



First record of *Erysiphe corylacearum* on *Corylus avellana* in Switzerland and in central Europe

L. Beenken^{1*}, T. Brodtbeck² and R. De Marchi³

¹ Swiss Federal Research Institute WSL, CH-8903 Birmensdorf, Switzerland ; ² Elsternweg 5, CH-4125 Riehen, Switzerland ;

³ Bühlackerweg 33, CH-8405 Winterthur, Switzerland

*E-mail: ludwig.beenken@wsl.ch

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From July to November 2019, a previously unseen powdery mildew disease was found repeatedly on *Corylus avellana* (hazelnut) in the canton of Ticino in Switzerland. It occurred on leaves of *C. avellana* shrubs growing in hedges and deciduous forests dominated by *Castanea sativa* at six locations north of the city of Lugano around Sonvico, at altitudes ranging from 510 to 700 m.

Morphological examination revealed small, white, effuse, amphigenous mycelial patches of 0.5-2 cm in diameter (Fig. 1). The ellipsoid to doliiform conidia (30-35 × 15-23 µm) were produced singly. They were mainly found in July and became rare in autumn. In contrast, the gregarious chasmothecia were common throughout the observation time. They measured 80-120 µm in diameter, had up to 14 appendices (60-100 µm long) with multiple dichotomously branched tips, and contained 2-5 obovoid asci (40-60 × 30-50 µm) with up to 8 ellipsoid ascospores (14-20 × 7-14 µm) (Fig. 2). These characters correspond to the description of *E. corylacearum* in Braun & Cook (2012).

The morphological identification was confirmed by sequencing the ITS-region of rDNA using three samples and performing a phylogenetic analysis as described in Beenken (2017). PCR was done with the *Erysiphales*-specific primer pair PMITS1/PMITS2 (Cunnington *et al.*, 2003) to eliminate co-amplification of the fungus *Ampellomyces quisqualis* that parasitises *E. corylacearum*, as preliminary molecular and microscopic investigations on the Swiss material had shown. Obtained sequences were deposited in GenBank (Accession Nos. MN822721-MN822723). Voucher specimens were deposited in the fungal herbarium of ETH Zurich (ZT Myc 59971-ZT Myc 59973).

The molecular phylogenetic analysis showed that the Swiss strains had identical ITS sequences to those of *E. corylacearum* from Azerbaijan, Georgia, Iran and Turkey and differed only in a few base pairs from those from China, Iran and Japan (Fig. 3). *Erysiphe corylacearum* is native to east Asia and has been reported from USA (Ohio) and Canada but until now it has been unknown from central Europe (Braun & Cook 2012). Recently, Heluta *et al.* (2019) reported its occurrence on *C. avellana* from Ukraine, but without molecular validation. The species has been reported as an invasive pathogen from hazelnut orchards in Turkey, Iran and Georgia where it caused serious damage (Arzanlou *et al.*, 2018, Meparishvili *et al.*,

2019).

Despite active searching for *E. corylacearum* in Switzerland, it has not yet been found outside the one small area in the canton of Ticino. The pathogen differs from the native hazelnut powdery mildew *Phyllactinia guttata*, with which it sometimes co-occurs, by forming mycelia on the upper leaf surface and having smaller chasmothecia with branched appendices.

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Figure 1



Figure 2

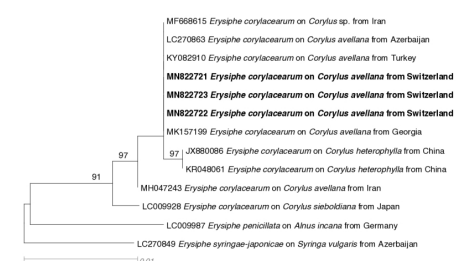


Figure 3

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