Diseases Caused by Bacteria and Phytoplasmas

Occurrence of Stem Blight Caused by *Pseudomonas extremorientalis* on *Pinellia ternata* in China

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Funding: Funding was provided by National Modern Agricultural Industrial Technology System (grant no. CARS-21), Technology R&D Program of Enshi Tujia and Miao Autonomous Prefecture (grant no. D20190015), Science Funds for Young Scholar of Institute of Chinese Herbal Medicines, Hubei Academy of Agricultural Sciences (grant no. 2019ZYCJJ01), Key R&D Program of Hubei Province (grant no. 2020BCA059), and Key Technology R&D Projects of Hubei Agricultural Science and Technology Innovation Center (grant no. 2020-620-000-002-04). Plant Dis. 105:1851, 2021; published online as <https://doi.org/10.1094/PDIS-10-20-2244-PDN>. Accepted for publication 15 January 2021.

Pinellia ternata is a perennial herbaceous plant whose tubers can be used for anti-inflammatory, and it has a significant position in traditional Chinese medicine (Marki et al. 1987). In April 2020, bacterial stem blight first occurred on *P. ternata* in Jingmen City (30°32'N, 111°51'E), Hubei Province, China. In the follow-up investigation, the disease also appeared in plantations of *P. ternata* in Qianjiang City and Tianmen City. Initial symptoms showed orange-red streak on the stem and then progressed into chlorotic and water-soaked lesions, which caused necrotic roots and stunting, fading, and wilting of leaves. In the end, the leaves withered, the stems rotted completely, and the incidence of plant collapse reached 20 to 30%. To isolate the plant pathogenic bacteria, 20 *P. ternata* plant samples with distinct chlorotic stem symptoms were obtained from two fields in Jingmen City. Symptomatic samples were cut to 1-cm-long pieces by sterile scalpel and then were streaked onto nutrient agar medium and grown at 28°C for

48 h. Four pure typical aerobic, gram-negative bacteria were isolated and were characterized by transparent, smooth, round, convex surfaces. The isolated colonies did not produce fluorescent pigments on King's B medium. In addition, the isolates were positive for nitrate reduction, arabinose, mannitol, D-ribose, sucrose, and D-sorbitol and were negative for gelatin liquefaction, rhamnose, D-glucose, and D-melibiose. These characteristics were identified as *Pseudomonas extremorientalis* (Ivanova et al. 2002). One representative colony (ZJH1) was selected randomly for further verification. The 16S rRNA, *gyrB*, and *rpoD* regions were obtained with primers 27F/1492R (Weisburg et al. 1991), *gyrB*-Fps/*gyrB*-Rps, and *rpoD*-Fps/*rpoD*-Rps, respectively (Sarkar and Guttman 2004). These sequences were deposited in GenBank as accessions MT459234.1, MT469887.1, and MT469886.1, which revealed 99% homology with *P. extremorientalis* strain BS2774 (accession no. LT629708.1). The pathogenicity of *P. extremorientalis* strain ZJH1 was confirmed by using 3-month-old, healthy, greenhouse-grown *P. ternata* plants. The stems were stabbed and inoculated 10 µl of the bacterial suspension (10⁸ CFU/ml), inoculating the same amount of sterile water as a control, and repeated five times for each treatment. The plants were cultivated in a greenhouse at 28°C and a humidity of 80%. Three days later, the stems showed necrosis, followed by withered leaves and plant death, whereas the control had no symptoms. *P. extremorientalis* was reisolated and verified again from symptomatic plants, which was consistent with Koch's postulates. This experiment was repeated thrice to get the same result. To our knowledge, this is the first report of bacterial stem blight caused by *P. extremorientalis* on *P. ternata* in China. Stem blight caused by *P. extremorientalis* poses a significant threat to yield and marketability of *P. ternata*. Further research on selecting a resistant variety and effective chemical control is needed.

References

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The author(s) declare no conflict of interest.

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Keywords: prokaryotes, ornamentals, epidemiology, disease development and spread

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