Diseases Caused by Fungi and Fungus-Like Organisms

First Report of Powdery Mildew Caused by *Podosphaera xanthii* on *Salvia farinacea* in Korea

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Salvia farinacea Benth. (Lamiaceae) is an herbaceous perennial plant, native to Mexico and southern parts of the United States. This plant is cultivated worldwide for its ornamental value. In November 2019, hundreds of *S. farinacea* 'Blue Bedder' grown in a flower garden in Jeju (33°30'57"N, 126°32'50"E), Korea, have been found to be infected with a powdery mildew fungus. The disease severity was estimated to be 100%. Likewise in October 2020, a similar situation with this plant was also observed in a flower garden in Seoul (37°35'19"N, 127°01'07"E), Korea. Leaves, stems, and inflorescence of plants were covered by white, thin mycelial felt, bearing an abundance of conidiophores and conidia. Eventually, infected plants lose their ornamental value. Two voucher specimens have been deposited in the Korea University Herbarium (KUS-F31478 and F32164). Fresh materials were examined. Hyphal appressoria were nipple-shaped but rarely found. Conidiophores ($n = 30$) were straight, 95 to 160 $\times$ 10 to 12 μ m, and produced two to seven immature conidia in chains with a crenate outline. Foot cells were cylindric and 36 to 60 μ m long. Conidia ($n = 30$) were ellipsoid-ovoid to barrel-shaped, 32 to 38 $\times$ 18 to 24 μ m, and contained conspicuous fibrosin bodies. Dark brown chasmothecia were found partly embedded in the mycelial felt on leaves, mostly hypophyllous, spherical, and 82 to 100 μ m diameter, with a single ascus in each. Appendages were few, mycelioid, one- to four-septate, brown near the base when mature, but paler above. Asci were broadly

ellipsoid to subglobose, 56 to 68 $\times$ 50 to 62 μ m, sessile and eight-spored. Ascospores were colorless, oval to subglobose, and 14 to 18 $\times$ 12 to 15 μ m. These characteristics were consistent with those of *Podosphaera xanthii* (Castagne) U. Braun & Shishkoff (Braun and Cook 2012). For further confirmation, genomic DNA was extracted from chasmothecia from KUS-F31478 and F32164. PCR amplification was performed using the primer pair ITS1F/PM6 for internal transcribed spacer (ITS) and PM3/TW14 for the large subunit (LSU) of the rDNA (Takamatsu and Kano 2001). Obtained sequences were deposited to GenBank under the accession numbers MZ359847 and MZ359859 for ITS, and MZ359858 and MZ359861 for LSU. For ITS regions 99.80 to 100% similarity was found with sequences MT131256 (*Salvia farinacea*), MT131254 (*Mazus pumilus*), and MT131252 (*Erigeron belliioides*) of *P. xanthii*, whereas it was 99.90% with sequences of this fungus on *Echinacea purpurea* (MT826247 and MT826245) for 28S rDNA gene. Pathogenicity tests were carried out by touching an infected leaf onto healthy leaves of disease-free 30-day-old potted Blue Bedder using a replication of five plants, with five noninoculated plants used as controls. The typical signs of powdery mildew started to develop on the inoculated leaves in 7 to 10 days, and microscopic examination revealed morphological identity with the fungus observed from the field. All noninoculated control plants remained symptomless. Hitherto, Golovinomyces powdery mildews on *Salvia* spp. were reported globally (Farr and Rossman 2021). However, *Podosphaera elsholtziae* on *Salvia* sp. and *P. xanthii* on *S. farinacea* were reported from China and Taiwan (Yeh et al. 2021; Zheng and Yu 1987). To our knowledge, this is the first report of *P. xanthii* on *S. farinacea* in Korea. The occurrence of *Podosphaera* powdery mildew on *S. farinacea* could pose a serious threat to the beauty of this plant, causing premature senescence of young leaves and gray to purplish discoloration of the leaves.

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