Diseases Caused by Fungi and Fungus-Like Organisms

First Report of *Gymnosporangium clavipes* Causing Stem Galls on *Crataegus marshallii* in Florida, U.S.A.

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The parsley hawthorn *Crataegus marshallii* Eggleston (Rosaceae, Maloideae) is a small tree native to the southeastern United States and is a less common but prized ornamental, known for its bright fruit and flaking bark. In March of 2020, a stem gall with visible aecia on the lower surface was observed on an ornamental parsley hawthorn in Gainesville, Alachua County, Florida, U.S.A. The affected stem was collected and brought to the Florida Department of Agriculture and Consumer Services – Division of Plant Industry headquarters in Gainesville for identification (FDACS-DPI, 2020-104160). Aecia tubular, whitish, occurred on twigs (cauliculous), producing terminal swellings, mostly short and up to 1.5 mm high with white peridium containing bright orange spores in masses. Aeciospores were semigloboid to globoid, with bright orange contents, 26 to 34 µm in diameter ($n = 20$)—color and size are considered diagnostic features (EPPO 2006)—wall was densely verrucose, hyaline, and 2 to 4 µm thick. The morphological characteristics are consistent with those of *Gymnosporangium clavipes* Cooke & Peck (Pucciniaceae, Pucciniomycotina) described by Kern (1973). A voucher was deposited in the Florida Department of Agriculture and Consumer Services DPI Herbarium (PIHG, specimen number 14893). The morphological identification was confirmed by molecular identification. Following DNA extraction, we performed PCR amplification and Sanger sequencing of the internal transcribed spacer (ITS) and the large subunit (LSU) (primer pairs ITS1/LR5, MW148514) of the rRNA genes (Aime 2006); phylogenetic analysis carried out in

RAxMLv8.0.0 (Stamatakis 2014). Because of the inclination among *Crataegus* species to hybridize and the ornamental nature of the specimen, host identification was confirmed both morphologically and molecularly (ITS, primer pairs ITS1A/ITS4, MW148513, Lo et al. 2009) with 98 to 99% identity to *C. marshallii* sequences available in GenBank (MN215977, EF127037, EU683925), and it was placed within the other *C. marshallii* specimens in a broader phylogenetic estimate including sequence data from other available species of *Crataegus* (not shown). In agreement with the phylogenetic analysis, NCBI megaBLAST searches (Chen et al. 2015) of the resulting fungal sequences revealed 99% identity (ITS and LSU) to *G. clavipes* CUP-18207 (GenBank accession nos. MN605770, MN605692) and 99.65% identity (ITS and LSU, respectively; GenBank accession no. KT821552) against the strain of *G. clavipes* PUR N11552, first report of this rust occurring on another Rosaceae species, *Pyrus calleryana* Decaisne, in the United States (Creswell et al. 2016). Given the heteroecious and nonculturable nature of this pathogen, Koch's postulates were not performed. This finding represents, to the best of our knowledge, the first record of *G. clavipes* in parsley hawthorn, and it adds to its broad range of known rosaceous hosts, having already been reported in 18 other species of *Crataegus* (Farr and Rossman 2020).

References:

- Aime, M. C. 2006. Mycosciences 47:112.
Chen, Y., et al. 2015. Nucleic Acids Res. 43:7762.
Creswell, T. C., et al. 2016. Plant Dis. 100:860.
EPPO. 2006. EPPO Bull. 36:441.
Farr, D. F., and Rossman, A. Y. 2020. Fungal Databases, Syst. Mycol. Microbiol. Lab., ARS, USDA. Retrieved July 16, 2020, from <https://nt.ars-grin.gov/fungaldbases/>.
Kern, F. D. 1973. A Revised Taxonomic Account of *Gymnosporangium*. Pennsylvania State University Press, University Park, PA.
Lo, E. Y., et al. 2009. Mol. Phylogenet. Evol. 51:157.
Stamatakis A. 2014. Bioinformatics 30:1312.

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