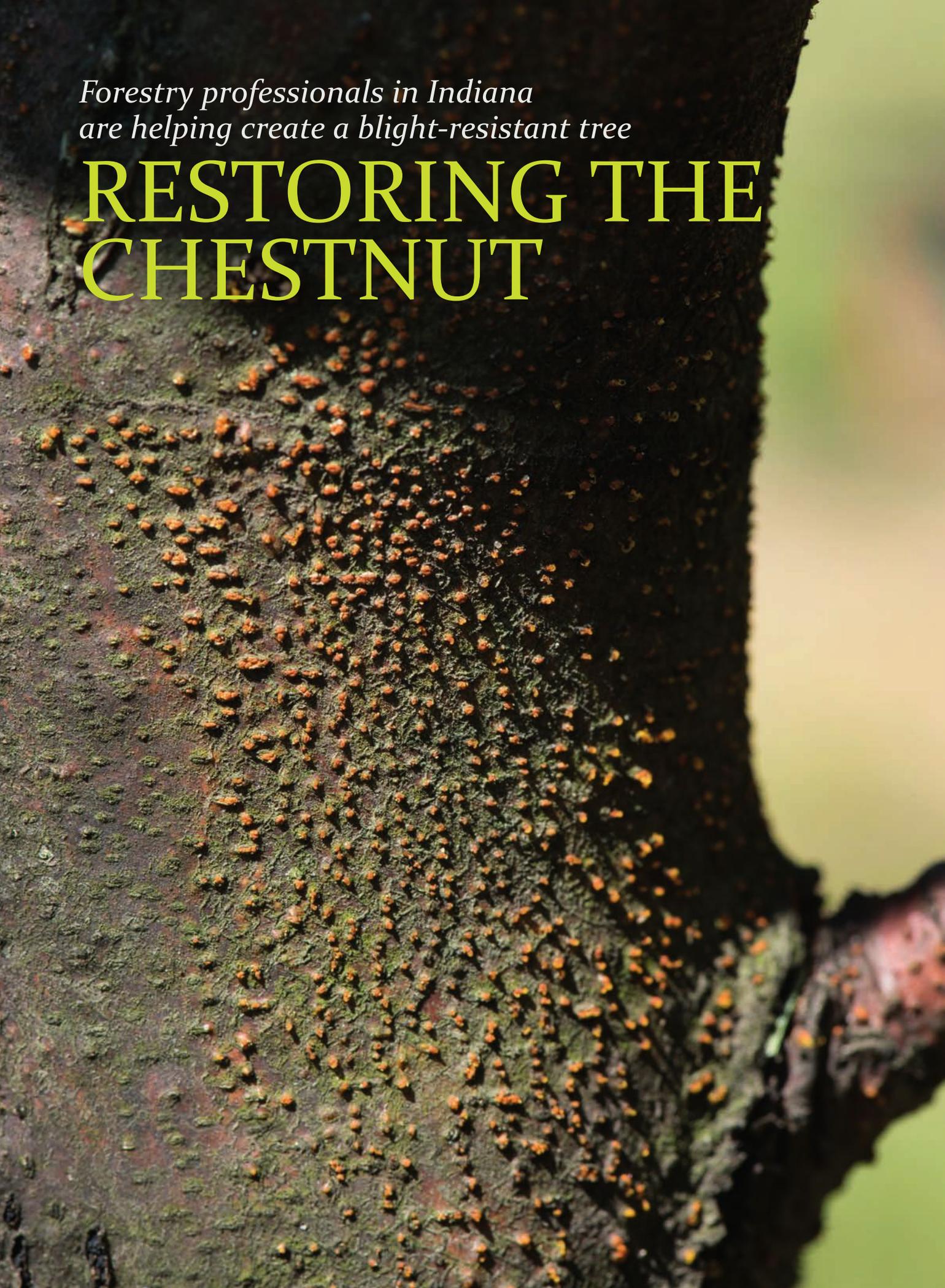


*Forestry professionals in Indiana
are helping create a blight-resistant tree*

RESTORING THE CHESTNUT



By Nick Werner, OI staff
Photography by Frank Oliver, OI staff

A quarter of all hardwood trees in Eastern forests used to be of one species. The American chestnut.

Today, Ron Doyle is thankful to have a writing pen made of that wood.

His dad, Irvin, gave him the pen as a gift in the 1980s. The elder Doyle had recovered the wood from a barn he owned. A friend turned it and several others on a lathe.

