Pilot study: Time and temperature to eliminate foliar fungal endophytes (2023)

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Foliar fungal endophytes (FFE) are fungi that reside within the leaves of plants without causing any visible symptoms or signs of disease. These foliar communities exhibit remarkable diversity, with potentially hundreds of different fungal species coexisting within a single host. While some of these fungi have been shown to play crucial roles in plant defense mechanisms and adaptation to stressful environments, the functions of many others remain unclear. It is assumed that some fungi are involved in the decomposition of leaf litter once leaves have abscised. Understanding community assembly processes associated with the colonization of leaves after abscission and the influence of FFE on the colonization of decay fungi is critical for a greater understanding of carbon cycling. The community composition of ecological communities is influenced by stochastic and deterministic community assembly processes (e.g., priority effects). Focusing on fungal communities from green leaves through the decomposition process by investigating their roles in leaf litter decomposition and effects on the carbon cycle at Big Chico Creek Ecological Reserve (BCCER), this study contributes to a deeper understanding of ecosystem dynamics. The findings can illuminate how FFE shape leaf litter communities, impact nutrient cycling, and influence carbon sequestration. By tracking the temporal changes in fungal communities, it offers insights into ecological succession and adaptation within ecosystems, enhancing our broader knowledge of microbial ecology and ecosystem function. The pilot project determines the optimal combination of temperature and duration required to sterilize valley oak *(Q. lobata)* leaves obtained from BCCER. While various methods, such as gamma radiation and X-ray, have been used to remove microbes from internal tissues, there were no facilities nearby Chico to employ these methods. Therefore, we utilized autoclave heat and pressure, being aware that high heat could potentially negatively impact leaf biochemistry. We successfully identified the lowest temperature of 75°C and a time of 15 minutes as the combination necessary to completely eliminate FFE. The findings from this project will provide valuable insights for the methodology of a subsequent field experiment designed to investigate the roles of FFE in the decomposition of leaf litter and ultimately their influence on the carbon cycle.