Diseases Caused by Fungi and Fungus-Like Organisms

First Report of Leaf Rust of *Acer mono* Caused by *Pucciniastrum hikosanense* in China

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Acer mono Maxim, mainly distributed in China, Japan, Korea, and eastern Russia (Shang et al. 2012), is a widely planted ornamental and pharmaceutical tree (Zhang et al. 2015). In September 2020, leaf samples of *A. mono* infected by uredinia were collected in Shaanxi Province (34°15'40.06'' N, 108°3'54.54'' E, altitude 432.35 m), China. Telia then developed in late autumn. Voucher specimens were deposited in the Herbarium Mycologicum Academiae Sinicae (no. HMAS249354), China. This leaf rust infected *A. mono* heavily, leading to premature defoliation and a 90% infection rate. Geographic investigation confirmed that this rust was widely distributed in local urban parks but was nonpathogenic to *A. buergerianum*, *A. negundo*, *A. oblongum*, *A. palmatum*, and *A. rubrum*. This fungus is morphologically characterized as follows and identified as *Pucciniastrum*. Uredinia hypophyllous, subepidermal, scattered to gregarious, oval or round, 0.10 to 0.30 × 0.08 to 0.15 mm, golden yellow to orange, at last somewhat pulverulent; peridia hemispherical, erumpent with apical pores; peridial cells minute, irregularly polygonal, hyaline to pale yellow; ostiolar cells ellipsoid or roundish. Urediniospores subglobose, ovate or ellipsoid, 20 to 33 × 15 to 21 μm, yellow to pale orange; wall 1 to 2 μm thick, hyaline to pale yellow, echinulate, somewhere smooth; pedicel deciduous, hyaline, minute, fragile. Telia hypophyllous, subepidermal, intermixed with uredinia, irregularly polygonal, restricted by veins, 0.34 to 0.91 × 0.21 to 0.54 mm, orange to amber brown. Teliospores parallelly single-layered, subglobose, oblong, sometimes angular, 23 to 47 × 16 to 34 μm, colorless to pale

yellow, one to five mediastinal, two- to six-celled; lateral wall 1 to 1.6 μm thick, apical wall 1 to 3 μm thick, smooth, hyaline. The internal transcribed spacer (ITS) and rDNA-28S regions were amplified using ITS1F/ITS4 and NL1/NL4 (Ji et al. 2019) to confirm the identification. The aligned sequences were deposited in GenBank (accession nos. MW391829, MW543709, MW541916, and MW541917). Phylogenetic trees were constructed based on neighbor-joining (NJ), maximum-likelihood (ML), and Bayesian methods. ML and NJ bootstrap values were calculated by bootstrap analyses of 1,000 replicates with GTR+G+I model using MEGA-X (Kumar et al. 2018), whereas Bayesian Markov chain Monte Carlo analyses were performed using MrBayes version 3.1.2 (Huelsenbeck and Ronquist 2001; Ji et al. 2019). Phylogenetic analysis revealed that HMAS249354 and *Pucciniastrum hikosanense* were grouped into one clade, with highly supported bootstrap values of NJ and ML and Bayesian posterior probability, 97%/93%/1. Koch's postulates were fulfilled with 1-year-old healthy plants of *A. mono*. Fresh urediniospores were collected and suspended in a 0.05% water solution of Tween 20, and 100 μl of urediniospore suspension (10⁶ urediniospores/ml) per leaf (*n* = 10) was sprayed, with another 10 healthy leaves sprayed with sterile water as the control. The plants were placed in dark for 48 h and then moved into a greenhouse at 22°C with 12 h of light per day. Disease symptoms on the tested leaves occurred identically to naturally infected leaves after 10 to 12 days of inoculation, whereas the control leaves remained healthy. Previously, *P. hikosanense* was reported infecting *Acer rufinerve* Sieb. et Zucc. in Japan (Hiratsuka 1940) and *A. rubescens* Hayata in Taiwan, China (Tai 1979). This is the first report of leaf rust of *A. mono* caused by *P. hikosanense* Hirats. f. in China.

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