

First Report of Downy Mildew Caused by *Peronospora arthurii* on Common Evening-Primrose (*Oenothera biennis*) in Italy.

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Common evening primrose (*Oenothera biennis* L.) belonging to the family Onagraceae is a low-maintenance biennial plant which was widely used as a border for blooming in the late spring and summer in parks and gardens in northern Italy. During spring 2017, symptoms of a downy mildew were observed on about 400 plants of *O. biennis* growing in mix borders as well as in pots, in a private garden near the city of Biella (northern Italy). In this garden plants of *O. biennis* have been reproduced by seeds for about 10 years and symptoms of downy mildew never appeared before. Infected leaves showed yellow, vein-limited lesions on the upper surface. As the disease progressed, affected leaves turned necrotic and plants lost their aesthetic value. The abaxial surface of affected leaves was covered by grey conidiophores and conidia in areas delimited by veins. Conidiophores measured 218 - 374 (average: 295) μm . Conidiophores branched dichotomously 4-6 times with terminal branches arranged at right angles and with curved ultimate branchlets that measured 7.6 - 20.2 (average: 12.8) μm . Conidia were light grey, elliptic to ovoid, and measured 21.1 - 27.4 \times 16.1 - 20.2 (average: 24.4 \times 18.1) μm . These morphological characteristics correspond to those described by Mullenko and Gosztyla (1997) for *Peronospora arthurii*. The ITS region (Internal Transcribed Spacer) of rDNA was amplified using primers ITS1/ITS4 (White et al. 1990) and sequenced. BLAST analysis (Altschul et al. 1997) of 730 bp sequence (GenBank accession number MF370230) revealed 99% similarity to that of *P. arthurii* AY198284. Pathogenicity was confirmed by gently pressing affected leaves of *O. biennis* with conidia of *P. arthurii* onto moistened leaves of three 4-month-old healthy plants of the same host. Nine affected leaves (three for each inoculated plant) were used. Leaves of three control plants were moistened with sterilized water. All plants were kept in a humid chamber located outside, at temperatures ranging from 9 to 27°C (17 h

inoculated plants. As the disease progressed, the same conidiophores and conidia described above were observed on affected leaves. *P. arthurii* on *O. biennis* has been reported in Austria, Canada, Czech Republic, US (Farr and Rossman 2017) and Poland (Mullenko and Gosztyla 1997). This is the first report of *P. arthurii* on *O. biennis* in Italy. The economic importance of this disease is at present limited, although it could spread due to the increasing planting of *O. biennis* in low maintenance gardens.

References

Altschul, S. F., et al. 1997. *Nucleic Acids Res.* 25:3389.

Farr, D. F., and Rossman, A. Y. Fungal Databases, U.S. National Fungus Collections, ARS, USDA. Retrieved July 12, 2017, from <https://nt.ars-grin.gov/fungaldatabases/>

Mułenko, W. and Gosztyła, E. M. 1997. *Acta Mycologica* 32:119-121.

White, T. J., et al. 1990. Page 315. In: *PCR Protocols: A Guide to Methods and Applications*. M. A. Innis et al., eds. Academic Press Inc., New York.