

First Report of Powdery mildew caused by *Golovinomyces orontii* on *Campanula glomerata* in Italy. A. Garibaldi, D. Bertetti, and S. Matic, Centre of Competence AGROINNOVA, University of Torino, Largo Braccini 2, 10095 Grugliasco, Italy; and M. L. Gullino, Centre of Competence AGROINNOVA and DISAFA, University of Torino, Largo Braccini 2, 10095 Grugliasco, Italy.

Clustered bellflower (*Campanula glomerata*), Campanulaceae family, is an herbaceous perennial plant belonging to the native flora in Italy and it is appreciated for the production of blue inflorescences. During the winter 2018, about 20% of 4-month-old plants growing in a greenhouse of the Centre of Competence Agroinnova, University of Torino, located in Grugliasco (Torino province, northern Italy) showed symptoms and signs of a powdery mildew. A thin, white mycelium covered leaves, in particular the adaxial surface, and petioles, causing necrosis on the affected tissues. As the disease progressed, the mycelium became thicker along the primary veining and resulted in leaf distortion. Hyphae produced erect conidiophores with cylindrical, sometime curved at the basis, foot-cells measuring $44\text{-}106 \times 9\text{-}12$ (average: 81×10) μm . Foot-cells were followed by 1-3 shorter cells, measuring $11\text{-}28 \times 8\text{-}13$ (average: 17×10) μm . Hyaline, elliptical conidia were in chains (up to 5 conidia per chain) and measured $26\text{-}41 \times 13\text{-}22$ (average: 31×17) ($n = 50$) μm . They were lacking of fibrosin bodies and germinated from an end. The perfect stage of the microorganism was not observed. The DNA of the pathogen was extracted from mycelium, conidiophores and conidia collected from affected leaves using the E.Z.N.A. Fungal DNA Mini Kit (Omega Bio-Tek, Darmstadt, Germany). A PCR reaction was performed using either primers ITS1 and ITS4 (White et al. 1990) or ITS1 and PM6 (Takamatsu and Kano 2001), to amplify the Internal Transcribed Spacer (ITS) region of rDNA. The NCBI blastn analysis of 513 and 446 bp sequences (Genbank accession numbers MH079551 and MH079552 respectively) showed a 100% similarity with *Golovinomyces orontii* (AB769464 and AB769465). In the pathogenicity test, some leaves affected by the pathogen were gently pressed onto leaves of three *C. glomerata* healthy plants. Inoculated plants were maintained in a green-house, at temperatures ranging from 20 to 26°C.

served as controls.

Symptoms and signs of powdery mildew appeared on inoculated plants, 11 days after the artificial inoculation, whereas controls remained healthy. *G. orontii* has been reported on *C. glomerata* in Finland, Norway and USSR, and on *Campanula* spp. in several European Countries (Braun 1995). In Italy, *G. orontii* has been identified on *C. rapunculoides* (Garibaldi et al. 2012), whereas this is the first report of this pathogen on *C. glomerata*. The economic importance of this disease is at present limited in Italy but it could spread to several *Campanula* spp., because the cultivation of these species are increasing among the ornamentals.

References

Braun, U. 1995. The Powdery Mildews (Erysiphales) of Europe. Gustav Fischer Verlag Jena.

Garibaldi, A., et al. 2012. *Plant Disease* 96: 291.

Takamatsu, S., and Kano, Y. 2001. *Mycoscience* 42:135-139.

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.