THE Journal OF THE AMERICAN CHESTNUT FOUNDATION

May/June 2011 | Issue 3 Vol.25

Where does the Chestnut Stand Today? Forest Inventory and Analysis

The Ozark Chinquapin Finally Gets Some Respect

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28th Annual Meeting
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Room rates start at $150 per night

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THE AMERICAN CHESTNUT FOUNDATION®

The Mission of The American Chestnut Foundation

The mission of THE AMERICAN CHESTNUT FOUNDATION is to restore the American chestnut tree to its native range within the woodlands of the eastern United States, using a scientific research and breeding program developed by its founders. The American Chestnut Foundation is restoring a species - and in the process, creating a template for restoration of other tree and plant species.

We harvested our first potentially blight-resistant nuts in 2005, and the Foundation is beginning reforestation trials with potentially blight-resistant American-type trees. The return of the American chestnut to its former range in the Appalachian hardwood forest ecosystem is a major restoration project that requires a multi-faceted effort involving 6,000 members and volunteers, research, sustained funding and most important, a sense of the past and a hope for the future.

About Our Cover Photo:

Clint Neel performs a Father Tree pollination at the Price Orchard at Meadowview Farm, using pollen from southern trees. The resulting nuts were planted in several orchards in the southern region. An article on controlled pollination appears on page 19.

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Journal
OF THE AMERICAN CHESTNUT FOUNDATION

Inside This Issue:

Charting Our Course - The Power of Volunteers

by TACF Chairman Glen Rea

The word "restoration" has become the buzzword for The American Chestnut Foundation (TACF) over the past 28 years. While it means many different things to many different people, restoration is, and always will be defined for me as TACF's sole mission. Today, restoration has taken on a new meaning – ACTION.

TACF recently began the restoration planning process by hosting four regionally-based workshops to develop a way to collect information, suggestions and associated questions about restoration from our members and partners. The ideas and suggestions that come from these workshops will help lead us toward developing a comprehensive restoration plan for the American chestnut. This process has been designed to ensure a bottom-up approach so that we can fully consider the comments and recommendations of our partners and any of our members who want to contribute to the process.

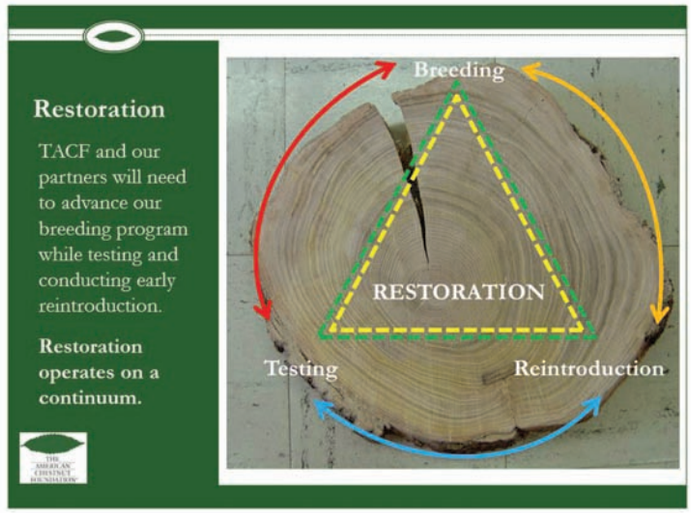
In addition to the workshops recently completed, TACF will sponsor three more technical workshops to gather ideas and suggestions regarding our restoration plan. These technical workshops include: Breeding and Testing, Development and Business, and Reintroduction and Ecology. These technical workshops will gather input from specific experts to help us develop a plan based on the best available science.

Our foundation was established with the idea that our members are the single most important factor in achieving our mission. "Take care of the volunteer, and they will take care of the mission." The development of this restoration plan follows the same path—this is an inclusive planning process and everyone has a chance to participate. If you were not able to attend any of the four workshops, I would encourage you to take a look at the first draft of the restoration plan on our website (www.acf.org) along with other relevant information about the planning process. There is still time to provide input and written recommendations to TACF for inclusion in the planning process and I want to reiterate that we are taking a very "ground up" approach to the development of this final restoration plan.

TACF Chairman Glen Rea

We want you to be involved in this very important planning process. By sending your ideas, questions and even concerns to any of the regional science coordinators, you will become part of a plan that has been 28 years in the making. This is an inclusive process that will someday result in our forests being filled with that mighty giant—the American chestnut tree.

Go to www.acf.org and click on "Regional Restoration Planning Workshops".



News From TACF

DNA Analysis May Help in Breeding Root-Rot Resistant Chestnut Trees

How many genes from Chinese chestnut does it take to make an American chestnut hybrid resistant to root rot disease? Is it possible to discover what these genes are and clone them? These were questions discussed by a group of scientists who met last fall. Dr. Dana Nelson of the USDA Forest Service's Southern Institute of Forest Genetics led the discussion, which focused on data collected over the last six years by Dr. Joe James of Seneca, SC, Dr. Steve Jeffers of Clemson University and Dr. Paul Sisco of TACF. Root rot, also known as ink disease, is caused by a soil-borne pathogen *Phytophthora cinnamomi*. It is lethal to American chestnuts and chinkapins, but the four Asian species of *Castanea* are resistant. Dr. James developed a screening protocol to select hybrids that are resistant to both root rot and chestnut blight.

One of the goals of the current Forest Health Initiative (www.foresthealthinitiative.org) is to use biotechnology to combat ink disease in chestnut. There are indications from previous data that a single gene from Chinese chestnut could confer much of the resistance to root rot. Over 1,000 seedlings at Dr. James' farm will be screened next summer. A leaf for DNA extraction will be collected from each of the seedlings before they are exposed to the root rot pathogen. When susceptible seedlings have died, data will be collected on survivors vs. dead seedlings to determine whether, indeed, there is a single major gene for resistance coming from Chinese chestnut.

This original artwork by 13-year-old Beau Badon beautifully illustrates the American chestnut and its historic place in Appalachia.

Younger Members are Key

Even TACF's youngest members can inspire us in our mission to reintroduce the American chestnut tree. Beau Badon, a 13-year-old Tennessean, sent a wonderful drawing that illustrates the beauty of the chestnut. In a letter to TACF, Beau said he heard the story of the American chestnut from his father, who is a TACF member. Set in the Appalachian Mountains, Beau describes his artwork as showing the dominance of the tree and how it was used to build homes. We also received a letter from 5-year-old Chloe Cohen of Massachusetts, who sent in her own donation in the hopes that "some chestnuts succeed!" Thank you to both Beau and Chloe!

Former President Jimmy Carter Talks Chestnuts with TACF Leaders

TACF board treasurer Steve Barilovits and TACF President & CEO Bryan Burhans recently had a chance to visit with former President Jimmy Carter to talk about the status of the American chestnut. Carter reported that the demonstration planting established at the Carter Center in Atlanta in 2005 is thriving.

News From TACF

Barilovits mentioned that President Carter is still very interested in TACF's progress and looks forward to hearing about how our work is going.

Virginia Chapter Raises $10,000 to Sponsor TACF Legacy Tree

The Virginia Chapter has proudly joined chapters from Georgia and Maine by raising $10,000 to sponsor an American Chestnut Foundation Legacy Tree. After setting the goal of Legacy Tree sponsorship, the Virginia Chapter Board raised $3,750 (with 100 percent board participation) before sending a letter to chapter members challenging them to contribute. Forty-seven members donated to the Virginia Legacy Tree sponsorship. In addition, Virginia preservationist and entrepreneur Sandy Lerner commissioned a limited edition silver chestnut spoon to be used as a reward for larger contributions to Virginia Chapter efforts.

