MANIPULATING SPREAD AND PREDICTING DISPERSAL OF ISOLATED EMERALD ASH BORER POPULATIONS

Nathan W. Siegert[1], Rodrigo J. Mercader[1], Deborah G. McCullough[1], Andrew M. Liebhold[2], Therese M. Poland[3], and Robert L. Heyd[4]

[1]Michigan State University, Department of Entomology, East Lansing, MI 48824

[2]USDA Forest Service, Northern Research Station, Morgantown, WV 26505

[3]USDA Forest Service, Northern Research Station, East Lansing, MI 48823

[4]Michigan Department of Natural Resources, Marquette, MI 49855

ABSTRACT

The ability to manipulate the spread of an invasive species could potentially be integrated into an effective management strategy to delay dispersal to uninfested areas while concentrating the population in an area where suppression activities could be applied. Here we examined the influence of clusters of girdled ash trees on the spread of isolated emerald ash borer, *Agrilus planipennis* Fairmaire (Coleoptera: Buprestidae), populations in forested areas. Two 16-ha (40 ac) forested sites with low-density emerald ash borer populations were selected for this study. Each site was divided into sixty-four 50×50 m cells and complete ash inventories by diameter class were conducted. The amount of ash phloem in each 50×50 m cell was calculated as per McCullough and Siegert (2007) and two 4-ha (10 ac) blocks with similar ash density and distribution of total ash phloem were selected per site. At each site, four clusters of girdled ash trees (three trees per cluster; n = 12 total girdled trees per site) were established in one of the randomly selected 4-ha blocks. Beetles were released from infested logs placed between the two blocks. Girdled and nongirdled ash trees (n = 230 trees) were sampled the following winter to assess spread of the populations. Preliminary results indicate that clusters of girdled trees strongly influenced the spread of the low-density emerald ash borer populations at both sites. Overall, emerald ash borer densities were 4.6× and 7.0× greater on the 4 ha with clusters of girdled trees compared to the 4 ha without girdled trees at the two sites, respectively. Girdled trees had densities that were 9.0× and 14.6× higher than emerald ash borer densities on nongirdled trees in the control blocks at the two sites.

Once an invasive species has become established and eradication is unlikely (or too costly), a successful strategy may be to stop or slow the spread of its population. This strategy has been proven to successfully reduce the negative impacts of numerous invasive species (Liebhold & Tobin 2008), most notably the Slow The Spread program implemented to manage the gypsy moth, *Lymantria dispar* (Tobin & Blackburn 2007). For this strategy to be effective, the ability to predict the potential effect of management options on the spread of the invasive species is essential. Here we incorporated components that allow the simulation of three potential management strategies to a model of the local spread of emerald ash borer (see Mercader et al., this volume). The potential management options simulated were the use of (1) a grid of trap trees; (2) phloem reduction; and (3) insecticide use. Within a homogeneous environment insecticide treatments applied to 50 percent of the phloem (~6 percent of stems if large trees are chosen) were more effective at slowing the spread of isolated populations of emerald ash borer than the use of a single trap tree per year per 50×50 m cell, which in turn was more effective than 50 percent phloem reduction. Results from simulations performed in environments varying in resource distribution indicated that the distribution of ash trees in an area strongly influenced the spread of emerald ash borer and the efficiency of the different management options. Overall these three management options did significantly reduce the local population size of emerald ash borer, which has the potential to slow the spread of emerald ash borer as the population moves out of the management area. However,

within the management area, only the use of trap trees and insecticide treatments lead to a decrease in the local spread rate of emerald ash borer.

Literature Cited

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