Diseases Caused by Fungi and Fungus-Like Organisms

First Report of *Fusarium falciforme* (FSSC 3+4) Causing Wilt Disease of *Phaseolus vulgaris* in Mexico

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Bean (*Phaseolus vulgaris*) is the second most important crop in Mexico after corn due to the high consumption of beans in all regions of the country. In the winter (January 2016), bean plants showing wilting, root discoloration, and necrosis were observed, with an incidence of approximately 30% in different fields (<1 ha) in Tecoaapa, Guerrero State, Mexico. Symptomatic fine roots (<2 mm) were cut into 0.5-cm-long pieces, washed with tap water, surface disinfected with 1.5% NaOCl for 3 min, and rinsed with sterile distilled water. Thirty-five pieces were placed on potato dextrose agar (PDA, Difco) and incubated at 25°C for 7 days. Then, single-spore isolates were obtained. Colonies on PDA showed abundant white aerial mycelium and a growth rate of 4.5 mm/day, and in reverse, colonies were white/pink with a brown center. Microconidia were cylindrical to ellipsoid, aseptate, hyaline and 7.8 to (6.0) to 4.7 × 2.7 to (2.1) to 1.6 µm. On carnation leaf agar, macroconidia were 37.8 to (29.4) to 23.5 × 4.1 to (3.5) to 2.6 µm, hyaline, falcate, with slightly curved apices, and three to five septa. Chlamydospores were round, intercalary, hyaline,

single or in chains (Booth 1971). A representative strain (CSAEGRO-AyDi-Ef) was analyzed by polymerase chain reaction, and the translation elongation factor 1-alpha (*tef1*) gene (GenBank accession no. MK945757) was sequenced using the EF-1/EF-2 primers (O'Donnell 2000). *Fusarium*-ID (Geiser et al. 2004) analysis showed 100% similarity with the *Fusarium solani* species complex (FSSC 3+4) strain NRRL28562. In addition, Bayesian phylogenetic analysis placed this strain in the *Fusarium falciforme* clade. A pathogenicity test was performed by immersing healthy plant roots (cv. Negro Jamapa) in 200 ml of a conidial suspension (5×10^7 conidia/ml) for 10 min and then transplanting the plants into pots. Control plants were immersed in sterile distilled water. Similar symptoms as those in the field were observed at 10 days after inoculation, and the controls were healthy. The fungus was reisolated from infected plants and showed the same morphology and *tef1* sequence as the original isolate, fulfilling Koch's postulates. Recently, *F. falciforme* was reported to cause wilting of *P. vulgaris* in Cuba (Duarte et al. 2019); however, this is the first report of *F. falciforme* (FSSC 3+4) causing wilt disease of *P. vulgaris* in Mexico. This species was previously reported in Mexico affecting onion (Tirado-Ramírez et al. 2018), papaya, tomato (Vega-Gutiérrez et al. 2019a, 2019b), and maize (Douriet-Angulo et al. 2019), suggesting an ample host range in the country.

References:

- Booth, C. 1971. The Genus *Fusarium*. Commonwealth Mycological Institute, Kew, U.K.
- Douriet-Angulo, A., et al. 2019. Plant Dis. 103:2951.
- Duarte, Y., et al. 2019. New Dis. Rep. 40:9.
- Geiser, D. M., et al. 2004. Eur. J. Plant Pathol. 110:473.
- O'Donnell, K. 2000. Mycologia 92:919.
- Tirado-Ramírez, M. A., et al. 2018. Plant Dis. 102:2646.
- Vega-Gutiérrez, T. A., et al. 2019a. Plant Dis. 103:2681.
- Vega-Gutiérrez, T. A., et al. 2019b. Plant Dis. 103:157.

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