



# American Chestnut Makes a Slow Comeback

Once a common eastern hardwood, the *American chestnut* has been almost eliminated by blight. See what one organization is doing to revive this stately tree.

By Kendra Gurney Photography and map provided courtesy of American Chestnut Foundation



Once a prominent eastern hardwood species that populated forests from Maine to Georgia, the American chestnut often grew more than 100 feet high and five feet in diameter. The tree has always been prized as a fast-growing large timber species: straight-grained, light, and rot-resistant, its wood was useful for everything from railroad ties and mine timbers to furniture and musical instruments. Plus, the late-flowering chestnuts reliably produced a mast crop of nuts every year. This nutritious food source was prized by humans, livestock, and wildlife—especially in the central heart of the Appalachian range, where one in four stems was often an American chestnut.

In New Hampshire, one of the states at the northern limit of the American chestnut's range, populations were not as dense. As a species likely limited by cold climates, chestnut would not have been found often in the high mountains or northern climes. However, it was present in the Lakes Region and a fairly common species in the southern counties. One part of the state renowned for its American chestnut was the "Nutfield" in western Rockingham County. Centered in Derry—a town name derived from the Irish "Doire," meaning "oak grove"—the Nutfield supported an abundance of American chestnut, oak, and other nut-producing trees.

### The Blight Begins

Unfortunately, American chestnut trees have been eliminated from eastern forests as a dominant hardwood by chestnut blight within the past 100 years. Caused by the fungus *Cryphonectria parasitica*, chestnut blight was introduced to the United States on Asian chestnut nursery stock during the late 1800s. While chestnut blight is merely a nuisance to Asian chestnuts, it is deadly to American chestnuts, which have no natural defense to the disease. The blight spread quickly on its new host, killing approximately four billion trees by the 1950s.

The blight fungus causes girdling cankers that block the flow of water and nutrients, eventually killing the tree. The root system, however, is not affected by the fungus, and root-collar sprouts are

quite common throughout the species' historic range. Unfortunately, very few of these sprouts survive to flowering age. The blight fungus is still present in our forests, harbored mainly on chestnut sprouts and oaks, allowing for a cycle of repeated sprouting, infection, and dieback.

### Early Restoration Efforts Unsuccessful

Because the species was of high value, the loss of four billion trees was not ignored. Many restoration attempts have been made to preserve the American chestnut, but early strategies that focused upon tree surgery and disease containment proved unsuccessful. As a result, efforts were quickly redirected toward the study of the blight fungus itself and breeding for blight-resistance. Early breeding work was supported in New Hampshire with experimental plantings established at Fox State Forest in Hillsborough and Russell Abbott State Forest in Greenfield.

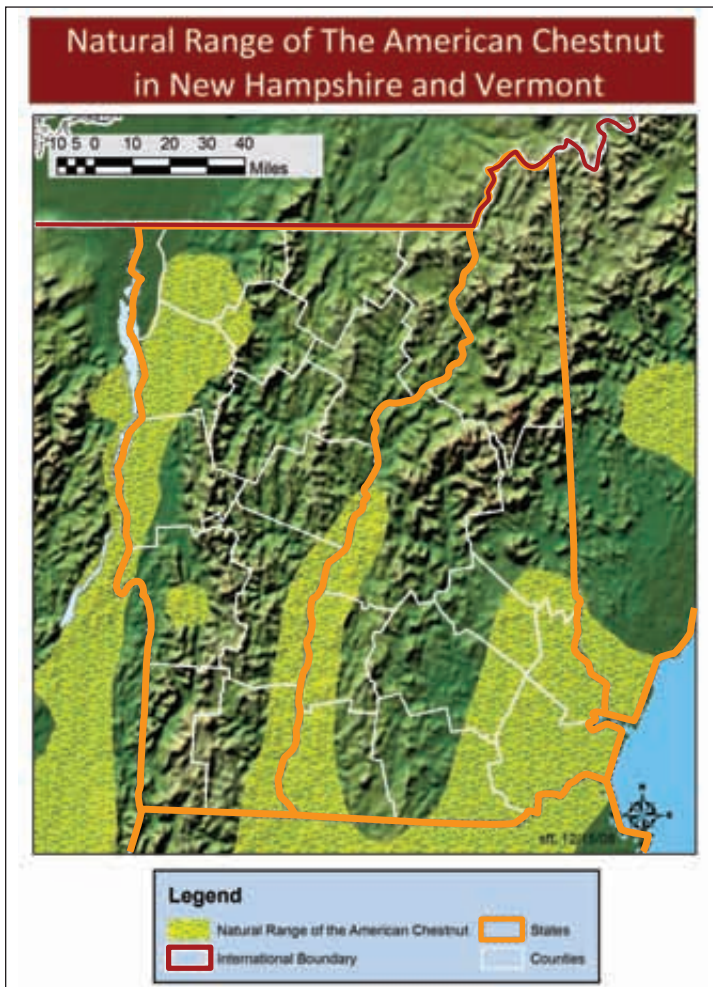
Although plantings of early breeding stock were maintained from the 1940s through the 1960s, most of the original trees have died, been transplanted, or been out-competed by other native species. Early breeding attempts also included a high proportion of oriental chestnut genes, a method that proved unsuccessful at capturing the desirable characteristics of the American chestnut while imparting blight-resistance. One biological method of controlling chestnut blight involves "fungal hypovirulence," whereby the blight fungus is infected with a virus that reduces its virility. Restoration efforts that employ this tactic are still under investigation, but there is more hope for the success of breeding programs aimed at producing blight-resistant trees.

