Diseases Caused by Fungi and Fungus-Like Organisms

First Report of *Fusarium verticillioides* Causing Cucumber Fruit Rot in Sinaloa, Mexico

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Cucumber (*Cucumis sativus* L.) is a fruit crop with high consumption worldwide. Mexico had a cucumber production of 826,485 tonnes in 2019. In December 2020, in a greenhouse in Sinaloa State, 18% of Persian cucumber fruits were observed with rot symptoms and the development of cottony white mycelia at both ends similar to those described for *Fusarium incarnatum* (García-Estrada et al. 2021). Isolation of the causal agent was carried out on potato dextrose agar (PDA) medium at 27°C for 7 days from sections of cucumber tissues disinfected in NaOCl at 1% for 1 min and then rinsed in distilled water. Morphological characterization was carried out on Spezieller-Nährstoffarmer agar (SNA) medium, in which cultures were colorless and showed scarce mycelial growth; however, microconidia were abundant and mainly clavate shaped, measuring $16.6 \pm 2.2 \times 5.32 \pm 1.0 \mu\text{m}$ ($n = 100$). The morphological characteristics were similar to those described for *Fusarium verticillioides* (Nirenberg 1981). To confirm the species identity, the internal transcribed spacer (ITS) region and the actin (*ACT*), β -tubulin (*B-tub*), calmodulin (*CAL*), and translation elongation factor 1- α (*TEF1- α*) genes were amplified and sequenced from the representative isolate FPM03. These sequences were submitted to GenBank with accession numbers MZ868200 for the ITS region and MZ955274 to MZ955277 for the *ACT*, *B-tub*, *CAL*, and *TEF1- α* regions, in order. BLASTn analysis of the sequences showed 99 to 100% identity with *F. verticillioides* sequence accession numbers MG515226, KU603765, MW402311, MW402449, and MW402113, which corresponded to strains CM1, CBS 576.78, and CBS 218.76. To evaluate Koch's postulates, 10 healthy cucumber fruits were

disinfected with 1% NaOCl for 1 min and then washed with distilled water. Fruits and five 2-month-old cucumber plants were inoculated with a single-spore suspension (3×10^4 conidia/ml) by spraying. For controls, 10 cucumber fruits and 5 plants were sprayed with sterile distilled water. All fruits were incubated in plastic bags at 25°C for 4 days and plants were placed under greenhouse conditions for a week. At 30 h after inoculation, all inoculated fruits showed soft rot symptoms at the fruit poles, and the development of white and cottony mycelia was observed at 48 h. Inoculated plants showed symptoms mainly in the flower end of the fruits after 3 days. The symptoms observed under laboratory conditions were similar to those registered initially in the field. Samples of rotted tissues (fruit ends and flowers) from inoculated fruits were cultured on PDA medium; the resultant colonies showed similar characteristics to those obtained initially and the same pathogen was recovered. All control fruits and plants remained healthy, confirming pathogenicity. *F. verticillioides* is primarily a maize pathogen causing stalk and ear rot globally, resulting in significant yield losses and reductions in grain quality; this species also produces large amounts of fumonisin B1 with high toxigenicity and is frequently found as a food contaminant (Leslie and Summerell 2006). In addition, this pathogen was reported to affect sweet sorghum in Spain and banana in Jordan (Palmero et al. 2012; Salem et al. 2020). Recently, in Mexico, *F. incarnatum* was reported to cause soft rot in cucumber fruits (García-Estrada et al. 2021); however, this is the first report of *F. verticillioides* affecting Mexican cucumber production. This information will be relevant for disease prevention and control.

References:

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