

Effects of Mycorrhizal Network on Overstory Tree Growth in Southeastern Forests

Abstract

The mycorrhizal fungi communities associated with tree growth has provided more plausible explanations for recent restoration challenges in Southeastern forests. Research has indicated a decline in ecologically important tree species such as oak and hickory, but an increase of maples, tupelos, and other undesirable tree species. The arbuscular mycorrhizal (AM) fungi associated with undesired species may be detrimental to ectomycorrhizal (EM) fungi communities which is associated with at risk tree species such as oak and hickory. Furthermore, effects of various forestry practices may be impeding ectomycorrhizal regeneration and impacting EM associated tree species while promoting growth of AM associated tree species. Despite considerable amount of research has been conducted on mycorrhizal networks and tree sapling establishment, there is little research on mycorrhizal networks effects on overstory tree growth. To understand the impacts of forest management systems on ecologically important tree species and their fungal associates, we planned to compare tree growth using WinDendro, a tree ring analysis platform of ectomycorrhizal associated tree species in uneven-aged natural forests and previously managed forests under clear-cut regeneration technique. We anticipated collecting 12-15 tree cores and root/soil samples from each sample population. Tree cores will be analyzed using standard dendrochronological method, and soil samples will be processed to detect presence/absence and abundance of mycorrhizal communities and other soil properties. We hypothesized that (1) overstory growth of EM associated tree species and will be more substantial in un-even aged forests than in forests regenerated from clear-cut silviculture; (2) there will be higher EM abundance in natural stands and higher AM abundance in restored forests managed under clear-cut silviculture. The research on the importance of ectomycorrhizal communities to maintain growth and productivity of our forests is critical for a continual supply of forest products to the society and maintain ecological services from our forests.

Keywords: ectomycorrhiza, tree ring analysis, winDendro, tree growth