### New Hope

The American Chestnut Foundation (TACF), founded in 1983, is helping to lead breeding efforts. The organization's range-wide breeding program seeks to produce genetically diverse and locally adapted populations of blight-resistant chestnut trees that will be suitable for restoration plantings and eventual naturalization within

*Facing Page:* Each year the late-flowering chestnut tree produces a mast crop of nuts, a nutritious food source prized by humans and wildlife alike.

*Above:* The American chestnut often grew more than 100 feet high and five feet in diameter. With wood that is straight-grained, light and rot-resistant, it has been a prized timber species.



*Left: New Hampshire and Vermont are at the northern limit of the chestnut's natural range, which extends as far south as Georgia. At one time, western Rockingham County supported an abundance of American chestnut, oak, and other nut-producing trees, earning the moniker "Nutfield."*

### Closer to Home: Success Slowly Taking Root in New Hampshire and Vermont

The Vermont/New Hampshire Chapter is a relatively new member to TACF. Local volunteers have been conducting controlled pollinations on and off since 1989, and in 2005 the first breeding orchard was planted in Vermont. But breeding is a long process, and it will likely be several years before a blight-resistant chestnut will be available in Vermont or New Hampshire.

In New Hampshire, organized work with the TACF breeding program began in 2007 with the pollination of an American chestnut in Farmington, the offspring of which were planted in the chapter's first New Hampshire breeding orchard, the Shieling Forest in Peterborough, in May of 2008. (See sidebar: "Hope for Stately Chestnut.") This orchard is the result of a collaboration between TACF and the NH Department of Resources and Economic Development's Division of Forests and Lands.

The State of New Hampshire has also supported TACF's efforts by supplying a dedicated volunteer through the NH Tree Steward Program to help maintain the Shieling Forest orchard, by providing growing space for replacement seedlings at the State Nursery in Boscawen, and by promoting the pollination of an American chestnut in Derry's Ballard State Forest in 2008. Chestnut trees in Milford were also pollinated in 2008, resulting in several new trees anticipated for the 2009 breeding program.

eastern forests. The program includes American chestnuts from the species' entire historic range from Maine to Georgia. Currently TACF has 16 state chapters that are supported by the national organization.

The goal of the breeding program is to combine the blight resistance of the Asian chestnut with the desirable characteristics of the American chestnut. TACF starts with a cross between American and Chinese chestnuts, followed by three or four generations of backcrossing to different American chestnuts, followed by two generations of intercrossing resistant offspring. The backcross generations are designed to recover as much of the American chestnut germplasm as possible while maintaining the same level of blight resistance found in the initial cross with Chinese chestnut. The final selected backcross chestnuts average 94 percent American chestnut and are moderately blight-resistant. Intercrossing generations allows for increased levels of blight resistance, and through a similar selection process, the final trees in the breeding program should still average 94 percent American chestnut but also be highly blight resistant.

Because several generations of early crosses are conducted at the main TACF research farms in Meadowview, Virginia, the state chapters can proceed rapidly into the later stages of the breeding program. The final backcrosses are made with local trees to increase the genetic diversity and regional adaptability of the blight-resistant trees that will one day be restored to the forest.

