Disease Note

Diseases Caused by Fungi and Fungus-Like Organisms

First Report of *Diplodia* Shoot Blight and Canker Disease Caused by *Diplodia sapinea* on Ponderosa Pine in Wyoming, U.S.A.

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Diplodia sapinea is a common fungal pathogen that causes shoot blight and canker of naturally occurring and planted pines and other conifers throughout the world. Damage can be severe, affecting needles, new shoots, branches, and main stems, often leading to mortality. In August 2018, aerial surveys revealed 1,659 ha of ponderosa pine (*Pinus ponderosa*) displaying varying degrees of crown necrosis in Crook County, Wyoming (WY). In May 2019, ground surveys of this area, which was affected by hail the previous spring, identified typical *Diplodia* shoot blight and canker signs and symptoms (e.g., pycnidia, crooked shoots, discolored needles, resinous cankers). Symptoms were observed in thousands of seedlings, saplings, and mature ponderosa pine trees over a large area. Because *D. sapinea* had not been previously reported in WY, this study was conducted to confirm the presence and aggressiveness of *D. sapinea* isolates from WY on this commercially and ecologically important host tree. Pycnidia and conidia (34 to 39 $\mu\text{m} \times 12$ to 13 μm) consistent with *D. sapinea* were confirmed in 19 trees from three locations in the county. Three isolates were confirmed as *D. sapinea* using species-specific PCR (Smith and Stanosz 2006) and are retained at the Rocky Mountain Research Station, Moscow, ID, and Colorado State University, Fort Collins, CO. To confirm isolate aggressiveness, 3-year-old potted ponderosa pine seedlings were inoculated in greenhouses from March to April 2020 at the Charles E. Bessey Nursery, Halsey, NE, using similar methods as previously described (Blodgett and Stanosz 1997). Wounding was conducted using a scalpel to excise a single needle

fascicle from a recently expanded shoot. Cuts were made flush to the stem at 2 to 2.5 cm below an apical bud tip. A 1.5% water agar plug with cultured mycelia of one of the three DNA-confirmed isolates was placed over the stem wound, while sterile water agar plugs were used as negative controls. Parafilm (4 cm wide) was wrapped around the inoculated stems, centered at the wound for 4 weeks. Two independent trials were conducted consecutively, 3 h apart, in different greenhouses with five seedlings per isolate or control. Symptoms first appeared 5 days postinoculation. All seedlings inoculated with the three isolates developed typical *D. sapinea* symptoms, including cankers (mean length 5.9 ± 1.1 cm SE and 5.5 ± 0.8 cm SE, trials 1 and 2, respectively) at 4 weeks postinoculation, while mock-inoculated seedlings developed no symptoms. Stem segments (2 cm long) were excised, centered at canker margins (or centered 3 cm below wounds for controls), and surface disinfested for 30 s in 70% ethanol and 5 min in 1.05% sodium hypochlorite, then placed in Petri plates containing tannic acid agar (Blodgett et al. 2003). After 3 weeks, isolates were subcultured from colony margins to Petri plates containing 1.5% water agar and autoclaved ponderosa pine needles. Pycnidia and conidia consistent with *D. sapinea* were confirmed after another month from all seedlings inoculated with each isolate, but not from control seedlings. This report confirms that *D. sapinea* is present in WY, and WY isolates can be aggressive pathogens of ponderosa pine. Reducing host water stress (Blodgett et al. 1997a, b) may be the best option to manage *Diplodia* shoot blight and canker disease in forested sites. This can be accomplished by stand thinning and/or managing competing vegetation. Favoring nonhost species might be an alternative management option in areas with severe disease.

References:

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