Hyaloperonospora sisymbrii-sophiae causing downy mildew disease on western tansymustard (*Descurainia pinnata*) in Korea

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Western tansymustard (*Descurainia pinnata*; Brassicaceae) is common in North America. In Korea, it has been used as medicine since the 1950s when the plant was introduced and naturalized. Young leaves are cooked like spinach, and seeds are used as a condiment owing to its mustard flavor. In April of 2017, typical symptoms of downy mildew were found on *D. pinnata* at a farmland in Namyangju (37°35'01"N, 127°14'12"E), Korea, with a disease incidence of 60%. Initial symptoms appeared as yellowish spots on the upper leaf surfaces, with white downy patches occurring densely on the corresponding lower surfaces. A representative specimen was deposited in the Korea University Herbarium (KUS-F29737). Conidiophores were tree-like, (135-)150–250 (–300) µm long, (8-)10–14(–16) µm wide and branched 3–5 times (n = 50). Ultimate branchlets were slightly curved to sigmoid and (7-)10–15(–20) µm long (n = 50). Conidia were hyaline, ovate to ellipsoidal, (23-)27–30(–32) µm long, and (20-)22–25(–27) µm wide, with a l/w ratio of 1.15–1.40 (n = 50). The morphological characteristics resembled those reported for *Peronospora sisymbrii-sophiae* (Gäumann 1918), now under the genus *Hyaloperonospora*. Genomic DNA was extracted from an infected leaf of KUS-F29737. Amplifications of ITS rDNA with primers ITS1-O and LR-0 and *cox2* mtDNA with *cox2*-F and *cox2*-RC4 were performed (Choi et al. 2015), and the resulting sequences were deposited in GenBank (MN788659, MN807796). A BLASTn search revealed that the ITS sequence differs by four nucleotide sequences with *H. sisymbrii-sophiae*

parasitic on *D. sophia* in Austria (AY531429, AY531430) and Germany (EU049255) and the *cox2* sequence is identical with one in China (KY417137). Based on morphological characteristics and the sequencing data, the pathogen was identified as *H. sisymbrii-sophiae*. Downy mildew on *D. pinnata* has only been previously known in USA (Farr and Rossman 2019). To our knowledge, this is the first report of downy mildew caused by *H. sisymbrii-sophiae* on western tansymustard in Korea.

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