Individuals can also sponsor a Legacy Tree. Sponsorship creates the opportunity to receive Restoration Chestnut seed produced in future years by these special trees from the seed orchards at the TACF Research Farms. The 2009 Legacy Tree sponsors were each able to receive six Restoration Chestnut seeds for planting in 2010.

Ninety-two-year-old Wylie Johnson poses with family members, state foresters and TACF representatives on the Johnson property in Bibb County, Ala. Mr. Johnson, who remembers eating homegrown chestnuts as a child, sponsored the planting of two Restoration Chestnuts. See page 9 for more Alabama Chapter activities.

In Memory of and In Honor of Our TACF Members

In Memory of

Richard Hutchison
Mary Best

Warren F. Halstead
John Bozeman
Heather Randall

Dr. John R. Leahy
Robert and Jean Lincoln

Dr. David J. Merrell
Amber and Dave Dapkus

Nick Soprano
Carolyn Worsley

Joseph N. Pew III
Kathy and Dave Deibert
Private Family Office, LLC
New Life Bible Fellowship Church
Curtis Barnette
The Glenmede Corporation
Albert and Joan Piscopo
Reinsel Kuntz Lesher, CPAs
Melinda Rath

D'Arcy Brent
Diane Dixon

Edwin Smoots
Jill Widseth
Dorothy Kullman
Joseph Johnston
Sherrie and Gary Fischer
Tom and Joanne Morrissey
Brooke and Sue Taney
Walter Seibert
Cynthia Lin Smoots

In Honor of

Kay Murray
Dorothy Gordon

Please consider making a gift in honor of or in memory of a loved one. Gifts may be directed to TACF, 160 Zillicoa Street, Suite D, Asheville, NC 28801

TACF's Heroes: Volunteer Orchard Managers

by Bryan Burhans, CEO

TACF President and CEO Bryan Burhans

When we talk about TACF's breeding work, we often point to our Meadowview Research Farms in southwest Virginia. But our breeding program extends far beyond Meadowview. Each TACF state chapter has taken on breeding work within our program to breed blight-resistant and regionally adapted American chestnuts. In fact, we could not satisfy our regional adaptability breeding program goals without the hard work of our state chapter volunteers.

TACF Chapters are tasked with breeding 20 American lines for each source of blight resistance, up to two or three sources. Most chapters have worked with either the 'Clapper' or 'Graves' sources of resistance; however, some have chosen to take on both sources or even try an additional source. This is a lot of breeding to do with an all-volunteer crew!

Breeding a line requires chapter members to find and properly identify wild American chestnut trees from their state. This is no small feat, as finding wild trees is only the first hurdle. To pollinate a tree, or collect pollen from it, the tree must be flowering. A flowering chestnut is a rare find, as blight often knocks the trees back long before they are of reproductive age. But a flowering and wild tree is not the end of the list – the tree must also be accessible. Many chapters rely on donated bucket trucks to access chestnut flowers, though more adventurous methods have certainly been employed. But our members persevere to find these "needle in a haystack" trees and to conduct the crosses they need to make and harvest nuts in the fall.

Once these hard-won nuts are harvested, they need a place to grow. We are lucky to have so many volunteer orchard managers and partners to support our chapters' breeding orchards. The job of an orchard manager is not a small one, especially as a volunteer. Planting is fun and it's usually an easy sell to get help planting the orchard. Who doesn't like to plant trees? It's a hopeful act and allows more people to get involved with our program. But what about watering during a heat wave? Or weeding individual tree shelters? Or spraying for defoliating insects? Our volunteer orchard managers know what they need to do and they get it done.

Growing chestnuts sounds like it should be easy. We often boast about how many chestnuts were once a part of eastern forests and how great a competitor American chestnut can be. But for a species that was once so prolific, there are constant battles our orchard managers face. Chestnuts are tasty, and not just the nuts. Deer find the foliage irresistible and in many parts of the range deer fencing is required. Voles find the roots irresistible and shelters are often employed to keep them, and any other bark-hungry rodents, away from the roots and base of the stem. Weeds are constantly fighting young chestnuts for resources and vegetation control can be a struggle, especially when the trees are young and need every advantage they can get. And, of course, Mother Nature can be cruel. Droughts, floods, ice storms, late frosts, early snows – all have caused problems for our orchards at one time or another. But our orchard managers roll with the punches and pick up the pieces as needed.

As you'll better understand after reading this issue, our volunteer breeders and growers are the backbone of our regional adaptability breeding program. They come from all walks of life – some from related fields, some from surprising backgrounds – but they share a common respect for the species and a hope for the future. We owe them all a big "thank you" for all that they do.

TACF Chapter Focus: Alabama

Over the past year, a major emphasis of TACF's Alabama Chapter has been placed on building relationships with organizations with the potential to participate in American chestnut restoration in their state. Some "partnerships" have been built simply through email and phone conversations, but most have been developed through the much more rewarding experience of face-to-face meetings. Typically, when you show up as a representative of TACF, you're treated as someone special involved in a respected effort.

Some of the more recognizable organizations now working with TACF in the state are the Alabama Forestry Commission, the Alabama Wildlife Federation, the Alabama Forestry Association, Alabama State Parks, Forever Wild, The Freshwater Land Trust, Russell Lands and the Boy Scouts of America. Some will be participating in planting. Some provide influence in government. Some are able to reach the public in ways we never could without them. Some partners will even be able to assist in the important task of locating new, wild American chestnuts. All serve to expand the scope of our efforts.

The value of these partnerships was recently demonstrated in a clear and very effective way: The heart of our breeding effort lies in the first orchard begun in 1995 by Dr. Jimmy Maddox in Muscle Shoals, Ala., on 4 acres of Tennessee Valley Authority (TVA) land with their full support. The TVA has since decided to divest itself of the 1,400 acres known as the Muscle Shoals Reservation and make the property available for development. As remarkably short-sighted as it sounds, there is a real danger that this orchard, in operation for 16 years, could be lost.

The TVA has invited public input on the various options for development of this land. We've sent an appeal to our friends and partners around the state to respond in support of keeping the orchard in place and their response has been explosive. Although the effort as of this writing is still ongoing, the TVA has acknowledged that this response on our behalf has been impressive. It has made a real difference.

A TACF planting is a relatively easy and enjoyable way to reach out to the public.

We've completed our first demonstration planting this past December on the campus of Huntingdon College in Montgomery. The Huntingdon campus is a beautiful setting and was actually the site of a number of scenes in the movie *Big Fish* directed by Tim Burton. The planting was a fun event attended by about 70 people. A TACF planting event is a relatively easy and enjoyable way to reach the public and more are planned for this year. Local papers often show an interest, and it's amazing the effect that a well-placed newspaper article can have.

In addition to our in-state efforts, we've recently met with the U.S. Army Corps of Engineers in northeast Mississippi in response to their expressed desire to participate in chestnut restoration. They have beautiful, well-suited land there and are excited about getting involved, and we're excited to be getting something started in Mississippi. We need to establish a TACF chapter there and this partnership is a step in that direction.

