Diseases Caused by Oomycetes

First Report of *Phytophthora nicotianae* Causing *Dianthus chinensis* Root Rot and Foliage Blight in China

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Dianthus chinensis is a popular ornamental plant that is widely cultivated in China. In May 2020, root rot and foliage blight were first observed on 50 to 55% of groundcover plants at several landscape sites of Xuanwuhu Park and Nanjing Railway Station, China. Symptoms of wilting and chlorosis appeared in the initial stage. Severe infection caused the death of whole plants. To recover the causal pathogen, infected root and leaf samples were cut into 5- × 5-mm squares, surface disinfected in 70% ethanol for 30 s, placed onto 10% clarified V8 juice agar (cV8A) containing pimarin (20 mg/liter), ampicillin (125 mg/liter), rifampicin (10 mg/liter), and pentachloronitrobenzene (20 mg/liter), and incubated at 25°C. *Phytophthora*-like hyphae growing into cV8A visibly emerged from both root and leaf tissues after 3 days. Individual hyphal tips were transferred to new cV8A plates to obtain 10 pure isolates. Colony morphology of all isolates had slightly radiate to stellate patterns with cottony aerial mycelia. All isolates had identical morphological traits including papillate and noncaducous sporangia as well as hyphal swellings after 5 days. Intercalary and terminal chlamydospores were produced after 12 days. Sporangia of a representative isolate Pni-dc7 were mostly ovoid and sometimes

obpyriform, averaging 28.9 ± 5.6 µm in length and 24.9 ± 5.8 µm in width ($n = 30$). Chlamydospores were abundant and spherical with an average diameter of 29.2 ± 0.3 µm ($n = 30$). Oogonia were not observed. The internal transcribed spacer (ITS) regions and large subunit (LSU) of the nuclear ribosomal RNA gene complex were amplified using the primer pairs ITS1/ITS4 (White et al. 1990) and NL1/NL4 (O'Donnell 1993), respectively, while the cytochrome *c* oxidase subunit II (*coxII*) gene was amplified using FM58/FM66 (Martin and Tooley 2003). The ITS sequence of isolate Pni-dc7 (GenBank accession no. MZ519893) was identical to those of *Phytophthora nicotianae* (MH219914, KU172524, MT065839). Its LSU sequence (MZ573547) was identical to those of *P. nicotianae* (KX250514, MZ348950, HQ665198). Its *coxII* sequence (MZ519893) was identical to those of *P. nicotianae* (MH221078, KJ506439, JF707072). Based on the morphological and molecular evidence, Pni-dc7 was identified as *P. nicotianae*. Pathogenicity tests were conducted using both detached leaves and whole plants. A 5-mm-diameter Pni-dc7-colonized cV8A plug was placed on each wound of five leaves. Sterile agar plugs were used for a noninoculated control leaf. All six leaves were placed on wet filter paper in a closed container at 25°C. All inoculated leaves had necrotic tissues around the wounds from spots to the entire leaves after 2 days. The control leaves remained asymptomatic. In the whole-plant assay, a plant (approx. 0.3 m in height) was inoculated with 5 ml of zoospore suspension (10^4 zoospores/ml) that was mixed into potting soil (approximately 500 g). Three plants were inoculated, while three control plants were treated with sterile distilled water. All inoculated plants in three repeats of the assay had root rot and foliage blight after 2 weeks, whereas all control plants remained asymptomatic. *P. nicotianae* was reisolated from all inoculated plants. This is the first report of *P. nicotianae* on *D. chinensis* in China. Considering the importance of *D. chinensis* to both ornamental nursery and landscaping industries in China, diseased plants were removed to prevent the spread of *P. nicotianae* to production sites and other landscape locations.

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