

Role of host identity, stand composition, soil type and disturbance severity in structuring ectomycorrhizal communities in the boreal forest

Natalie M E Scott

Abstract

The symbiosis between trees and ectomycorrhizal fungi (EMF) is essential for tree establishment and survival in the boreal forest because it is a disturbance prone ecosystem characterized by long harsh winters and low nutrient mobility. Ectomycorrhizal fungal community composition can be influenced by factors such as host tree identity and subsequently stand composition, soil type and disturbance severity. However, a less explored concept is the fact that these factors can interact and influence one another. Because of the essential role EMF play in tree productivity in the boreal forest it is important to understand the driving factors and interactions between them in structuring the fungal community. To that end, I investigated the EMF community on roots of planted seedlings in soils from (1) an oil sands reclamation site constructed with different salvaged surface soils and (2) a site that experienced a gradient of harvest disturbances to address the influence of disturbance severity, soil type and host identity on EMF community composition. Additionally, I utilized the oil sands reclamation site to test if mixed-species stands have overall additive or synergistic effects on EMF richness and composition. The EMF community was significantly influenced by host identity, disturbed soil the interaction between them ; the different species of planted seedlings hosted different fungal communities depending on which disturbed soil they were planted in. Factoring in stand composition on the forest reclamation site, the interaction between host identity and soil type was a stronger influence in

structuring ectomycorrhizal fungal communities. Additionally, the strong host identity preference for EM fungal communities meant that overall composition and species richness of EMF in mixed-species stands was the additive result of combining different tree species. Taken together, this research suggests that host identity, soil type and level of disturbance can interact to influence ectomycorrhizal community composition and therefore, both biotic and abiotic factors should be taken into consideration when measuring fungal communities in the boreal forest. Also, at this point in time, stand composition does not have an influence on EM fungal communities of planted seedlings on a forest reclamation site compared to host identity and soil type.