Diseases Caused by Fungi and Fungus-Like Organisms

Litchi Anthracnose Caused by *Colletotrichum karstii* in Guangxi, China

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Litchi (*Litchi chinensis* Sonn.), a native fruit tree from southern China, has been planted in many subtropical and tropical countries; its fruit is considered delicious and of medicinal value (Anderson et al. 2013). Anthracnose, an important disease, can cause flower drop, fruit drop, and fruit rot. Infected leaves form dark brown spots, which turn reddish brown with gray-white edges. Infected fruits formed dark brown spots, which developed to entire black rotted fruits. On both tissues, small dots of acervuli appeared with high humidity (Lai et al. 2004). In April 2019, leaf spot samples from two litchi plants were collected from a 2-ha orchard in Xintang Town (N 22.38°, E 108.61°), Qinzhou City, Guangxi province. Incidence of leaf spots in the orchard was >20%. Each sample was cut into pieces targeting the zone between symptomatic and healthy plant tissues, disinfected with 75% ethanol for 10 s and 1% NaClO for 1 min, and washed three times with sterilized distilled water. The sterilized leaf tissues were placed on PDA and incubated at 28°C in darkness for 1 week. Growing hyphae from each sample were transferred to fresh PDA. The pieces from each leaf yielded a similar fungal morphotype >75% of the time, and a representative one from each leaf was retained and called LZ1-1 and LZ3-1. The resulting colonies were incubated on PDA for 7 days with gray to white aerial tufted hyphae, and abundant colorless to pale orange conidia in the center of the colony. Conidia were smooth, apex obtuse, base truncate, straight, cylindrical, and the contents remained granular. The conidial size of LZ1-1 was 10.6 to 21.4 ×

4.5 to 9.1 μm ($n = 100$) and that of LZ3-1 was 12.7 to 16.7 × 5.5 to 8.0 μm ($n = 100$). Appressoria of LZ1-1 (6.9 to 14.9 × 6.0 to 11.1 μm) ($n = 100$) and LZ3-1 (6.5 to 15.4 × 5.4 to 11.4 μm) ($n = 100$) were pale to medium brown, ovoid to bullet-shaped, not nodose, and smooth-walled to undulate. DNA was extracted from two isolates, followed by PCR amplification and sequencing using primers for the rDNA ITS, ACT, CAL, CHS-1, GAPDH, and TUB2 (Damm et al. 2012). The resulting sequences were deposited in GenBank (ITS, MW494453, MW494454; ACT, MW495034, MW495035; CAL, MW495036, MW495037; CHS-1, MW495038, MW495039; GAPDH, MW495040, MW495041; TUB2, MW495042, MW495043). The concatenated sequences comprising six genomic regions of LZ1-1, LZ3-1, and other sequences of *Colletotrichum* obtained from GenBank were used to construct a neighbor-joining tree with 1,000 bootstrap replicates using MEGA4 (Tamura et al. 2007). The results revealed both LZ1-1 and LZ3-1 were clustered with type strain of *Colletotrichum karstii* with high bootstrap value. The pathogenicity of the two isolates was determined by inoculating on leaves of 1-year-old litchi saplings in the greenhouse. Slight scratches were made on the surface of healthy leaves, and 10 μl of spore suspension (10^6 conidia/ml) in 0.1% Tween 20 was inoculated onto each wounded spot. Blank control groups were inoculated with 10 μl of 0.1% Tween 20. Each isolate was inoculated onto at least 27 leaves of three saplings, with each leaf wounded at two spots. The inoculated saplings were placed in a greenhouse (12 h/12 h light/dark, 25 ± 2°C) and humidity maintained by covering with plastic bags. Leaves inoculated with spore suspension showed reddish-brown spots after 1 week; no symptoms were observed in the control. Each isolate was consistently reisolated from inoculated leaves, fulfilling Koch's postulates. It was reported that members of the *C. acutatum* species complex and the *C. gloeosporioides* species complex could cause anthracnose on litchi (Ling et al. 2019), including *C. gloeosporioides*, *C. siamense*, *C. fiorinae*, and *C. simmondsii* (Ling et al. 2019, 2021). To our knowledge, this is the first report of anthracnose on litchi in China caused by *C. karstii*, a member of the *C. boninense* species complex. This study expands the understanding of the pathogen of anthracnose on litchi, which can lead to improved management and control.

References

- Anderson, J. M., et al. 2013. Plant Pathol. 62:279.
- Damm, U., et al. 2012. Stud. Mycol. 73:1.
- Lai, H. L., et al. 2004. Chin. Plant Prot. 5:26.
- Ling, J. F., et al. 2019. Plant Pathol. 68:1533.
- Ling, J. F., et al. 2021. Plant Dis. 105:1225.
- Tamura, K., et al. 2007. Mol. Biol. Evol. 24:1596.

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