Diseases Caused by Fungi and Fungus-Like Organisms

First Report of Brown Rot of Nectarine Caused by *Monilia yunnanensis* in Tibet

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Brown rot caused by *Monilinia* spp. is one of the most important diseases of stone fruits. To date, three species of *Monilinia* have been found to occur on *Prunus* species worldwide: *Monilinia fructicola* (G. Winter) Honey, *Monilinia fructigena* (Aderhold & Ruhland) Honey, and *Monilinia laxa* (Aderhold & Ruhland) Honey (Hu et al. 2011a; Zhu et al. 2005). Whereas *M. fructicola* is widespread in the Americas and parts of Europe and Asia (CABI 2010), *M. laxa* and *M. fructigena* are the primary species causing brown rot of peach in Europe (Bryde et al. 1977). In China, a new species, *Monilia yunnanensis*, was identified in 2011 (Hu et al. 2011b; Yin et al. 2015, 2017; Zhao et al. 2013). However, the species causing brown rot of nectarine (*Prunus persica* var. *nectarina*) in Tibet have not been identified. In the summer of 2017–2018, brown rot disease of nectarine was observed in Nyngchi, Tibet, and approximately 30% of nectarines were affected annually. Therefore, the brown rot disease of nectarine is one of the main factors that restrict the yield and quality of nectarine fruit production, and cause severe economic losses in Tibet. Thirty-six nectarine fruit with typical brown rot symptoms were collected from Tibet during the summer of 2017–2018. In order to isolate the causal agent, small pieces of pericarp were disinfected with 75% ethanol for 1 min, and then for 1 min in 1% NaOCl, rinsed in sterile distilled water for three times, dried on sterile paper, and placed on potato dextrose agar (PDA). Thirty-six single-spore isolates were obtained, all morphologically similar, and three representative isolates (2-1, 2-16, and 2-31, which were from

different period and years in 2017–2018) were characterized phylogenetically and morphologically to identify them to species level. Pathogenicity of each representative isolate was confirmed by inoculating five surface-disinfected mature nectarines with mycelial plugs in the wound of the fruit. Nectarine fruit inoculated with sterile PDA plugs served as the negative control. The inoculated nectarines developed brown lesions after 6 days of incubation at 22°C, and the pathogen was successfully reisolated. There were no symptoms on the control nectarine fruit. The isolates 2-1, 2-16, and 2-31 produced gray-green colonies with even margins and concentric rings of sporogenous mycelium after 3 days incubation, and abundant black-colored stromata on the medium after 16 days of incubation at 22°C, resembling those described for *M. yunnanensis* (Hu et al. 2011b). Conidia were one-celled, hyaline, ellipsoid to lemon shaped (9.24 to 15.58 µm), and borne in branched moniloid chains. The average daily growth of mycelium on PDA at 22°C was 11.56 mm. Therefore, the isolates 2-1, 2-16, and 2-31 were preliminarily identified as *M. yunnanensis* based on the morphological investigations (Hu et al. 2011b). Morphological identification was confirmed by phylogenetic analysis based on sequences of glyceraldehyde-3-phosphate dehydrogenase (*G3PDH*) and β -tubulin (*TUB2*) genes of 2-1, 2-16, and 2-31, which were amplified using primers Mon-G3pdhF/Mon-G3pdhR and Mon-TubF1/Mon-TubR1 (Hu et al. 2011b). In both *G3PDH* and *TUB2* phylogenetic trees, the isolates 2-1, 2-16, and 2-31 formed monophyletic clades within a derived clade with the *M. yunnanensis* isolates. Additionally, the three isolates were more closely related to *M. yunnanensis* (HQ908782.1 and HQ908783.1) than to other *Monilinia* species. Based on morphological and molecular identification, the isolates 2-1, 2-16, and 2-31 were identified as *M. yunnanensis*. Previously, *M. yunnanensis* has been reported as a new species causing brown rot of peach in China (Hu et al. 2011b). To our knowledge, this is the first report of *M. yunnanensis* causing brown rot of nectarine fruit in Tibet. These findings suggest that *M. yunnanensis* is spreading on its principal host plants and causing substantial economic losses in Tibet fruit production.

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