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Disease Notes

***Phytophthora* Species in Soils Associated with Declining and Nondeclining Oaks in Missouri Forests**

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Periodic episodes of oak decline have occurred in the Missouri Ozark forests since the early 1900s and the disease is currently severe (2). Several *Phytophthora* spp. contribute to oak decline in Europe (1), but the role of *Phytophthora* spp. in oak decline in the eastern United States is not known. Mineral soils collected around the bases of declining and nondeclining oaks in paired sites in central Missouri forests were assayed for the presence of these taxa by baiting flooded soil with *Quercus robur* leaves. *Q. rubra* and *Q. velutina* were the oak species on three sites and *Q. alba* was on the fourth. Isolates from symptomatic baits plated on PARPNH selective medium were identified tentatively on classical taxonomic characteristics. Five isolates of *P. cambivora*, two of *P. quercina*, and eight of *P. cinnamomi* were obtained from soils around one, one, and three trees, respectively, on decline sites. The internal transcribed spacer sequences for each isolate were compared to those in GenBank; BLAST searches for all isolates had nucleotide identities of 99% and *E* values of 0, which confirmed the identifications. Greenhouse pot trials were conducted to assess pathogenicity of isolates on stems of 2-year-old *Q. alba* and *Q. rubra*. A mycelial agar plug was inserted into a 1-cm long slit cut into the cambium 5 cm above the root collar and covered with sterile, moist cotton and wrapped with laboratory film. The treatments included two isolates of *P. cambivora*, one of *P. quercina*, three of *P. cinnamomi*, and a sterile agar plug. Each host × isolate combination was replicated four times, and the experiment was conducted twice in the greenhouse (natural lighting; temperature ≤32°C in summer and ≥7°C in winter). Stem lesions were produced commonly by *P. cambivora* (28 of 32 seedlings) and *P. cinnamomi* (46 of 48 seedlings) within 3 months; none was found on control seedlings or those inoculated with *P. quercina*. Mean lengths (cm) of lesions caused by *P. cinnamomi* were greater for *Q. rubra* (5.6) than for *Q. alba* (4.3) and lesion lengths for *P. cambivora* were greater for *Q. alba* (5.2) than for *Q. rubra* (4.4). Seven *Q. alba* seedlings inoculated with *P. cambivora* and one *Q. alba* inoculated with *P. cinnamomi* died before 3 months. All *Phytophthora* species were recovered from inoculated stems at 3 months except that *P. quercina* was not recovered in one trial. To our knowledge, this is the first report of *Phytophthora* species in soils of Missouri oak forests, of *P. quercina* in the United States, and of the ability of *P. cambivora* to cause stem lesions on *Q. alba*. *P. cinnamomi* and *P. cambivora* should be investigated in situ as possible contributing factors of oak decline in Missouri.

References: (1) T. Jung et al. *Plant Pathol.* 49:706, 2000. (2) R. Lawrence et al. *MO. Conserv.* 63:11, 2002.