First report of rust caused by *Coleosporium zanthoxyli* on *Zanthoxylum piperitum* in Korea

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Zanthoxylum piperitum (L.) DC. (Japanese pepper) is a deciduous, aromatic, spiny shrub of the Rutaceae family. It is cultivated for harvesting fruits which are used as a condiment for fish soups and stews in Korea. In September 2016, approximately 50% of the shrub were found affected by a rust in Seoguipo, Korea. Orange-yellow rust pustules were formed on the leaves, causing early defoliation and poor growth. Similar symptoms and signs of rust infection on about 80% of the shrubs were also found in Jeju in October 2017. Two voucher specimens have been deposited in the Korea University herbarium (KUS), Seoul, Korea. Uredinia were hypophyllous, circularly gregarious or scattered, orange-yellow, erumpent, and up to 600 µm in diameter. Urediniospores were subglobose to ellipsoid, 20–40 × 16–26 µm, and verrucose. The telial stage was not found. These morphological characteristics were in agreement with those of *Coleosporium zanthoxyli* Dietel & P. Syd. (Hiratsuka et al. 1992). To confirm the morphological identification, genomic DNA was extracted from urediniospores taken from two dried herbarium specimens, KUS-F29470 and F30013. PCR amplifications were performed for the internal transcribed spacer (ITS) and large subunit (LSU) rDNA, using specific primer pairs ITS5u/ITS4rust and universal primers LR0R/LR6, respectively (Beenken et al. 2017). PCR products were sequenced and deposited in GenBank (accession Nos. MK530182 and MK530183 for ITS; MK530184 and MK530185 for LSU). A BLASTn search revealed that the sequences share high nucleotide similarities of 99 to 100%

with the ITS (GenBank accession Nos. KX386018, KX386019, MG561459, MG561460) and LSU sequences (KX386049, KX386050, KX386051) of *C. zanthoxyli* on *Zanthoxylum* spp. *C. zanthoxyli* has been reported on 24 species/varieties of *Zanthoxylum* from China, India, Japan, Korea, Taiwan, and Vietnam. However, to our knowledge, this is the first report of *C. zanthoxyli* on *Z. piperitum* in Korea (Farr and Rossman 2021).

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Declarations

Informed consent The manuscript is new and not being considered elsewhere. All authors have approved the submission of this manuscript.

Conflict of interest The authors have no conflict of interest to declare.

Research involving human participants and/or animals The authors declare that no human participants and animals were involved in this study.

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