The heart of our mission has always been, and remains, in the breeding effort. Still, as we move towards restoration, the "strategic" part of our Restoration Plan involves expanding our abilities by joining with others who support our effort. We're proud to say the plan is working in Alabama.

Mac Phillippi is president of the Alabama chapter of The American Chestnut Foundation.

Inoculating Chestnuts with Chestnut Blight

Testing our Trees for Resistance to Blight

by Kendra Gurney

This Petri dish of chestnut blight fungus has been cut into plugs by a cork borer and is ready to use.

A standard method of identifying blight-resistant chestnuts is to inoculate them with known strains of chestnut blight. Here's how our scientists and volunteers are using this science to breed a stronger chestnut.

What is Inoculation?

The term inoculation often makes us think of going to the doctor and getting a shot. We receive a controlled, low-dosage injection of an infectious disease, which induces an immune response in our bodies and protects us against future encounters with the pathogen. But what does it really mean to inoculate?

According to Merriam-Webster.com, the verb "inoculate" means "to introduce into a suitable situation for growth." And when we talk about inoculating American chestnut trees with the chestnut blight, this is what we mean. We introduce fungal mycelium of the chestnut blight fungus, *Cryphonectria parasitica*, into the cambium, or living tissues under the bark, of a chestnut tree. This produces an immune response in the tree, but not in the same way it would in a human. Unlike mammals, trees do not have an adaptive immune system that "remembers" a pathogen to help guard against future infection. But what inoculation does do is infect the chestnut tree with chestnut blight in a controlled manner, such that we can evaluate the blight-resistance of the tree.

Why Do We Inoculate?

Inoculation is the first step to determining the resistance of chestnut trees to chestnut blight. In our breeding program, we use inoculation to gauge the resistance of individual trees within breeding lines.

When Do We Inoculate?

Inoculation usually occurs in early summer, once the trees are fully leafed-out. The size of the trees is also a consideration, and the ideal size for inoculating depends somewhat on the

breeding generation of the tree. Backcross trees are only expected to be moderately blight-resistant and we typically wait until they are at least 2 inches in diameter at breast height (dbh). Intercross trees are expected to be highly resistant and may be inoculated when they are closer to 1 inch in diameter at 1 foot above the ground. Keep in mind though; it is possible to kill even a blight-resistant Chinese chestnut with a blight inoculation if it is done incorrectly, or while the tree is too small.

How Do We Inoculate?

The inoculation process is fairly simple. We use two strains of the fungus, one known to be highly virulent (EP155) and one known to be mildly virulent (SG 2,3). This allows us to see the range in responses – some trees may be resistant to the less virulent strain, but not the more virulent – and this range helps us select the most blight-resistant trees.

We use a standardized process for inoculation throughout our orchards. A cork borer is used to punch a hole through the bark and cambium of the tree. The two strains of the fungus are grown in Petri dishes and brought out to the field. The same cork borer is used to create a plug of fungal mycelium and growth media from the Petri dish. The plug is then inserted into the hole in the bark and secured in place with masking tape. Because we are using two strains of the blight we create two of these inoculations, one for each strain, with the weaker strain about 12 to 18 inches above the stronger. This way, if spores are washed down the tree over the course of the season, the strong strain won't contaminate the weaker strain. In addition, the stronger strain produces a larger canker, and placement lower on the tree gives it more room to grow without girdling the tree.

How Are Inoculations Rated?

The fungal inoculations are left to grow for the rest of the season and the resulting cankers are rated once in the fall, about 5 to 6 months after inoculation, and once again a full year later. The trees showing the best resistance are then evaluated for an assortment of morphological traits specific to American chestnut. Those trees with the best blight-resistance and American chestnut characteristics are used for the next generation of breeding.

Thea Evans and Tristan Evans Fargione select an inoculation site on this backcross chestnut in Maine's Deer Hill orchard.

How Can You Help?

We often inoculate an entire orchard at one time, which can be a lot of trees! If you are interested in volunteering to help inoculate trees in your area, please contact your local state chapter or TACF Regional Science Coordinator for more information.

Kendra Gurney is the New England Regional Science Coordinator for The American Chestnut Foundation.

American Chestnut Learning Box

The Learning Box was a big hit at TACF's Annual Meeting. So what comes next?

Some of the items included in version 1.0 of TACF's American Chestnut Learning Box. Inspiration for the learning box came from volunteers who found that audiences became more engaged when they were able to touch tangible items connected with the American chestnut and TACF's restoration work. KAM photo.

Have you ever shown a child a chestnut bur for the first time? After your quick warning about the prickly spines, comes the child's delight in touching the bur's velvety interior. The bur is an amazing package, both for protecting the chestnut AND for attracting the interest of new learners. The power of hands-on encounters to engage learners in the story of the American chestnut has inspired the creation of TACF's American Chestnut Learning Box.

TACF's Learning Box 1.0

TACF's American Chestnut Learning Box includes nuts, burs and leaves from American and Chinese chestnut trees, a chestnut "tree cookie" (tree ring slice), blocks of five different types of wood, and chestnut tree sections showing inoculation sites and chestnut blight. Explanatory pages keyed to each of these samples are included in a binder. In addition to these "hands on" items, many resources for teaching about the American chestnut are included either in printed form or on accompanying CDs. The target audience for the current version is people of all ages who visit informal learning environments such as nature centers or museums.

Last fall's TACF Annual Meeting included a workshop on using the American Chestnut Learning Box, and each TACF chapter was invited to take a Learning Box home at the end of the meeting. This generated many animated conversations. Several attendees asked "How can I get one for my class, group or museum?" *(The answer is that Learning Boxes will be available in the near future for a modest fee. The contact point to get your Learning Box is Lisa Sousa at TACF Headquarters in Asheville (828) 281-0047 –ed.)*

A Bit of History

After more than a year of discussions and disappointment in terms of grant funding efforts, the Development Cabinet's Education Committee decided in the fall of 2009 to move forward with available resources. Sara Fitzsimmons, Gary Carver (MD) and Bruce Wakeland (IN) had already been collecting leaves, burs and wood samples, and Carver's explanatory pages had been circulated for comment. We concluded that we could assemble enough of the plant materials to create 20 Learning Boxes by the next annual meeting. We then set a goal of providing an American Chestnut Learning Box to each TACF chapter, and presenting a workshop to assist chapter representatives in making use of the Learning Box. This version of the Learning Box would be a prototype, or test version. Insights for improvement would be sought from the chapters' experiences.

As fall approached, we still needed funding

for the non-plant materials—the boxes, binders, specimen jars and posters. Bryan Burhans encouraged us to ask the TACF chapters for support. We sent a request to each of the chapter presidents and they came through, with chapters and three individuals contributing a total of $1,000 just in time to cover the major out-of-pocket expenses.

TACF contributed two beautiful posters and a copy of *Mighty Giants* for each box. Staff in the Asheville office also created a resource CD with slide presentations, files for additional posters created by Dr. Carolyn Keiffer (OH), and many photos. The New York Chapter provided copies of two Charlie Chestnut videos created for the Charlie Chestnut program. Much of the coordination and assembly of the boxes was done by volunteers.

What We've Learned

With a better understanding of the time, effort and logistical issues involved in assembling all of the materials into Learning Boxes, we are now better able to estimate and build our capacity to produce larger numbers of Learning Boxes as demand increases. We plan to create at least 20 more Learning Boxes before the 2011 Annual Meeting.

