

Arborcide In The Forest

By [DEBRA MCCOWN](#)

Reporter / [Bristol Herald Courier](#)

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ABINGDON, Va. – The region’s forests are not what they used to be.

Never mind old-timers’ talk about the days before clear-cutting and construction; the problem is much more sinister.

One by one, native tree species are falling victim to foreign insects that take no prisoners, and experts say it’s only going to get worse.

Walking through the woods today, it’s nearly impossible to find an American chestnut, the durable hardwood that used to rule the forest. Or what about an elm, the towering tree that used to line the streets of U.S. cities?

They’re all but gone. And other trees that even suburbanites know by name – oak, hemlock, beech, dogwood, ash – may already be marked for death.

“It’s probably going to have impacts that amount to billions of dollars a year [in Virginia] in terms of less-productive forests,” said Chris Asaro, forest health specialist for the Virginia Department of Forestry. “It’s not like one day you’re going to wake up and the sky’s going to be on fire and there’s going to be dead trees everywhere you look, but locally there could be severe impacts.”

History repeats itself

One of the first forest pests of the modern scientific era was introduced into the port of New York on nursery stock at the end of the 19th century: chestnut blight.

It wiped out literally billions of trees around the United States in an unprecedented level of destruction and changed the mountains here forever.

“The chestnut was a reliable producer of nuts,” said Fred Hebard, staff pathologist for the American Chestnut Foundation, which is doing research with hopes of bringing back the tree – once a staple of the region’s culture and economy – to its glory.

“It was abundant, and it produced lots of nuts. And the nuts were not only important to people, they were important to wildlife. It’s estimated that wildlife populations were much larger when chestnuts were producing nuts,” Hebard said.

“In years with a hard spring frost, late spring frost, it could still produce flowers and nuts, unlike oaks and hickories and dogwoods, which can be affected by spring frosts and not bear [nuts].”

Once the blight reached an area – in Southwest Virginia it came in the 1930s – it took just a few short years before forests of prized timber – more than one in four trees was a chestnut – to be reduced to standing skeletons.

“[The] chestnut was a vital part of the economy. It’s gone, and it’s not necessarily substituted by all the species that came in following chestnut,” Hebard said. “How many trees can we afford to lose before there isn’t any forest?”

The chestnut foundation has been working in Meadowview, Va., since the 1980s to cross-breed American and Chinese chestnut trees in hopes of creating a blight-resistant tree that resembles the American chestnut.

“Whether or not these trees are going to be resistant enough to grow old, I don’t know. What we’re doing now is testing to find out whether that’s so or not. ... You’ll know for sure when they’re 100 feet tall, which will be 30 to 60 years in the best case,” Hebard said. “At least the chestnut provides a model that sometimes you can do things about these problems ... so there’s hope in that respect.”

The next wipeout to come along – beginning in the 1930s when a shipment of infected logs arrived from Europe – was for the American elm.

“Elms were one of the most popular street trees at the time ... they really handled urban conditions quite well ... and they also had very beautiful umbrella-shaped crowns, so it was up above the streets and all the utility lines,” said Sean Fox, assistant arboretum manager and Elm Recovery Project coordinator for the University of Guelph in Ontario, Canada. “When the disease [Dutch elm disease] came, it went tree to tree, street to street, town to town.”

By the end of the 1970s, the disease, a fungus spread by beetles, had killed hundreds of millions of trees in North America.

“In a natural system, if plants and diseases are evolving together ... they just kind of tolerate it to a certain extent,” Fox said. “But when a disease comes from the other side of the world, the plants just aren’t ready for it.”

He said when a few trees from a species survive, as in the case of the elm, the trees eventually will repopulate – but it can take thousands of years. Efforts are under way to speed up this process for the elm by bringing together seeds of the scattered survivors in one place.

“Usually there’s something in the species that’s different enough to be able to survive something,” Fox said. “We’re trying to take that natural thousands-of-years approach and trying to condense it down to 50 or 60 years.”

Present Pests

Another common tree species is in the process of a wipeout: hemlock. The stream-shading evergreen is under attack by another accidental Asian import, the hemlock woolly adelgid.

The adelgid is an insect that feeds on the sap of the tree; infested trees often die within a few years.

“They’ve been spreading through Southwest Virginia in the last 10 years, and they’re pretty much now in every county in Southwest Virginia ... so you’re going to be seeing more hemlock trees dying, unfortunately,” Asaro said, adding that Shenandoah National Park has already lost 90 percent of its hemlocks. “You’ll have sections of forest with dead trees. You’re already seeing it in the Mount Rogers area.”

Spray treatments are available to protect individual yard trees from the adelgid, but in the forest, the only option is a tiny beetle, smaller than the head of a pin, that eats the hemlock woolly adelgid.

Even with efforts to slow the attack of the adelgid, trees are dying by the thousands.

“They are preserving the gene pool,” Asaro said. “They’re collecting the seeds all over the place, and the [U.S.] Forest Service is growing them in greenhouses in other countries to keep the possibility of reforestation if we ever get this hemlock woolly adelgid thing under control so hemlock trees can be replanted.”

