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Disease Notes

Fusarium Canker of Bitternut Hickory Caused by *Fusarium solani* in the North-Central and Northeastern United States

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Multiple annual cankers were observed on the upper main stems of bitternut hickory (***Carya*** *cordiformis*) exhibiting top dieback in Indiana, Iowa, Minnesota, New York, Ohio, and Wisconsin during a 2006 to 2008 survey of declining hickory. The top-killed trees had normal-sized, green leaves below and the cankers were oval, sunken, and bounded by heavy callus that seemed to arrest further canker expansion. *Fusarium solani* was consistently isolated from the margins of inner bark lesions or discolored sapwood of the cankers. When cultured on potato dextrose agar, the isolates grew rapidly with abundant aerial mycelium. On carnation leaf agar, thick-walled macroconidia with 4 to 5 septa were produced in cream, blue-green, or blue sporodochia. Macroconidia were generally cylindrical with a blunt or rounded apical cell and a rounded or foot-shaped basal cell. Microconidia were oval to kidney shaped with 0 to 1 septa and were produced in false heads on elongate monophialides. Chlamydospores were formed singly or in pairs. These morphological characteristics are consistent with descriptions of *F. solani* (2). The identities of 42 representative isolates were confirmed by sequencing the translation elongation factor (tef) 1-α gene. BLAST analysis of the sequences from each isolate against the GenBank and FUSARIUM-ID database found 98 to 100% similarities to *F. solani* isolates (GenBank Accession Nos. DQ246841, DQ247025, DQ247282, and DQ247436 and FUSARIUM-ID isolate FD01041). Two haplotypes (BB and BC) were distinguished based on the tef 1-α gene sequences that differed by 10 bp. Pathogenicity tests were conducted with two isolates of each haplotype on asymptomatic *C. cordiformis* (12 to 21 cm in diameter) in forest stands. In May 2009 in Wabasha County, MN, 0.1-ml spore suspensions (1×10^4 macroconidia/ml) or sterile water was placed in one of three holes (0.6 cm in diameter) drilled to the cambium of 12 trees. The holes were sealed with moist cotton and moldable putty. A duplicate trial, but with BB and BC isolates from Wisconsin, was initiated in Chippewa County, WI in June 2009. The extent of inner bark necrosis was assessed 13 months after inoculation in both sites. Inoculations with *F. solani* in Minnesota resulted in inner bark lesions with average lengths of 20 and 30 mm for the BB and BC haplotypes, respectively. In Wisconsin, BB and BC haplotypes caused inner bark lesions with average lengths of 34 and 38 mm, respectively. While sunken or open cankers were found for all the BC isolate inoculations, relatively small and callus-bounded cankers were found for BB isolate inoculations. All control wounds were callus-closed with average wound lengths of 12 and 23 mm in Minnesota and Wisconsin, respectively. The same haplotype of *F. solani* used for inoculation was recovered from each canker as confirmed by analysis of tef 1-α gene sequences. *F. solani* was not obtained from control wounds. To our knowledge, this is the first report of a canker caused by *F. solani* on bitternut hickory (1). The same fungus has been previously reported to cause cankers on stems of other hardwood tree genera in the eastern United States and Canada. We hypothesize that numerous main-stem cankers caused by *F. solani* lead to top dieback of bitternut hickory.

References: (1) D. F. Farr et al. Fungi on Plants and Plant Products in the United States. The American Phytopathological Society, St. Paul, MN, 1989. (2) J. F. Leslie and B. A. Summerell. The Fusarium Laboratory Manual. Blackwell Publishing, Ames, IA, 2006.