We have also learned that one of the challenges in seeking grant funding and in future planning for the American Chestnut Learning Box is to more accurately know what production costs are. With this initial effort, we learned enough about out-of-pocket and labor costs to seek future funding and to establish a price as we move forward on a small scale. Any proceeds in excess of out-of pocket costs will fund future TACF educational initiatives.

On to Version 2.0

The initial 20 American Chestnut Learning Boxes are labeled "Version 1.0". This expresses an intention to improve the materials in the Learning Box as we move forward. There is plenty of room for additional materials in future versions. (See Sidebar)

Kathleen Marmet is a member of the TACF Development Cabinet and Virginia Chapter Board member.

Hands on learning activities engage and motivate learners of all ages. These students from Briceville, TN worked with adults to plant chestnut trees during their annual history & ecology field trip. Items in TACF's Learning Box provide opportunities for hands on engagement even when a field trip is not possible. Photo used with permission of Coal Creek Watershed Foundation, Inc. www.coalcreek.com

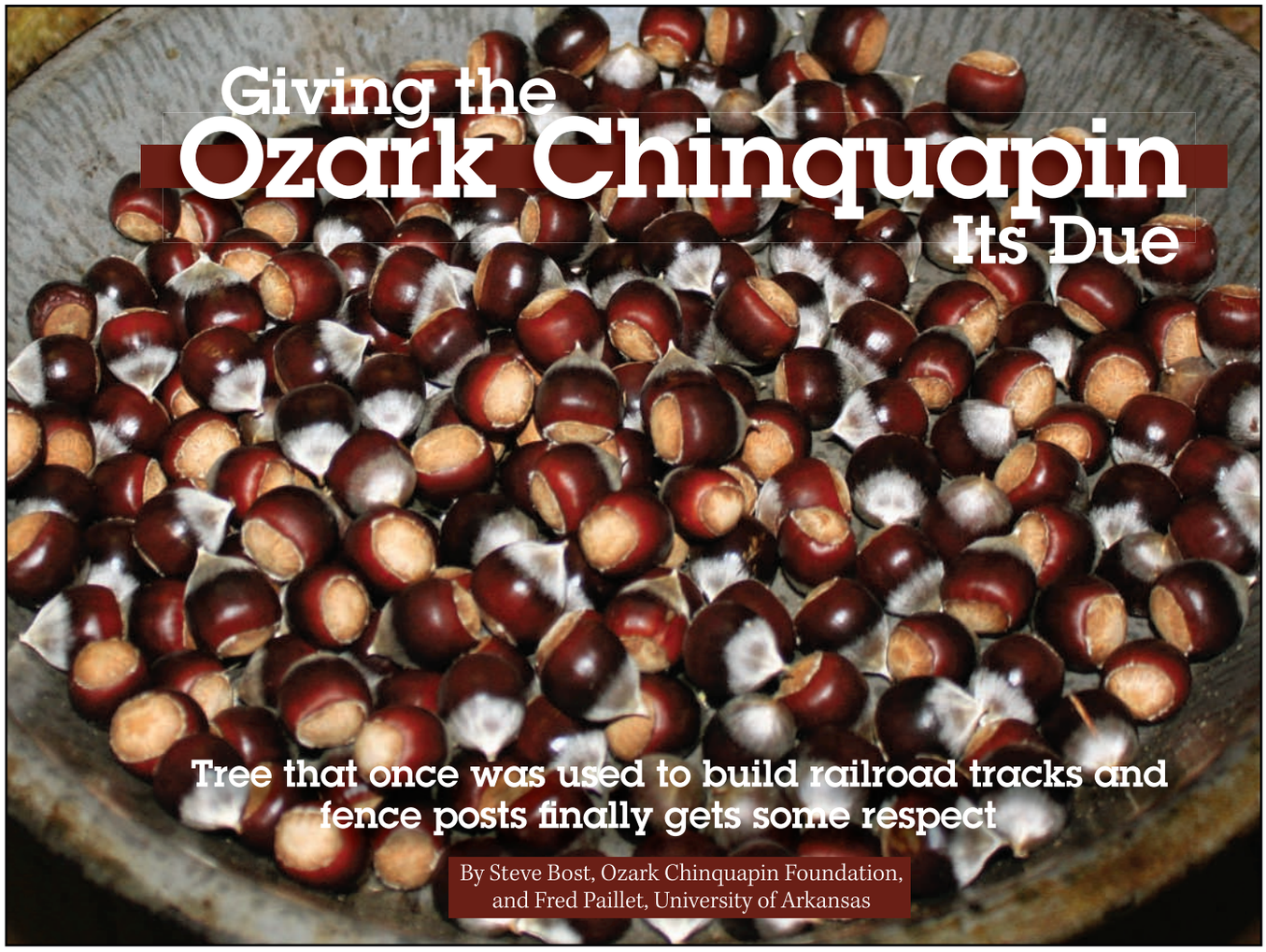
Help Us Build a Better Learning Box

Enter the "American Chestnut Experiences in Learning" Contest!

Help us improve the next version of TACF's American Chestnut Learning Box by sending us your ideas for new American chestnut learning activities. All submissions received by September 30, 2011, will be on display during the TACF Annual Meeting October 21-23rd in Java Center, NY. The winner(s) will receive as a prize, his or her own Version 2.0 American Chestnut Learning Box. All submissions selected for inclusion in the Learning Box will be announced at the 2011 Annual Meeting and acknowledged on the TACF web site's education page.

Your submission should be original and/or should credit anyone else who has contributed to its creation. It can be in any form that would be suitable for inclusion in the Learning Box. Written pages should be 8 ½" by 11" so that they can be added to the existing binder. Your activity is more likely to be used in the Learning Box if it can be readily carried out by others and it should be suitable for any age group. Please include a list of necessary materials and clear directions, including any advance preparation required. Stuck for ideas? Fred Paillet used his wonderful drawing skills to create two sample learning activities that may inspire you. You can find Fred's drawing, along with contest details and a complete list of the Learning Box contents at: www.acf.org/educational_programs.php.

Contest Entries should be sent to:
Lisa Sousa, Director of Grants and Agreements
The American Chestnut Foundation
160 Zillicoa Street, Suite D
Asheville, NC 28801 Phone: (828) 281-0047
Email: lisa@acf.org



Giving the Ozark Chinquapin Its Due

Tree that once was used to build railroad tracks and fence posts finally gets some respect

By Steve Bost, Ozark Chinquapin Foundation, and Fred Paillet, University of Arkansas

Ozark chinquapin nuts. Photo by Steve Bost

The Ozark chinquapin (*Castenea Pumila var ozarkensis*) is surely the Rodney Dangerfield of the chestnut world – this magnificent tree that once produced bountiful crops of nuts and sturdy, rot resistant wood for railroad ties and fence posts is routinely dismissed as a minor shrub like its Appalachian cousin, the Allegheny chinquapin. The generic name itself seems dismissive, until one recognizes that the term chinquapin refers to the habit of bearing nuts one to a bur and does not automatically confer shrub status. In fact, the related Chinese chinquapin (C. henryi) is a giant forest tree. During an initial project with the U.S. Forest Service in the 1990s, Fred Paillet was amazed to stumble onto the giant trunks of long dead Ozark chinquapins in the Ozark National Forest. This was clearly different from anything seen in the mountains of North Carolina and Virginia.

