Diseases Caused by Fungi and Fungus-Like Organisms

First Report of Halo Blight of Hop (*Humulus lupulus*) Caused by *Diaporthe humulicola* in Quebec, Canada

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Halo blight of hop caused by *Diaporthe humulicola* has recently been reported in Michigan and Connecticut (Allan-Perkins et al. 2020; Higgins et al. 2021). In August 2020, growers in Quebec, Canada, reported necrotic foliar lesions and desiccation of the hop strobile (cone) on Chinook and Nugget cultivars. The foliar lesions were dry concentric circles with a chlorotic halo surrounding the lesions; no pycnidia were observed on leaves or cones. Up to 100% of the infected bract tissue was dry and easily shattered; the grower estimated that more than 90% of the plants in the hopyard exhibited symptoms. Twenty-six isolates were obtained from surface-sterilized leaf and cone tissue by plating the leading edge of lesions on potato dextrose agar. Fungal isolates were hyphal tipped and were incubated at 22°C with a 12-h photoperiod. After 21 days, all cultures were white to beige with pycnidia. DNA was extracted from cultures using the MagMAX Plant DNA Isolation Kit (Applied Biosystems, Foster City, CA). DNA amplification of a representative isolate (CD6C) was performed with the primers ITS1/ITS4 (White et al. 1990) for the internal transcribed spacer (ITS), CYLH3F/H3-1b (Glass and Donaldson 1995) for histone 3 (HIS), and Ef1728f/Ef1-986R (Carbone and Kohn 1999) for the translation

elongation factor 1- α (TEF). Amplification primers were used for bidirectional Sanger sequencing, and reads were assembled using Geneious Prime (Biomatters, New Zealand) and identified using NCBI BLAST. BLAST results showed that the sequences for TEF, ITS, and HIS all had 100% pairwise identity to the *Diaporthe* sp. 1-MI (MT909101, MT909099, MT909093, OK001342, MZ934713, and OK001341). Furthermore, BLAST results showed that ITS and HIS have 100% pairwise identity to *D. humulicola* (MN152929 and MN180214). The TEF sequence also had a 99.7% pairwise identity to *D. humulicola* (MN180209). Koch's postulates were conducted by inoculating six 3-month-old Chinook plants with conidia harvested from 28-day-old cultures and spraying 50 ml of inoculum (6×10^5 conidia/ml) or water onto each plant. Plants were then stored in a greenhouse at 100% relative humidity at 22°C with a 14-h photoperiod. Lesions appeared on the adaxial side of the leaf after 21 days. *D. humulicola* was reisolated from all infected leaf tissue, but not from any water-inoculated plants, and identified by conidial morphology using descriptions from Higgins et al. (2021). So far, *Diaporthe* sp. 1-MI appears to be synonymous with *D. humulicola*, but currently two names are being utilized (i.e., *Diaporthe* leaf spot and halo blight). In Higgins et al. (2021), it was proposed that the name halo blight might be more appropriate because disease symptoms are not confined to the leaves and there was significant blighting of cones. Halo blight caused by *D. humulicola* appears to be widespread in Michigan and Canada and may become an issue in other eastern North American growing regions with humid conditions.

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