

## Plant Disease

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### Disease Notes

## **Ceratocystis Canker of Bitternut Hickory Caused by *Ceratocystis smalleyi* in the North-Central and Northeastern United States**

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Between 2006 and 2008, diffuse cankers without surrounding callus and callus-edged sunken cankers were observed on main stems of poletimber (13 to 28 cm in diameter at 1.4 m high) and sawtimber (>28 cm in diameter) bitternut hickory (*Carya cordiformis*) in Iowa, Indiana, Minnesota, New York, Ohio, and Wisconsin. Reddish, inner bark necrosis and reddish brown sapwood discoloration were associated with the cankers. Entry or exit holes of the hickory bark beetle (*Scolytus quadrispinosus*) were commonly associated with the cankers. *Ceratocystis smalleyi* was consistently isolated from the margins of cankers or discolored sapwood of assayed samples. When cultured on 2% malt yeast extract agar (MYEA), the isolates produced perithecia, ascospores, endoconidiophores, and conidia diagnostic of *C. smalleyi* (1). To confirm identification, the translation elongation factor (tef) 1- $\alpha$  gene and the internally transcribed spacer (ITS) regions were sequenced. DNA for both regions was extracted from mycelia growing on MYEA. The tef sequences (GenBank Accession Nos. GU201529–201539) and the ITS sequences (GenBank Accession Nos. GU190734–190745) were 98 to 100% similar to sequences of *C. smalleyi* isolates (GenBank Accession Nos. EF070408 and AY9907030–907032). Pathogenicity tests were conducted with local isolates (two per site) on healthy *Carya cordiformis* (13 to 28 cm in diameter) in forest stands in three states. In May 2007, one fungus-colonized MYEA disk or sterile MYEA agar was placed in one of two holes (0.6 cm in diameter) drilled to the cambium on stems of 10 trees in Allamakee County, IA. Sterile moist cotton and laboratory film held the disks in place. After 12 months, diffuse cankers were found for all but one fungus inoculation site; no cankers occurred with control inoculations. Reddish brown, inner bark necrosis (mean area 22.4 cm<sup>2</sup>) and sapwood discoloration (mean volume 38.1 cm<sup>3</sup>) were associated with the cankers. *C. smalleyi* was recovered from five of nine cankers, but not from the control wounds. In June 2008, 0.1 ml of spore suspension ( $1 \times 10^4$  ascospores/ml) of *C. smalleyi* or sterile dH<sub>2</sub>O was pipetted into four drilled holes (to the outer sapwood) of four trees in Chippewa County, WI. Holes were sealed with moist cotton and masking tape. Two months later, diffuse cankers with reddish inner bark (mean 49.7 cm<sup>2</sup>) surrounded 16 inoculation points; no cankers or inner bark necrosis was observed for the control points. In a similar trial, a spore suspension or sterile water was placed into four drilled holes covered with moist cotton and moldable putty on six trees in Olmstead County, MN. Fourteen months later, either diffuse or sunken cankers with reddish, inner bark necrosis (mean 22.3 cm<sup>2</sup>) were observed surrounding all inoculated points while all control points were callus closed. For the latter two trials, long, narrow discoloration (reddish brown) was found in the sapwood associated with each canker; no sapwood discoloration was observed for the control points. In addition, *C. smalleyi* was reisolated from all cankered stems in Wisconsin and from 21 of 24 cankers in Minnesota, but not from the controls. This report verifies the ability of *C. smalleyi* to cause a newly described canker disease on poletimber-sized hickories. We hypothesize that this disease is contributing to the death of hickory bark beetle-attacked *Carya cordiformis* in the eastern United States.

**Reference:** (1) J. Johnson et al. Mycologia 97:1067, 2005.