

By Michael French

Redwoods of the East

The forests of eastern North America were once home to American chestnut (*Castanea dentata*), formerly an extremely important tree for timber, tannin production, and wildlife. Chestnuts once composed approximately 20 percent of the canopy cover throughout the eastern forests, ranging from Maine south to Georgia and Alabama and west to the Mississippi River. The massive hardwoods were known as “redwoods of the east” and averaged five feet in diameter, attaining heights of more than 100 feet. The largest recorded specimen was found in Francis Cove, North Carolina, and was an incredible 17 feet in diameter. The trees grew quickly and produced a versatile wood that is lightweight, straight grained, easily worked, and rot resistant, even when in contact with the soil. These characteristics made it valuable for building construction, telephone poles, railroad ties, fence posts, and even fine furniture and musical instruments. The wood was so useful that it has been referred to as a “cradle to the grave” species because one’s crib and casket might both have been made from chestnut.

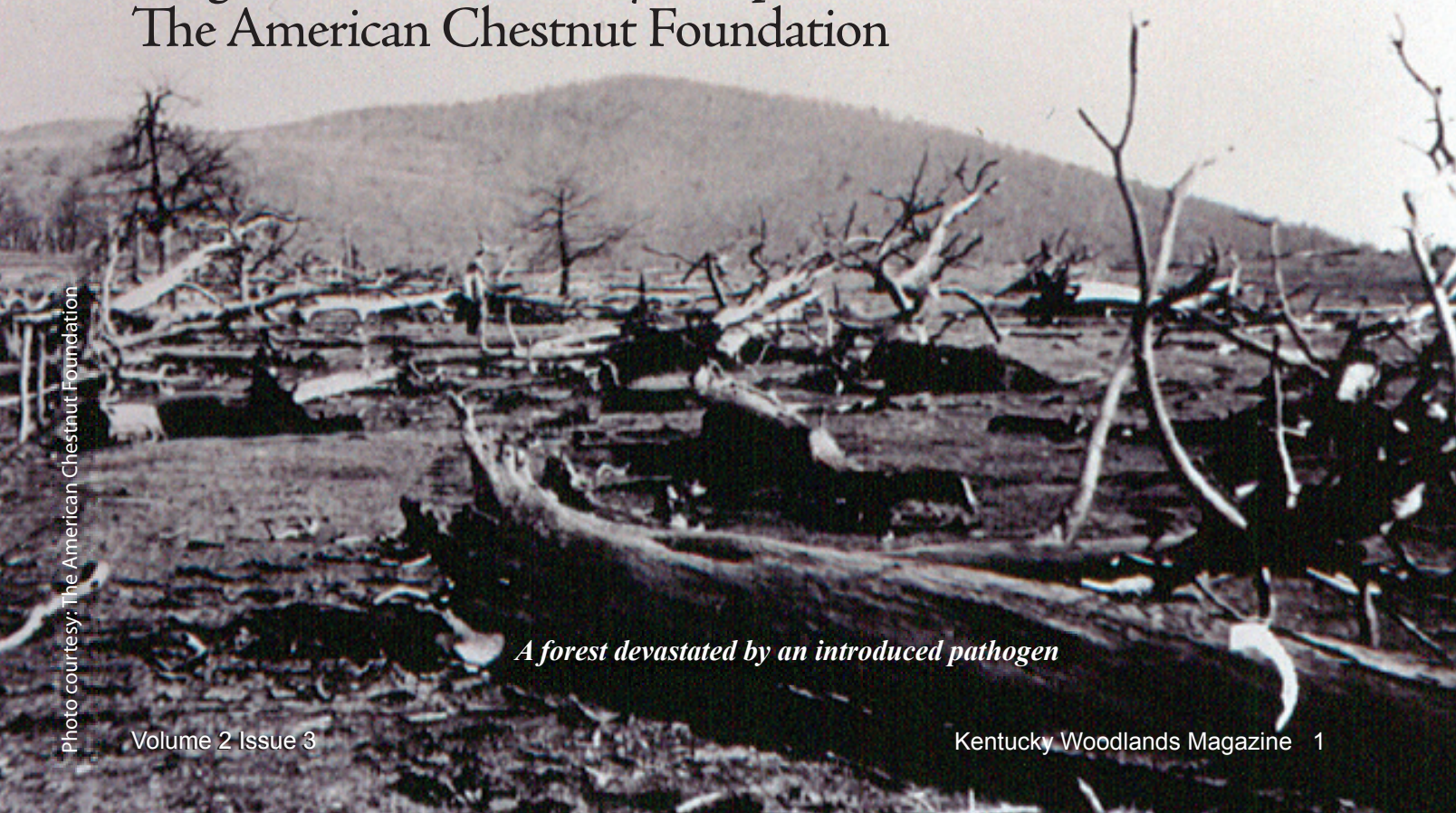
Chestnuts also produce a small, sweet nut, and their production was unrivaled. Unlike other nut producers such as oaks and beech, which flower early and vary in production from year to year, chestnuts bloomed in early-to-mid



