Diseases Caused by Fungi and Fungus-Like Organisms

A Molecular Approach Reveals *Tranzschelia discolor* as the Causal Agent of Rust on Plum and Peach in Brazil

G. S. Vidal,¹ M. H. Hahn,¹ W. V. Pereira,¹ D. B. Pinho,² L. L. May-De-Mio,¹ and H. S. S. Duarte^{1,†}

¹ Departamento de Fitotecnia e Fitossanidade, Universidade Federal do Paraná, Curitiba, Paraná, Brazil

² Departamento de Fitopatologia, Universidade de Brasília, Brasília, Distrito Federal, Brazil

Funding: This study was financed in part by the Coordenação de Aperfeiçoamento de Pessoal de Nível Superior - Brasil (CAPES) - Finance Code 001. The authors LLMM and HSSD thank the Conselho Nacional de Desenvolvimento Científico e Tecnológico (CNPq)/Brazil for its research fellowship. Plant Dis. 105:1855, 2021; published online as <https://doi.org/10.1094/PDIS-11-20-2379-PDN>. Accepted for publication 12 January 2021.

Plum and peach are important crops in the southernmost regions of Brazil, and in the majority, fresh fruit producers are small producers, which guarantees their family income. *Tranzschelia discolor* and *T. pruni-spinosae* are the etiological agents of rust on *Prunus domestica* (plum) and *P. persica* (peach) in Brazil (Mendes and Urben 2020). The molecular characterization of *Tranzschelia* specimens revealed different clades that are not attributed to known species, showing the need for taxonomic evaluation of *Tranzschelia* species in the tropics (Scholler et al. 2014, 2019). As *Tranzschelia* species reported in Brazil were identified only by morphological characteristics, this study aimed to carry out a survey to verify the etiology of rust on plum and peach based on molecular data. In 2018, rust symptoms in peach and plum trees were observed with maximum severity of 30 and 35%, respectively, in three Brazilian states. Symptoms of plum and peach rust are yellowish-green spots visible on the adaxial side of the leaves and uredia/uredinal sori releasing the brown urediniospores on the abaxial side. Symptomatic leaves of plum and peach were collected at Curitiba in the states of Paraná (lat. 25°25'47" S, long. 49°16'19" W, altitude 935 m) in a research station, Videira in Santa Catarina (lat. 27°00'30" S, long. 51°09'06" W, altitude 750 m) in a research station, and Paranapanema in São Paulo (lat. 23°23'19" S, long. 48°43'22" W, altitude 610 m) in a farmer's field and were deposited in the herbarium of the Municipal Botanical Museum of Curitiba (MBM 429790 to 429795).

Urediniospores collected on plum and peach leaves were all echinulate, obovoid, orange-brown, and measured 18.0 to 33.5 × 10.5 to 20.5 µm ($n = 150$) and 22.5 to 40.0 × 11.5 to 20.5 µm ($n = 150$), respectively. The genomic DNA of the urediniospores was extracted for amplification and sequencing of the internal transcribed spacer region (ITS) using primers ITS5-u and ITS4-u (Pfunder et al. 2001). The sequences were deposited (accession nos. MT786213 to MT786218) and compared with sequences in the GenBank repository using the BLASTn algorithm. The sequences of ITS showed a high percentage of identity (>99%) with sequences from *T. discolor* (accession nos. AB097449, EU014071, KU712078, KY764179, MH599069, MN545867, DQ995341, DQ354542, and KX985768). Additionally, our isolates clustered with others *T. discolor* in a Bayesian phylogenetic tree based on ITS sequences (study S26663 deposited in TreeBASE). A pathogenicity test was carried out on plants by inoculation of a 1.5×10^5 urediniospores/ml suspension on the abaxial side of the leaves. Leaves sprayed with sterile water were used as controls. The plants were incubated in a growth chamber (GC) in the dark for 48 h at 23°C and maintained with 100% relative humidity to establish infections. The inoculated plants were afterward kept in the GC at a photoperiod of 12 h under same conditions until 14 days, when the symptoms and pathogen structures were observed for all six isolates. Control leaves remained symptomless. *T. discolor* infects plants in the genus *Prunus*, including almond, apricot, nectarine, cherry, peach, and plum (Farr and Rossman 2020). As *T. pruni-spinosae* was not found, *T. discolor* is probably the prevalent species in the main regions of Brazil. This information reveals *T. discolor* as the causal agent of plum and peach rust in Brazil and helps to understand the distribution of this disease in tropics or worldwide.

Author recommended internet resources: <https://dataverse.harvard.edu/api/access/datafile/4161496>, <https://dataverse.harvard.edu/api/access/datafile/4271373>

References

- Farr, D. F., and Rossman, A. Y. 2020. Fungal Databases, Syst. Mycol. Microbiol. Lab., ARS, USDA. <https://nt.ars-grin.gov/fungaldatabases/>.
- Mendes, M. A. S., and Urben, A. F. 2020. Fungos relacionados em plantas no Brasil. <http://pragawall.cenargen.embrapa.br/aiqweb/michtml/fgbanco01.asp>.
- Pfunder, M., et al. 2001. Mycol. Res. 105:57.
- Scholler, M., et al. 2014. Mycologia. 106:448.
- Scholler, M., et al. 2019. Mycol. Prog. 18:295.

The author(s) declare no conflict of interest.

Keywords: fungi, stone fruit, etiology

[†]Indicates the corresponding author.
H. S. S. Duarte; henriqueduarte@ufpr.br