

88th Annual ESA Meeting

Wednesday, August 6 Presentation from 5:00 PM to 6:30 PM. SITCC Exhibit Hall B.

Hemlock woolly adelgid density affects net photosynthetic rates but not respiration rates or needle biochemistry in eastern hemlock.

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ABSTRACT- Invasive, non-native insects and pathogens are a significant threat to native forests. Currently, forests from North Carolina to Massachusetts are experiencing striking declines in eastern hemlock (*Tsuga canadensis*) associated with the invasion of the hemlock woolly adelgid (*Adelges tsugae*). Although this invasion may dramatically alter carbon and nutrient cycling in affected forests through effects on resource uptake and allocation within infested trees, relatively little is known about the effects of the hemlock woolly adelgid on hemlock physiology or biochemistry. This study examined the effects of differences in hemlock woolly adelgid density on needle biochemistry and photosynthetic rates. Net photosynthetic rates declined by 30% as the average density of hemlock woolly adelgid increased from zero to 0.5 adelgid per needle. However, net photosynthetic rates did not significantly vary as adelgid density increased from 0.5 to two adelgid per needle. Further, needle nitrogen and chlorophyll concentrations did not significantly vary with adelgid density. Similarly, quantum yield, light compensation points, and daytime respiration rates did not significantly vary with adelgid density. These results suggest that eastern hemlock may have the capacity to partially compensate to low levels of hemlock woolly adelgid infestation, but not to high levels of infestation. In addition, effects of adelgid density on net photosynthetic rates appear to be independent of any effects on respiration rates, and do not appear to be driven by effects on needle nitrogen or chlorophyll concentrations.

Key words: photosynthesis, *Tsuga canadensis*, invasive species, *Adelges tsugae*