Nearly Forgotten

It may still not be widely known that the Ozark chinquapin was a real tree, but local residents of these hills certainly valued what they had, and still mourn the loss of their own chestnut species. Older natives of the Ozarks still remember the wondrous nut crops and valuable wood that was once an integral part of their natural world. Harold Adams, a local resident old enough to remember chinquapin in its heyday, said, "The Ozark chinquapin nuts were delicious and we waited for them to fall like you would wait on a crop of corn to ripen. Up on the hilltop the nuts were so plentiful that we scooped them up with flat blade shovels and loaded them into the wagons to be used

Left: University of Arkansas student Francis Onduso measures the height of trees on one of our study sites. Photo by Fred Paillet

Right: U of A student Chris Cerny pulls a core from a shortleaf pine on one of our historical reconstruction sites. Photo by Fred Paillet

as livestock feed, to eat for ourselves, and to sell. But, starting in the 1950s and 60s all of the trees started dying off. Now they are all gone and no one has heard of them."

An Effort at Restoration

More than a decade ago, a small but dedicated group of local outdoorsmen led by Steve Bost undertook a serious effort to restore our native chestnut species. Thus, the Ozark Chinquapin Foundation began. The initial goal of the foundation was to identify large surviving trees with possible blight resistance, collect nuts, establish test plots, and cross-pollinate outstanding trees. The ultimate goal is to restore 100 percent native chinquapin trees to the Ozarks without resorting to the introduction of non-native gene material as a source of resistance. Of course, this is much more likely to occur in the case of chinquapin, where the trees bear significant nut crops at a much earlier age than in the case of American chestnut, so that it is likely that sexual reproduction has been occurring in the wild. Some natural concentration of resistance may well have occurred already.

While local residents work to restore the Ozark chinquapin, we have also begun a more systematic study of the tree and its status in pre-blight and modern forests. With the help of students in the Tree Ring Laboratory at the University of Arkansas and a generous grant from TACF, we have surveyed the remains of old blight-killed chinquapin on local natural areas and mapped the distribution of living chinquapin sprouts. These results leave no doubt that Ozark chinquapin was a real tree. We find old chinquapin logs up to two feet in diameter lying on the forest floor, or occasionally still upright where they lean into the crowns of adjacent trees. The average diameter of chinquapin on our study sites was about a foot.

Unfortunately, we can't compare their size with that of the other trees in the forest today because the surrounding trees have put on many decades of added growth since blight arrived in the Ozarks. When you take borings from the surrounding forest trees it is clear that chinquapins were larger than almost all their competitors – and growing at about double the increment rate – at the time when blight arrived to eliminate them. And when exactly was that? We can use the dramatic acceleration of growth shown by cores from trees next to the remains of dead chinquapins to demonstrate that blight arrived in northwest Arkansas in 1957.

Similarities with Chestnuts

Our studies provide a wealth of additional information about Ozark chinquapin. The tree was widespread, but not as abundant as the oaks and hickories with which it grew. Trees were scattered in small groves of a few to perhaps a dozen or so, averaging less than one per acre overall. The little groves were mostly found

Top: Steve Bost and Dent County Forester Mike Fioani with a two-year-old seedling in a Chinquapin Foundation planting. Photo by Steve Bost

Middle: University of Arkansas student Jesse Edmundson cuts a section from old chinquapin wood for a tree ring study – not a job for a handsaw! Photo by Fred Paillet

Inset: Fred Paillet posing on the remains of an Ozark chinquapin killed by blight in 1957. Photo by Fred Paillet

on the upper slopes and benches within sandstone and chert ledges. The old wood shows chinquapin most often growing with a single main trunk as befits a true forest tree. The groves of mature trees were surrounded by seedlings in the form of living seedling sprouts, most of which are alive today. Very few of the older trees seem to have resprouted after initial blight infection.

All of this is surprisingly similar to what we see with American chestnut. In fact, Ozark chinquapin sprouts themselves look eerily like chestnut. They have the same growth form and show the same ability to persist as tiny sprigs of growth under adversity, while achieving six to eight feet of upward growth in a single season when the opportunity arises. The leaves themselves start to look like those of chestnut – long and thin with prominent teeth – on the fastest growing shoots. The one important difference between the two chestnut species is that Ozark chinquapin seems to develop a broader crown so as to divert more resources into nut production at an early age. This growth characteristic may be the salvation of the chinquapin because the ability to bear fruit between bouts of blight infection confers the ability to concentrate blight resistance in an evolving gene pool.

The dedicated membership of the Ozark Chinquapin Foundation is working hard to accelerate that process. In the meantime we are doing all we can to insure that this long neglected tree gets the widespread respect it truly deserves.

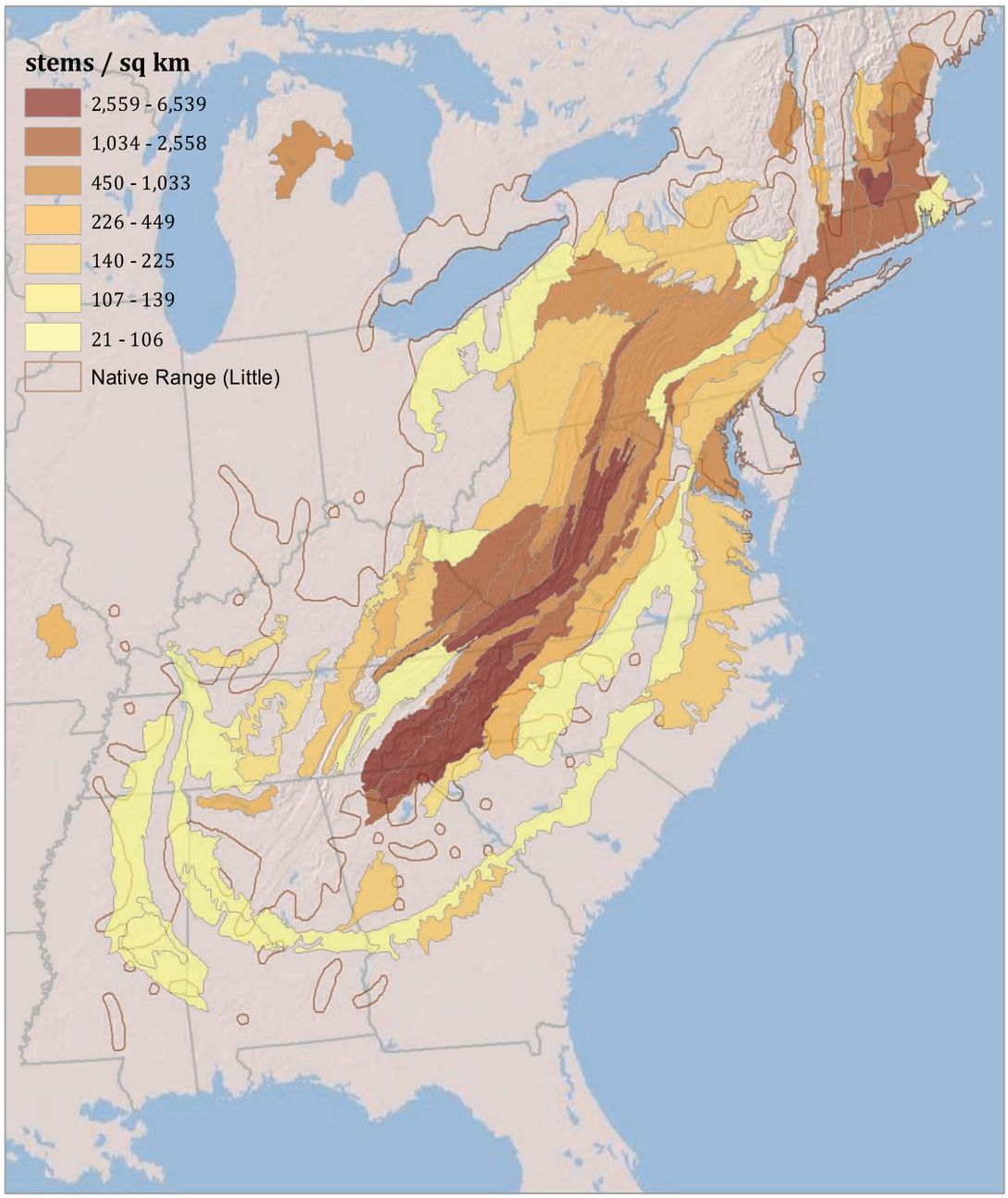
Stephen Bost is a Naturalist with the Missouri State Park system and Founder of the Ozark Chinquapin Foundation. He lives with his wife Angela and four children in Poplar Bluff, Missouri. Steve grew up hunting and fishing around his family's cabin in the Ozarks and appreciates the opportunity to work in the outdoors while doing something to restore an important part of Missouri's natural heritage.

