

plant disease

Editor-in-Chief: Alison E. Robertson

Published by The American Phytopathological Society

December 2016, Volume 100, Number 12

Page 2534 <http://dx.doi.org/10.1094/PDIS-06-16-0909-PDN>

DISEASE NOTES

First Report of *Fusarium proliferatum* Causing Fusarium Root Disease on Sugar Pine (*Pinus lambertiana*) in a Forest Container Nursery in California

J. E. Stewart and **K. Otto**, Department of Bioagricultural Sciences and Pest Management, Colorado State University, Ft. Collins, CO 80523; **G. A. Cline**, Eldorado National Forest, Placerville Nursery, Camino, CA 95709; **R. K. Dumroese and N. B. Klopfenstein**, USDA Forest Service, Rocky Mountain Research Station, Moscow, ID 83843; and **M.-S. Kim**, Department of Forestry, Environment and Systems, Kookmin University, Seoul 02707, Korea.

Fusarium species, specifically *F. commune*, *F. proliferatum*, and *F. solani*, can cause severe damping-off and root disease in container and bareroot forest nurseries throughout North America. Many conifer and hardwood species can be affected, but Douglas-fir (*Pseudotsuga menziesii*), western white pine (*Pinus monticola*), and ponderosa pine (*P. ponderosa*) are known to be susceptible to Fusarium root disease (Stewart et al. 2012). In June 2015, 30% of two seedlots of sugar pine (*P. lambertiana*) seedlings (~1,300 of 4,400 total seedlings) growing in a container forest nursery in California (38°45'13.70"N, 120°44'03.16"W, elevation 852 m) showed classic symptoms of Fusarium root disease: needle chlorosis, needle tip/twig dieback, foliar/branch/stem necrosis, and root decay. Root tips of symptomatic sugar pine seedlings were surface disinfested in 1% sodium hypochlorite solution for 10 to 20 s, washed in distilled water, dried on sterile filter paper, placed onto Komada medium (Komada 1976), and incubated at 22°C for 3 to 7 days. Pure cultures were obtained by single hyphal tip transfers on potato dextrose agar medium. Isolates produced abundant aerial white

mycelium and violet pigments in the agar (with age) that are characteristics of *Fusarium* section Liseola. For DNA-based identification, total DNA was extracted from five isolates, and PCR analyses were conducted to sequence the translation elongation factor-1 α (*tef-1 α*) gene (O'Donnell et al. 1998). Sequences of *tef-1 α* for all isolates showed an identity of 99% (e.g., GenBank accession nos. KT376486, KP964908, and JX174033) to *F. proliferatum* with 100% coverage. Pathogenicity tests were performed using two isolates (1.1[7477] and 2[5760], GenBank accession nos. KX582248 and KX582247, respectively) to confirm Koch's postulates. Inoculum was prepared following the techniques of Miles and Wilcox (1984), and pathogenicity tests followed the methods of Stewart et al. (2012). Sugar pine seeds were stratified 120 days at 4°C. After stratification, seeds were germinated on filter paper, and a germinant was placed inside a 300-ml glass jar containing ~200 ml of a 1:1 (v/v) peat moss/vermiculite growing medium amended with inoculum or mock inoculum (control) at a 50:1 w/w growing medium/inoculum. Each fungal isolate was tested on four sugar pine seedlings. After 20 days, tested isolates caused damping-off and wilting of seedlings, including needle chlorosis/reddening and root dieback on all inoculated seedlings, while control sets remained asymptomatic. Reisolations onto Komada media were made from all inoculated seedlings and isolates were confirmed as *F. proliferatum* using *tef-1 α* sequencing. To our knowledge, this is a first report of *F. proliferatum* on sugar pine in North America, although this pathogen is frequently associated with other conifer seedlings in nurseries across the United States. *Fusarium* root disease can be managed in bareroot and container nurseries using established techniques (Dumroese and James 2005).

References:

- Dumroese, R. K., and James, R. L.** 2005. New For. 30:185. 10.1007/s11056-005-4422-7
Komada, H. 1976. Proc. Am. Phytopathol. Soc. 3:221.
Miles, M. R., and Wilcox, R. D. 1984. Plant Dis. 68:310. 10.1094/PD-68-310
O'Donnell, K., et al. 1998. Proc. Natl. Acad. Sci. USA 95:2044. 10.1073/pnas.95.5.2044
Stewart, J. E., et al. 2012. For. Pathol. 42:220.