

Effect of HWA Feeding on Volatile Emissions of Eastern Hemlock, *Tsuga canadensis*

Corey D. Broeckling and Scott M. Salom

Virginia Tech, Department of Entomology
216 Price Hall, Blacksburg, VA 24060

Abstract:

The hemlock woolly adelgid (HWA), *Adelges tsugae* Annand, has been recognized as a major pest of eastern hemlock, *Tsuga canadensis* Carriere, and the less frequently encountered Carolina hemlock, *T. caroliniana* Engelm. Biological control is seen as the most promising method of large-scale control of HWA, however, there is currently no effective method for estimating population levels of biological control agents at release sites. As a means of improving the sampling method we are attempting to uncover the host finding mechanisms of the predators. It is our hypothesis that predators use olfactory cues. It is therefore our objective to identify and quantify the volatiles associated with HWA-infested and noninfested eastern hemlock twigs.

Ten compounds were identified as being consistent components of the hemlock volatile profile. Identified were a- and b-pinene, camphene, limonene, a- and b-phellandrene, myrcene, tricyclene, terpinolene, and bornyl acetate. Infested hemlock tended to have a higher release rate for all compounds. Due to high variability, not all compounds demonstrated a statistically significant change. Those not significant at the 0.1 level were only marginally insignificant. The trend is clear--infested foliage tends to release more monoterpene than noninfested foliage and more repetitions would have likely led to statistical significance. It is unclear why variability was so high. In addition to the increased release due to HWA feeding, there is a slight but significant change in the relative composition of certain compounds. The portion of the terpene profile represented by total a-pinene and its minus isomer was lower for infested foliage as compared to noninfested foliage. Isomeric composition was not significantly altered for any compound. If olfactory cues are used by HWA predators, this study will allow us to replicate hemlock odor for incorporation into an olfactory baited trap for improved predator sampling methods.

Keywords:

Tsuga canadensis, *Adelges tsugae*, monoterpenes, olfaction.