Diseases Caused by Oomycetes

First Report of Eggplant Fruit Rot Caused by *Phytophthora nicotianae* in Mexico

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Eggplant (*Solanum melongena* L.) is an important solanaceous crop that is produced mainly in tropical and subtropical regions and is widely consumed worldwide. In 2018, eggplant production in Mexico was approximately 80,000 t, and Sinaloa State contributed 96% of this production; however, this crop suffers significant losses from plant pathogens. In December 2019, fruits from commercial orchards (geographical coordinates: 24°45'39.39"N, 107°26'57.30"W) with visible brown soft rot and profuse white mycelia were analyzed. On V8 medium, pieces of tissue obtained from the border of lesions were plated and incubated between 25 and 36°C. After 5 days, a dense cottony mycelium with a slightly petaloid pattern was observed at 25°C and did not grow at 36°C. Isolates of that pathogen were heterothallic, and microscopic preparations showed development of coenocytic mycelium and spheroid sporangia that were noncaducous and papillate, measuring $35.6 \pm 5.8 \times 27.1 \pm 4.4$ µm. Based on morphological characteristics, the eggplant soft rot causal agent was identified as *Phytophthora nicotianae* Breda de Haan (Erwin and Ribeiro 1996). From a representative isolate denominated PhySm01, two DNA regions (internal transcribed spacer [ITS] and the large subunit ribosomal [28S]) were amplified and sequenced with ITS1/ITS4 and NL1/LR3 primers, respectively. The obtained ITS sequence (GenBank accession no. MT508842) showed 100% identity with several *P. nicotianae* sequences (MT065840, MH290435, and MG570057) with 100% query coverage and 740 matching nucleotides. For the 28S sequence (MT508843), the identity with strains EU080889 and EU080508 of *P. nicotianae* was 99.86%, with 100 query coverage and 729 matching nucleotides. Further, phylogenetic analysis from *P. nicotianae* strain

PhySm01 and GenBank reference sequences was carried out by the maximum likelihood method with Mega 7 software based on the ITS sequences, which verified the species identification. To fulfill Koch's postulates, a suspension containing 1×10^4 zoospores/ml of the oomycete isolated from the original diseased eggplant fruit was used to inoculate 10 healthy and disinfested fruits. Sterile water was used as a control. Three wounds per fruit were made with a sterile needle, and 20 µl of the zoospore suspension (or water) was placed on each. All fruits were placed into plastic bags with moistened paper and incubated at 25°C for 3 days. This test was repeated twice with similar results. Initial symptoms developed 24 h after inoculation with brown soft tissue forming around the inoculated area, and profuse soft rot accompanied by white mycelium was observed 2 days after inoculation. No symptoms developed on the control fruits during this time. Pieces of necrotic tissue were plated on V8 medium and incubated as described previously. The reisolated pathogen was compared with the original isolate and had the same morphological characteristics. *P. nicotianae* has a worldwide distribution and can infect multiple solanaceous crops, including tobacco (Gallup et al. 2018). In addition, it has been reported on other hosts outside of the Solanaceae family, causing economically important losses in citrus and strawberry. In India, it causes necrosis of citrus fruits and roots, leading to tree decline (Das et al. 2016), and in the United States, it causes crown rot of strawberry (Marin et al. 2018). In Mexico, *P. nicotianae* has been reported on vinca (Alvarez-Rodriguez et al. 2013); however, this is the first report of *P. nicotianae* causing fruit soft rot of eggplant, and this pathogen represents a new threat when the environment is favorable for disease outbreaks.

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