Diseases Caused by Fungi and Fungus-Like Organisms

First Report of Anthracnose of American Ginseng Caused by *Colletotrichum sojae* in Northeast China

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Funding: This study was supported by China Agriculture Research System of MOF and MARA, Central Public-Interest Scientific Institution Basal Research Foundation of Chinese Academy of Agricultural Sciences (No.1610342020004), and Science and Technology Development Project (20191001021XH). Plant Dis. 105:3755, 2021; published online as <https://doi.org/10.1094/PDIS-11-20-2440-PDN>. Accepted for publication 29 April 2021.

American ginseng (*Panax quinquefolium*) is a medicinal plant that is commercially cultivated in China. Anthracnose is a devastating disease of American ginseng, with annual production losses exceeding 20%. In July 2019, anthracnose of American ginseng was observed on 3-year-old plants in Fusong County, Jilin Province, China, the most important region of American ginseng. Round or irregular-shaped, brown, sunken, and necrotic lesions (5 to 11 mm in diameter), occasionally with a concentric ring or surrounded by brown halos, were detected on leaves. Multiple lesions gradually coalesced, eventually causing yellowing and wilting. More than 36% of plants in a 30-ha field were infected. Symptomatic leaves ($n = 16$) were collected, and the diseased tissue was cut into small pieces, immersed in 1% NaOCl for 2 min, rinsed three times with sterile water, and placed on acidified potato dextrose agar (PDA) in Petri dishes. After incubation in darkness at 25°C for 4 days, 15 suspected *Colletotrichum* single-spore isolates purified in water agar were obtained. The isolate XTJ2 was randomly selected for identification. On PDA, colonies were white to gray, occasionally mixed with gray-black strips, and the reverse was similar to the surface. Colonies on nutrient-poor agar were flat, thin, floccose, with an entire margin, whitish to pale gray, with the same colors on the reverse. The conidia were hyaline, smooth-walled, straight with a rounded base and apex, ranging from 11.1 to 21.2 $\times$ 4.0 to 5.5 μ m ($n = 100$), with length/width = 3.5. Conidia were initially aseptate but became septate with age. Setae were dark

brown with a slightly acute tip, two to three septa, and 31.5 to 81.6 μ m long. Appressoria were rarely observed, brown, smooth-walled, oval, bullet-shaped or irregular. Chlamydospores were not observed. The isolate was initially identified as *Colletotrichum* sp. (Damm et al. 2019). Initial BLAST searches of XTJ2 sequences of the rDNA internal transcribed spacer region (GenBank accession no. MW048745), partial glyceraldehyde-3-phosphate dehydrogenase (MW053381), chitin synthase 1 (MW053382), histone H3 (MW053383), actin (MW053384), and beta-tubulin (MW053385) in GenBank showed that the sequences were, respectively, 100% similar to *Colletotrichum sojae* sequences: NR_158358, MG600810, MG600860, MG600899, MG600954, and MG601016 (Carbone and Kohn 1999; Crous et al. 2004; Guerber et al. 2003). The identity of XTJ2 was confirmed by constructing a phylogenetic tree combining all loci, which grouped the isolate and the type strain of *C. sojae* into one clade. The sequences of all isolates were genetically identical to XTJ2 sequences. For pathogenicity tests, 15 healthy 3-year-old plants grown in five pots were spray inoculated with the XTJ2 conidial suspension (1×10^5 spores/ml), and the same number of plants were sprayed with water as the control. This experiment was repeated twice. Plants were kept in a greenhouse (28°C, natural light, and 85% relative humidity) under clear plastic bags. After 10 days, inoculated leaves exhibited symptoms that were similar to those observed in the field, whereas the controls were symptomless. The same fungus was recovered and sequenced, and its identity was confirmed by a phylogenetic analysis. This is the first report of *C. sojae* causing anthracnose of American ginseng in China, being a potential threat to the production of this plant. More studies on the epidemiology of this disease are needed to improve disease management.

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The author(s) declare no conflict of interest.

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Keywords: American ginseng, anthracnose, *Colletotrichum sojae*

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