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Title: Production and decomposition of mycorrhizal fungal hyphae in hinoki cypress forests

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Related RISH mission: Mission 1 (Environmental Diagnosis and Regulation of Circulatory Function)

Abstract:

Forest carbon (C) sequestration is a significant counterweight to the C emissions from human activities to the atmosphere and, hence, integral to mitigate climate change. Understanding of the drivers of the forest C cycling and sequestration is, therefore, important. Most forest plants live in symbiosis with mycorrhizal fungi which use extraradical mycorrhizal hyphae (EMH) to acquire soil inorganic nutrients such as nitrogen (N) and phosphorus (P). In exchange for providing these nutrients to plants, mycorrhizal fungi receive up to 22% of the plant-assimilated C and, hence, become a major pathway for plant-assimilated C in forests.

The production and decomposition of mycorrhizal fungi and, in particular, EMH has been studied at more than 150 forest sites. However, most of these sites were in cold-temperate forests where trees associated with ectomycorrhizal (ECM) fungi. In contrast, our understanding of the EMH production and decomposition in warm-temperate forests, where arbuscular mycorrhizal (AM) fungi often dominate, is limited. In this talk, I will outline the results of two recent studies in warm-temperate forests of hinoki cypress (*Chamaecyparis obtusa*), an AM tree species (Fig. 1). In the first study, evidence for the close coupling of EMH production to the C assimilation of hinoki cypress trees was shown. In the second study, a rapid decomposition of EMH in hinoki cypress forests was shown, with an initial half-life of only 10 days. Both studies highlight EMH as important drivers of the C cycling in warm-temperate forests of AM trees and indicate the need for further study.

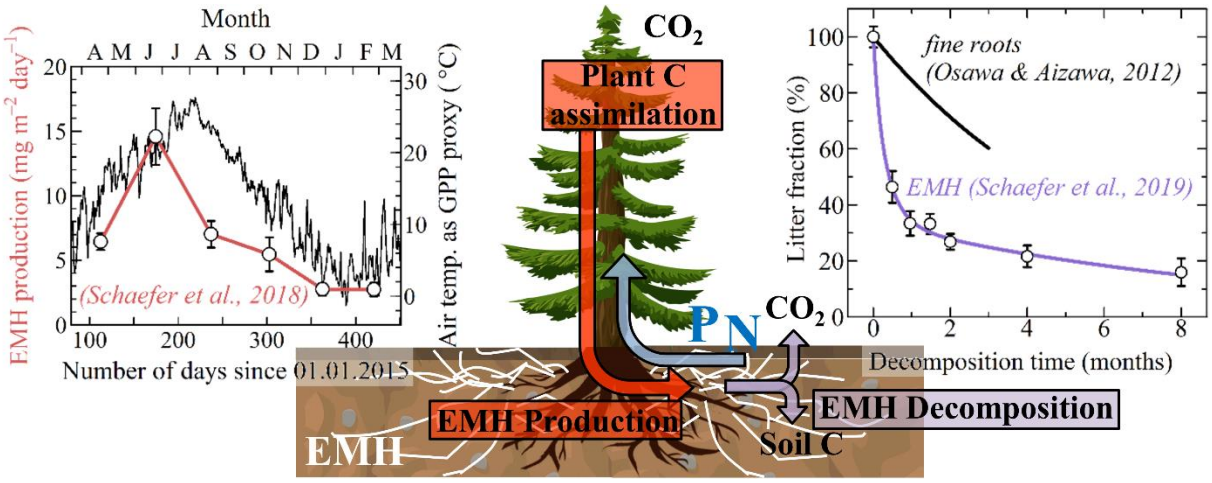

Fig. 1: Extraradical mycorrhizal hyphae (EMH) as drivers of the C cycle in hinoki cypress forests.