Diseases Caused by Fungi and Fungus-Like Organisms

First Report of *Fusarium fujikuroi* Causing Wilt on Pima Cotton (*Gossypium barbadense*) Seedlings in New Mexico, U.S.A.

Y. Zhu,¹ A. Abdelraheem,¹ T. Wedegaertner,² R. Nichols,² and J. F. Zhang^{1,†}

¹ Department of Plant and Environmental Sciences, New Mexico State University, Las Cruces, NM 88003

² Cotton Incorporated, Cary, NC 27513

Plant Dis. 105:228, 2021; published online as <https://doi.org/10.1094/PDIS-03-20-0638-PDN>. Accepted for publication 17 July 2020.

Cotton has a production value of US\$45.86 million in New Mexico (USDA-NASS 2018). In June 2019, 1 to 2% of cotton seedlings with chlorotic, necrotic, or wilted leaves or root rot were observed in six Pima cotton fields in south Las Cruces, NM. Roots from five symptomatic plants sampled in each field were washed free of the soil, surface sterilized with 0.8% sodium hypochlorite, rinsed two to three times with sterile distilled water, and blotted dry with a paper towel. The sterilized tissues were then dissected and plated on acidified potato dextrose agar (PDA) and incubated for 5 days at 25°C with a 12-h dark/light photoperiod. Fungal colonies that had similar morphology were consistently isolated at 70% isolation frequency. One representative isolate from each field was selected for the following analysis. Colonies were initially white and turned pinkish 5 days later on PDA. Dark orange pigments on the bottom of plates were observed after 7 days. On PDA, the macroconidia were slender, almost straight, three to five septa, and medium length with a size of 25.5 to 41.0 × 2.8 to 4.5 µm ($n = 30$). The microconidia were abundant, zero to one septa, and oval shaped, with a size of 5.5 to 11.0 × 2.0 to 3.2 µm ($n = 30$). Sporodochia and chlamydospores were not observed. The pathogen was therefore identified as *Fusarium fujikuroi* (Leslie and Summerell 2006). Genomic DNA from the isolates was extracted, and a portion of the translation elongation factor *EF-1α* gene (GenBank accession nos. MN896942 to MN896947), β -tubulin gene (MN896949 to MN896954), and phosphate permease (*PHO*) gene (MN896956 to MN896961) were amplified and sequenced using the paired primers EF-1A/EF1885R, BT-100F/BT1828R, and PHO48F/PHO2034R, respectively (Ortiz et al. 2017). BLASTn analysis

of the three genes of all the isolates showed 100% (1,640/1,640 bp, 1,694/1,694 bp, and 1,872/1,872 bp) identity to the reference isolate of *F. fujikuroi* TX75 (MH828026, MH827999, and MH828057, respectively) and 99% (1,634/1,640 bp, 1,691/1,694 bp, and 1,863/1,872 bp) identity to another *F. fujikuroi* GA1A-1-1 (KY293654, KY293646, and KY293662, respectively). A phylogenetic analysis based on the concatenated sequences clustered the six isolates with the *F. fujikuroi* reference isolates at 100% bootstrap support, confirming the identity of the isolates. Pathogenicity of the six isolates was tested on Upland PHY 725 RF and Pima PHY 841 RF. Fifty milliliters of a conidial suspension (5×10^5 conidia/ml) of each isolate was pipetted onto the soil around the base of the seedlings at the first true-leaf stage. The experiment was performed twice. Initial symptoms of wilting cotyledons were observed 7 days after inoculation (DAI). All the isolates were pathogenic to the two genotypes, causing wilting and yellowing of the leaves, rot of the root, and eventually death of some plants at 30 DAI, similar to the symptoms observed in the field. No symptoms were observed on the control plants inoculated with sterile distilled water. The average foliar disease severity rating was 2.9 on PHY 725 RF and 1.6 on PHY 841 RF on a scale of 0 for no symptoms to 5 for plant death. *F. fujikuroi* was successfully reisolated from the roots of a symptomatic plant and was identical to the isolates used for the pathogenicity test. *F. fujikuroi* has been reported to cause root rot and wilt on soybean (Pedrozo et al. 2015; Zhao et al. 2020), bakanae disease on rice (Carter et al. 2008), and a seedling disease on cotton (Colyer 1988). To our knowledge, this is the first report of *F. fujikuroi* causing wilt on cotton seedlings in New Mexico and the United States.

References:

- Carter, L. L. A., et al. 2008. Phytopathology 98:992.
- Colyer, P. D. 1988. Plant Dis. 72:400.
- Leslie, J. F., and Summerell, B. A. 2006. The *Fusarium* Laboratory Manual. Blackwell Publishing, Oxford, U.K.
- Ortiz, C. S., et al. 2017. Plant Dis. 101:134.
- Pedrozo, R., et al. 2015. Plant Dis. 99:1865.
- USDA-NASS. 2018. 2018 State Agriculture Overview for New Mexico. <https://www.nass.usda.gov/>
- Zhao, W., et al. 2020. Plant Dis. 104:981.

The author(s) declare no conflict of interest.

Keywords: *Fusarium fujikuroi*, cotton (*Gossypium*), wilt

[†]Indicates the corresponding author.
E-mail: jinzhang@nmsu.edu (J.F.Z.)