Disease Note

Diseases Caused by Fungi and Fungus-Like Organisms

First Report of Gray Leaf Spot Caused by *Pyricularia oryzae* (synonym: *Magnaporthe oryzae*) in Oat (*Avena sativa*) in Georgia, U.S.A.

W. T. Spratling,¹ S. Sapkota,^{1,2} C. B. Vermeer,¹ J. E. Mallard,³ E. Ali,⁴ A. D. Martinez-Espinoza,¹ and B. A. Bahri^{1,2,†}

¹ Department of Plant Pathology, University of Georgia, Griffin Campus, Griffin, GA 30223

² Institute of Plant Breeding, Genetics and Genomics, University of Georgia, Athens, GA 30602

³ University of Georgia Cooperative Extension, Screven County, Sylvania, GA 30467

⁴ Department of Plant Pathology, University of Georgia, Tifton Campus, Tifton, GA 31794

Current address of S. Sapkota: Crop Genetics and Breeding Research Unit, USDA-ARS, Tifton, GA 31793.

Funding: This study is supported by the State of Georgia and USDA National Institute of Food and Agriculture Hatch project 1023739. Plant Dis. 106:763, 2022; published online as <https://doi.org/10.1094/PDIS-06-21-1182-PDN>. Accepted for publication 25 August 2021.

In the southeastern United States, oat (*Avena sativa* L.) is predominantly grown as a grain or forage crop due to its exceptional palatability (Buntin et al. 2009). In November 2020, leaf spot symptoms were observed in an oat field (cv. Horizon 720) in Screven County, Georgia (GPS: 32°38'57.6"N, 81°31'32.178"W). Lesions were oblong, whitish to gray in color, and surrounded by dark brown borders. Symptomatic oat leaves were sampled from the field and cut into 1 cm² sections that were surface sterilized, plated onto potato dextrose agar (PDA) medium, and incubated in the dark at 23°C. To obtain pure cultures, fungal hyphal tips were transferred onto fresh PDA plates three times. The pathogen was identified as *Pyricularia* (*Magnaporthe*) based on typical conidial morphology (Ellis 1971). Conidia were hyaline, pyriform, 2-septate, and displayed a basal hilum. Conidia measured 5.32 to 10.64 µm (average 8.24 µm) wide by 15.96 to 29.26 µm (average 25.40 µm) long. The identification of *Pyricularia* was further confirmed genetically via PCR amplification followed by sequencing. Genomic DNA was extracted from a 14-day-old pure culture using a CTAB method (Doyle and Doyle 1987). The internal transcribed spacer (ITS) region of ribosomal DNA, calmodulin (CaM) gene, and β-tubulin (TUB) gene were amplified using ITS5-ITS4 (White et al. 1990), CMD5-CMD6 (Hong et al. 2005), and Bt2a-Bt2b

(Glass and Donaldson 1995) primer sets, respectively. Amplicons were Sanger sequenced and blasted against the NCBI database. Results exhibited 100% (ITS), 100% (CaM), and 99.61% (TUB) homology with *Pyricularia oryzae* Cavara (GenBank accession nos. LC554423.1, CP050920.1, and CP050924.1, respectively). The ITS, CaM, and TUB sequences of the isolate were deposited in GenBank as MZ295207, MZ342893, and MZ342894, respectively. In a greenhouse (23°C, 80% RH), Koch's postulates were carried out by using oat seedlings cv. Horizon 270 grown in Kord sheet pots filled with Sun Gro professional growing mix and a *P. oryzae* spore suspension containing 10⁴ conidia/ml. The spore suspension (10 ml) was sprayed with an air sprayer onto seven pots of oat seedlings at the two-leaf stage. Seven supplementary pots of oat seedlings of the same cultivar were sprayed with sterile water as controls. After inoculation, plants were covered with black plastic bags that had been sprayed with sterile water to maintain high humidity and incubated overnight in the greenhouse. The bags were removed the next day, and plants were evaluated for symptoms in the following days. Seven days after inoculation, plants displayed symptoms similar to those found in the original field sample. Control plants showed no symptoms. *P. oryzae* was consistently reisolated from inoculated symptomatic oat tissues. To our knowledge, this is the first report of gray leaf spot caused by *P. oryzae* on oat in the state of Georgia and in the continental United States. *P. oryzae* can infect several graminaceous plants, including agronomically important crops such as rice (*Oryza sativa*) and wheat (*Triticum* spp.) (Chung et al. 2020). Phylogenetic analysis on the ITS region using six different host lineages was performed and revealed that this oat isolate was most closely related to the *Lolium* lineage. This outbreak could have economic implications in oat production.

References:

- Buntin, G. D., et al. 2009. Page 67 in: Southern Small Grains Resource Management Handbook. University of Georgia, Athens, GA.
Chung, H., et al. 2020. Plant Pathol. J. 36:305.
Doyle, J. J., and Doyle, J. L. 1987. Phytochem. Bull. 19:11.
Ellis, M. B. 1971. Dematiaceous Hyphomycetes. Commonwealth Mycological Institute, Kew, U.K.
Glass, N. L., and Donaldson, G. C. 1995. Appl. Environ. Microbiol. 61:1323.
Hong, S. B., et al. 2005. Mycologia 97:1316.
Kumar, S., et al. 2018. Mol. Biol. Evol. 35:1547.
White, T. J., et al. 1990. Page 315 in: PCR Protocols: A Guide to Methods and Applications. Academic Press, San Diego, CA.

The author(s) declare no conflict of interest.

e-Xtra

Keywords: *Pyricularia oryzae*, oat, *Avena sativa*, gray leaf spot, Georgia

[†]Indicates the corresponding author.
B. A. Bahri; bbahri@uga.edu