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# The Present and Future of the Emerald Ash Borer in the United States

**By Nick Cowie**

In the summer of 2002, America came face to face with the emerald ash borer (EAB) for the first time. The larval form of this insect has been absolutely devastating to all seventeen North American species of the Fraxinus genus. The natively Asian invasive species, *Agrilus planipennis,* was discovered in southeastern Michigan and has since spread to thirty of the forty-eight continental United States.

Most recently, in 2016, EAB was found in Delaware, Alabama, and Oklahoma. Because it is the larvae of the EAB that kills a tree from the inside out, not the adult beetle, it is difficult to detect an infestation until the damage has already been done. The emerald ash borer larvae feed on the tree's water and nutrient transporters, dooming the tree before an infestation is even visible. The adult beetle's tendency to fly long distances along with accidental movement from humans has created an infestation that is quickly spreading throughout North America.

## Economics

The emerald ash borer has not only become an ecological disaster, but an economic one as well. It is known to have killed over a hundred million trees in the United States and is approaching an estimated $10 billion in damages. This is a threat to the very lucrative ash timber industry. The USDA estimates America's ash trees to be worth approximately $282 billion in timber. Even if no more trees were to become infested, the damage would continue for years to come as the emerald ash borer takes one to five years to kill a tree.

With the emerald ash borer multiplying and spreading, the damage is projected to grow. Researchers have found that trees that go untreated have a 99% mortality rate. In many states, ash trees are a very common urban tree. This means that a large majority of these costs land on the backs of homeowners and municipalities. With the average removal cost of a street tree being $5.00 per diameter inch, it is very expensive to remove and replace such a large quantity of trees in a short period of time.

States around the country have stopped planting ash trees until further notice. Dead ash trees will be replaced with a variety of other species. Urban foresters emphasize diversity in street tree species for maximum protection against invasive species and large scale losses.

## Life Cycle Monitoring

The majority of the forestry community agrees that emerald ash borer is here to stay. No matter what, the pest will most likely never be completely exterminated but it is still crucial to stabilize the population and slow the spreading of EAB.

Growing degree days are a commonly used and reliable way to monitor pests and can be useful in planning population management efforts. Growing degree days account for temperature rather than the simple calendar date. Because the emerald ash borer, like most insects, depends on higher temperatures to develop more quickly, growing degree days can be used to track its lifecycle.

To track growing degree days (GDD) per day, for emerald ash borer, a base temperature of fifty is subtracted from the average of the daily high and low temperatures. An average temperature below fifty degrees will simply be zero growing degree days. The emerald ash borer tends to emerge, creating a D-shaped exit hole, as an adult between 450-550 growing degree days. This is useful to set a target time for population management efforts. EAB does its damage before it is mature, so if using pesticides, it is important to treat the tree using injection before the 450 GDD mark.

**Drone Detection**

Because the emerald ash borer is so difficult to protect against, new methods of detection and population control must be developed. With such a high mortality rate of infested trees, early detection is a vital step. In Boulder Colorado, drones are being used in early detection efforts. The drones, while expensive, have a variety of uses. They can assist in mapping infected areas as well as find infested areas much more quickly than an on-foot human.

An early sign of an EAB infestation is the dieback and thinning of the tree's upper canopy. The drones are able to keep track of and detect this issue very early in an infestation and in a timely manner. GIS professionals can use the information from the drones to create heat maps and help forestry professionals decide where to focus their efforts.

**Biocontrol**

While it is always a good idea to track and detect an invasive species, it is useless without also finding ways to destroy it. Pesticides are considered a short term but immediate solution for individual trees. Alternatively, biological pest control can be used for long term population control. The emerald ash borer has very few known predators, especially in the United States.

Fortunately, *Spathius galinae,* a Russian wasp has been approved for release by the USDA. It will work alongside three other similar wasps that have already been released. These small wasps do not sting humans. The larvae of the parasitoid wasps feed on emerald ash borer eggs and larvae. The idea is that each year, the population of these wasps will grow with the EAB population and will keep them in check. Because this is such a slow, natural process along with the quantity and long life cycle of ash trees in the U.S. it will be years before researchers can decide if these wasps are able to adequately manage the emerald ash borer population. This type of biocontrol can only be used in forested areas and is ineffective for urban or suburban settings.

**Urban Forestry Control**

In urban and suburban communities, the use of pesticides and traps has long been the main way to combat emerald ash borer. Pesticides are injected into an infested tree through the phloem. In some instances, if the beetle has been present for too long, the phloem may have already been destroyed making it impossible for the pesticides to travel through the tree properly.

Multi-funnel traps and prism traps are also used to detect emerald ash borer in preparation for the use of pesticides. Multi-funnel traps are newer and have been found to be generally superior to prism traps. The green color of the multi-funnel traps attracts more beetles and collects the emerald ash borers easily and more efficiently. These traps capture the beetles without the hassle of glue and can be reused. Even with the help of traps and pesticides, the emerald ash borer continues to be devastating to residential communities. It is very likely that the use of ash as a residential street tree is coming to an end.

**Outlook**

Even with various population management efforts being implemented around the country, the outlook for the future of ash trees in the United States looks bleak. Pam Zipse, Outreach Coordinator of Rutgers Urban Forestry Program of NJAES, offered her projection for EAB in New Jersey. “Individual trees can be protected through ongoing chemical treatment, but we will not be able to get rid of EAB,” she says. “Researchers continue to study resistant individuals, but EAB is spreading at a fast pace. In New Jersey, it has been confirmed in fifty municipalities spanning twelve counties. I think that in New Jersey, the next couple years are going to be quite devastating.”

The rapid spread of emerald ash borer is not exclusive to New Jersey. This ecological and economic disaster has made its way across the country and is continuing to expand. Unfortunately, it appears that the emerald ash borer is here to stay. Although the pest will most likely never be completely killed off, researchers will continue to develop methods to keep the EAB population in check. Past experiences with hemlock wooly adelgid and Asian ambrosia beetle among others have taught us that once an invasive species establishes itself, it is here to stay. The best we can do is manage it and control the population as effectively as possible.