

*The American
Chestnut Foundation
Virginia Chapter
Strategic Plan 2007 – 2014*



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Mission

The American Chestnut Foundation (TACF) was created to restore the American chestnut tree (*Castanea dentate*) to the eastern forest. Today, this once dominant tree is nearly extinct, the victim of an Asian blight accidentally introduced in the United States a century ago. Sometimes when a plant or animal is lost to extinction, we simply accept the loss. But American chestnut is worth saving. And happily, we have the opportunity to save it because of the pioneering work of TACF scientists and others, and because the blight does not always kill the root system.

Virginia was the geographic center of the tree's original range, from Maine to Georgia and from the Appalachian mountains to the coastal plain. The Virginia chapter of TACF was established in 2006 with the principal mission of supporting the effort to restore American chestnut in Virginia.



Why is the American chestnut worth saving?

There is a significant lack of awareness, particularly among public officials, about the horrible impact of the chestnut blight. Most people alive today were born after the tree disappeared from the landscape and never experienced its grandeur.

Before the blight, American chestnut was the most important hardwood tree species in the forests of the eastern United States. A quarter of the hardwoods in our forest were chestnut. Chestnut was valuable as a source of timber, producing millions of board feet of lumber per year. It was a valuable source of food, producing edible, nutritious nuts for wildlife and livestock. Roasted chestnuts were a familiar staple of the American diet. Its loss significantly reduced the biodiversity of eastern North America.

American chestnut had other unique qualities as a tree: it was stronger than white oak, grew as fast as poplar, weathered better than locust and split easily. This beautiful species often reached 100-120 feet in height and 6-8 feet in diameter. Its branches, wide foliage and late spring flowers made it a lovely, decorative shade tree.

The U.S. Forest Service, recognizing the accomplishments of TACF, recently partnered with the national organization in a joint effort to restore the forest health. The Forest Service anticipates that American chestnut will assist in the battle against invasive species by out-competing them in areas where other natives have been losing the battle.

As scientists have grown to understand better the role of carbon in climate change, restoring American chestnut has taken on new significance. Because it is indigenous to Appalachia, fast growing and its wood is long lasting, chestnut has the potential to sequester far more carbon than most other plants native to the eastern seaboard. This fact alone makes the cross-breeding program globally important.

How will the American chestnut be saved?

In its 25 years of research, TACF's has proved that by using standard back-cross breeding, it is possible to transfer blight resistance into the American chestnut from blight resistant Asian chestnuts. (See Appendix for an explanation of back-cross breeding.) Some species of chestnut native to Asia co-evolved with the blight that killed our tree. However, these Asian varieties do not grow well in eastern North America. Soon after the blight reached our continent, a program was started to cross-breed the American and Asian species, particularly the Chinese chestnut (*Castanea mollissima*). Trees that look like American chestnuts but retain the blight resistance from their Chinese ancestors are selected for further cross-breeding. Each generation brings us closer to a blight-resistant but otherwise pure American species.

In order to achieve a genetically diverse population, surviving cross-bred chestnuts over many generations must be grown. Flowers are carefully hand pollinated to control the genetics in nuts for the next generation. Then saplings are exposed to the blight to determine which inherited enough blight resistance to be bred again. The back-cross breeding program is complemented by DNA research being conducted with the help of several universities, principally North Carolina State University's Forest Biotechnology Department; The Pennsylvania State University's Schatz Tree Genomics Center; Clemson University Genomics Institute; and State University of New York College of Environmental Science and Forestry.

It is also critical to achieve a geographically diverse population of American chestnut. Blight-resistant trees raised in one habitat may not grow successfully when transplanted to a different habitat, so research orchards must be established through out the tree's historical range.

TACF's principal research station is Meadowview Research Farms, located in southwest Virginia. Meadowview is where the techniques used in the breeding program were developed. Progress has been steady since 1989, and TACF has proved that the back-cross method works. Testing of progeny from this program will start in our national forests in the next two to four years.

The role of the Virginia chapter is to grow crosses from Meadowview's advanced line of blight-resistant chestnuts and American chestnuts still living in the mountain and piedmont regions of Virginia. Ideally, four lines of 100 trees each would be planted at participating farms in this area. The orchard would consist of a mix



How will the chestnut be saved? (continued)

of chestnuts and historically associated tree species, called check trees, on a plot of about two acres. The purpose of check trees is to provide a reference against which to just the impact of the environment on the health of the orchard, including weather, activities on adjacent farms, such as spraying herbicides or predators. Chestnut progeny would be screened for blight resistance during their fifth growing season and, typically, seed collected for the final generation of breeding between the sixth and tenth growing seasons.

