

# First report of powdery mildew caused by *Podosphaera xanthii* on *Euphorbia tithymaloides* in Malaysia

## ABSTRACT

*Euphorbia tithymaloides* L. (zig-zag plant) is a succulent, perennial shrub belonging to the Euphorbiaceae family and is widely cultivated in Malaysia for ornamental purposes and commercial value. In June 2019, typical symptoms of powdery mildew were observed on over 50% of the leaves of *E. tithymaloides* in a garden at Universiti Putra Malaysia (UPM), Serdang city of Selangor province, Malaysia. Initial symptoms included circular to irregular white powdery fungal colonies on both leaf surfaces and later covered the entire leaf surface. Severely infected leaves became necrotic, distorted, and senesced. A voucher specimen, Ma (PM001-Ma), was deposited in the Mycology Laboratory, Faculty of Agriculture, UPM. Microscopic observation showed hyphae hyaline, branched, thin-walled, smooth, 3 to 6  $\mu\text{m}$  wide with nipple-shaped appressoria. Conidiophores were straight, measured 30 to 90  $\mu\text{m}$  long  $\times$  8 to 12  $\mu\text{m}$  wide, and were composed of a cylindrical foot cell, 50 to 75  $\mu\text{m}$  long. Conidia formed in chains were hyaline, ellipsoid to oval with fibrosin bodies, measured 25 to 36  $\times$  16 to 20.1  $\mu\text{m}$  in size, and chasmothecia were not observed on the infected leaves. Genomic DNA was directly isolated from mycelia and conidia of isolate Ma using a DNeasy Plant Mini Kit (Qiagen, U.S.A.). The universal primer pair ITS4/ITS5 of rDNA (White et al. 1990) was used for amplification, and the resulting 569-bp sequence was deposited in GenBank (accession no. MT704550). A BLAST nucleotide search revealed 100% similarity with that of *Podosphaera xanthii* on *Momordica charantia* wild from Taiwan (accession no. KM505135) (Liu and Kirschner 2015). Both the morphological characteristics of the anamorph and internal transcribed spacer (ITS) sequence data support the identification of this powdery mildew on *E. tithymaloides* as *P. xanthii* (Castagne) U. Braun & Shishkoff (Braun and Cook 2012). A pathogenicity test was conducted by gently pressing the infected leaves onto young leaves of five healthy potted plants. Five noninoculated plants were used as controls. The inoculated plants were maintained in a greenhouse at  $25 \pm 2^\circ\text{C}$ , and the test was repeated. Seven days after inoculation, white powdery symptoms were observed similar to those on the naturally infected leaves, whereas control plants remained asymptomatic. The fungus on the inoculated leaves was morphologically and molecularly identical to the fungus on the original specimens. Sequence alignments were made using MAFFT version 7.0 (Katoh et al. 2019), and a maximum likelihood phylogram was generated by MEGA version 7.0 (Kumar et al. 2016). Isolate Ma grouped in a strongly supported clade (100% bootstrap value) with the related species of *P. xanthii* available in GenBank based on the ITS region. Powdery mildew caused by *P. xanthii* has been reported as a damaging disease that can infect a broad range of plants worldwide (Farr and Rossman 2020). It also has been recently reported on *Sonchus asper* in China (Shi et al. 2020). According to our knowledge, this is the first report of powdery mildew caused by *P. xanthii* on *E. tithymaloides* worldwide. The occurrence of powdery mildew on *E. tithymaloides* could pose

a serious threat to the health of this plant, resulting in death and premature senescence of young leaves.

**Keyword:** Powdery mildew; *Euphorbia tithymaloides*; *Podosphaera xanthii*