Diseases Caused by Fungi and Fungus-Like Organisms

First Report of Damping-Off on *Sedum plumbizincicola* Caused by *Rhizoctonia solani* AG 2-1 in China

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Sedum plumbizincicola X.H. Guo et S.B. Zhou sp. nov. is a member of the family Crassulaceae that has the ability to hyperaccumulate cadmium and zinc in very high concentrations (Liu et al. 2017). In April of 2018 and 2019, a disease of damping-off was observed on *S. plumbizincicola* seedlings in a nursery in Changsha (28°13'N; 112°56'E), Hunan Province of China, in which nearly 1 million seedlings were planted. Approximately 40% of the surveyed plants were infected. The affected plants displayed water soaking on the shoots and stems and chlorosis on the leaves. As the disease spread upward, leaf stalks or the whole plants became wilted and collapsed. Five diseased stem and leaf samples were collected. Symptomatic tissues were excised and surface sterilized with 70% ethanol for 10 s, 0.1% HgCl₂ for 2 min, sterile distilled water for three times, and then cultured on potato dextrose agar (PDA) at 26°C in in darkness. Fungal colonies were similar in morphology and were transferred to fresh PDA plates. Fungal colonies grown on PDA were white, light gray to brown, with hyphae branched at nearly right angles, septa near the branching point, and constrictions at the base of hyphal branches. After 10 days, brown or white-gray sclerotia were produced on PDA. The morphological characteristics were consistent with those of *Rhizoctonia solani* (Sneh et al. 1991). Genomic DNA of a representative strain was extracted using the CTAB method. The internal transcribed spacer (ITS) region of rDNA was

amplified and sequenced with the primer pairs ITS4/ITS5 (White et al. 1990). When analyzed by BLASTn program, the resulting ITS sequence (GenBank accession no. MN961664) had 100% identity to the corresponding gene sequence of *R. solani* anastomosis group (AG) 2-1, such as the strains MKL1 (LC202869.1) and CBS 204.97 (MH862641.1). In addition, primers including Rhsp1/ITS4B and Rhsp2/ITS1F specific for *R. solani*, and AG21sp/ITS4B specific for *R. solani* AG 2-1, were also used (Salazar et al. 2000). Results revealed that our isolated fungal strain was *R. solani* AG 2-1. Pathogenicity was confirmed via in vivo inoculation of 1-month-old *S. plumbizincicola* seedlings in sterilized nursery soil with four representative strains. For each pot, five 5-mm-diameter mycelium plugs that were collected from 7-day-old colonies grown on PDA were placed in the soil near the base of the stems. Plants inoculated with agar plugs without mycelium served as controls. The inoculated plants were kept in a growth chamber at 25°C with a 12-h/12-h light/dark cycle. Pathogenicity tests were performed twice, and each one had three replicative potted plants. Approximately 25 days after inoculation, damping-off symptoms resembling those observed in the field were displayed on the inoculated plants, whereas no obvious symptoms were observed on the control plants. *R. solani* was reisolated from all infected plants and molecularly characterized, thus confirming Koch's postulates. *R. solani* has been previously reported as the pathogen of damping-off disease in many plants, such as oat (Zhang et al. 2016) and canola (Paulitz et al. 2006). However, to the best of our knowledge, this was the first report of *R. solani* causing damping-off of *S. plumbizincicola* in China. *S. plumbizincicola* is widely planted for heavy metal pollution treatment in China. The occurrence of this disease could seriously affect the production of the seedlings, and management strategies should therefore be developed.

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