Diseases Caused by Fungi and Fungus-Like Organisms

First Report of Fruit Rot in Opium Poppy (*Papaver somniferum*) Caused by *Alternaria alternata* in China

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Opium poppy (*Papaver somniferum* L.) is an important medicinal herbaceous plant. In July 2019, approximately 15% of opium poppy in the west of China, showed a new fruit rot disease after continuous rainfall. The infected fruits exhibited light brown, water-soaked circles, whose edges displayed a yellow halo and white mildew layer. Abundant dark sclerotia were irregularly present in the central necrotic site. The spores were collected from three symptomatic fruits and purified using the single-spore separation method. Each spore isolate with similar morphological characteristics was cultured in the dark on potato sucrose agar at 25°C for 5 to 7 days. Morphologically, the cultured fungi were dark brown with whitish edges and abundant aerial mycelia. The pure cultures appeared as dark olive flocculent mycelia. The conidia were dark and formed at the tip

of long unbranched conidiophores; they were borne in chains or singly and were elongated, obovate, and obovate-elliptic. Conidia were $8.50 (4.20 \text{ to } 13.64) \times 4.42 (1.64 \text{ to } 8.18) \mu\text{m}$ in size, with two to six transverse septa and no longitudinal septa ($n = 300$). Based on the morphology and conidial characteristics, the pathogen was identified as *Alternaria* sp. (Ko et al. 2019). The total genomic DNA of the isolated fungus was directly extracted using the 2xT5 Direct PCR kit (Plant) (Tsingke Biological Technology, Beijing, China). Internal transcribed spacer and β -tubulin were amplified with primers ITS1/ITS4 and β -tubulin-Bt1a/ β -tubulin-Bt1b, respectively. They were sequenced, and the sequences have been deposited in GenBank (accession nos. MN700177 and MN836582, respectively). All sequences shared 100% identity with *Alternaria alternata* (MF099865.1 and MH475293.1, respectively). The pathogenicity assay was performed as described by Guo et al. (2012) with slight modifications. Briefly, using a pipette, 10 ml of mycelial suspension per fruit was transferred onto 20 surface-sterilized poppy fruits, either unwounded or wounded with a sterile needle. Another 10 healthy fruits were treated with sterile nutrient solution as the control. Fruits were maintained at 70 to 80% relative humidity for 5 to 7 days. Three days postinoculation, inoculated fruits were evaluated for disease development. The necrotic lesions were similar to those observed on the original samples. The disease incidence in the fungal-inoculated group was 70%. The fungi were reisolated from the symptomatic plants and compared with the original strains, matching morphological identity to the original isolates. However, the control fruits were symptomless, thus fulfilling Koch's postulates. To the best of our knowledge, this is the first report of fruit rot in opium poppy in China. *A. alternata* is a widespread pathogen, and the disease poses a significant threat to the sustainability of opium poppy producers.

References:

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