About the Virginia chapter of TACF:

The Virginia Chapter of TACF was launched in the fall of 2006. To date these volunteers have:

- Initiated two research orchards, one at the University of Virginia's Blandy Experimental Station and one at Roland Farm near The Plains. The number of seedlings in these two nurseries should exceed 500 by the end of 2008.
- Started a database of surviving American chestnut trees in Virginia with information on location, condition and size. To date, 95 trees have been surveyed and logged.
- Trained a group of local volunteers leading to the pollination of four mother trees and possibly 209 nuts.
- Held a full day symposium in Warrenton with five technical lectures.
- Assisted in the expansion of the Meadowview Research Farms.
- Established a strong relationship with the Virginia Department of Forestry. The Department of Forestry designated a research forester to serve on our Chapter Board of Directors.
- Cosponsored a chestnut festival at Willow Grove Inn in Orange.

These advances, while great, do not leave the chapter without significant challenges. Chief among them is funding. All organizations share the challenge of competing for public and private funds, but the chestnut restoration program has a particular handicap in that the restoration program is a long term, 50+ year, effort. Most donor organizations are keen on seeing results in a shorter time frame than the chestnut breeding program offers.

In order to address the challenges we need to provide professional support to our volunteers, particularly at the management level.

The goals of the Virginia chapter:

The Virginia chapter has set for itself three principal goals for the seven-year period 2008-2014 while we wait for our first seeds to grow –

1. *Develop blight-resistant American chestnuts that are adapted to the geographical regions of Virginia.*
2. *Educate the public about the values of American chestnut and efforts to develop blight-resistance.*
3. *Prepare for reintroduction of American chestnut trees in Virginia.*

The plans for achieving these goals follow.



Goal #1 - Development

1. Develop blight-resistant American chestnuts that are adapted to the geophysical regions of Virginia.

A. *Establish new orchards.*

Each chestnut orchard, approximately 400 trees, must be actively managed to prevent predation and sustain healthy growing conditions. Pollination and seed harvest are carefully controlled to preserve genetic integrity. The goal is to establish two more orchards in 2008 and one per year thereafter for a total of 10.

B. *Increase the number of genetic lines.*

To maximize genetic diversity, the Virginia chapter will develop new genetic lines by crossing local mother trees and trees from Meadowview. Our goal will be to establish 20 unique lines, four each year.

C. *Initiate testing.*

Seedlings will be monitored regularly by our biologist to assess their health and look for signs of blight infestation. The first significant test of blight resistance will probably be when seedlings are three to five years old, beginning in the first orchards in 2011-12. Seedlings are then judged for their American chestnut qualities, and if insufficient, are eliminated from the orchard.

D. *Locate mother trees.*

Surviving trees provide important additional sources of genetic diversity. The goal will be to locate a dozen additional American chestnuts in Virginia each year.

2. Educate the public on the values of American chestnut and our efforts to develop blight-resistance.

Publicizing our work is critical to our success. Publicity increases and sustains membership, attracts new volunteers, locates possible orchards and mother trees, and exposes the chapter to potential funding sources.

A. *Lectures and Presentations*

Our goal is to give 15 lectures or workshops each year to civic and professional associations. Exhibit materials need to be updated periodically.

B. *Conduct public Events*

- Tree Planting ceremonies, attended by local officials, have generated good publicity. Trees were planted at the White House in 2005 and at Mt. Vernon in 2006. The goals are: (i) plant a tree at Monticello in 2007, (ii) plant a tree at Montpelier in 2008, and (iii) identify locations for future ceremonies.
- Annual statewide membership meeting to showcase progress to the chapter's entire membership.
- Scientific seminars. The goal is to hold public seminars on the plight of the chestnut twice a year, starting in Charlottesville in the fall of 2007; and in Richmond and northern Virginia in 2008.
- Chestnut festivals. The chapter will co-sponsor chestnut festivals as opportunities arise.

C. *Publications*

We will seek to publish at least two articles yearly in regional publications, provide numerous news releases for local papers and distribute a semi-annual newsletter to the membership.

Scientific articles are primarily written by the national organization. Information on Chapter activities will complement information provided to the scientific community.

