

First Report of Powdery Mildew of Carrot and Parsley Caused by *Erysiphe heraclei* in Washington State

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Since 1982 (G. Q. Pelter, *personal communication*), powdery mildew has been observed on carrot [*Daucus carota* L. subsp. *sativus* (Hoffm.) Arcang.] processing crops, and on carrot and parsley [*Petroselinum crispum* (Mill.) Nym.: A. W. Hill] seed crops in Washington, but no published report of this disease in Washington exists. From 2002 to 2004, the anamorph of *Erysiphe heraclei* DC was observed on plants from processing carrot fields in central Washington. The teleomorph of *E. heraclei*, not previously reported in Washington, was discovered in a processing carrot field in Grant County in September 2004. A fungus matching the description of the anamorph of *E. heraclei* (2,3) also was found attacking parsley in a home garden in Grant County. This report documents the occurrence of *E. heraclei* and its teleomorph on carrot in Washington and the occurrence of *E. heraclei* on parsley in Washington.

Disease symptoms and signs included chlorotic and necrotic areas on affected leaves with conspicuous white to gray masses of conidia and mycelia. Severity of powdery mildew ranged from < 10 to > 50% of the foliage affected in individual crops. Preliminary observations suggest incidence and severity may be affected by cultivar and type of irrigation system under which the crop is grown (the disease appeared to be more severe in furrow- than overhead-irrigated crops).

The fungus formed the following anamorphic features on both hosts: hyphae were ectophytic with lobed appressoria; conidiophores bore single conidia (Fig. 1); conidiophore foot cells were cylindrical, straight, and measured (L × W) (22.5-) 26.5-39.5 (-40.0) × (8.0-) 8.5-10.0 (-10.5) μm; conidia (Fig. 2) were short-cylindrical to cylindrical, lacked fibrosin bodies, and measured (29.5-) 32.0-43.5 (-47.0) × (10.5-) 12.5-16.5 (-19.0) μm. The teleomorph, observed on carrot leaves, included subspherical ascocarps (Fig. 3) that became dark brown to black, formed hyphoid appendages, and measured (107-) 112-153 (-170) μm in diameter. Ascocarps each contained multiple asci (Fig. 4) that were saccate, short-stipitate, measured (52.5-) 57.5-70.5 (-78.5) × (44.0-) 46.0-60.0 (-64.5) μm, and each contained 3 to 5 ascospores. Ascospores were subhyaline, ovoid to ellipsoid, multiguttulate, and measured 19.0-26.5 (-27.5) × (11.5-) 12.5-18.0 (-21.5) μm. [Size ranges follow standard mycological usage (e.g., 3), where the typical range is nested within the observed extreme values which are given in parentheses].

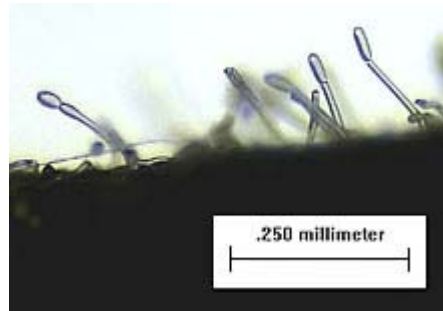


Fig. 1. Conidiophores with single conidia, formed on carrot by *Erysiphe heraclei*.



Fig. 2. Conidium formed on carrot by *Erysiphe heraclei*.

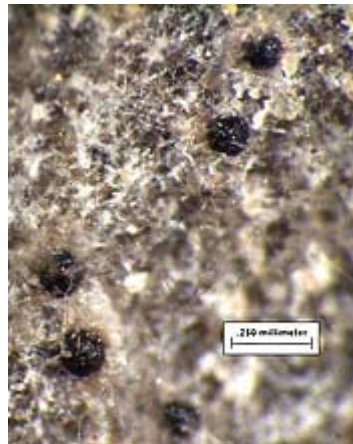


Fig. 3. Ascocarps and mycelium formed on carrot by *Erysiphe heraclei*.



Fig. 4. Ascus with four ascospores formed on carrot by *Erysiphe heraclei*.

This fungus fits Braun's (3) concept of *E. heraclei*, the only *Erysiphe* species he listed on the Apiaceae. The names *Erysiphe polygona* DC and *E. umbelliferarum* (Lév.) de Bary also have been used for similar fungi attacking Apiaceae (2) but reflect superseded taxonomic concepts (2,3). *Erysiphe heraclei* has been reported on various species of Apiaceae in other regions in North America (1,4). Powdery mildew also has been observed on carrot in Oregon (J. W. Pscheidt, *personal communication*). This appears to be the second report of *E. heraclei* on parsley in North America, a host reported previously in California (4).

Contamination of seed lots with ascocarps of *E. heraclei* has been suggested as a possible means of disseminating the pathogen, although transmission by seeds has not been demonstrated (1,3). Because the Pacific Northwest provides up to 75% of the U.S. supply of carrot seed, the discovery of the teleomorph in central Washington suggests that additional research is needed to investigate the risk of disseminating the pathogen with carrot seed.

Erysiphe heraclei includes many host-specific races (2,3). Additional research on host ranges of Washington strains, supported by molecular data, is needed to determine the level of biologic and pathogenic diversity within the species; the risks the fungus poses to processing, fresh market, and seed crops; and the role of alternative hosts in the epidemiology of this disease.

Literature Cited

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