Diseases Caused by Fungi and Fungus-Like Organisms

First Report of *Penicillium olsonii* Causing Postharvest Fruit Rot of Grape (*Vitis vinifera*) in China

Jian Zou, Tingfu Zhang, Guoqin Wen, Bo Song, and Shijiao Jiang[†]

Key Laboratory of Southwest China Wildlife Resources Conservation, School of Life Science, China West Normal University, Nanchong 637002, Sichuan, China

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Grapes (*Vitis vinifera* L.) are very popular in China as fresh fruit. Due to their storability, some varieties can be kept fresh until winter, increasing the popularity of fruit grapes. However, in 2019, rot symptoms were observed on the cultivar Crimson in Wuhan, Hubei (30.52°N, 114.31°E), and Chengdu, Sichuan (30.67°N, 104.06°E). From 2019 to 2021, the same decay symptoms were found in Liangshan (28.33°N, 102.42°E, cv. Crimson), Ya'an (29.40°N, 102.66°E, cv. Red Globe), and Nanchong (30.80°N, 106.06°E, cv. Victoria), Sichuan. Initial symptoms of this disease were slightly sunken lesions on berries 5 to 7 days in storage at 28°C and then white mycelial growth on the lesion surface. The growth became bluish green following the occurrence of abundant sporulation, along with softening and collapsing of the whole berry. Twenty symptomatic berries from each city were collected (100 total) and 20 isolates were obtained using the single spore isolation technique of Chomnunti et al. (2014). Colonies on PDA medium initially appeared as white mycelium that developed greenish-gray to grayish-green sporulation with white margins. Colony diameter reached 32.5 to 34.5 mm after 10 days of incubation at 28 ± 1°C. The reverse side of the colony was olive brown or grayish yellow. Conidiophores were broom-shaped and verticillate, and the stipes were smooth walled and 120 to 300 × 2.5 to 4.0 µm; the ramus ($n = 2$ to 3) was 6.0 to 15 × 2.5 to 3.6 µm; the metulas ($n = 2$ to 4) were verticillate, 8.7 to 9.8 × 2.0 to 3.2 µm; the phialides ($n = 3$ to 7) were elongate and ampulliform, 2.0 to 3.5 × 2.0 to 2.4 µm; and the conidia (2.0 to 3.5 × 2.0 to 2.4 µm) were subglobose to ellipsoidal in shape, with thick and finely roughened walls. Based on these cultural and morphological characteristics, the

isolates were identified as *Penicillium olsonii* Bainier & Sartory (Frisvad et al. 1990). A multilocus approach was performed to accurately identify representative isolate WHG5. The internal transcribed spacer regions (ITS), calmodulin (*CaM*), beta tubulin (*BenA*), and 18S ribosomal RNA (18S) of isolate WHG5 were amplified and sequenced as described by Walker et al. (2012). The pairwise alignments of ITS, *CaM*, *BenA*, and 18S sequences were nearly 100% identical to *P. olsonii* with GenBank accession numbers KX056230.1 (524/524 bp, 100%), DQ645807.1 (570/572 bp, 99%), AY674444.1 (472/472 bp, 99%), and FJ717701.1 (1299/1301 bp, 99%), respectively. The resulting sequences were deposited in GenBank (accession nos. ITS: MW192867; *CaM*: MZ936474; *BenA*: MZ936475; and 18S: MZ936476). Phylogenetic analysis with the neighbor-joining method classified WHG5 into the *P. olsonii* clade with a posterior probability of 100% based on the concatenated sequences of the ITS, *CaM*, *BenA*, and 18S. Combined with the above morphological characteristics, we confirmed the identity of WHG5 as *P. olsonii*. To fulfill Koch's postulates and confirm the pathogenicity of WHG5, 10 µl of conidial suspension (1×10^6 spores/ml) was inoculated into healthy grape berries (cv. Crimson), using sterile distilled water as a control. Thirty berries were surface disinfected with 2% NaOCl and artificially wounded with a sterilized steel needle with a diameter of 0.5 mm and a depth of 0.3 cm prior to inoculation. All the inoculated fruits were placed in sealed, sterilized Petri dishes and incubated at 28 ± 1°C. The experiments were done in triplicate. After 5 days, inoculated berries showed typical symptoms while controls remained asymptomatic. Using the same protocol as above, *P. olsonii* was reisolated from symptomatic inoculated berries but not from mock-inoculated berries. *P. olsonii* has been reported from Portuguese wine grapes (Serra et al. 2007). This study is the first time that *P. olsonii* was reported as a plant pathogen in China. Since the grapes were collected from grocery stores, details of postharvest management that could have affected disease presence and progression of rotting were not available.

References:

- Chomnunti, P., et al. 2014. Fungal Divers. 66:1.
- Frisvad, J. C., et al. 1990. Persoonia 14:193.
- Serra, R., et al. 2007. Mycologia 99:78.
- Walker, D. M., et al. 2012. Mol. Phylogenet. Evol. 64:500.

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[†]Indicates the corresponding author.
S. Jiang: jiangshijiao@outlook.com