summer, which protected the flowers from late frosts, so every fall they produced a reliable, abundant nut crop that was consumed by deer, turkeys, grouse, bears, small mammals, livestock, and humans. Railroad cars were loaded with bushels of nuts which were shipped to cities and sold freshly roasted to pedestrians. Attics throughout Appalachia would be filled with nuts for cooking and eating

Restoring an American Classic:

Progress of the Kentucky Chapter of The American Chestnut Foundation



A forest devastated by an introduced pathogen

throughout the winter. Nearly everyone has heard of chestnuts roasting on an open fire, although few today are able to truly enjoy them.

In 1904, a forester at the New York Zoological Park reported an unknown fungus killing chestnuts. The chestnut blight, as it came to be known, was likely introduced by the importation of infected Japanese chestnuts (*Castanea crenata*). The disease was spread by wind, insects, and animals, including humans, and traveled approximately 50 miles each year, leaving destroyed forests in its wake. The disease attacks the vascular tissues of the trees through wounds in the bark, rapidly girdling the tree and cutting off circulation above the infection. By the 1950s, it had covered the entire range, approximately 4 billion trees had perished, and we had lost an important timber and wildlife tree. Many consider the demise of the American chestnut to be the greatest ecological disaster of the 20th century.

The American Chestnut Foundation—There's Hope

Since 1983, the goal of The American Chestnut Foundation (TACF) has been to restore this respected tree to its rightful

position as a dominant tree throughout its natural range. Fortunately, chestnuts have the ability to sprout from the stump, and although few survive to reach the flowering stage, TACF is selectively breeding chestnuts to develop a tree that has a high degree of resistance to the blight and will be able to thrive and reproduce independently in a forest setting. By conducting controlled pollinations through a series of crosses, backcrosses, and intercrosses, TACF is producing backcross chestnuts that incorporate Asiatic chestnuts' blight resistance while retaining the desirable timber- and nut-producing characteristics of the American chestnut (Figure 1). Essentially, TACF would like to breed all Asian chestnut characteristics out of its backcross trees, with the exception of blight resistance. Each family line within a generation is selected for blight resistance by inoculating the trees with strains of the blight fungus and using only those that show good disease resistance during successive stages of crossing. In this manner, TACF is currently producing trees that are approximately 15/16 American chestnut in characteristic and 1/16 Chinese chestnut. TACF produced the first of its "final" product in 2005 and hopes to begin widespread testing around 2010.



Photo courtesy: TACF

Loggers take a break to pose for a picture inside an enormous American chestnut.

THE AMERICAN CHESTNUT FOUNDATION'S BACKCROSS BREEDING PROGRAM

With each cross, additional American chestnut characteristics are regained. Only at the final cross, however, is blight resistance equal to that of the Chinese parent again reintroduced.