Another exotic pest making its way into the region is the gypsy moth, which affects primarily oak trees.

Asaro said this bug, which can create a huge nuisance by the sheer volume of caterpillars that come with an infestation, won’t cause a major wipeout – but it does extensive damage, and it kills trees.

“Usually the worst damage is on mountaintops, mountain ridges where the trees are under stress, because trees growing on mountaintops are growing on thin soil, and it tends to be much drier and there are more rocks and the trees are not as healthy up there,” Asaro said. “They don’t kill the trees outright; they defoliate them. ... Even if a tree lost all its leaves in one year, it usually will leaf-out again in that same year. But if it happens again, and then again and again in following years, then the tree will die.”

The moth is making its way into the region despite efforts to slow its spread – and Asaro says its effects now are “pretty inevitable.”

The list of deadly forest pests gets even longer at Great Smoky Mountains National Park, where Supervisory Forester Kristine Johnson said at least four other forest pests have taken a toll.

“We’ve lost about 80 percent of the mature Fraser fir trees ... and we’ve lost the majority of the high-elevation beech forest ... we’ve lost 75 percent of the dogwood trees

at cool, moist, shady sites ... and we've lost about 80 percent of the butternut trees that are found along streams at lower elevations," she said.

Dogwood anthracnose, a fungus of unknown origin that appeared in the United States in the mid-1970s, has destroyed trees around the nation.

"Dogwood berries are rich in calcium, they're an important food source for birds and small mammals and the leaves are also rich in calcium, which has a buffering effect against acid deposition from air pollution," Johnson said.

She said it was found in the park in the 1980s, along with butternut canker – another fungus that had wiped out 77 percent of the butternut trees in the Southeast by 1995, according to a U.S. Forest Service estimate.

The butternut tree, which is akin to black walnut, produces nuts that were historically used in baking, with husks used as a source of fabric dye.

Beech scale, which entered the region as late as the 1990s, is changing not only the composition of the forest, but also of the forest understory or undergrowth.

"It's opened up the canopy so the understory, especially spring ephemeral flowers, are crowded out by species that are adapted to sunlight," Johnson said.

All the forest pests combined have the potential to crowd out not only native species of plants but also the associated bugs, birds and mammals, she said.

"The impacts are cumulative and they are preventable," Johnson said. "All of these pests that are so devastating are imported from other continents."

Another pest, the balsa woolly adelgid, has killed 80 percent of the mature Fraser fir trees in the Smokies, she said, affecting higher elevation areas like Roan Mountain and parts of the Cherokee National Forest.

Johnson said while pests that affect commercially important species get more attention, others can be devastating too.

In many cases, she said nothing is present to replace a tree that's lost to an imported pest.

"There's no evergreen that will replace hemlock," Johnson said. "That's going to have an impact on streams, water quality, wildlife, birds, it's a cascading effect all down through the ecosystem when you lose those key tree species."

On the Horizon

Asaro said some other potential wipeouts could be seen in the near future.

The emerald ash borer has the potential to do what Dutch elm disease did in the 20th century: wipe out the urban forest.

“This one’s right on our doorstep, and it’s already killed over 30 million trees in Michigan ... now, we don’t have as many ash trees as they do in the Midwest, but we still have a lot of ash,” Asaro said.

“We have ash planted as street trees all over the place ... and this is a pest that the trees have zero defense against. They’ll kill all ash trees regardless of their size or health or anything. It’s in West Virginia and Pennsylvania, so it won’t be long probably before it shows up here. We’re going to try to slow it down, but sooner or later it’ll get here, so the future of ash is looking pretty grim.”

Another plant pathogen with wipeout potential is sudden oak death, a fungus-like organism that’s killing trees on the West Coast.

“In California, it’s killing lots of oak trees,” Asaro said. “It destroys the tissue right under the bark, which we call the vascular tissue ... it interrupts the ability of the tree to move nutrients and water up into the crown from the roots, so it just basically girdles the tree.

“It’s killing western oak trees; whether or not it will be aggressive on our eastern oaks, we’re not sure ... they’re trying to eradicate it by cutting and destroying the trees and burning all the vegetation beneath those trees.”

With Virginia having mostly oak-hickory forests, the prospect of the disease reaching here is potential devastation.

“You start adding it up, and part of the problem is we’re moving so much material with all this global free trade and everything ... we have thousands of invasive species, insects, pests, diseases, that have come to our country in the last 500 years,” Asaro said.

“Most of them don’t become severe pests, most of them we don’t even notice, but a few of them become severe pests like the emerald ash borer, like the Dutch elm disease ... we seem to be getting another one every five to 10 years.

“It makes you wonder what the forests are going to look like in a hundred years. We’re going to lose a lot of our tree species, and a lot of our forests are going to become overgrown with invasive weeds, and they’re not going to be as pretty or as useful.”

dmccown@bristolnews.com | (276) 791-0701