Reconstructing the Temporal and Spatial Dynamics of Emerald Ash Borer in Black Ash: A Case Study of an Outlier Site in Roscommon County, Michigan

Nathan W. Siegert[1], Deborah G. McCullough[1], Andrew M. Liebhold[2], and Frank W. Telewski[3]

[1] Departments of Entomology & Forestry, Michigan State University,
243 Natural Science Bldg.,
East Lansing, MI 48824-1115

siegert1@msu.edu
mccullod@msue.msu.edu

[2] USDA Forest Service, Northeastern Research Station,
180 Canfield Street,
Morgantown, WV 26505

aliebhold@fs.fed.us

[3] Department of Plant Biology, Michigan State University,
166 Plant Biology Bldg.,
East Lansing, MI 48824-1312

telewski@msu.edu

ABSTRACT

The temporal and spatial dynamics of emerald ash borer (EAB), *Agrilus planipennis* Fairmaire (Coleoptera: Buprestidae), in an outlier site in Roscommon County, Michigan, were reconstructed using dendrochronological analyses. The site was characterized by pockets of black ash, *Fraxinus nigra* Marsh., located in swampy areas surrounded by ash-free, higher terrain consisting mainly of oaks (*Quercus* spp.) and pines (*Pinus* spp.). Ash eradication operations were underway during the summer of 2004 within an elongated eradication zone delimited by Michigan Department of Agriculture personnel. Within the eradication zone were two main swampy areas that were separated by a distance of more than a half mile. Thirty black ash trees, ranging in vitality from '*apparently healthy*' to '*declining*' (i.e., reduced leaf size and canopy dieback) to '*dead*', in the two main swampy areas were selected, partially debarked, and cored in late June to early July 2004. Signs of EAB presence were evident on all dead and declining ash trees sampled. Increment cores were prepared using standard dendrochronological techniques and crossdated using skeleton-plots and verified using COFECHA software. Crossdating analyses indicated that trees began to die in 2001 in one of the swampy areas. Preliminary results suggest that three trees in close proximity were initially infested with EAB and the infestation radiated out from that point in subsequent years. In the other swampy area,

EAB infestations did not begin causing tree mortality until 2003. Phenological development of EAB in the lower portions of the trees was considerably less advanced than in the upper portions of the trees. Dendrochronological examination of wood growth during gallery formation indicated that, under certain conditions, successful EAB development from egg to adult can be extended over multiple years (e.g., early instars present in 2002 and adult emergence in 2004). Additional dendrochronological analyses are in progress to determine when EAB initially infested the sample trees. Implications of this research were discussed in relation to future management guidelines.