



Forest Fire Intensity Affects the Abundance of *Armillaria* Root Disease

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Abstract--Diseases influence forest fires by changing stand structure and generating fuels. Conversely, fires influence the abundance and distribution of fuel-generating diseases, but few studies have examined these relationships. The Black Hills in South Dakota has been the focus of much attention following recent severe fires. *Armillaria* root disease, caused by *Armillaria ostoyae*, is arguably the most common disease in this forest. This field study was designed to examine the effects of fire on the abundance and potential spread of *Armillaria* root disease in ponderosa pine (*Pinus ponderosa*) forests. Five plots were established in the Jasper Fire area of the Black Hills National Forest, SD that burned 3 years previous to this study. Each plot consisted of four subplots that varied in fire intensity (*i.e.*, low, medium, and high fire intensity, and unburned). Host condition (living or dead) was recorded for 15 ponderosa pine trees per subplot. The root collar of each tree was divided north-south by east-west into quarters, and the abundance of *Armillaria* rhizomorphs was ranked for each quarter. The abundance of *Armillaria* rhizomorphs on root collars increased ($P < 0.001$) as fire intensity increased. Pair-wise comparisons were significant among fire intensities except between unburned and low intensity subplots. As expected, host condition worsened ($P < 0.001$) as fire intensity increased with average mortality of 0% for unburned and low fire intensity subplot trees, 59% for medium fire intensity subplot trees, and 100% for high fire intensity subplot trees. Our results show that *Armillaria* can survive intense fires and can readily colonize roots of trees killed by fire. Therefore, wildfires can increase *Armillaria* inoculum, which might result in increased future fire-related *Armillaria* mortality.

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