### How You Can Help

The VT/NH Chapter of TACF is looking for more American chestnuts to pollinate. If you think you have found an American chestnut, please send a leaf sample to Kendra Gurney at the USFS Northern Research Station, 705 Spear St., South Burlington, VT 05403. (NOTE: Avoid wrapping samples in plastic. Instead, press leaves with approximately six inches of stem between two pieces of cardboard.)

Also, records of American chestnut work in New Hampshire are incomplete. If you know of previous research or pollination work, please contact the VT/NH Chapter of TACF at (802) 951-6771 x1350 or [kendra@acf.org](mailto:kendra@acf.org).

The first Annual Meeting of the VT/NH Chapter will take place on April 25, 2009. The organization is eager to develop new partnerships and sign on new members. For more information, visit the chapter website at [http://www.acf.org/ChapterNews\\_vt.php](http://www.acf.org/ChapterNews_vt.php). ♣

*Kendra Gurney is the TACF New England Regional Science Coordinator.*

An extended version of this story can be viewed at [www.forestsociety.org/news/forest-notes.asp](http://www.forestsociety.org/news/forest-notes.asp)

# Hope for Stately Chestnut

By John Quinn

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The seedlings of a cross-pollinated American chestnut tree have surpassed expectations as part of a project to make the once productive tree more resistant to a fungus that laid waste to them in the country.

In July 2007, the American Chestnut Foundation introduced pollen from a chestnut tree in Tennessee—one resistant to the fungus known as Asian blight—to cross-pollinate a hardy chestnut tree discovered on the 125-acre property of Bill and Nancy Yates, which is located along Chestnut Hill Road [in Farmington, NH].

Bill Yates, 68, said he's glad to hear the project is going well and that some of the trees survived. He added the 40-foot-tall chestnut tree that donated the nuts did not suffer from the experience, unlike other trees on his property along Chestnut Hill Road.

"The tree lived and it had a good crop," Yates said, adding most of his chestnut trees "grow about a year and just die."

Nonetheless, he still has a few chestnut trees growing on his property and has high hopes the experiment is successful, but understands the project will take time to bear results.

"Hopefully, we'll beat this blight," Yates said, fondly remembering 60 years ago when Chestnut Hill Road was lined with the broad American chestnuts and homes were built from the rot-free wood before Asian blight struck many down.

"A lot of old barns were made of this and they are still as strong as they were when they were built," Yates said.

The ACF hopes to repopulate the eastern seaboard with American chestnut trees, which were decimated by Asian blight in the early 20th century.

Seven trees were cross-pollinated in this phase, the fourth of six—drawing two from New Hampshire and five from Vermont—which provides "a fair amount to plant," according to Kendra Gurney, ACS's New England Science Coordinator.

She said the ACF will look at another American chestnut tree in Exeter for another potential source for the project.

The tree from Farmington produced 154 viable seeds and 100 of them were planted in Shieling State Forest in Peterborough in May alongside a 19-tree control group made of American, Chinese and a hybrid American-Chinese chestnut trees. As of Sept. 15, 102 of the 119 total trees were still alive, including 87 from Farmington, according to Gurney.

"This is actually better than expected," Gurney said.

This is the fourth generation in the tree breeding program. The most resistant trees from this generation will then be selected for another round of cross pollination, which should be the second to last. The ACS hopes its efforts will lead to a blight-resistant American chestnut suitable for reintroduction to New Hampshire's forests, according to an ACS release.

After two more rounds of breeding trees, the ACS hopes to breed a tree that is 94 percent American chestnut and resistant to Asian blight.

Gurney said the remaining 54 seedlings from Farmington were sent to a nursery in Boscawen, which can be used

to keep the numbers to a healthy level for the project. She added more seedlings may be planted in the spring.

Eventually, Asian blight will be introduced to the trees in about five to seven years, although some of the trees will probably be naturally infected by the fungus, which grows beneath the bark and eventually blocks the flow of water and nutrients through the tree, Gurney said.

"The blight can attack (trees) at any time. It's opportunistic, but requires an open wound," Gurney said, adding a broken limb is a common site of infection.

Blight is spread on the wind and by small animals such as birds and rodents. Oak trees, which are not affected by the fungus, can act as carriers, but it is also found on chestnut root sprouts, which rarely get large enough to flower and reproduce before they are killed by blight, according to the ACS.



*The cross-bred offspring of an American chestnut tree in Farmington were recently planted in the Shieling State Forest in Peterborough (pictured), New Hampshire's first chestnut breeding orchard.*