

A COMPARISON OF STRATEGIES FOR EXPERIMENTALLY INOCULATING EASTERN HEMLOCK WITH THE HEMLOCK WOOLLY ADELGID

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ABSTRACT

We assessed the importance of several factors potentially affecting the settlement rate of the invasive hemlock woolly adelgid, *Adelges tsugae*, on uninfested foliage of the eastern hemlock, *Tsuga canadensis*. We conducted our experiments in Massachusetts (USA) with overwintering sistens adelgids, and applied standard densities of infested foliage to uninfested branches in a planned multiple-comparison design. Settlement rates of progrediens crawlers produced by the overwintering sistens were highest when adelgid-infested foliage was loosely attached to uninfested foliage and both branches were then enclosed in a mesh sleeve. Early-emerging crawlers settled at a higher rate than did late-emerging crawlers. Increasing the density of infested branches did not affect settlement rates. We also tested whether less severe winter conditions improved settlement. There was no

effect of using adelgids from more southern locations, and overwintering infested foliage in a refrigerator decreased settlement rate relative to foliage overwintered outdoors; however, methodological issues may have confounded both experiments. Our results suggest the following protocol for adelgid inoculations: (1) Time the inoculation to coincide with the beginning of crawler emergence from infested foliage; (2) Use a waterpic to keep infested foliage alive longer; (3) Loosely attach the infested foliage to the target branch, and enclose both branches in a mesh sleeve; and (4) Use the overwintering, high-fecundity sistens generation to maximize the number of emerging crawlers. Using a protocol like the one described above could substantially increase the success rate of experimental manipulations and encourage additional research on the population dynamics of this pest.