

# The Forestry Source

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## What Ever Happened to Thousand Cankers Disease?

By Jackson Landers

The first case of thousand cankers disease in the US were reported in 2001 in New Mexico. A fungus, *Geosmithia morbida*, was carried by some tiny walnut twig beetles into a walnut tree, where they reproduced and chewed tunnels. As the beetles spread through the tree, small cankers appeared beneath the bark like chicken pox.

The sheer number of cankers overwhelmed the walnut tree as summer heated up, resulting in its death and the start of a disease that many researchers warned could wipe out North American walnuts. Rifle manufacturers snapped up blanks for gunstocks, fearing the supply for their preferred material would disappear. Economists projected massive potential losses.

Eighteen years later, a lot of trees have died, but the walnut apocalypse clearly has not come to pass as projected. According to the USDA's Animal and Plant Health Inspection Service, walnut mortality has occurred in the West in Arizona, California, Colorado, Idaho, New Mexico, Oregon, Washington, and Utah, and as well as in the East in North Carolina, Pennsylvania, Tennessee, and Virginia. What happened, and is the US really out of the woods?

A substantial body of research by scientists from throughout the US has recently shown that some initial assumptions about *G. morbida* were wrong. Originally, many people assumed that the beetle and fungus were each an invasive



Evidence of thousand cankers disease (*Geosmithia morbida*) on black walnut. Photo: Elizabeth Bush, Virginia Polytechnic Institute and State University, Bugwood.org.

species and that this was the same sort of invasive dynamic witnessed with the gypsy moth and, more recently, with the emerald ash borer. A recent paper in *PLOS One* by scientists from Colorado State University, Purdue University, and the US Forest Service states that *G. morbida* is native to the US, as shown by the robust genetic diversity found in the researchers' samples (see [tinyurl.com/y6jvcyzq](https://tinyurl.com/y6jvcyzq)). Invasive species usually show a genetic bottleneck in their population stemming from a single contaminated shipping container or similar pathway that brought the invader in.

The beetle and fungus seem a lot less scary than they did a few years ago. The swarms of beetles largely disappeared from the eastern US once the walnut trees regained their health, although

the fungus would also be capable of hitching a ride on any other beetle that emerges from a dead walnut branch.

So if the beetle and the fungus are native, why did they suddenly start killing walnut trees?

The answer seems to be temperature, rainfall, and climate stress.

“It seems that in the eastern US, where the black walnut is native, the trees were stressed out by a series of unusually hot and dry years,” says Jiri Hulcr, associate professor of forest entomology at the University of Florida’s School of Forest Resources and Conservation. “When more-favorable weather returned, the disease essentially disappeared. In the West, where the walnut is planted and the conditions are dry by default, the stress persists and, therefore, thousand cankers disease continues to be a problem.”

Walnut twig beetles and *Geosmithia* probably lived unobtrusively on several species of walnut tree for at least a century without causing problems. But according to Keith Woeste, a geneticist and one of the lead authors on the *Geosmithia* genetics paper, the tendency of people to plant more walnut trees in the 20th century set the stage for thousand cankers disease to not only occur but also to spread.

“Then things changed: Humans started changing the density of walnut in the West, they introduced new species [of walnut], and they moved the insect from place to place, enabling it to overcome the large inhospitable distances in the West that separated hosts. If the beetle population in one area exploded and got totally out of control, then all the hosts would die and the beetle would die, too. So in those circumstances, beetles and hosts evolve to live in balance, neither getting the upper hand.”

All known species of *Geosmithia* can potentially be transported from tree to tree by various species of beetle. So even areas without walnut twig beetles could eventually experience outbreaks of something like thousand cankers disease if climate conditions allow it.

A team within Hulcr’s lab, led by Yin-Tse Huang, recently published a paper in *Fungal*

*Ecology* demonstrating that they have discovered at least four additional species of *Geosmithia*, closely related to *G. morbida*, in American forests.

Hulcr thinks that American foresters need to continue to be aware of both the walnut twig beetle and its fungus. The two have been introduced to Europe and will pose a threat anywhere walnuts are grown in hotter, drier conditions than their ideal native climate. That could also include future outbreak in parts of North America.

The other new *Geosmithia* species could become an issue as well.

“I would be on a lookout regarding species that are host-tree-specific,” Hulcr says. “Those can prove to be opportunistic pathogens on their respective hosts, just as other beetle-borne fungi did before.”

In the event of a future outbreak, foresters should be cautioned that there is currently no pesticide or other treatment recommended to save infested walnut trees. Trees exhibiting thousand cankers disease should be destroyed on-site to prevent further infestations, and an extension agent should be contacted for advice on safely managing a salvage harvest.

*Jackson Landers is a strategic science communicator employed by the Hulcr Lab at the University of Florida.*

*For more information about the disease, see [thousandcankers.com](http://thousandcankers.com).*