Diseases Caused by Fungi and Fungus-Like Organisms

First Report of Banana (*Musa acuminata* cv. Formosana) Leaf Spot Disease Caused by *Curvularia geniculata* in China

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Bananas (*Musa acuminata* L.) are an important tropical fruit in China. During 2019 to 2020, a new leaf spot disease was observed on bananas (*M. acuminata* L. AAA Cavendish, cv. Formosana) at two orchards of Chengmai county (19°48'41.79" N, 109°58'44.95" E), Hainan province, China. In total, the disease incidence was about 5% of banana trees (6,000 trees). The leaf spots occurred sporadically and were mostly confined to the leaf margin, and the percentage of the leaf area covered by lesions was less than 1%. Symptoms on the leaves were initially reddish-brown spots that gradually expanded to ovoid-shaped lesions and eventually become necrotic, dry, and gray with a yellow halo. The conidia obtained from leaf lesions were brown, erect or curved, fusiform or elliptical, and had three to four septa with the dimensions of 13.75 to 31.39 × 5.91 to 13.35 µm (average 22.39 × 8.83 µm). The cells of both ends were small and hyaline, while the middle cells were larger and darker (Zhang et al. 2010). Morphological characteristics of the conidia matched the description of *Curvularia geniculata* (Tracy & Earle) Boedijn. To acquire the pathogen, tissue pieces (15 mm²) of symptomatic leaves were surface disinfected in 70% ethanol (10 s) and 0.8% NaClO (2 min), rinsed in sterile water three times, and transferred to potato dextrose agar (PDA) for 3 days at 28°C. Grayish-green fungal colonies appeared and then turned fluffy with gray and white aerial mycelium with age. Two representative isolates (CATAS-CG01 and CATAS-CG92) of single-spore cultures were selected

for molecular identification. Genomic DNA was extracted from the two isolates, and the internal transcribed spacer (ITS), large subunit ribosomal DNA (LSU rDNA), glyceraldehyde-3-phosphate dehydrogenase (GAPDH), translation elongation factor 1- α (TEF1- α), and RNA polymerase II second largest subunit (RPB2) were amplified and sequenced with universal primers ITS1/ITS4, LROR/LR5, GPD1/GPD2, EF1-983F/EF1-2218R, and 5F2/7cR, respectively (Huang et al. 2017; Raza et al. 2019). The sequences were deposited in GenBank (accession nos. MW186196, MW186197, OK091651, OK721009, and OK491081 for CATAS-CG01; MZ734453, MZ734465, OK091652, OK721100, and OK642748 for CATAS-CG92, respectively). For phylogenetic analysis, MEGA7.0 (Kumar et al. 2016) was used to construct a maximum likelihood tree with 1,000 bootstrap replicates, based on a concatenation alignment of five gene sequences of the two isolates in this study as well as sequences of other *Curvularia* species obtained from GenBank. The cluster analysis revealed that isolates CATAS-CG01 and CATAS-CG92 were *C. geniculata*. Pathogenicity assays were conducted on 7-leaf-old banana seedlings. Two leaves from potted plants were stab inoculated by puncturing 1 mm into the leaf using a sterilized needle and placing 10 µl of conidial suspension (2×10^6 conidia/ml) on the surface of wounded leaves. An equal number of leaves were inoculated with sterile distilled water, serving as a control group (three replicates). Inoculated plants were grown in the greenhouse (12 h/12 h light/dark, 28°C, 90% relative humidity). Necrotic lesions on inoculated leaves appeared 7 days after inoculation, whereas control leaves remained healthy. The fungus was recovered from inoculated leaves, and its taxonomy was confirmed morphologically and molecularly, fulfilling Koch's postulates. *C. geniculata* has been reported to cause leaf spot on bananas in Jamaica (Meredith 1963). To our knowledge, this is the first report of *C. geniculata* on bananas in China.

References:

- Huang, Q., et al. 2017. Plant Dis. 101:387.
- Kumar, S., et al. 2016. Mol. Biol. Evol. 33:1870.
- Meredith, D. S. 1963. Ann. Appl. Biol. 51:371.
- Raza, M., et al. 2019. Fungal Divers. 99:1.
- Zhang, T. T., et al. 2010. Flora Fungorum Sinicorum 30:126.

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