

Silvicultural and Integrated Pest Management Strategies for Restoring Eastern Hemlock to Degraded Southern Appalachian Mountain Ecosystems¹

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The ecologically foundational species eastern hemlock, *Tsuga canadensis*, is being functionally eliminated from southern Appalachian forests by the hemlock woolly adelgid (HWA, *Adelges tsugae*). The management of HWA has focused on chemical and biological control, conservation of hemlock genetic resources, and host resistance breeding; however, research on the reintroduction of hemlocks to forests where it has been lost has received almost no attention. This poster presents progress made on phase one of a three phase project to develop a hemlock restoration strategy that integrates silvicultural prescriptions with biological and chemical controls for the reintroduction of eastern hemlock to southern Appalachian forests. Phase one is testing the effects of canopy structure (thinned versus canopy gap), deer exclusion, fertilization, and weed control on the establishment, survival, and growth of planted eastern hemlock seedlings receiving insecticide protection. A total of 12 research plots were established at two sites in western North Carolina in stands dominated by dead and dying eastern hemlock. Plots were established as pairs with one serving as a “high” light canopy treatment (clearcut/canopy gap) and the other as a “low” light canopy treatment (thinned to ~27.55m²/ha). Each plot is divided into two 10x10 m subplots with one surrounded by a 2.5 m high deer exclusion fence and the other remaining open (no fence). Each subplot contains four 5x5 m treatment plots, each with 16 eastern hemlock seedlings planted at a 1x1 m spacing. The four treatments are weed control, fertilization, weed control + fertilization, and no treatment (control). Wildlife cameras were installed at each of the 12 plots to monitor deer presence. Year 1 growth data indicates superior diameter and height growth in the clearcut/canopy gap plots compared to the thinned treatment. A thorough statistical analysis has not been completed, but there are no discernable trends in growth means between the fenced and unfenced plots or the fertilization and herbicide treatments. While wildlife cameras have recorded deer presence in each of the plots, hemlock browse has not been observed. This poster will provide an overview of study establishment and preliminary results on seedling height and basal diameter following the first year of the study. This study is ongoing. A more detailed data analysis is planned when additional yearly measurements have been recorded.

¹ A version of this paper was presented at the Gene Conservation of Tree Species – Banking on the Future Workshop, May 16-19, 2016, Chicago, IL.

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