

## Ash tree species likely will survive emerald ash borer beetles, but just barely

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"Lingering ash." That's what the U.S. Forest Service calls the relatively few green and white ash trees that survive the emerald ash borer onslaught. Those trees do not survive by accident, and that may save the species, according to Penn State researchers, who conducted a six-year study of ash decline and mortality.

The research shows some ash trees have varying degrees of resistance to the strangely beautiful, invasive beetle from Asia. The study is unique because it took place at a plantation of ash trees planted on Penn State's University Park campus in the mid-1970s.

"We found that genetic variation exists in trees from around the country, and through time—especially as the emerald ash borer population collapses because host trees are rapidly disappearing—the resistance that we observed will likely ensure the survival of the species," said Kim Steiner, professor of forest biology, College of Agricultural Sciences.shredded

Genetics moderated the rapidity with which emerald ash borers injured and killed trees, researchers learned. This suggests that some ash genotypes, especially on favorable sites, will survive.

Steiner, who also is director of The Arboretum at Penn State, collected seeds from wild green ash trees in 27 states and Canadian provinces in the fall of 1975. He grew the seedlings for two years before methodically planting 2,100 of them, all 12 feet apart, in a seven-acre plot. Mixed in were a small number of white ash trees.

Steiner conducted a provenance trial—moving trees that had evolved in different climates to one location and carefully monitoring their growth and other characteristics—with the goal of

understanding how species adapt to their environments. over the last few decades, researchers maintained the plantation to study the effects of climate change on trees.



This little-known ash plantation off Porter Road near the Penn State's Swine Research Facility—the largest collection of green ash germplasm in one location in the world—may play a role in saving the species.

"We began measuring the decline in 2012, shortly after emerald ash borers arrived in the plantation, and we measured it every year through 2017," said Steiner. "The effect of the insect was devastating. As of August of this year, only 13 trees remained of the 1,762 that were alive when the emerald ash borer arrived."

Although final destruction was nearly complete, genetics moderated the rapidity with which emerald ash borers injured and killed trees, noted Lake Graboski, Steiner's assistant, who earned a master's degree in ecology at Penn State.

"This suggests that some ash genotypes, especially on favorable sites, will survive with lower densities of emerald ash borer beetles on the landscape," he said.

The fact that some trees survived longer means there are heritable genetic differences among trees from different populations and seed parents, Steiner added.

"For the first time, this study demonstrated that there is genetic variation that could be captured in a breeding program to improve resistance to emerald ash borer in both white ash and green ash species," he said.

Source: <https://phys.org/news/2019-09-ash-tree-species-survive-emerald.html>