AN INVESTIGATION OF NUTRITIONAL EFFECTS ON CAUSAL ORGANISMS OF BEECH BARK DISEASE IN AFTERMATH FORESTS

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INTRODUCTION

• Beech bark disease (BBD) invaded North America over a century ago, but the pathosystem is still not well understood
• BBD occurs when beech scale insects, Cryptococcus fagisuga (invasive) and Xylococcus betulæ (native), attack American beech (Fagus grandifolia) and feed on the inner bark making the tree susceptible to fungal infections, primarily by Neonectria ditissima and N. faginata, which cause cankers that kill the tree
• Three stages of BBD: the Advancing Front, the Killing Front, and the Aftermath Forest.
• I am conducting research in the White Mountain National Forest in New Hampshire, USA, at Hubbard Brook and Bartlett Experimental Forest, taking advantage of an existing study of Multiple Element Limitation in Northern Hardwood Ecosystems with treatment plots of N, P, N+P, Ca, and untreated controls across three forest stand age classes (young, mid-aged, old)

OBJECTIVES

• Identify Neonectria species in our forest stands
• Assess the density of native and invasive beech scale
• Assess if older stands will have higher lesion densities than younger stands
• Challenge findings by Cale et al. (2015) that high bark N:P predicted Neonectria canker development. If correct, N and N+P plots would have higher lesion densities than P and control plots.

METHODS

FUNGAL COLLECTION

Neonectria identification

DNA Analysis

agar media

Neonectria

lesion density

Neonectria

feeding wounds

PHOTOGRAPHIC ANALYSIS

Culturing a Neonectria library on potato dextrose agar for future nutritional comparisons of growth rates, and to determine key fungi food sources.

Five trees per treatment plot were selected for photographing at 2 heights (0.5 and 1.5m) in the 4 cardinal directions resulting in 8 pictures per tree. Images will be analyzed using ImageJ.

DISCUSSION

• This work was started in July 2017 with an anticipated completion date of January 2018 and currently there are no results
• Establishing baseline measurements of disease severity allows for future comparisons
• Fungal identification will allow us to examine potential impacts of nutrient additions to Neonectria species
• Nutrient application may show direct or indirect correlations to aftermath forest biodiversity, particularly with X. betulae; most studies of BBD focus on European beech scale
• Creating a Neonectria library will more easily allow future nutrient manipulation trials

REFERENCES