

Diseases Caused by Fungi and Fungus-Like Organisms

First Report of *Armillaria cepistipes* Causing Root Disease on *Populus trichocarpa* (Black Cottonwood) in Oregon, U.S.A.

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Populus trichocarpa Torr. and Gray (black cottonwood) is an economically and ecologically important tree species native to western North America. It serves as a model in biology and genetics due to its relatively small genome size, rapid growth, and early reproductive maturity (Jansson and Douglas 2007). Black cottonwood is susceptible to root rot caused by at least one species of *Armillaria* (Raabe 1962), a globally distributed genus that exhibits diverse ecological behaviors (Klopfenstein et al. 2017) and infects numerous woody plant species (Raabe 1962). However, several *Armillaria* spp. have been isolated from *Populus* spp. in North America (Mallett 1990), and the most recent report of *Armillaria* on *P. trichocarpa* used the now ambiguous name *A. mellea* (Vahl.) Quel. (see Raabe 1962). In April 2016, mycelial fans and rhizomorphs of an unknown *Armillaria* species (isolate WV-ARR-3) were collected from *P. trichocarpa* in a riparian hardwood stand ~5.5 km east of Springfield, Oregon, U.S.A. (44°3'21.133"N, 122°49'39.935"W). The host was dominant in the canopy, large in diameter (~90 cm at breast height) relative to neighboring trees, and exhibited minimal crown dieback (approximately <5%). A mycelial fan was observed destroying living cambium beneath the inner bark, indicating pathogenicity. The isolate was cultured on malt extract medium (3% malt extract, 3% dextrose, 1% peptone, and 1.5% agar) and identified as *Armillaria cepistipes* on the basis of somatic pairing

tests and translation elongation factor 1 α (*tefl*) sequences (GenBank accession no. MK172784). DNA extraction, PCR, and *tefl* sequencing followed protocols of Elías-Román et al. (2018). From nine replications of somatic incompatibility tests (18 tester isolates representing six North American *Armillaria* spp.), the isolate showed high intraspecific compatibility (colorless antagonism) with three *A. cepistipes* tester isolates (78%), but low compatibility with the other *Armillaria* spp. (0 to 33%) that occur in the region. Isolate WV-ARR-3 yielded *tefl* sequences with a 99% identity to *A. cepistipes* (GenBank accession nos. JF313115 and JF313121). A second isolate (WV-ARR-1; GenBank accession no. MK172783) with a nearly identical sequence was collected from a maturing *P. trichocarpa* in a riparian stand ~8 km northeast of Monroe, Oregon (44°21'47.57"N, 123°13'14.415"W) along the Willamette River, downstream from the McKenzie river tributary where WV-ARR-3 was collected. *A. cepistipes* has been reported on *Alnus rubra* (red alder) in Washington, U.S.A. (Banik et al. 1996) and on broad-leaved trees in British Columbia, Canada (Allen et al. 1996). It is generally considered to be a weak pathogen on broad-leaved trees in the Pacific Northwest, but it is also associated with disease on both coniferous and deciduous trees in Europe (e.g., Lygis et al. 2005). However, a recent phylogenetic study suggested that North American *A. cepistipes* is phylogenetically distinct from Eurasian *A. cepistipes* (Klopfenstein et al. 2017), but additional studies are needed to determine the formal taxonomic status of North American *A. cepistipes*. To our knowledge, *A. cepistipes* has not been previously collected from *P. trichocarpa* in the United States or formally reported as a pathogen of any *Populus* species in North America. Continued studies are needed to determine the distribution, host range, and ecological role of *A. cepistipes* in riparian forests of the Pacific Northwest, while monitoring its populations under changing climates.

References:

- Allen, E. A., et al. 1996. Common Tree Diseases of British Columbia. Natural Resources Canada, Canadian Forest Service, Pacific Forestry Centre, Victoria, BC.
- Banik, M. T., et al. 1996. Mycologia 88:492.
- Elías-Román, R. D., et al. 2018. Mycologia 110:347.
- Jansson, S., and Douglas, C. J. 2007. Annu. Rev. Plant Biol. 58:435.
- Klopfenstein, N. B., et al. 2017. Mycologia 109:75.
- Lygis, V., et al. 2005. Scand. J. For. Res. 20:337.
- Mallett, K. I. 1990. Can. J. For. Res. 20:1859.
- Raabe, R. D. 1962. Hilgardia 33:25.

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