Poster 10

Effects of Oak Wilt Disease on Fungal Community Composition and Wood Decomposition in Dead *Quercus serrata* Trunks

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In Japan, mass attacks of an ambrosia beetle *Platypus quercivorus*, vectoring a pathogenic fungus *Raffaelea quercivora*, cause oak wilt outbreaks in recent decades. Since *P. quercivorus* inoculates symbiotic fungi into wood tissue, it can alter the fungal community composition within the dead wood. A change in the fungal community composition may alter the decomposition function of the community, as well as the physical and chemical properties of the dead wood. The difference in properties of the dead wood may impact surrounding biological communities. Therefore, understanding the effects of oak wilt disease on a dead wood fungal community is important for predicting wood decomposition and forest biodiversity after the dieback. In this study, we used DNA metabarcoding to compare the fungal communities between *Q. serrata* trunks killed by oak wilt and healthy trunks that felled artificially at three sites across latitude in Japan. A total of 1200 samples from 5-time points during the 2016 autumn – 2018 spring were subjected to amplicon sequencing of the fungal internal transcribed spacer 1 region and 1128 fungal operational taxonomic units (OTUs) were detected. Fungal community composition differed significantly between *Q. serrata* trunks killed by oak wilt and healthy-cut trunks (Fig. 1), and diversity indices showed that trunks killed by oak wilt were significantly lower than that of healthy-cut trunks (Fig 2). The Fungal Trait database was used to estimate the function of each OTU and revealed a dominance of wood-decomposing fungi, mainly white rot fungi, which have the ability to decompose wood. The generalized linear mixed model (GLMM) showed that the OTU richness and DNA copy number of white rot fungi were significantly affected by the sampling period, mean air temperature, precipitation, and oak wilt infestation, and that the OTU richness and DNA copy number of white rot fungi increased with oak wilt. During the ca. 1.5-year experiment, wood density decreased by an average of 9.2%. Structural equation modeling (SEM) showed that oak wilt and environmental variables significantly affected the fungal community, but the fungal community didn't significantly affect wood decomposition (Fig 3). Rather, trunk moisture and mean air temperature strongly affected decomposition. This study focused on the initial decomposition of the trunks during ca. 1.5 years after the start of the experiment. It is important to conduct further research over a longer time period to evaluate the effects of oak wilt and associated fungal communities on trunk decomposition.

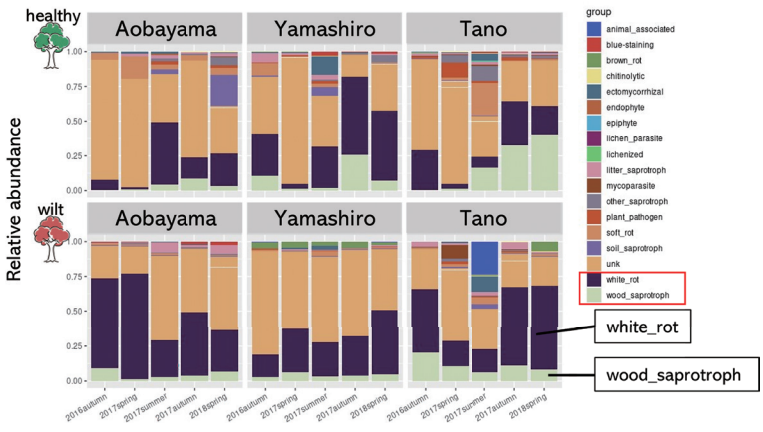

Figure 1. Relative abundance of fungi (functional group)

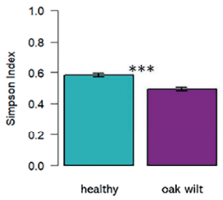

Figure 2. Diversity index

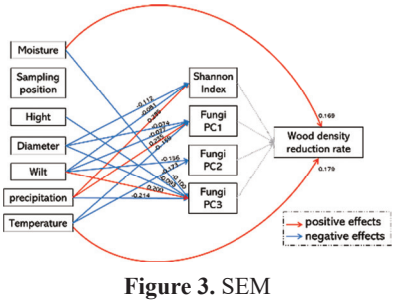

Figure 3. SEM