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First North American Record of Powdery Mildew of *Cleome hassleriana* Caused by *Leveillula taurica*

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The introduced plant pathogen *Leveillula taurica* (Lév.) G. Arnaud (anamorph = *Oidiopsis sicula* Scalia) occurs on a range of hosts in the Pacific Northwest (PNW), including onion (*Allium cepa* L.) (4). In an onion cultivar trial conducted in Malheur Co., Oregon, powdery mildew caused by *L. taurica* was observed in the first week of September 2006 on 5 out of 46 cultivars. Examination of crops, weeds, and other plants in the vicinity of the field for possible sources of inoculum led to the discovery of a single plant of *Cleome hassleriana* Chod. (common name: pink queen, family: Capparaceae), growing in a nearby garden, infected with *L. taurica*. This report documents the first record of *L. taurica* on a species of *Cleome* (spiderflower) in North America.

Characteristics of powdery mildew on *C. hassleriana* were as follows. Symptoms were observed on the plant that was beginning to senesce after flowering. Leaves and petioles exhibited effuse to dense, white floccose colonies (Fig. 1). Symptoms were most severe on older infected leaves which became necrotic and desiccated. Infected leaflets curled inwards from margins. The fungus formed dense mycelial mats on abaxial surfaces, later spreading to adaxial surfaces and petioles. All leaves (about 10) except the youngest 3 or 4 were infected. Infected leaves usually became completely covered with mycelia. Conidiophores emerged from stomata singly or in groups (Fig. 2). Conidia were hyaline, of two kinds (Fig. 3): primary (first-formed) conidia were lanceolate with narrowed apex and relatively broad base, (46-)48-67(-77.5) × (14-)14.5-19.5 (-20.5) µm; later-formed (secondary) conidia were elongate to cylindrical, (43.5-)44-66.5(-70.5) × 14-19.5(-20) µm. Chasmothecia (Fig. 4A) were observed on leaves and petioles, became dark brown to black at maturity, 220-280 µm in diameter, and the dorsal surface frequently was concave. Asci were clavate-ovoid, short-stipitate, about 80 × 35 µm, containing two ascospores. Ascospores (Fig. 4B) were subhyaline to pale yellow, multi-guttulate, ellipsoid-ovoid, (20.5-)29-35(-36.5) × 15.5-23(-24) µm.

Fig. 1. Powdery mildew of *Cleome hassleriana* caused by *Leveillula taurica*.

Fig. 2. Conidiophore of *Leveillula taurica* producing a single primary conidium on *Cleome hassleriana*. Scale bar = 250 μ m.

Fig. 3. Primary (left) and secondary (right) conidia produced by *Leveillula taurica* on *Cleome hassleriana*. Scale bar = 25 μ m.

Fig. 4. *Leveillula taurica* on *Cleome hassleriana*. (A) Chasmothecium and associated mycelium. Scale bar = 250 μ m. (B) Ascospore. Scale bar = 25 μ m.

The fungus was determined to be *L. taurica* on the basis of anamorph and teleomorph morphology (1). A fungus identified as *Erysiphe polygoni* DC was reported previously from an unidentified species of *Cleome* in California (2). *Leveillula taurica* is easily distinguished from *Erysiphe* species on the basis of dimorphic conidia (1), making it unlikely that the California report was based on *L. taurica*. Although the anamorph of *L. taurica* was reported earlier on glossy leaf genotypes of onion (5) from Canyon Co., ID, this is the first report of its teleomorph in the Treasure Valley (eastern Oregon and southwest Idaho). *Leveillula taurica* has an extremely broad host range (1) and was previously reported from *C. hassleriana* in Egypt, Italy, Romania, and South Africa (2). *Cleome hassleriana* is planted commonly as a flowering annual in gardens, and it reseeds easily. All previous records of *L. taurica* from PNW, except the one from greenhouse-grown *Triglochin maritima* (3), are of only the conidial state. This discovery of the teleomorph suggests that it may contribute to genetic variability of *L. taurica* in the region and that *C. hassleriana* could play a role in overwintering of this pathogen in the Treasure Valley. This agricultural region produces a diverse range of crops that could be impacted by this pathogen.

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