First record of powdery mildew of castor- oil plant (*Ricinus communis*) caused by the anamorphic stage of *Leveillula taurica* in Iran

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Abstract In August 2010, leaves of *Ricinus communis* with typical symptoms of powdery mildew were collected in south Khorasan province, eastern Iran. The pathogen was identified as the anamorphs of *Leveillula taurica*. This is the first report of a powdery mildew on *Ricinus* in Iran.

Keywords First reports · *Leveillula taurica* · *Ricinus*

The castor- oil plant (*Ricinus communis*) is an annual herb or spreading shrub to about 6 m tall that belongs to the Euphorbiaceae. It is perennial in moist areas and annual in seasonally frosty or dry areas. It has been cultivated in Asia and Africa from ancient times. This plant is now widely naturalized in moist tropical and subtropical zones of the world (Francis 2004).

During a survey of plant pathogens conducted on *R. communis* in August 2010, typical symptoms of a powdery mildew disease were observed on nearly 10% of the plants

Fig. 1 Powdery mildew signs on upper leaf surface of *Ricinus communis* infected with *Leveillula taurica*

Fig. 2 Conidiophore (C) of *Leveillula taurica* emerging through a stoma (S). Bar=50 μm

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Fig. 3 *Leveillula taurica* on *Ricinus communis*. Primary (top) and secondary (bottom) conidia, Bar=20 μ m

in the surveyed area in the Mahammadiyah region (32° 52' N/ 59° 13' E), south Khorasan province, eastern Iran. Symptoms included extensive abaxial cover of older leaves by white patches of external superficial mycelium and conidiophores, along with chlorotic and necrotic regions on the upper leaf surface. Colonies were also present on the upper leaf surface (Fig. 1). These symptoms were mainly observed on castor-oil plants subjected to water deficiency stress, 2 weeks prior

to harvest. However such symptoms were not observed in an ornamental castor- oil variety, planted close to the diseased plants. A sample was collected, dried and deposited in the herbarium at the Plant Pests and Diseases Research Institute (IRIPP) with voucher number IRAN 15030 F.

Fungal structures were detached from the diseased leaves of with a razor blade, mounted in water or lactic acid and examined with a light microscope.

Conidiophores emerged through leaf stomata, singly or branched, usually in groups of two to three, and formed dimorphic conidia (Fig. 2). Examination of 50 of each type of conidia yielded the following description of their morphology: primary conidia lanceolate with distinct apical points, 12.5–19 $\times$ 37.5–70 μ m; secondary conidia cylindrical, 12.5–20 $\times$ 37.5–77.5 μ m; both conidia hyaline with angular/reticulated wrinkling of the outer walls (Figs. 3 and 4). These morphological features are typical of the anamorphic stage description of *Leveillula taurica* (Lév.) Arnaud (Braun 1987).

Leveillula taurica has been reported on *R. communis* worldwide [Ramakrishnan and Narasimhalu (1941), Chiddarwar (1954), Amano (Hirata) (1986), Farr and Rossman (2010)] but this is the first report of this powdery mildew species on *Ricinus communis* in Iran (Ershad 2009; Khodaparast and Abbasi 2009). Other recent records of *L. taurica* from Iran were published by Mirzaee et al. (2007) and Mirzaee and Mohammadi (2010).

Fig. 4 *Leveillula taurica* conidiophores: **a)** with a primary conidium and **b)** with a secondary and cylindrical conidium. Bar=20 μ m

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