Diseases Caused by Fungi and Fungus-Like Organisms

First Report of *Podosphaera xanthii* Causing Powdery Mildew on Mungbean (*Vigna radiata*) in Taiwan

Z. M. Sheu,[†] M. H. Chiu, and L. Kenyon

World Vegetable Center, Shanhua District, Tainan 74151, Taiwan, ROC

Funding: Funding for this research was provided by core donors to the World Vegetable Center: Taiwan, U.K. aid from the U.K. government, United States Agency for International Development (USAID), Australian Centre for International Agricultural Research (ACIAR), Germany, Thailand, Philippines, Korea, and Japan. Plant Dis. 105:1856, 2021; published online as <https://doi.org/10.1094/PDIS-09-20-2092-PDN>. Accepted for publication 12 January 2021.

Mungbean (*Vigna radiata* L.) is routinely grown in the experimental fields at the headquarters of the World Vegetable Center (23°6′30.88″N, 120°17′51.31″E) for breeding, research, and germplasm multiplication. In a spring 2016 mungbean trial, about 50% of the plants were affected with powdery mildew. The white, powdery-like patches first appeared on the upper leaf surfaces and soon developed to gray patches on both sides of the leaves. Purple to brown discoloration appeared on the underside of the infected leaf. Microscopy examination revealed that the causal organism was not *Erysiphe polygoni*, which had previously been documented as the powdery mildew pathogen on mungbean in Taiwan (Hartman et al. 1993). The fungus produced typical structures of the powdery mildew *Euoidium*, anamorph of the genus *Podosphaera*. The mycelium consisted of septate, flexuous hyphae with indistinct appressoria. The erect conidiophores arising from superficial hyphae varied from straight or slightly curved to curled. Three to 10 conidia were borne in long chains with crenate edges. Foot cells were straight, cylindrical, and measured 30 to 52 µm long. Conidia were hyaline, ellipsoid-ovoid to barrel-shaped, with fibrosin bodies, and measured 27 to 33 (mean = 30.4) × 15 to 20 (mean = 16.6) µm. Germ tubes were clavate and occasionally forked and were produced from the lateral sites of the conidia. No chasmothecia

were found in the samples. The morphological characteristics were consistent with *Podosphaera xanthii* (Castagne) U. Braun & Shishkoff (Braun and Cook 2012). To confirm the identity, the internal transcribed spacer (ITS) region of rDNA and partial β -tubulin gene (TUB2) for the isolate MG3 were amplified with the primers ITS4/ITS5 (White et al. 1990) and BtuF5/BtuR7a (Ellingham et al. 2019), respectively. BLASTn analysis revealed the ITS sequence (MN833717) was 100% identical to many records of *P. xanthii*, whereas the TUB2 sequence (MW363957) was 100% identical to a record of *P. fusca* (syn. *P. xanthii*; KC333362) in NCBI GenBank. A pathogenicity test was conducted by dusting conidia from an infected leaf onto six healthy 4-week-old mungbean plants (cv. Tainan No. 3). Another three plants were not inoculated and were used as a control. All the plants were maintained in a greenhouse at 25 to 28°C. All inoculated plants developed powdery mildew symptoms after 10 days, whereas the control plants remained symptomless. To our knowledge, this is the first report of *P. xanthii* causing disease on mungbean in Taiwan. *P. xanthii* also has been reported on mungbean in Thailand (Meeboon et al. 2016), while other records referring to *E. polygoni* infecting *Vigna* spp. are from Brazil and Fiji (Farr and Rossman 2020). Although both *P. xanthii* and *E. polygoni* have now been reported as causing powdery mildew on mungbean in Taiwan, which species predominates or is more important remains unclear. A comprehensive survey with accurate species identification is required to develop effective management of the disease, particularly for resistance breeding.

References:

- Braun, U., and Cook, R. T. A. 2012. Taxonomic Manual of the Erysiphales (Powdery Mildews). CBS, Utrecht, the Netherlands.
- Ellingham, O., et al. 2019. Mycologia. 111:798.
- Farr, D. F., and Rossman, A. Y. 2020. Fungal Databases, Syst. Mycol. Microbiol. Lab., ARS, USDA. <https://nt.ars-grin.gov/fungal-databases/>.
- Hartman, G. L., et al. 1993. Int. J. Pest Manage. 39:418.
- Meeboon, J., et al. 2016. Plant Pathol. Quar. 6:142.
- White, T. J., et al. 1990. Page 315 in: PCR Protocols: A Guide to Methods and Applications. Academic Press, San Diego, CA.

The author(s) declare no conflict of interest.

e-Xtra

Keywords: Erysiphaceae, conidia, internal transcribed spacer, beta-tubulin

[†]Indicates the corresponding author.

Z. M. Sheu; zong-ming.sheu@worldveg.org