Goal #2 - Education

D. *Promotion in elementary schools.*

The New York TACF Chapter developed a teaching module for elementary schools called “Charlie Chestnut.” We will promote the program to school teachers in the Commonwealth.

E. *Increase membership 20%.*

Members are our primary source of volunteers and support. In addition, membership dues and contributions are an important source of revenue to implement these goals. An organized effort will be made to improve the past growth. As of July 2007, we had 558 members in the Virginia Chapter.

F. *Open a chapter office.*

A chapter office is necessary to (i) provide a meeting and training facility, (ii) distribute public information, (iii) administer the chapter, and (iv) house publications, scientific files and exhibits. The office will be staffed by up to 3 people, a part-time biologist, a public relations director and an administrative assistant.

- * The biologist will train volunteers to locate and confirm the identity of surviving American chestnuts, to pollinate trees in accordance with established protocols and to harvest nuts. This person will be responsible for working with the established orchards and locating and developing new orchards. He or she will also serve as a liaison with our Meadowview scientists and work closely with them on the development of blight resistant chestnuts.
- * The public relations director will be responsible for coordinating public events, board meetings, the annual statewide membership meeting and scientific seminars. This person will develop media contacts, issue press releases of current chapter events, develop and make presentations to local civic organizations, and work closely with elementary and secondary schools to increase public awareness.

Goal #3 - Re-introduction

3. Prepare for re-introduction of American chestnut trees in Virginia.

The long-term goal of the Virginia chapter is to plant blight-resistant American chestnut trees in existing woodlands as well as new areas, such as surface mine reclamation sites and former agricultural fields.

TACF scientists estimate that an acre of American chestnut could sequester a ton of carbon per year. To make a significant impact, reintroduction will take a great deal of planning, experimentation and hard work in the coming years.

Wide scale tree planting is quite different from planting in orchards. Chestnuts and seedlings planted in the wild will be more vulnerable to predation and drought.

The short-term goal of the Virginia chapter is to experiment with different methods of planting and nurturing to determine which are the most cost-effective.

We need your help

Work is well underway toward restoring the majestic American chestnut to Virginia's forests. We can succeed, but only with the help of good science, dedicated volunteers and generous donors like you.

Budget and Finance:

Estimated Chapter Expenses

| | 2008 | 2009 | 2010 |
|-------------------------------------|----------------|----------------|----------------|
| <i>Personnel</i> | 130,000 | 135,000 | 140,000 |
| <i>Facilities</i> | 15,000 | 15,000 | 15,000 |
| <i>Equipment*</i> | 20,000 | 22,000 | 25,000 |
| <i>G & A**</i> | 25,000 | 26,000 | 35,000 |
| <i>Total Estimated Costs</i> | 190,000 | 198,000 | 215,000 |

Estimated Chapter Income

| | |
|------------------------|---------------|
| Revenue from Dues | 8,000 |
| Donations from Members | 3,000 |
| <i>Total</i> | 11,000 |

* Equipment includes, among other things, ladders, truck rental, safety gear, hand tools and supplies for maintaining orchards, pollinating trees and preserving nuts. In addition, each orchard needs to be fenced to prevent deer browse; to date fencing has been donated by landowners.

