will assist in future development of improved germplasm for this important worldwide tree crop.

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