Irvin belonged to the last generation to understand the tree.

“He grew up when they were dying out,” said Ron, who retired from Hoosier National Forest last year as a program support clerk.

In the chestnut’s native range from Maine to Mississippi, the tree supported many aspects of life. Its usefulness earned it the designation as a “cradle-to-grave” tree. It was popular for making cribs and coffins, and about everything in between.

But in the late 1800s, a fungus hitchhiked from Asia to the United States. Asian chestnut trees had developed resistance to the fungus, but their American cousin had never encountered the pathogen, known as chestnut blight. The blight killed almost every chestnut in the native range, which included southern Indiana.

Overall, about 4 billion trees died in about 50 years.

Now, surviving chestnut trees are rare enough that, when found, they often make headlines.

Forestry professionals and researchers are trying to restore the chestnut in Indiana. Their approach involves crossbreeding American trees with Asian chestnuts to develop a hybrid with a native appearance and Asian blight resistance.

IN LIGHT OF BLIGHT

The hybrid trees are 15/16 American chestnut.

To put it in human terms, one of the tree’s great-great grandparents was Asian.

To survive, the trees must be blight resistant because the fungus still lingers around Eastern forests. After the chestnuts died, it found a home on several oak species. While unaffected by the blight, those oaks host the fungus.

(Opposite page) Chestnut blight covers the side of a tree in a Purdue University research area. Researchers are trying to restore the tree in Indiana. (Above) An insect sits on a healthy chestnut tree leaf at a Purdue research planting.

Wild, pure American chestnuts still exist, often as stump sprouts. Blight kills them before they reach maturity.

The hybrid chestnuts grown in recent years in experimental plantings throughout Indiana are largely the result of breeding efforts by Jim McKenna, a research biologist with the U.S. Forest Service who specializes in central hardwood forests.

McKenna and his Purdue University research assistants crossbred an American and Asian chestnut to produce 50-50 hybrids. They then cross those seedlings back with pure American chestnuts for three generations to produce the 15/16 hybrid. The breeding program started in 2003, in orchards owned by Purdue University at Martell Forest, a roughly 400-acre forestry research facility in Tippecanoe County.

McKenna injects each of his trees with blight.

Trees that inherit resistance develop a callous, and recover. Those trees are selected for further breeding. Trees that don’t show resistance are cut down.

The only trait McKenna tries to retain from Asian chestnut is blight resistance.

“I’m more Asian than these trees,” said McKenna, who is white.

BEAST OF THE EAST

An old saying in forestry is that by the time a white oak made a baseball bat, a chestnut had made a railroad tie.

That means chestnuts are tremendous growers. The largest stretched 120 feet above the forest floor. Their girth, combined with their longevity—some lived to be 600 years old—earned them the nickname “sequoias of the East.”

Indiana state botanist Mike Homoya said notes from an 1805 Public Land Survey of an Ohio River bottomland near Tobsport in Perry County recorded a chestnut that was 8 feet in diameter.

“I’ve never seen surveyors mention a tree bigger than that in all the notes I’ve looked at,” Homoya said.

Chestnut wood has bold, coarse grain, much like oak. Some people find chestnut’s yellowish tint homely. Craftspeople often covered chestnut with veneer.

Color aside, chestnut is lightweight, rot-resistant, straight-grained and easy to work with tools. It was the lumber of choice for telegraph poles, fencing, log cabins, churches, barns, mine timbers, shingles, pianos, packing crates and railroad ties.

Beyond lumber, chestnut flowers produced nectar for honeybees. Its dependable autumn crop of nutrition-rich nuts offered food and income for poor mountain families and inspired Christmas carol lyrics. The bark was used for tanning animal hides.

Because the chestnut was rot-resistant, trees stood long after they died. The bark would fall off and expose the silvery, weathered wood underneath. People called them ghost trees.

Eventually, ghost trees were harvested for framing timbers, pulpwood and utility poles.

The stumps of ghost trees resisted decomposition well into the late 20th century in places like Jackson-Washington State Forest, according to Dwayne Seig, property manager at Harrison-Crawford State Forest.





(Top) A Purdue student looks over a planting of chestnut trees between pine trees in a research area at Martell Forest in Tippecanoe County. (Below) Mekala Sundaran, also a Purdue student, closes the door of a squirrel enclosure at Martell Forest. Sundaran did research to help determine if squirrels could help spread chestnuts.



“When I worked there in the ‘80s, hills were still full of chestnut stumps,” Seig said.