Fred Paillet is a retired U. S. Geological Survey researcher and Adjunct Professor of Geosciences at the University of Arkansas. He has studied chestnut ecology in New England for many years and has continued his interest in chinquapin since relocating to the northwest corner of Arkansas.

The Ozark Chinquapin Foundation can be contacted at P. O. Box 1133, Salem, MO 65560 or through their web site ozarkchinquapin.com.

Ed.-The discussion on proper naming of the Ozark Chin quapin is ongoing. The author has used Castenea Pumila var ozarkensis citing a paper by George P Johnson (1985, Revision of Castanea section Balanocastanon (Fagaceae), Journal of the Arnold Arboretum., v. 69, p. 35-49). For another view see William Lord's article on Page 21, which explores alternate views on the taxonomy and of this fascinating tree.

Forest Inventory & Analysis

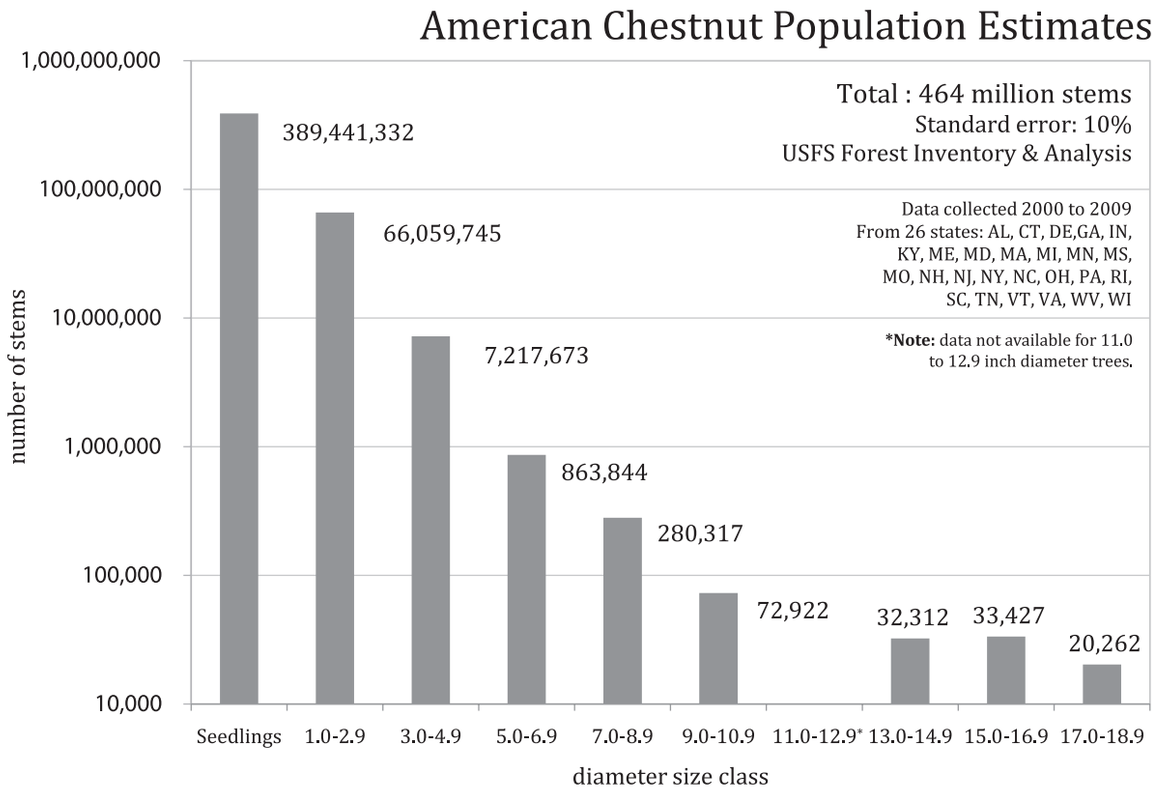


Chestnut Survivor Density (FIA Data)

John Scrivani - January 2011

Sources: Miles, P.D. Tue Jan 11 12:13:04 CST 2011. Forest Inventory EVALIDator web-application version 4.01 beta. St.Paul, MN: U.S. Department of Agriculture, Forest Service, Northern Research Station.
[Available only on internet: http://fiatools.fs.fed.us/Evalidator4/tmattribute.jsp]
The National Atlas of the United States, ESRI, Tele Atlas North America, Inc.

THE AMERICAN CHESTNUT FOUNDATION



Source: Miles, P.D. Tue Jan 11 12:13:04 CST 2011. Forest Inventory EVALIDator web-application version 4.01 beta. St.Paul, MN: U.S. Department of Agriculture, Forest Service, Northern Research Station. [Available only on internet: http://fiatools.fs.fed.us/Evalidator4/tmattribute.jsp]

It has been estimated that before the blight struck, more than 4 billion chestnut trees were in eastern North America. This estimate likely referred to mature forest specimens, and the total number of stems, from seedling to sapling to tree, was likely several times greater. The blight reduced this dominant, upper canopy resident to a population of sprouts surviving in the understory, undergoing repeated cycles of growth and dieback from chestnut blight. So how many of the 4 billion plus trees still survive?

Up until recently, a reasonable answer was not available. Inventory procedures were neither consistent nor precise enough to estimate sprout populations. Relatively new procedures and data management systems now make it possible to obtain a reasonably precise estimate.

Using the US Forest Service's FIADB (Forest Inventory and Analysis Database) we can estimate the surviving American chestnut population at 464 million (with a 10% error) as can be seen in the chart above. The great majority, 389 million, are less than 1.0 inch in diameter at breast height. The estimates drop rapidly for larger diameter classes, from 66 million in the 1.0 – 2.9 inch class, to less than 160 thousand trees in classes 9.0 inches or greater.

Survivors are found throughout much of the former range but are concentrated in certain provinces: the Blue Ridge Mountains, the Ridge and Valley, Lower New England, the Allegheny Mountains, and the Northern Cumberland Mountains. These areas, not surprisingly, were areas in which chestnut was also most prominent pre-blight.