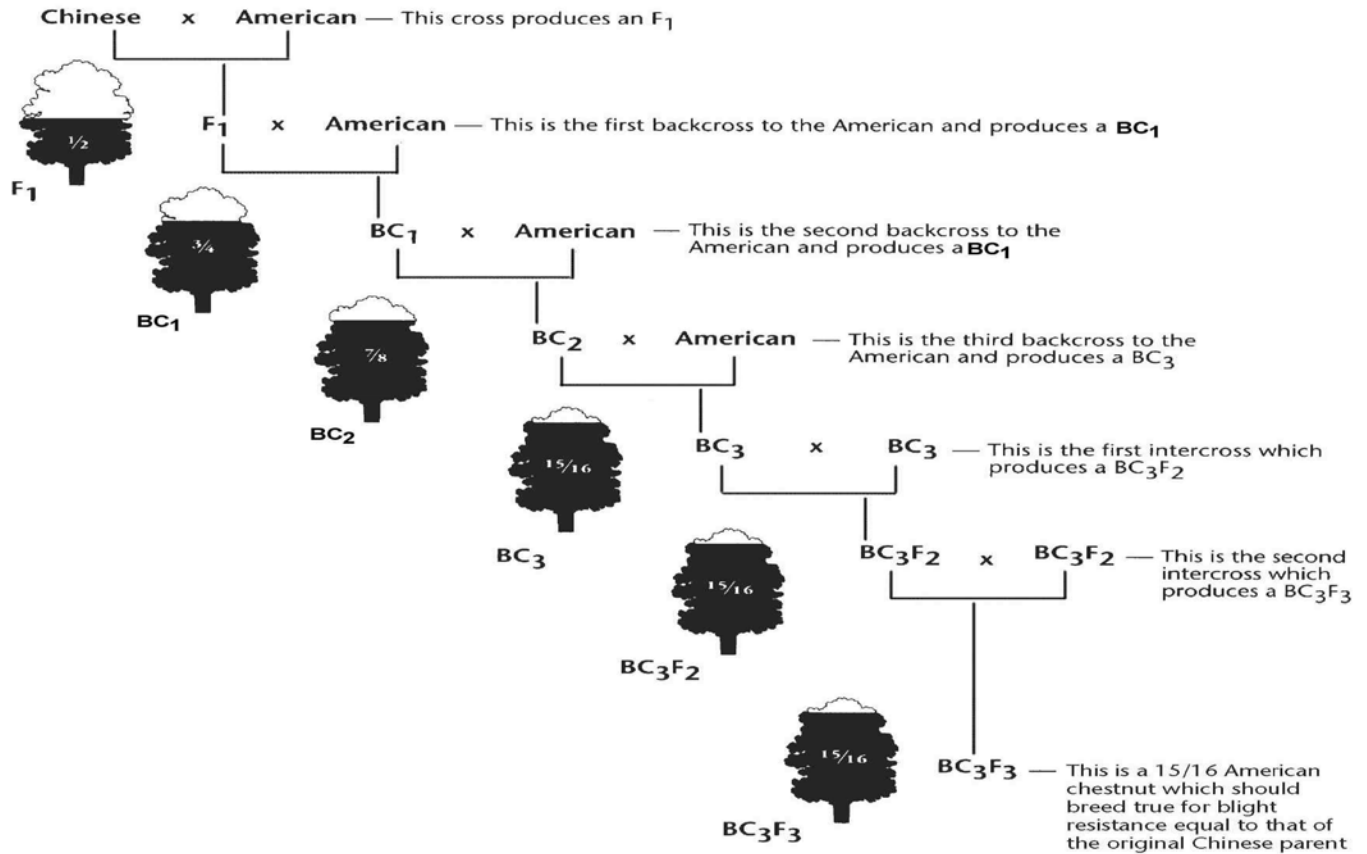
** G&A is approximately 15% of direct costs.

Appendix – The backcross method of plant breeding.

The American Chestnut Foundation is using a conventional breeding program to transfer the blight resistance of the Chinese chestnut tree into the American chestnut tree. The only characteristic desired from the Chinese chestnut tree is blight resistance, so the backcross method is used to dilute out the undesirable characteristics of the Chinese parent in progeny. The backcross method entails crossing the two trees to obtain a tree which is 1/2 American, 1/2 Chinese (F_1). This first hybrid is then backcrossed to American chestnut to obtain a tree which is 3/4 American, 1/4 Chinese, on average, known as the first backcross (BC_1). First backcrosses which manifest some blight resistant are then backcrossed again to American chestnut, to obtain trees which are 7/8 American, 1/8 Chinese (BC_2). A third cycle of selecting and backcrossing produces trees which are 15/16 American, 1/16 Chinese (BC_3). Plant breeders have found that third backcrosses are indistinguishable from the recurrent parent, in this case American chestnut. A final step is to intercross third backcrosses with each other to produce trees (BC_3F_2) which have a chance of inheriting the genes from blight resistance from both parents; they will breed true for those genes, and will serve as the mother trees to produce nuts for reforestation.

THE AMERICAN CHESTNUT FOUNDATION'S BACKCROSS BREEDING PROGRAM

WITH EACH BACKCROSS, ADDITIONAL AMERICAN CHESTNUT CHARACTERISTICS ARE RETAINED. ONLY AT THE FINAL INTERCROSS, HOWEVER, IS BLIGHT RESISTANCE EQUAL TO THAT OF THE CHINESE PARENT RESTORED.



Note: In each step, the backcross is selected for resistance. Trees indicate average fraction of American genes with no selection.