Diseases Caused by Fungi and Fungus-Like Organisms

First Report of *Fusarium oxysporum* f. sp. *lactucae* Causing Vascular Wilt of Lettuce in Florida

J. Murray,¹ R. N. Raid,¹ C. F. Miller,² and G. Sandoya-Miranda^{1,†}

¹ Everglades Research and Education Center, University of Florida Institute of Food and Agricultural Sciences, Belle Glade, FL 33430

² Palm Beach County Extension, University of Florida IFAS, West Palm Beach, FL 33415

Funding: The authors acknowledge the USDA Foundation for Food and Agricultural Research, the Florida Specialty Crop Foundation, the Florida Leafy Vegetable Growers, and the Hatch Project FLA-ERC-005599 for funding. Plant Dis. 104:3069, 2020; published online as <https://doi.org/10.1094/PDIS-12-19-2625-PDN>. Accepted for publication 27 May 2020.

Florida is the third largest producer of lettuce (*Lactuca sativa* L.) in the United States. In March and April 2017, lettuce exhibiting signs of wilt and chlorosis was observed in commercial fields in Florida's Everglades Agricultural Area, indicating infection with *Fusarium oxysporum* f. sp. *lactucae* (*FOL*). Affected fields were planted with the iceberg cultivar 'Chosen', and wilt incidence was as high as 90%. Upon dissection, diseased plants exhibited red-to-brown vascular discoloration in the taproot, and plant death occurred at 30 to 60 days after planting. Taproot tissue samples were surface sterilized in 10% bleach for 90 s and plated on Komada's semiselective medium (Komada 1975). After subculturing single spores, a total of 102 samples were obtained from four different fields. Mycelia were collected from each sample and grown on potato dextrose agar, a plug of which was placed in a 50-ml flask in potato dextrose broth (PDB) and shaken on a rotary shaker at 130 rpm for 10 days, and *FOL* conidia morphology was verified microscopically. Conidial suspensions were prepared by filtering the broth with sterilized cheesecloth and standardizing the suspension to 1×10^6 conidia/ml. The conidial suspensions were used to conduct greenhouse pathogenicity tests on transplanted lettuce seedlings of the susceptible cultivar Chosen. Seeds were sown in sterilized potting soil and sand mixture in 200-cell planting trays and grown until the second leaf stage. During transplanting, undisturbed roots were submerged in the conidial suspension for

5 min, placed separately in 10.2-cm pots containing sterilized potting soil and sand 1:1, and maintained in a greenhouse. After 7 days, disease severity for each plant was rated daily for 30 days on a scale from 0 to 5, where 0 = no disease and 5 = dead. Infected plants exhibited similar wilting, chlorosis, and vascular discoloration, many of which died between 10 and 21 days after inoculation. Taproots from inoculated and noninoculated control plants were plated on Komada's medium to fulfill Koch's postulates. Of the 102 isolations, 75 were used for the pathogenicity test, and 62 caused wilting disease in the newly infected seedlings with a variety of responses of taproot discoloration severity; 13 isolates did not cause any root discoloration symptoms. The 75 isolates were also grown in PDB; mycelia were harvested and freeze dried, and genomic DNA was extracted using the DNAeasy plant mini kit. Two primers, FLA0101F-FLA0101R (1,500 bp) and Hani3'-Hanilatt3rev (200 bp), were used to amplify race 1 of *FOL* (Pasquali et al. 2007; Shimazu et al. 2005). Sixty-three samples amplified *FOL* race 1 with the primer FLA0101F-FLA0101R, 72 samples amplified *FOL* race 1 with primer Hani3'-Hanilatt3rev, and three isolates did not amplify with either primer or produce root discoloration. Six isolates that amplified *FOL* race 1 with either both or one of the primers did not produce root discoloration in lettuce and are considered nonpathogenic. To our knowledge, this constitutes the first report of *FOL* in Florida. *Fusarium* wilt of lettuce was first reported in the United States in 1993 in California's San Joaquin Valley (Hubbard and Gerik 1993) and later in Arizona in 2003 (Matheron and Koike 2003) as well as in Europe in 2002 (Garibaldi et al. 2002). If *FOL* continues to increase in Florida, the disease may pose a serious threat to the industry.

References:

- Garibaldi, A., et al. 2002. Plant Dis. 86:1052.
- Hubbard, J. C., and Gerik, J. S. 1993. Plant Dis. 77:750.
- Komada, H. 1975. Rev. Plant Prot. Res. 8:114.
- Matheron, M. E., and Koike, S. T. 2003. Plant Dis. 87:1265.
- Pasquali, M., et al. 2007. Phytopathology 97:987.
- Shimazu, J., et al. 2005. J. Gen. Plant Pathol. 71:183.

The author(s) declare no conflict of interest.

e-Xtra

Keywords: lettuce, *Fusarium* wilt, pathogenicity tests, Everglades Agricultural Area

[†]Indicates the corresponding author.

E-mail: gsandoyamiranda@ufl.edu (G.S.-M.)