Dr. John Scrivani is Geospatial Projects Manager, Virginia Geographic Information Network. He is the President of the Virginia Chapter of TACF and is actively involved in the Appalachian Trail MEGA-Transect Chestnut Project which is mapping and studying chestnut trees along the Appalachian Trial. (Visit: www.vatacf.org/a_t_mega-transect.html).

Controlled Pollination for Blight Resistance

Bags are used to keep "promiscuous" trees from being contaminated with unwanted pollen.

Les Tate of Alabama, and Jack Torkelson and Clint Neel of Tennessee pause to survey their work as they perform a controlled Father Tree pollination at the Price Research Farm in Meadowview.

Many people know TACF is using a backcross breeding program to create an American chestnut with blight resistance. But just how do we do this breeding to create these backcross trees? The answer is controlled pollination, at least in the early stages of the breeding program. Before becoming receptive, female flowers on a tree are covered with bags to prevent unwanted pollen from reaching them. Only known pollen of one type is then placed on the flowers. In the infamous words of Dr. Fred Hebard, think of the bags as "chastity belts for chestnuts."

Sometimes, female flowers become receptive before they are bagged and form nuts despite the "chastity belts." To detect this pollen contamination, the flowers in every tenth bag are left unpollinated. If the bags have been placed properly, before the flowers are receptive, no nuts will form in the unpollinated bags.

Window of Opportunity

The scientists and volunteers at TACF are essentially creating a science experiment with every cross that is made. Chestnuts from Georgia to Maine will need to be bagged starting in mid-June through early July, with the dates varying based on latitude, elevation and season. The flowers will be ready for bagging within a narrow window of time when the styles have emerged, but before they are receptive to pollen, as chestnut trees are very "promiscuous" and we do not want that.

The Pollination Process

The flowers are usually ready for pollination about 12 days after bagging. It is usually a good idea to leave some flowers unbagged to help with pollination timing. Take the pollen, which will create progeny of the cross you want to make, and put it on the flowers. It is very important to leave some bags unpollinated, as controls. If there are seeds in the control bags

Steve Barilovits IV performs a controlled Father Tree pollination at the Price Research Farm in Meadowview

at harvest time, you know the cross is contaminated and any nuts should be discarded. The controls ensure that TACF is creating progeny that contain the genetic material we want. But because chestnuts are very promiscuous, accidental pollen contamination happens to veteran and rookie pollinators alike.

Trees Have Mothers and Fathers Too

Because the peak of flowering occurs at different times across the range of the American chestnut, TACF operates what we call the Mother and Father Tree Programs with the state chapters. The chapters' primary responsibility is to combine resistance backcross materials from Meadowview with their American chestnuts. The trees in the southern end of the range flower earlier than the trees at Meadowview, Va., so these chapters operate the Father Tree Program. They take pollen from their native chestnuts and put it on the materials at Meadowview. This allows the southern chapters to use the freshest pollen available, and has increased yields versus pollen stored from last year. The chapters north of Meadowview operate what we call the Mother Tree Program. Their trees flower after Meadowview's, so fresh pollen is sent northward for them to pollinate their native chestnut trees. Doing this ensures TACF is using the highest viable pollen for all the crosses we create. Doing controlled pollination is a lot of work, especially because the average harvest is one nut per bag.

The progeny from these controlled crosses are planted into orchards where they will be allowed to open pollinate. Open pollinate means the female flowers will be left to be pollinated by whatever pollen manages to land, which dramatically increases yield over controlled pollinations, and is a lot less work. Open pollination is being used to create an intercross between the parents, which typically are third or fourth backcrosses. Having numerous progeny from these intercrosses is necessary for the following step in the breeding program, which is creating a seed orchard. Many trees will be needed for the strict selection process in these seed orchards that will produce the chapter's 'Restoration' chestnuts in the future.

For more information about pollinating trees in your own state or joining a state chapter, visit www.acf.org/Chapters.php.

William White is Southern Regional Science Coordinator for The American Chestnut Foundation.

The Ozark Chinquapin

By William Lord

Castanea ozarkensis
Ashe, Bull Torrey Botanical Club 50: 360 (1923)

William W. Ashe, 1872-1932, was the right man for his time. A native of North Carolina, in 1909, he became a member of Gifford Pinchot's team, in the recently formed U.S. Forest Service. They knew each other early in their careers, co-authoring, *Timber Trees and Forests of North Carolina*, in 1897. They had the same goals, but whereas Pinchot spoke for conservation and forestry in high echelons at a national level, Ashe was regional, working long hours to master his field and work with groups large and small on behalf of our southern forests. His extensive field work led to the acquisition of land for national forests, including that of George Vanderbilt's Biltmore Forest, and now known as the Pisgah National Forest.

He was also a prodigious plant collector with a lifetime collection of over 20,000 dried specimens, now in the Coker Herbarium at the University of North Carolina, Chapel Hill. He spent many hours in the field gathering data, giving lectures, and publishing, but these endeavors had to compete with his dedication to the hand lens, concentrating on the minutest detail to describe and differentiate one plant species from another.

He was particularly attracted to *Castanea pumila,* the Allegheny chinquapin. As recently as 1913 this scientific name applied to a single species found from New Jersey west through southern Pennsylvania to Missouri

William W. Ashe was a contemporary of famed naturalist Gifford Pinchot, working for him in what was the newly formed U.S. Forest Service and co-authoring a book with him. His work led to the creation of the Pisgah National Forest and recognition of the Ozark chinquapin as separate species from the Allegheny chinquapin.

and south from Florida to Texas. It ranged in size from a shrub to a small tree of 45 feet [An Illustrated Flora of the Northern U. S. and Canada, Britton & Brown, Vol. 1, p 616, 1913]. Ashe found *C. pumila* to be a smorgasbord for his hand lens and descriptive nomenclature. From 1922-26, he published descriptions dividing *C. pumila* into seven new species and seven new varieties. Only one, *C. ozarkensis* is now recognized as a species, separate from *C. pumila*.

Ashe's meticulous endeavor is represented in the *World Checklist of Fagales*, by R. Govaerts and D. G. Frodin, published in 1998 by Kew Royal Gardens of London. Four species and six varieties described by Ashe are listed as synonyms of *C. pumila*; two species and one variety are listed as synonyms of *C. ozarkensis*. Ashe established himself as the author of new species, *C. ozarkenensis* with the publication of an article in the *Bulletin of the Torrey Botanical Club, Volume 50, November, 1923, 350-61*:

Castanea ozarkensis

"A tree becoming 12 m. high. Leaves spreading, coarsely serrate, teeth about 5 mm. long, often mucronate [with a short, abrupt tip]; sun leaves lanceolate, 12-20 cm. long, bright green above, closely yellowish or tawny pubescent beneath; shade leaves much broader, sometimes 10 cm. wide, glaucous [fine, whitish bloom], glabrous or puberulent [smooth or minutely pubescent] beneath. Staminate aments [catkins] 12 - 15 cm long, 7-8 mm. thick. Fruit, in large almost sessile [stemless] spikes, at times 1.2 dm. long, is 2.7 to 3.2 cm. thick, the densely set spines 1.0-1.3 cm. long; nut, oblong-ovate, 1.5 cm. long, dull brown. Common north of the Arkansas River from Center Ridge, Arkansas, northward to southwestern Missouri and westward to the valley of the White River. Specimens collected in Barry County, Missouri, by Bush and A. B. Smith seem, on account of their glaucous leaves, to belong to this species rather than to the next, which appears entirely to replace it in northwestern Arkansas in Madison and Washington Counties."

