MODELING EMERALD ASH BORER SPREAD IN OHIO AND MICHIGAN

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ABSTRACT

Our group has been modelling the spread of emerald ash borer (EAB) in Ohio using a spatially explicit cell-based model that takes into account the insect's flight characteristics (Insect Flight Model) as well as external factors that enable the insects to travel passively (Insect Ride Model).

To accomplish this, we calculated the available ash from Forest Inventory Analysis data and created estimates for an EAB infestation "front" and years since colonization. The Insect Flight Model calculates the probability of colonization in each cell based on the basal area of ash (ash abundance) and EAB abundance by assuming an 11-year cycle starting with initial colonization of a site and ending when all ash at the site are dead. The Insect Ride Model weights the road network, wood products, population density, and campground information in a GIS and calculates an ash abundance multiplier that alters the ash abundance input to the Insect Flight Model. The modelled EAB colonization probability yields a map of colonization potential.

When the actual EAB finds were overlaid to determine the accuracy of our predicted spread, we found that 83% of the infections fell within a zone of high probability of colonization. In addition, 69% of the EAB finds (2004-2007) in the outlier zone (i.e., the zone beyond the immediate infestation front) occurred within 2 km of major Ohio roads. For campgrounds and wood products that are located farther from major roads, we are seeing more EAB positive detections beyond the immediate vicinity (2-10 km) of the major roads. This shows that these potential sources of infection are more likely to contribute to EAB finds as we move away from the roads. We found no significant relationship between ash basal area and EAB positive detections in either the occupied or the outlier zones. This analysis may contribute to more reasoned placement of detection trees.

We are currently applying the model to test EAB spread in Michigan, where campgrounds rather than roads are implicated as the major spread factor.