Diseases Caused by Fungi and Fungus-Like Organisms

First Report of *Penicillium olsonii* Causing Postharvest Fruit Rot on Tomato in Serbia

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Tomato (*Solanum lycopersicum* L.) is one of the most important vegetable crops in Serbia, with a total production of 111,639 t in 2019 (Statistical Office of the Republic of Serbia 2020). In July 2020, six tomatoes (cv. Balkan) with symptoms of fruit rot were collected from a market in Belgrade, Serbia. The incidence of disease was about 2%, and the symptomatic samples were stored for 10 days after harvest. The initial symptoms on fruits were small circular, slightly sunken, and water-soaked spots with white mycelia that progressively expanded into larger gray lesions following the occurrence of sporulation. Isolations were conducted from one spot per fruit. Small pieces (2 to 3 mm^2) from the margins of lesions were surface sterilized for 1 min in 1% NaOCl, washed twice with sterile distilled water, and cultivated on potato dextrose agar at 25°C. The isolation frequency of *Penicillium*-like colonies was 100%. In total, six monosporic isolates were obtained, and two isolates (SZ-20-6 and SZ-20-7) were selected as representative for morphological and molecular identification and for pathogenicity testing. Morphological characteristics of both isolates were observed after growth on malt extract agar (MEA) for 7 days at 25°C. On MEA, mycelia were white, and colonies turned greyish-green with abundant sporulation. On the reverse sides, colonies were pale yellow. The mean colony diameter on MEA for isolate SZ-20-6 was 25 ± 1.2 mm and for isolate SZ-20-7 was 26 ± 1.0 mm. The colony texture was velvety, without exudates and pigmentation. The conidiophores of both isolates were terverticillate, unbranched; phialides were flask shaped with a short neck, and conidia were smooth, greenish, and subglobose to ellipsoidal. The conidial diameter for isolate SZ-20-6 was 3 to 4 × 2.5 to 3 μm, and for isolate SZ-20-7 was 3.5 to 4 × 2.5 to 3.5 μm (n = 50). Based on these characteristics, isolates were identified as *Penicillium olsonii* (Pitt 1979). To confirm the morphological identification, genomic DNA was extracted from isolates (SZ-20-6 and SZ-20-7), and the rDNA ITS region and partial β-tubulin gene (*BenA*) were amplified using the primers ITS1/ITS4 (White et al. 1990) and Bt2a/Bt2b (Glass and Donaldson 1995), respectively. All sequences showed 99 to 100% similarity to *P. olsonii* and were deposited in GenBank (ITS, MW130235 and MW130236; *BenA*, MW145147 and MW145148). In multilocus phylogenetic analysis (ITS + *BenA*), isolates from this study clustered together with other *P. olsonii* sequences with 100% bootstrap support. To complete Koch's postulates, asymptomatic fruits of tomato cv. Balkan (five fruits per isolate) were superficially sterilized with 70% ethanol, wounded with a sterile needle, and inoculated with 10 μl of a spore suspension (1×10^6 spores/ml). Five control fruits were inoculated with 10 μl of sterile distilled water. The experiment was repeated twice. After 7 days of incubation in a moisture chamber at 25°C, typical gray lesions developed on inoculated fruits. The control fruits remained symptomless. The isolates recovered from symptomatic fruits showed the same morphological features as the original isolates. *P. olsonii* was previously reported on tomato fruit only in Canada (Chatterton et al. 2012) and Pakistan (Anjum et al. 2018). To our knowledge, this is the first report of *P. olsonii* causing postharvest fruit rot on tomato in Serbia, and in Europe as well. Therefore, it is essential to monitor spreading of *P. olsonii* on tomato and other crops in storage and develop efficient disease management strategies.

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