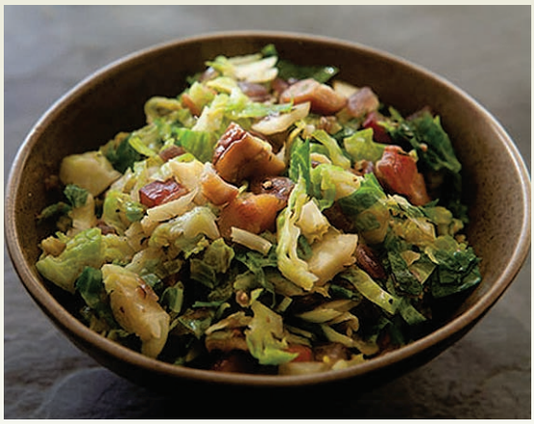
The "next" that Ashe refers to is described in the same Torrey bulletin as *C. arkansana*, [and as a synonym of *C. ozarkensis* in the World Checklist] is remarkable for its greater height and breadth. "A tree becoming 20 m. high and reaching a diameter of about 1 m..... Both of the above proposed species are well separated from other related species by their very large and coarsely toothed foliage and large involucres [burs]."

Bill Lord, a retired veterinarian, is a naturalist and author who spends much of his time in libraries, researching material with a focus on chestnuts.

Brussels Sprouts with Bacon & Chestnuts

Courtesy of SimplyRecipes.com - Reprinted with permission

Brussels Sprouts with Bacon & Chestnuts

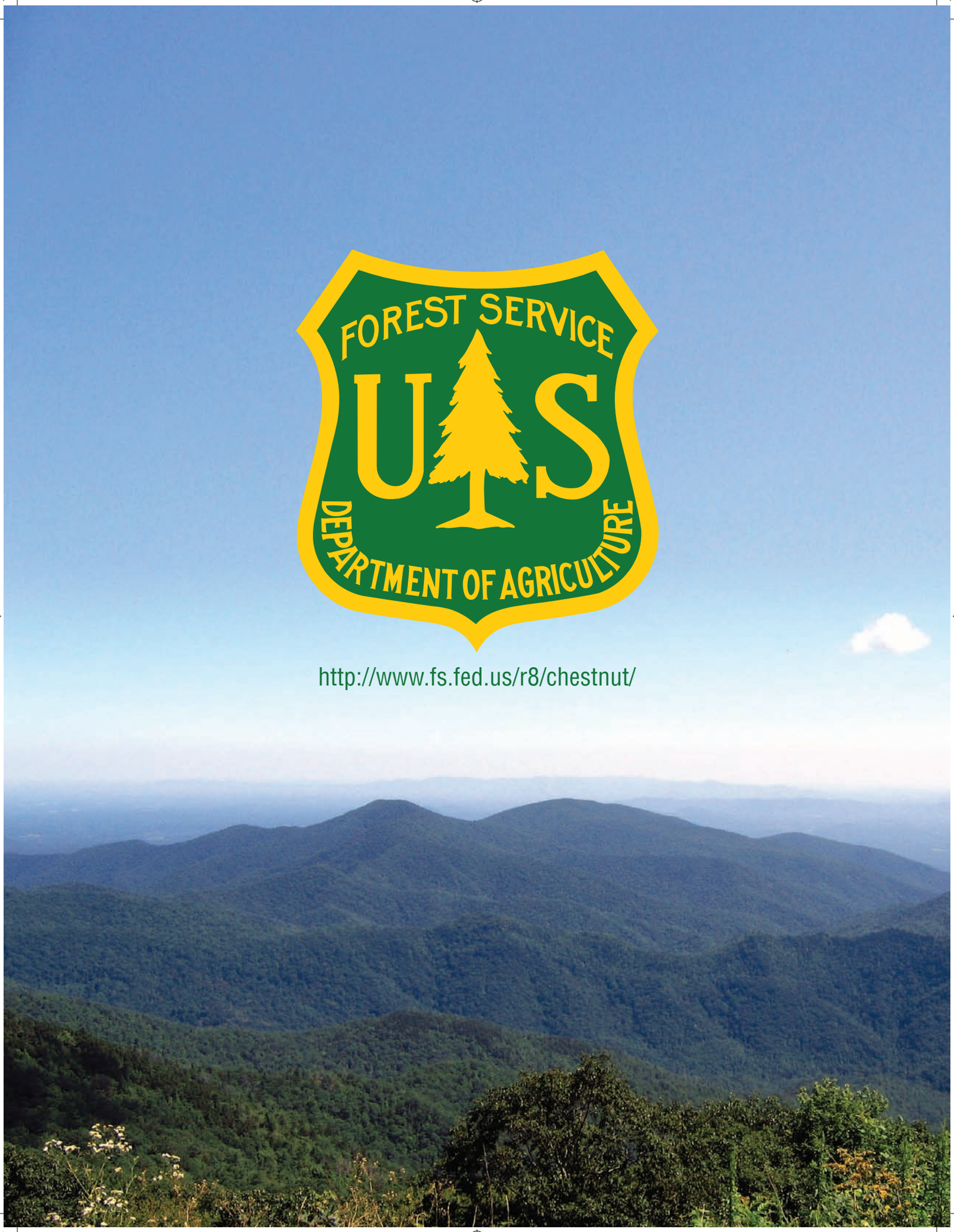


Ingredients:

1 lb. Brussels sprouts
1/3 lb. thick-sliced bacon or slab bacon, cut into 1/4-inch pieces or batons
1 red onion, chopped
20-25 canned roasted chestnuts, quartered or roughly chopped
1/4 cup chicken stock
Salt and pepper to taste
Lemon wedges to serve

Chestnuts are delicious, but can be a major pain to roast and shell (have you ever exploded chestnuts all over your kitchen? I have). Canned chestnuts (or jarred, more likely) actually work better in many recipes than the kind you roast and peel yourself. The texture and moisture content is more consistent. So, we suggest using canned roasted chestnuts for this recipe. You can of course roast and shell your own if you prefer.

- Put a large pot of salty water on the stove to boil. While the water is heating, cut the Brussels sprouts in half and slice thinly, starting at the top of the sprout and working back toward the stem. Discard the hard tip of the stem side.
- Cut the bacon into pieces about 1/4 inch wide and put them in a large sauté pan over medium heat.
- Once the water is boiling, add all the Brussels sprouts and boil them for 2 minutes. While the sprouts are boiling, get a large bowl of ice water ready. Transfer the Brussels sprouts to the ice water (this will shock them vibrant green and stop the cooking) and chill thoroughly. Move to a colander to drain.
- When the bacon is browned, remove with a slotted spoon and set aside. Remove all but 1 tablespoon of the bacon fat (do not put down the drain, see how to render bacon fat) from the sauté pan. Turn up the heat to high, add the red onions. Cook until the onions begin to brown, add back the bacon.
- Add the chestnuts and Brussels sprouts to the sauté pan with the bacon and onions. Add the chicken stock and toss to combine. Stir in about 1 teaspoon of salt, more or less to taste. Cook over high heat for 2-3 minutes. Add pepper to taste. Serve hot with lemon wedges. Squeeze a little lemon juice over the sprouts right before you eat them. Serves 8-10 as a side dish.



http://www.fs.fed.us/r8/chestnut/