Diseases Caused by Fungi and Fungus-Like Organisms

First Report of Powdery Mildew Caused by *Podosphaera xanthii* on Hulless *Cucurbita pepo* of Western District in China

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Hulless *Cucurbita pepo*, an annual herb in the Cucurbitaceae family, is one of the main economic vegetable crops in China and is a raw material for cosmetics and health care products. It is also called hulless pumpkin because its seeds have no seed coat, which is a rare variation of *Cucurbita*. In July 2010, powdery mildew was observed on hulless *C. pepo* ‘Tianran’ in fields of Wuwei District, Gansu Province, China (Liang et al. 2010). Disease incidence when first observed was 66%, but it increased to 100% in July 2019; it also occurs on hulless *C. pepo* planted in Linhe City, Wuyuan County, Inner Mongolia Autonomous Region, and in Beitun City, Hutubi City, and Shihezi City in Xinjiang Autonomous Region, as well as on locally grown *Cucurbita moschata*. Early disease symptoms appeared as circular or irregular white powdery areas on both leaf surfaces. At later infection stages, entire leaves, petioles, and stems were covered with white fungal mycelia that resulted in leaf yellowing and senescence but not defoliation. Fungal hyphae were septate, branched, and flexuous to straight. Conidiophores were unbranched, straight, and grew perpendicular to the mycelium. Conidiophore foot cells were cylindrical with slight constrictions at basal septa and followed by one to four short cells that eventually became conidia. Conidia were barrel-shaped with ends darker than the middle and average measurement of 20 to 32 × 12 to 19 µm. Cleistothecia formed at 20°C with 70% relative humidity and light intensity of 4,400 lx. They were scattered, spherical, dark brown, with parietal cells irregularly

rectangular or polygonal, and 70 to 75 × 90 to 95 µm in average diameter. Cleistothecia had four to eight appendages that were colorless to partially brown, each with three to five septa and lengths 0.5 to 3.0 times the diameter of cleistothecia. The powdery mildew fungus was tentatively identified as *Podosphaera xanthii* and showed characteristics similar to those previously reported (Choi et al. 2020; Cui et al. 2018). rDNA was extracted from fungal conidia and the ITS region amplified using primers ITS1 (5'-TCCGTAGGTGAACCTGCGG-3')/ITS4 (5'-TCCTCCGCTTATTGATATGC-3') and then sequenced. BLASTn analysis of the 540-bp (MT250855) amplicon revealed 100% sequence identity with respective rDNA sequences of *P. xanthii* isolates from *Momordica charantia* (AB774158.1), *Citrullus lanatus* (KX369541.1), and *Lagenaria siceraria* (MG706136). Based on the morphological characteristics and ITS sequences, the fungal species was identified as *P. xanthii*. Pathogenicity of the powdery mildew fungus was tested by dusting conidia from infected hulless pumpkin leaves onto three asymptomatic plants. Three noninoculated plants were used as controls. Conidia began to germinate 12 h after inoculation. Twenty-four to 72 h postinoculation, powdery mildew mycelia appeared on inoculated leaves. After 73 to 96 h, chains of conidia formed, and these germinated to form secondary infection sites. In later stages of the disease cycle, dark brown cleistothecia formed on the yellowing plant foliage. Fungus morphology from inoculated leaves was identical to that observed on original naturally infected plants. Uninoculated plants remained healthy. Powdery mildew caused by *P. xanthii* is a major foliar disease that affects members of the Cucurbitaceae family worldwide. The fungus has previously been reported from China on *Abelmoschus esculentus* (okra), *Sechium edule* (mirliton, vegetable pear), and *Lagenaria siceraria* (bottle gourd) (Choi et al. 2020; Cui et al. 2018; Fan et al. 2019; Xu et al. 2020). To our knowledge, this is the first report on the occurrence of *P. xanthii* on hulless *C. pepo* planted in Linhe City, Wuyuan County in Inner Mongolia Autonomous Region and in Beitun City, Hutubi City, and Shihezi City in Xinjiang Autonomous Region in China.

References:

- Choi, I. Y., et al. 2020. Plant Pathol. 102:599.
- Cui, H., et al. 2018. Plant Dis. 102:2374.
- Fan, C., et al. 2019. Plant Dis. 103:1027.
- Liang, Q. L., et al. 2010. Mycosystema 29:636.
- Xu, D. D., et al. 2020. Plant Dis. <https://doi.org/10.1094/PDIS-04-20-0741-PDN>

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