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DISEASE NOTES

First Report of *Seiridium cardinale* Causing Bark Cankers on MacNab Cypress (*Cupressus macnabiana*) in California

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Cypress canker is a pandemic disease of cupressaceous plants caused by *Seiridium cardinale* (Wagener) Sutton & Gibson, a fungus recently shown to be native to California (Della Rocca et al. 2011). Disease outbreaks in California can be severe, especially in areas where cypresses are not indigenous (Danti and Della Rocca 2017). This paper describes a case of cypress canker on MacNab cypress (*Cupressus macnabiana* A. Murray), a species native to a few inland counties of northern California (Farjon 2005). In July 2009, dieback of several branches was shown to be associated with bark necrosis on a young *C. macnabiana* in the botanical garden of the University of California at Berkeley (37°52′28.00″ N, 122°14′18.54″ W; 223 m a.s.l.), Alameda County, California. Although an isolate from this diseased tree was used in a study published by Della Rocca et al. (2011), symptoms were not described in that study, and Koch's postulates were not performed. Four dying shoots were collected and fragments of necrotic tissue 0.5 cm^2 in size were placed on potato dextrose agar (PDA) in standard 9-cm diameter Petri dishes at the U.C. Berkeley Forest Pathology Laboratory. The fungus *S. cardinale* was cultured out of all four shoots. Its identity was determined based on cultural, microscopic, and molecular traits. After a 10-day-long incubation at 25°C, the developing colonies had a soft and floccose surface, becoming deep green or grayish-olive in the middle with time. Conidia (mitospores) were obtained from acervuli (asexual fruiting bodies) produced on water agar amended with autoclaved cypress seeds and kept for 2 to 3 weeks at 18°C under a fluorescent and near UV light. They were oblong-fusoid in shape, 6-celled (penta-euseptate), with four dark brown median cells and two hyaline small end cells. Conidial size was 26.4 × 10.0 µm on average (± 0.8234 × 0.2604 SD). The β-tubulin locus sequence (GenBank accession no. HQ678150) showed a 100% match with *S. cardinale* sequences of β-tubulin A-type genotypes (Della Rocca et al. 2013). Inoculations on stems were carried out in the greenhouse on six 3-year-old MacNab cypress plants growing in 5-

liter pots. A mycelial plug 3 mm in diameter was taken from the margin of a 1-week-old colony of the *S. cardinale* isolate grown on PDA. A bark plug of the same size as the inoculum plug was excised with a sterile cork borer and a colonized plug was inserted directly on the exposed phloem. After 4 months, necrotic lesions 20.7 × 9 mm in size (± 11.0 × 4.7 SD) were observed on the bark around the inoculation site. *S. cardinale* was successfully reisolated from all necrotic lesions. Lesions were identical to those observed in the naturally infected tree. This report demonstrates the ability of *S. cardinale* to infect a native California cypress species regarded as moderately susceptible to the disease (Wolf and Wagener 1948). The natural range of the pathogen (Danti and Della Rocca 2017) currently matches that of the host only marginally (Farjon 2005), but predicted climatic changes could cause a shift northward in the distribution of the disease, increasing the overlap between the geographic range of the pathogen and that of the host, and possibly causing significant damage to this endemic cypress species.

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Citation