Diseases Caused by Oomycetes

Occurrence of *Plasmopara destructor* Causing Downy Mildew on *Impatiens walleriana* in Brazil

M. H. Hahn, J. Gelain, W. V. Pereira, D. D. Martinha, L. L. May-De-Mio, and H. S. S. Duarte[†]

Departamento de Fitotecnia e Fitossanidade, Universidade Federal do Paraná, Curitiba, Paraná, Brazil

Funding: This study was financed in part by the Coordenação de Aperfeiçoamento de Pessoal de Nível Superior - Brasil (CAPES) - Finance Code 001 and by Universidade Federal do Paraná. Authors LLMM and HSDD thank the 'Conselho Nacional de Desenvolvimento Científico e Tecnológico' (CNPq)/Brazil for its research fellowship. Plant Dis. 105:1572, 2021; published online as <https://doi.org/10.1094/PDIS-07-20-1519-PDN>. Accepted for publication 25 November 2020.

Impatiens walleriana (Balsaminaceae), popularly known as impatiens, is an African succulent and a popular ornamental plant worldwide (GBIF 2019). In Brazil it is broadly grown indoors and outdoors, including in public parks of Curitiba, State of Paraná (Viezzier et al. 2018). In September 2018, *I. walleriana* plants showing typical downy mildew symptoms were observed in wastelands and gardens in Curitiba. The symptoms included adaxial chlorotic leaf spots with abundant white sporulation on the abaxial side. The disease led to severe defoliation of the plants, and the incidence of the plant disease varied from 20 to 80% of plants in an area ranging from 400 to 40,000 m². A representative sample was deposited in the herbarium of the Museu Botânico Municipal de Curitiba (MBM 331601). The following morphology was observed: Sporangiophores ($n = 30$), hyaline, thin walled, emerging through stomata, 407.3 to 551.1 µm long, slightly swollen base, first branch at 165.8 to 324.7 µm from base, end branches 5.1 to 13.1 µm long, sporangia ($n = 50$) hyaline, thin-walled subglobose to ovoid, 12.8 to 21.9 × 12.5 to 17.9 µm, slightly papillate. Due to morphological and genetic variations within the species *Plasmopara obducens*, Görg et al. (2017) proposed the new species *P. velutina* and *P. destructor*. The morphology of the Curitiba specimen was equivalent to that described for *P. destructor* (Görg et al. 2017). DNA was extracted from LEMIDPRTf-19-02 isolate, and the ITS1 and *cox2* regions were PCR amplified as described in Görg et al.

(2017). The resulting sequences were deposited in GenBank (ITS1, MT680628; *cox2*, MT952335). A BLASTn analysis of the sequences revealed 100% homology with ITS (MF372742) and *cox2* (MF372728) sequences of the type strain of *P. destructor* (GLM-F107554). A Bayesian phylogenetic analysis was performed to compare the sequences from this study with reference sequences for *P. obducens*, *P. destructor*, and *P. velutina* (Görg et al. 2017; Salgado-Salazar et al. 2018). The oomycete from Curitiba grouped in a reliable clade with *P. destructor*. Pathogenicity was carried out by ex vivo and in vivo tests. For ex vivo, stems with approximately four healthy leaves of *I. walleriana* ($n = 10$) were embedded in aluminum grid inside of a plastic box with the stem bases immersed in distilled water. The inoculation of five stems was carried out by spraying a suspension with 6×10^4 sporangia/ml on the abaxial side of the leaves. Five stems with leaves inoculated with sterile water were used as controls. They were incubated in a growth chamber in the dark for 48 h at 20°C and another 12 days in a 12-h light photoperiod. The confirmation of pathogenicity in plants (in vivo) was obtained with the inoculation of *I. walleriana* seedlings (1 month old) grown in 2-dm³ aluminum pots. The inoculation methodology and number of plants were the same as the stems test. After the inoculation, plants were incubated in a growth chamber for 48 h in the dark at 20°C with 100% relative humidity with nebulization, and another 10 days at a photoperiod of 12 h of light. For both tests, abundant sporulation was observed with morphology equivalent to *P. destructor* described by Görg et al. (2017). No disease developed on control plants. To our knowledge, this is the first report of *P. destructor* on *I. walleriana* in Brazil (Farr and Rossman 2020; Silva et al. 2020), representing a potential loss to flower production and a reduction in flowering period in public gardens and parks.

References:

- Farr, D. F., and Rossman, A. Y. 2020. Fungal Databases, Syst. Mycol. Microbiol. Lab., ARS, USDA. <https://nt.ars-grin.gov/fungaldatabases/>.
- GBIF. 2019. GBIF Backbone Taxonomy. <https://www.gbif.org/species/2891772>.
- Görg, M., et al. 2017. Mycol. Prog. 16:791.
- Salgado-Salazar, C., et al. 2018. Plant Dis. 102:2411.
- Silva, R. M., et al. 2020. Plant Dis. 104:295.
- Viezzier, J., et al. 2018. Cienc. Florest. 28:369.

The author(s) declare no conflict of interest.

e-Xtra

Keywords: oomycetes, ornamentals, herbaceous/flowering plants, etiology

[†]Indicates the corresponding author.

H. S. S. Duarte; E-mail: henriqueduarte@ufpr.br