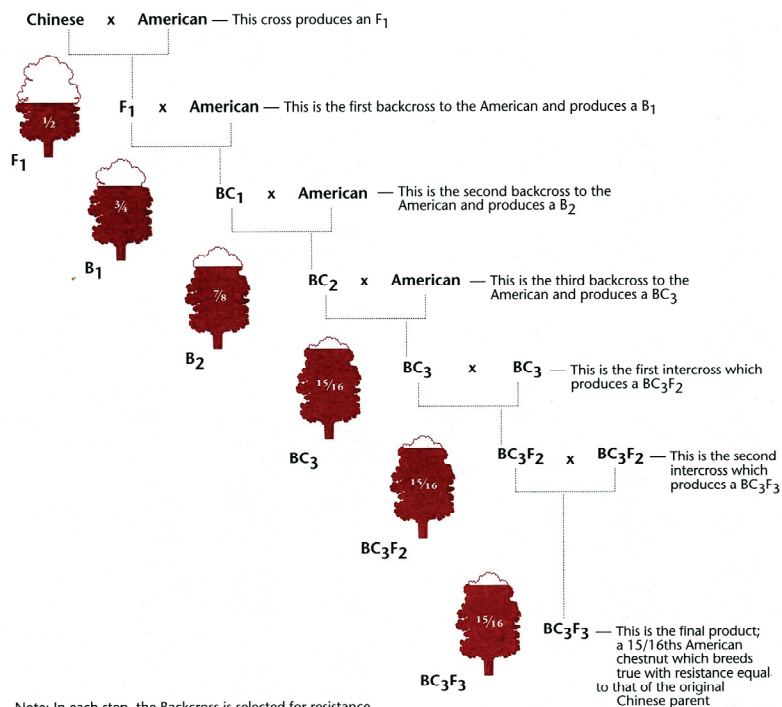


Figure 1. The American Chestnut Foundation's breeding strategy

Kentucky Division of Forestry employees help pollinate the state champion American chestnut in Adair County.



Photo courtesy: Michael French

Chestnuts in Kentucky

Chestnuts, which prefer rich, slightly acidic, well-drained soils, were found across Kentucky. They were most abundant along Pine Mountain and the Cumberland Plateau region, and the standing skeletons of long dead trees can still be found on the ridges. Sprouts are also abundant throughout these regions, but they persist in the understory and rarely reach reproductive maturity. Chestnuts dominated the ridge tops, often forming pure stands of many acres, and old-timers tell stories of how the ridges appeared to be covered with snow in June, due to all of the chestnut blooms. Chestnuts generally do not fare well in limestone soils and soils with high water-holding capacity and clay content, and they were rare or absent in the Bluegrass and Western Coalfields regions.

TACF is organized by state chapters, and in 2001, Kentucky formed a chapter following the discovery of a large surviving American chestnut in Adair County. By applying a pollen that is 7/8 American in character to the tree, the Kentucky chapter produced its first 15/16 family line. The minimum goal of each state is to produce 20 of these family lines, although the chapter would like to capture many more so that we preserve as much genetic diversity as possible. The offspring of each surviving American chestnut pollinated with a 7/8 pollen constitutes a family line, so it requires at least 20 flowering trees to reach our goal. The Kentucky chapter currently has completed or is working on 17 of these family lines including trees from as far west as Marshall County and as far east as Pike County.

The Kentucky chapter will continue to search for flowering trees across the state to include in its breeding strategy. Several survivors were discovered this past year and were immediately put into the breeding program. A few of the family lines will not be followed, due to seedling losses, mother tree death, or both, so the chapter must replace these lines with those from other naturally occurring survivors. We have also established breeding orchards in six counties so that we can grow the seedlings and screen them for levels of blight resistance and growth characteristics, and we will establish more as we produce more family lines.

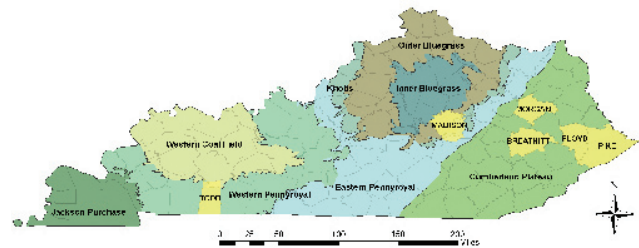
We have recently begun to experiment with mother tree orchards. Created from existing sprouts, these orchards have been successful in other states. The sprouts are flagged during the summer, then dug up and transplanted to another location during dormancy. A map of the orchard will then be created so that we will know where each sprout came from. In doing this, we will be able to care for them until they reach the flowering stage. This will save us time and travel expenses during the pollination season, and later their blight-resistant offspring can be planted in the region from which the parents were dug.

For more information about American chestnut restoration, please visit our Web site at: www.acf.org.

Author:

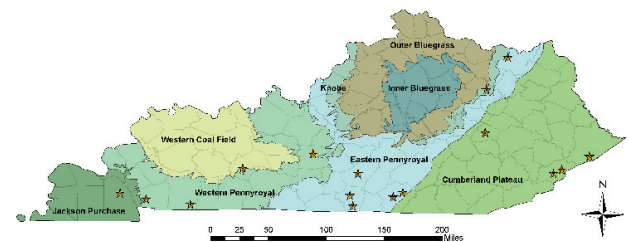
Michael French is a graduate student in the Department of Forestry at the University of Kentucky working on linking American chestnut restoration to mine land reclamation. He is also the vice president of the Kentucky Chapter of The American Chestnut Foundation.

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Locations of Kentucky's breeding orchards by physiographic region and county

Maps courtesy: Michael French



Locations of Kentucky's mother trees by physiographic region and county

Rob Watts, forest manager of Lilley Cornett Woods, examines a cankered tree with basal sprouts.



Photo courtesy: Michael French