OBSTACLES AND CONCERNS

The American Chestnut Foundation (TACF) developed the idea of crossing American and Asian chestnuts. The Virginia-based non-profit formed in 1983 to find a way to restore the species. Part of McKenna’s goal is to see if TACF breeding plans could work in Indiana.

Even if hybridization is successful, repopulating the native range through plantings and natural expansion could take centuries.

One potential helper is the squirrel population.

Squirrels preserve food by caching certain nuts in the ground. Many are never dug up again, and grow into trees.

But not every nut gets cached.

For reasons unknown to science, squirrels can identify which type of nut will germinate quickly and lose its food value. Because these nuts don’t preserve well, squirrels eat them immediately.

Purdue Ph.D. student Mekala Sundaran wanted to find out whether squirrels could help spread chestnuts. So she developed an experiment to determine whether they would cache chestnuts.

Sundaran trapped several gray squirrels from campus and placed them in enclosures at Martell. Each day she gave them 10 nuts, including black walnuts, English walnuts, hazelnuts, acorns, and chestnuts.

“In certain situations a squirrel will cache chestnuts,” Sundaran said. “It kind of depends on what other seeds are available and a variety of other factors.”

Knowing this type of information will help foresters identify where to plant chestnuts so they receive help from squirrel caching.

Competing with other tree species for squirrel assistance is just one obstacle the chestnut faces.

Another is white-tailed deer.

“The density of deer in the chestnut’s historic range is really high right now,” said Nathan Lichti, another Purdue Ph.D. candidate.

Losing seedlings to deer browsing is a serious risk.

Foreign threats also continue to invade American forests.

The Asian ambrosia beetle was first detected in the United States in 1974. It attacks more than 200 broadleaf trees, shrubs and vines, including chestnuts. McKenna’s orchards have lost several trees to ambrosia beetles.

Some resistance to the project exists among natural resources professionals, too.

Homoya said he has concerns about introducing trees with Asian genes into American forests.

“There’s no one who wants true American chestnut restored to our forests more than I do,” Homoya said.

But with hybrids, “We don’t know how their presence might affect the natural communities they are in. It’s possible they may become invasive. I have a lot of questions that make me hesitant to want to proceed further.”

Homoya supports the approach taken by a lesser-known chestnut organization, The American Chestnut Cooperators’ Foundation. The group breeds chestnuts from the few surviving American trees in hope of producing a blight-resistant strain that is 100 percent native.

He also said he wished scientists would devote more time to trying to “deactivate the pathogen.”

Indiana state forester John Seifert said he understood some of Homoya’s concerns.

But both Seifert and McKenna said that hybridization could become a valuable tool in protecting American forests against current and future pests and pathogens, from chestnut blight to emerald ash borer to thousand cankers disease.

“The system survived with the loss of the chestnut,” Seifert said. “You have a different ecology now, and it’s functioning. So you have to be careful about unintended consequences. But, like it or not, if you are going to bring this species back, you better have a breeding

program with genes outside the natural range. There’s always a tradeoff in the world we live in.”

“IT’S COMING”

Sometime in the next decade, the DNR hopes to make hybrid chestnut trees available to the public through the state nursery.

But there’s still a lot of work to be done, Seifert said.

Seifert isn’t satisfied with the current hybrid crop. He wants them to grow straighter and taller. He’s also worried about the damage blight infections leave behind, even if the tree survives.

“Getting the tree to survive is huge,” he said. “That’s the first goal, and we are getting close. They are surviving the blight. The wounding may continue on. It might have a big wound on it. The wound may not heal up.”

Seifert said landowners who want to plant hybrid chestnuts should stay tuned.

“It’s coming, but we don’t know when,” he said.

In 2011, Doyle planted the first hybrid chestnut tree on the Hoosier National Forest in honor of his father, who died later that year.

“I told him about the tree,” Ron said. “He was happy about that.”

Five years later, the tree is hidden in a nearly impenetrable jungle.

The tree was planted on a rare clear-cut timber harvest. That clear-cut is now a thick stand of other planted chestnuts, as well as oaks, tulip poplars, ashes, dogwoods and maples that grew on their own. At 15 to 18 feet tall, the chestnuts were outpacing the other trees.

If all goes well, these chestnuts will support hundreds of creatures with their dependable mast.

And in a few decades, they will have grown enough wood to build much more than writing pens. □



(Above) Jim McKenna is a research biologist with the U.S. Forest Service who specializes in central hardwood forests.

Email at nwerner@dnr.IN.gov.