Farmington chestnut tree may have saved species

DOVER — With the help of a tree in Farmington, those working to breed a blight-resistant American chestnut tree say they are seeing positive results, giving them hope they will reach their goal in the next few years.

Over the past decade, the American Chesnut Foundation has escalated its efforts in hopes of cross-pollinating American chestnut trees to create a species resistant to a fungus that has rapidly decreased chestnut tree populations across the nation.

According to Kendra Gurney, New England Science Coordinator for the ACF, Asian blight made its way to the United States in the late 1800s and has since affected the tree species known as a prolific bearer of nuts. The first reports of Asian blight in New Hampshire and Vermont were reported in the 1920s.

This type of blight is transferred by wind and small animals, affecting the chestnut tree’s tissue. The blight enters the tree through cracks in the bark as well as sites of injury. Once infected, the tree will never flower, pollinate or produce chestnuts. The growth of the tree is dramatically stunted as well.

Repopulating the American chestnut tree came in to focus about 30 years ago when the American Chestnut Foundation was established. According to the ACF website, founder Dr. Charles Burnham proposed a method of breeding known as “backcrossing” that incorporates blight resistant characteristics into the American chestnut tree in hopes of phasing out the genes susceptible to blight.

Trees chosen to be used in this program are selected based on their level of resistance to Asian blight. Scientists have spent the past few decades cross-pollinating blight-susceptible American chestnut trees with fully-resistant Chinese chestnut trees.

In the summer of 2007, volunteers with the ACF cross pollinated a healthy 40-foot-tall chestnut tree discovered on the Farmington property of Bill and Nancy Yates. Scientists introduced pollen from a chestnut tree located in the ACF’s controlled research farm in Tennessee that has high levels of resistance to Asian blight. Bags were tied around 80 of the Farmington tree's blossoms to prevent airborne pollen from jeopardizing the fertilization process.

By 2008, more than 150 viable nuts produced by the Yates' were planted in a controlled research environment located in Peterborough and monitored by the New Hampshire/Vermont chapter of the ACF. Come 2013, Gurney said the seedlings from Yates' tree are surviving and have grown more than 10 feet tall.

Although the tree on his property has since died, having been infected by Asian blight, Yates said he is hopeful that the seeds extracted from his once-towering American chestnut tree will
help once again blanket the nation with the species known for its quality of wood and nuts.

According to Gurney, the trees produced from the one originally found on the Yates property will continue to grow in the Peterborough orchard until they are a size that is large enough to be challenged with Asian blight. Researchers will then inject the fungus into wounds made on the stems of the trees.

“Some of the trees should have a moderate level of resistance,” said Gurney. “Once we get the results of this process, we can make our breeding selections.” The trees selected from this process will become parents to the next generation of cross pollinated chestnut trees. Gurney said this will likely occur next year.

This process has already begun in Maine and Massachusetts, however. Gurney told Foster's ACF volunteers in these two states are seeing positive results.

“We're certainly finding trees in those orchards that are resistant enough to continue our breeding work,” she said.

The ACF's pollination efforts have expanded over the past year, with trees having been cross-pollinated in Hollis, Bristol, Eaton Center and Antrim. In Vermont, healthy American chestnut trees were discovered and pollinated in Westminster, Chester, Windsor and Woodstock.

“We've had a pretty busy pollination season,” said Gurney.

Three new research orchards have also been established over the past year, two of which are located in Vermont while one was added in the Granite State town of Bristol. This brings the total number of controlled chestnut orchard sites in Vermont and New Hampshire to eight.

“If we want to save this species, we need to continue helping them along,” said Gurney.

Because of Asian blight, Gurney said researchers are finding that wild American chestnut trees living in the forest are only aging between five and 15 years and are dramatically stunted in growth.

“They are kind of stuck in a shrubbery form instead of the tall tree they should be,” she said. “Finding a mature chestnut tree is a pretty rare thing. We do find some, but we probably only know of a handful in most states.”

In the ACF’s Meadowview Farm in Virginia, trees have been through the cross pollination breeding system for about seven years. Gurney said at this point, researchers have begun integrating the trees into the forest to see how well they survive in a noncontrolled environment. This will allow the ACF to take the next step in their breeding work by experimenting with restoring of the American chestnut species in its natural habitat.

According to Dr. Fred Hebard, a chief scientist with the ACF, more than a dozen states across the nation have embraced efforts to repopulate the country with the American chestnut tree and have established breeding programs. With each generation that is cross pollinated, researchers are able to decrease the Chinese chestnut genes in hopes of restoring all of the American chestnut genes except for its
susceptibility to blight. That is the one gene that researchers are not eliminating during backcross.

“We're progressively getting rid of all the trains of the Chinese chestnut tree except for blight resistance,” said Hebard. “After three or four generations of backcrossing, we should be able to eliminate the majority of the Chinese characteristics and restore the American characteristics that allow these tree to grow well in the woods.”

He went on to note that most states are in the phase where they are setting up controlled tree orchards to produce generations of chestnut trees born from blight-resistant trees.

At Meadowview Farm, however, staff have been uprooting trees from the farm and planting them in the forest with the help of the U.S. Forest Service since 2009.

“A lot of the trees seem to be hanging in there with the competing vegetation, which is important,” said Hebard. “Whether or not they will have adequate blight resistance, we don't know yet.”

Hebard noted that ACF staff should be able to better determine whether or not these American chestnut trees have the same resistance level to Asian blight as Chinese chestnut trees do in the next five years.

For more information about the American Chestnut Foundation, visit www.acf.org.