Diseases Caused by Fungi and Fungus-Like Organisms

First Report of Sea Buckthorn Stem Wilt Caused by *Fusarium sporotrichioides* in Gansu, China

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Sea buckthorn (*Hippophae rhamnoides*) is an important deciduous shrub for fruit and ecological restoration in arid and semiarid regions of China. Twelve Chinese and Russian cultivars (cv. ShenqiuHong, eshi01, ... eshi11) were planted in an approximately 0.65-ha in a seedling nursery, located in Qingyang, Gansu Province, in northwest China, where high mortality (more than 70%) of sea buckthorn was observed in late July 2019. Symptoms consisted of massive chlorosis, drooping leaves, and dried-up stems on 5-year-old trees. Pieces of tree roots and stems with irregular light-brown discoloration in the xylem vessels were selected. Small pieces of discolored tissue were surface disinfested (1 min in 1% sodium hypochlorite, followed by three rinses with sterile distilled water), air-dried, and placed on potato dextrose agar (PDA) medium for 5 days at 25°C in the dark. A fungus was consistently isolated from both diseased roots and stems tissues. Colonies on PDA grew rapidly. Dense mycelia were pinkish-white initially and became carmine red with age on the undersurface of the plate. Macroconidia were moderately curved, 3 to 5 marked septa, hyaline, thick walled, and measured $27.8 \pm 3.6 \mu\text{m} \times 4.8 \pm 0.5 \mu\text{m}$ ($n = 30$). Microconidia were abundant, pear-shaped, ellipsoid to fusoid, often with a papilla at the base, and $8.4 \pm 2.2 \mu\text{m} \times 3.1 \pm 0.3 \mu\text{m}$ ($n = 30$). Genomic DNA was extracted for

amplification and sequencing of the internal transcribed spacer region (ITS1 and ITS4 primers) (White et al. 1990) of the ribosomal DNA (accession nos. MN160235 to MN160238) and translation elongation factor-1 alpha (EF1 and EF2 primers, accession nos. MN429075 to MN429078) (O'Donnell et al. 1998). The sequences revealed 99% similarity to the sequences of the ITS (AY188917), and 100% identity with EF1- α (JF740808) regions of *Fusarium sporotrichioides*. Based on morphological and molecular characteristics, the fungus was identified as *F. sporotrichioides* (Leslie and Summerell 2006). Koch's postulates were fulfilled on healthy, potted 1-year-old sea buckthorn seedlings using two isolates in a greenhouse at 25°C, 90% relative humidity, and 12-h light/dark photoperiod. Ten potted seedlings were inoculated on the stems by placing a 5-mm-diameter mycelial plug (5-day-old PDA cultures for each isolate) into the surface of a wound created with a needle, and the inoculation sites were covered with Parafilm to maintain moisture. Ten seedlings were inoculated with PDA plugs as controls. Seven to 10 days after inoculation, typical symptoms of dark-brown necrotic lesions on chlorotic leaf margins were observed. About 2 weeks after inoculation, the inoculated stems gradually dried up, accompanied by withering and fallen leaves. Control plants remained asymptomatic. Pathogens were successfully isolated from the inoculated stems again, exhibiting morphological characteristics identical to those of *F. sporotrichioides*. Previous papers reported *F. sporotrichioides* as a common pathogen caused lavender wilt (Cosic et al. 2012), foliar spots on forage corn (Moya-Elizondo et al. 2013), and maize ear rot (Wang et al. 2020). To our knowledge, this is the first report of sea buckthorn stem wilt caused by *F. sporotrichioides* on several Chinese and Russian cultivars in Gansu Province of China. In Heilongjiang Province, the same disease was reported in 2010 (Song et al. 2010), nearly 30° longitude away from Gansu Province. Therefore, this disease appears to be a serious risk for future sea buckthorn production.

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