Diseases Caused by Fungi and Fungus-Like Organisms

Fusarium solani Causing Root Rot Disease on *Gastrodia elata* in Shaxi, China

Jinshao Li and Cheng Li[†]

Key Laboratory of Agricultural Microbiology, College of Agriculture, Guizhou University, Guiyang 550025, Guizhou, China

Plant Dis. 106:320, 2022; published online as <https://doi.org/10.1094/PDIS-04-21-0753-PDN>. Accepted for publication 2 August 2021.

Gastrodia elata, a traditional and important Chinese medicinal plant, calms the liver, dispels wind, relieves pain, prevents cardiovascular disease, resists epilepsy, lowers blood pressure, and delays aging. It can also combat dementia onset and improve memory. It is widely planted in Shaxi, Guizhou Province, China. *G. elata* grown in Guizhou is of high quality and an important source of income for the region. However, root rot disease has been reported on *G. elata* in this area in recent years, with an incidence rate of approximately 25%; this disease has markedly affected the plant growth and development. It causes “rotten nest” and “empty nest”, significantly reducing the yield and medicinal value of *G. elata*. Eighty diseased *G. elata* samples were collected from August to December 2020 in Shaxi. The plant tissue separation method was used to isolate the pathogen on an ultra-clean workbench. *G. elata* surface was wiped with 75% alcohol cotton for 30 s and then rinsed three to four times with sterile water. After the surface had dried, the skin from an infected area of the plant was cut into a net shape using a sterile scalpel. Eighty diseased tissue samples were placed on different potato dextrose agar (PDA) medium using a sterile medical syringe needle and cultured in an incubator at 25°C for 7 days, and 61 fungal isolates with the same morphological characteristics were obtained from the diseased samples. Pure cultures of the representative strain SX13 were obtained using the single-spore method and cultured on PDA for identification and analysis. The colony grew in a circular shape, and the early hyphae were compact and white. A light-yellow ring appeared in the outer circle of the hyphae. The upper side of the colony turned white subsequently, and the lower side was light yellow. The light-yellow ring could be seen clearly on both sides. The macroconidia were sickle-shaped with two to five septa; most of them had three

septa (length by width: 17.28 to 36.23 by 4.33 to 6.43 µm). The small conidia were fusiform, renal, or oblong, with zero or one septum (length by width: 5.56 to 14.35 by 2.93 to 5.76 µm). The diameter of chlamydospores ranged from 3.43 to 13.12 µm. Identification of SX13 as *Fusarium solani* was primarily done based on morphological characteristics (Chitrampalam et al. 2018) and verified through DNA sequencing. Genomic DNA was extracted using the Biomiga Fungal gDNA Kit. The internal transcribed spacer (ITS) region (primers ITS5/ITS4) (Schoch et al. 2012), β-tubulin (primers T1/T2) (O'Donnell and Cigelnik 1997), and actin gene (ACT) region (primers ACT-512F/ACT-783R) (Carbone and Kohn 1999) were PCR amplified, sequenced, and subjected to NCBI BLASTn homology matching analyses (GenBank accession nos. MW888340, MW892976, and MZ440809). The highest identity was obtained with the *F. solani* nucleotide reference sequence (accession nos. MT560378, ITS = 100%; KU938955, β-tubulin = 100%; KM231197, ACT = 99%). Morphological and molecular results confirmed SX13 as *F. solani*. In line with Koch's postulates, a conidial suspension (10⁶ spores/ml) collected from isolate SX13 was sprayed onto nine *G. elata* root samples; sterile water was sprayed as a negative control. The experiment was repeated three times. The inoculated materials were moisturized and incubated in the dark at 25°C for 7 days. Black rot appeared in all treatment groups. The affected parts were whitish, decayed, and accompanied by a pungent odor. In contrast, the control group was normal. The pathogen was reisolated successfully from the diseased tissues and verified based on morphology and molecular biology. To the best of our knowledge, this is the first report of *F. solani* causing root rot disease on *G. elata* in China. These findings provide a basis for further research on this disease and its management and control.

References:

- Carbone, I., and Kohn, L. 1999. Mycologia 91:553.
Chitrampalam, P., et al. 2018. Plant Dis. 102:327.
O'Donnell, K., and Cigelnik, E. 1997. Mol. Phylogenet. Evol. 7:103.
Schoch, C. L., et al. 2012. Proc. Natl. Acad. Sci. U.S.A. 109:6241.

The author(s) declare no conflict of interest.

e-Xtra

Keywords: *Fusarium solani*, root rot disease, *Gastrodia elata*

[†]Indicates the corresponding author.
C. Li; licheng20070242@126.com