Diseases Caused by Fungi and Fungus-Like Organisms

First Report of Powdery Mildew Caused by *Podosphaera xanthii* on *Sigesbeckia orientalis* in China

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Sigesbeckia orientalis L. (St. Paul's wort) is an annual herb in the family Asteraceae with a long therapeutic history for a wide range of inflammation-related diseases in China (Yang et al. 2019). In June 2020, typical symptoms of powdery mildew were observed on 30% of wild *S. orientalis* plants grown along roadsides and in gardens in Minjiang University, Fuzhou, China. Circular to irregular white powdery fungal colonies were observed on both surfaces of the leaves and young stems, causing necrosis and premature senescence. Fungal hyphae were epigenous, flexuous to straight, branched, and septate. Appressoria on the hyphae were nipple-shaped or nearly absent. Conidiophores were straight, 30 to 210 × 8 to 12 μm, and produced three to seven immature conidia in chains with a crenate outline. Foot cells were cylindrical, 45 to 75 × 10 to 12 μm, followed by one to two shorter cells. Conidia were hyaline, ellipsoid-ovoid to barrel-shaped, 25 to 38 × 18 to 23 μm with distinct fibrosin bodies. Germ tubes were produced from a lateral position on the conidia. Chasmothecia were not observed on the infected leaves. Based on anamorph characteristics, the fungus was identified as *Podosphaera xanthii* (Castagne) U. Braun & N. Shishkoff (Braun and Cook 2012). For molecular identification, total genomic DNA was extracted (Mukhtar et al. 2018) from fungal colonies on infected leaves of five separate collections. For each DNA sample, the partial LSU and ITS regions were amplified using primers LSU1/LSU2 and ITS1/ITS4 (Scholin et al. 1994; White et al. 1990),

respectively. A BLAST search revealed 100% sequence similarity with *P. xanthii* sequences reported on *Ageratum conyzoides* (KY274485), *Eclipta prostrata* (MT260063), *Euphorbia hirta* (KY388505), *Sonchus asper* (MN134013), and *Verbena bonariensis* (AB462804). Representative sequences (ITS: MZ613309; LSU: MZ614707) of an isolate were deposited in GenBank. A phylogenetic analysis also grouped the obtained sequences into the *P. xanthii* clade. Pathogenicity was confirmed by gently pressing the infected leaves onto young leaves of five healthy 1-month-old *S. orientalis* plants, while three noninoculated plants were used as controls. All plants were maintained in a greenhouse at 25 ± 2°C. After 7 days, white powdery colonies were observed on inoculated plants, while controls remained mildew-free. On inoculated leaves, the fungus was morphologically and molecularly identical to the fungus on the original specimens. *P. xanthii* has been reported as a significant damaging pathogen on a wide range of plants in China (Farr and Rossman 2021). To our knowledge, this is the first report of powdery mildew caused by *P. xanthii* on *S. orientalis* in China as well as worldwide. *S. orientalis* is one of the most important commercial Chinese medicinal herbs and the occurrence of powdery mildew is a threat to its production, quality, and marketability.

References:

- Braun, U., and Cook, R. T. A. 2012. Taxonomic Manual of the Erysiphales (Powdery Mildews). CBS Biodiversity Series No. 11. CBS, Utrecht, the Netherlands.
- Farr, D. F., and Rossman, A. Y. 2021. Fungal Databases, Syst. Mycol. Microbiol. Lab., ARS, USDA. Retrieved 9 October 2021 from <https://nt.ars-grin.gov/fungalatabases/>
- Mukhtar, I., et al. 2018. Sydowia 70:155.
- Scholin, C. A., et al. 1994. J. Phycol. 30:999.
- White, T. J., et al. 1990. Page 315 in: PCR Protocols: A Guide to Methods and Applications. Academic Press, San Diego, CA.
- Yang, Y.-Y., et al. 2019. Chin. Med. 14:1.

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