Diseases Caused by Nematodes

First Report of *Meloidogyne javanica* Pathogenic on Hybrid Lavender (*Lavandula × intermedia*) in the United States

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Root-knot nematodes (RKNs), *Meloidogyne* spp., are some of the most economically important pathogens of cultivated plants. *Meloidogyne javanica* is one of the most destructive RKN species and is well known for its broad host range and the severe damage it causes to plant roots (Perry et al. 2009). In February 2018, four mature dead and dying hybrid lavender plants (*Lavandula × intermedia* ‘Phenomenal’) were collected in Edgefield County, South Carolina, and suspected of having *Phytophthora* root and crown rot (Dlugos and Jeffers 2018). Greenhouse-grown plants had been transplanted in December 2016 and January 2017 into a sandy loam soil on a site that had been fallow or in pasture for over 30 years. Some plants began to turn gray and die in summer 2017, and approximately 40% of 1,230 plants were symptomatic or dead by February 2018. *Phytophthora* spp. were not isolated from the collected plants but were isolated from plants collected on subsequent visits. Instead, all four plants had small, smooth galls on the roots. Lavender roots were examined microscopically (30× to 70×), and egg masses of RKNs were observed on the galls. Mature, sedentary RKN females were handpicked from galled roots, and perineal patterns of 10 specimens were examined and identified as *M. javanica*. Juveniles and eggs were extracted from lavender roots by the method of Coolen and D’herde (1972). To confirm species identification, DNA was extracted from 10 individual juveniles, and a PCR assay was conducted using species-specific primers for *M. javanica*, Fjav/Rjav (Zijlstra et al. 2000). A single amplicon was produced with the expected size of approximately 720 bp, which confirmed identity as *M. javanica*. To determine pathogenicity, *M. javanica* from lavender roots were inoculated onto

susceptible tomato plants for multiplication, and severe gall symptoms occurred on tomato roots 60 days later. Nematodes were extracted from tomato roots and inoculated onto healthy, rooted cuttings of Phenomenal lavender plants growing in pots of soilless medium in a greenhouse. Plants were inoculated with 0, 1,000, 2,000, 5,000, or 10,000 eggs and juveniles of *M. javanica*. Five single-plant replicates were used for each treatment, and plants were randomized on a greenhouse bench. Plants were assessed 60 days after inoculation, and nematodes were extracted from roots and counted. The reproduction factor was 0, 43.8, 40.9, 9.1, 7.7, and 2.6 for initial nematode populations 0, 1,000, 2,000, 5,000, and 10,000, respectively, which confirmed pathogenicity (Hussey and Janssen 2002). *M. javanica* also was recovered in March 2018 from galled roots on a ‘Munstead’ (*L. angustifolia*) lavender plant from Kentucky (provided by the University of Kentucky Plant Disease Diagnostic Laboratories), and an unidentified species of *Meloidogyne* was isolated in August 2020 from a Phenomenal plant grown in Florida. COI mtDNA sequences from the South Carolina (MZ542457) and Kentucky (MZ542458) populations were submitted to GenBank. *M. javanica* previously was found associated with field-grown lavender (hybrid and *L. angustifolia*) in Brazil, but pathogenicity was not studied (Pauletti and Echeverrigaray 2002). To our knowledge, this is the first report of *M. javanica* pathogenic to *L. × intermedia* in the United States and the first time RKNs have been proven to be pathogenic to *Lavandula* spp. following Koch’s postulates. Further studies are needed to investigate the geographic distribution of *M. javanica* on lavender and the potential threat this nematode poses to lavender production in the United States.

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