The Plant Doctor's LANDSCAPE TIPS

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THE EMERALD ASH BORER

INTRODUCTION:

The Emerald Ash Borer (EAB), Agrilus planipennis, was discovered by the author in 2002 and was subsequently determined to have been inadvertently introduced into Southeast Michigan from Asia, probably at least ten years previously. This flat-headed wood boring beetle is lethal to all native species of ash trees (Fraxinus) in North America. Mountain ash (Sorbus) is not affected. The insect has now spread throughout most of Michigan and into other Midwestern states and Canada. The eventual spread of this invasive insect throughout North America signifies that ash species, unless treated, may no longer be viable as important landscape and forest trees.

DIAGNOSIS AND SYMPTOMS:

As trees are attacked by the EAB, upper branches begin to become sparse with chlorotic foliage and exhibit dieback symptoms (Photo 1). On occasion, but not always, epicormic shoots (suckers) may emerge from the trunk. Trees may die within two to three years, earlier or later, depending on the incidence of EAB populations in the area. With respect to a typical life cycle, EAB adults (Photo 2) emerge through D-shaped emergence holes (Photo 3) in May and through the summer, feed on foliage, mate, and lay eggs in bark crevices. Within a short time, eggs hatch, and larvae bore into the trunk and feed in an "S" or serpentine pattern within the cambial tissues of the tree (Photo 4); the insect overwinters in the larval form, which also represents the destructive phase to ash trees (Photo 5). The life cycle may take more than one year to complete depending on temperatures and health of the host tree. The first sign of EAB infestations may be bark removal (Photo 3) by various wood peckers (hairy, downy, red headed) as they extract larvae for food from infested trees.

Other diseases and problems may cause symptoms similar to the EAB. These include native insect borers, Verticillium wilt, anthracnose, ash yellows and site problems that may lead to tree decline. Confirmation of the EAB depends on the presence of the adults or larvae, D-shaped emergence holes and serpentine tunneling.

MANAGEMENT:

Although an expensive government sponsored cut and chip program failed to contain and eradicate the insect from North America, research and field observations have

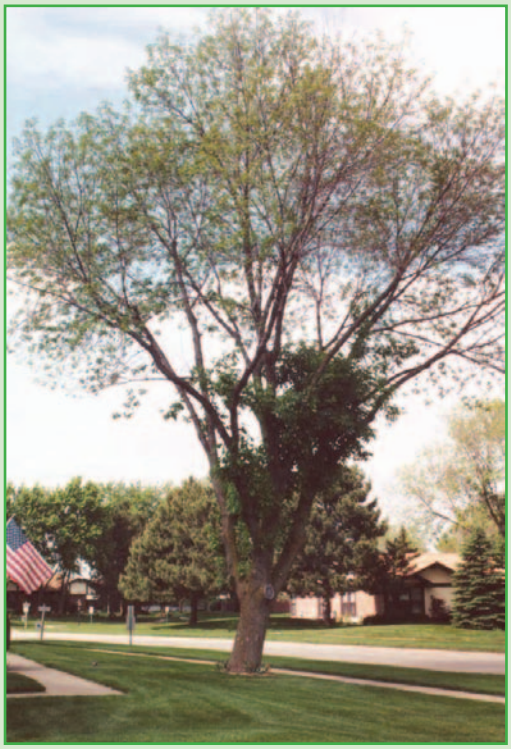

Photo 1: Typical decline symptoms caused by the Emerald Ash Borer include upper branch thinning, yellowing and decline, and epicormic shoots emerging from the trunk.

Photo 2: Adult EAB measure about one-eighth by about one-half inches.

Photo 3: Adult EAB emergence holes are D-shaped (see arrow). Bark has been stripped, and larger jagged holes created, by woodpeckers in search of EAB larvae as food.

Photo 4: The destructive phase of EAB attack is performed by larvae that destroy cambial tissues in a serpentine pattern.

Photo 5: Larvae are segmented and measure over one-inch when mature.

shown that individual trees can be saved from EAB destruction by utilizing chemical treatment. Options for treating ash trees can involve three different delivery methods:

1) Spraying: Normally, the trunk and branches (and foliage) are treated with an insecticide. Generally two sprays are timed during June and July.
2 Soil/trunk treatment: Chemicals (usually imidacloprid as Merit, Bayer, etc.) are applied as soil drenches, by soil injection, and/or by a bark penetrant.
3) Trunk injection: Various injection procedures from Arbor Systems Inc, Arborjet Inc., Mauget Inc., etc. inject chemical insecticides directly into the trunk of trees.

Through research and field observations, virtually all of these delivery methods have successfully protected ash trees from EAB destruction (Photos 6 & 7) . . . and all have failed. Failure of treatments is usually associated with misapplication of chemicals and/or treatment after the EAB has infested specific trees; vascular disruption by the EAB prevents the uptake and translocation of chemicals within the tree.

There are advantages and disadvantages with each of the delivery methods. For example, because spraying and soil treatments release chemicals into the environment, trunk injections are probably considered to be more environmentally friendly. However, some injection procedures also cause wounding to the tree. Tips for enhancing efficacy of treatments include: 1) begin treatments on trees to be saved at least one or two years before the EAB infests an area, 2) if trees are already infested, it may be advisable to use at least two treatment protocols, more often, at higher rates, until the EAB wave front passes through the area, 3) provide supplemental water and nutrients to facilitate vigor and wound recovery in trees, and 4) remove ash trees that are not destined for treatment–these trees harbor and build up populations of the destructive insect.

Research is showing that after the EAB wave front passes through an area, many of the management techniques may be reduced in frequency to every two or even three years. Please feel free to keep apprised of updates as they become available by visiting the following web sites for more information: www.anr.msu.edu/robertsd, www.treeresearch.org, or www.emeraldashborer.info.

For more information, the author may be contacted at robertsd@msu.edu. The author, MSU or MGIA do not endorse any particular product or delivery system. When applying treatments, be sure to read and follow label directions and consult local and state regulations.

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Photo 9: A professional arborist used Mauget injection techniques to successfully protect this focal point ash tree at his residence.

Photo 8: The City of Grosse Pointe Farms, Michigan, hired a local arborist company to successfully save over 600 ash trees using Merit soil treatment and Wedgle injections.

Photo 6&7: The world's oldest and most successful EAB management site in Plymouth, Michigan, near the epicenter of release of the EAB into North America. Photo 6 (left) was taken in 2002 when all ash trees (dormant) were over 90% girdled by EAB activity; note severe cankering (inset). By 2006, all 30 trees had fully recovered and exhibited excellent growth (Photo 7, right), thanks in large part to Arbor Systems Wedgle injection treatments using Pointer. Supplemental nutrients and water augmented the program.