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Disease Notes

First Report of the Armillaria Root Disease Pathogen, *Armillaria gallica*, on Douglas-fir (*Pseudotsuga menziesii*) in Arizona

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In August 2010, a mycelial fan (isolate AZ32F) of *Armillaria* sp. was collected from the root collar of a living Douglas-fir tree on the Mogollon Rim within the Coconino National Forest (approximate location 34°25’31.26”N, 111°20’41.04”W, elevation 2,293 m) in central Arizona. Mycelial fans under the bark of living trees are a sign of pathogenicity, and symptoms of the diseased tree included resinosis, sloughing bark, and thinning crown. The infected tree was located on a south-facing slope with approximately 30% tree cover, dominated by ponderosa pine (*Pinus ponderosa*), with lesser components of Douglas-fir and Gambel oak (*Quercus gambelii*). Based on three replications of somatic incompatibility tests against 24 tester isolates representing seven North American *Armillaria* spp., isolate AZ32F showed 100% intraspecific compatibility (colorless antagonism) with all four *A. gallica* isolates, 22% compatibility with *A. calvescens*, and 0% compatibility with the remaining *Armillaria* spp. Based on GenBank BLASTn of isolate AZ32F sequences, the partial LSU-IGS1 (GenBank Accession No. KF186682)

showed 99 to 100% similarity to *A. gallica* and two other related *Armillaria* spp. with 99 to 100% coverage, and translation elongation factor-1 alpha (*tef-1α*) sequences (KC525954) showed 96% similarity to *A. gallica* (JF895844) with 100% coverage. Thus, isolate AZ32F was identified as *A. gallica*, based on somatic incompatibility tests and DNA sequences (partial LSU-IGS1 and *tef-1α*). Although the isolate is identified as *A. gallica* with similarities to other North American isolates, evidence is mounting that currently recognized *A. gallica* likely represents a species complex that comprises multiple phylogenetic species (4). Previous surveys in Arizona have noted *A. mellea* and *A. solidipes* (as *A. ostoyae*) (3), but *A. gallica* has never been previously confirmed in this state. Within North America, *A. gallica* is commonly reported east of the Rocky Mountains and in West Coast states of the United States, where it infects hardwoods and conifers including Douglas-fir (1,2). Its ecological behavior ranges from saprophyte to weak/aggressive pathogen (1,2). Because damage by *A. gallica* appears to increase on hosts predisposed by stress (1), further surveys are needed to document its distribution, frequency, and ecological behavior in the southwestern United States, where climate change will likely cause tree stress due to maladaptation. Continued surveys for *Armillaria* spp. will better determine their potential threat within the geologically and ecologically unique Mogollon Rim of Arizona.

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