THE
Journal
OF THE AMERICAN CHESTNUT FOUNDATION

SEPTEMBER / OCTOBER 2013 | ISSUE 5 VOL. 27

TACF CELEBRATES 30 YEARS 1983 -2013

Latest News from the State Chapters

American Chestnut's Role in Restoration of Coal-Mined Landscapes

Hybridizing with a Cyclone Pollinator in Pennsylvania

TACF's 30th Annual Meeting

October 18-20, 2013

Join Us this Fall at the Hyatt Dulles in Herndon, VA

30th Annual Meeting Registration Fees

Full Registration: $324 per person *(Lodging not included)*

Includes:

- Friday Welcome Dinner and Awards Program
- Saturday Opening Session
- Saturday/Sunday Workshops/Presentations
- Breakfast, Lunch and Snacks for both days
- Saturday 30th Anniversary Gala Dinner

Other Registration Options:
per person, includes Workshops/Presentations, Breakfast, Lunch and Snacks
DOES NOT INCLUDE FRIDAY AND SATURDAY DINNERS

- Saturday/Sunday Pass: $199
- Saturday Only Pass: $149
- Sunday Only Pass: $50
- Student Saturday Only: $50 (must show Student ID)
- Student Sunday Only: $35 (must show Student ID)

Friday and Saturday Dinners

- Friday Welcome Dinner and Awards Program: $50 per person
- Saturday 30th Anniversary Gala Dinner: $75 per person

Register online at www.acf.org/annualmeeting.php
or call The American Chestnut Foundation at (828)281-0047

Accommodations

Reserve rooms now by calling Hyatt Dulles at 1-800-233-1234 or visit https://resweb.passkey.com/go/Chestnut2013. When reserving a room, let them know that you are attending TACF's 30th Annual Meeting.

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THE AMERICAN CHESTNUT FOUNDATION®

The Mission of The American Chestnut Foundation

Restore the American chestnut tree to our eastern woodlands to benefit our environment, our wildlife, and our society.

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 Image

This issue's cover photo was taken by Laura Pirisi del Balzo of Cervinara, Italy. Laura's photo earned first place in TACF's 2012 Photo Contest and it captures the beauty of a European chestnut (*Castanea sativa*), right before dropping from its bur. If you have a photo you would like to submit for the cover of The Journal of TACF, please send it to mila@acf.org.

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THE Journal OF THE AMERICAN CHESTNUT FOUNDATION

INSIDE THIS ISSUE

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Background photo: Seven-year-old backcrossed chestnut trees growing on a reclaimed strip mine in southeastern Ohio. These trees are currently being evaluated in a long-term joint project between Miami University and Ohio University.
Photo by Jenise M. Bauman

Dr. Laura Georgi in TACF's Glenn C. Price Research Laboratory at Meadowview Research Farms.

Changing the Face of Chestnut Science

By Dr. Kim Steiner, TACF Chairman, and Bryan Burhans, TACF President & CEO

The American Chestnut Foundation's (TACF) mission is clear: to restore the American chestnut to our eastern woodlands to benefit our environment, our wildlife, and our society. To achieve this mission, TACF uses science as a tool to guide our efforts.

But all scientific programs are faced with limitations, and our efforts are no different. Gaps in our knowledge and potential but not-yet-developed technologies pose constraints on our work. We have made remarkable progress, of course, but that progress would be even faster if we were merely limited by the generation length of chestnut, and not also by our understanding of the biology and genetics of the tree and its pathogens.

We seldom understand how much we are limited by current technologies until they change. How different our world is from a generation ago, yet very little of the present could have been predicted then! Who would have imagined that most of us would someday own a laptop or desktop computer far more powerful than our universities' "mainframe" research computers of yesterday? Or that information that once required hours to research in a library could be retrieved within seconds from a hand-held device? Or that we would be able to call one another at almost no cost, from almost anywhere in the country, using a phone that can fit in a shirt pocket? Technology has changed the way we live, how long we live, the food we eat, and how we get around from place to place.

For TACF, investments in research and technology development offer a dramatic opportunity for the organization to further our mission by speeding up the breeding and selection program, expanding our understanding of hypovirulence, and developing effective methods of reintroducing improved chestnut into a forest . . . a forest that is much different from what it was 100 years ago. Advances in our understanding of chestnut genetics and the blight, in particular a better understanding of which genes actually control disease resistance, is just one example of how new, technologically feasible discoveries will help us achieve our goals.

TACF members are currently receiving our End-of-Year Appeal. This appeal is an important tool for raising the funds for our ongoing operations. Your generous support will help us further our mission through investments in science and technology.

Although we have made tremendous strides in developing a disease-resistant chestnut tree, our work is far from over. In fact, our efforts continue to turn up new questions whose answers reveal innovative opportunities that will advance our mission. We hope you will help us unlock these new opportunities and make the dream of restoring the American chestnut a reality.

Two New Faces at TACF

TACF recently hired Sarah Dee as Technical Coordinator at Meadowview Research Farms. Born and raised in Las Vegas, Nevada, Sarah moved east to Morgantown, West Virginia, in order to earn her BS in Forestry and BA in History from West Virginia University. Her work with the US Forest Service as a forestry technician and with West Virginia University as a research assistant has given her solid work experience in forest resource management and statistical analysis. At Meadowview Sarah is the liaison with off-site collaborators for progeny test establishment and is responsible for all GIS-related activity and data processing. She also functions as facility safety coordinator and assists with all aspects of field research and seed orchard management related to the development of blight-resistant American chestnut trees, including tree planting, weed control, fertilization, pesticide application, and seed collection and processing. Her hobbies include fishing, hiking, writing, reading, and traveling.

Sarah Dee. Photo by Jeff Donahue

"I am very pleased to have Sarah as a member of our Meadowview team," said Jeff Donahue, Director of Operations at Meadowview Research Farms. "She has already made significant progress in mapping our seed and breeding orchards."

Laura Schnitzlein. Photo by Sebastian Collett

Also new this fall is Laura Schnitzlein, TACF's Development Coordinator. She supports the varied development activities of the organization and is based at the National Office in Asheville, NC. Laura brings a breadth of experience to TACF, including a position with Sims & Steele Consulting, one of the leading non-profit consulting firms in Asheville, NC. Laura was previously Development Assistant at All Souls Counseling Center. She holds a Non-Profit Management Certificate from Duke University, is a member of the Association of Fundraising Professionals, and is a board member of Meals on Wheels of Asheville and Buncombe County. Her hobbies include reading, hiking, and book conservation. Laura received her BA in Anthropology and Art History from the University of North Carolina at Wilmington.

"With a background in the legal field and a strong understanding of database systems, data analysis, communications, and non-profit management, Laura is a valuable asset to the organization," said Ginny Blossom Kruntorad, Vice President of Development.

Society of American Foresters
Continuing Forestry Education

Continuing Forestry Education Credits Now Offered at TACF's Annual Meeting!

Society of American Foresters is offering Continuing Forestry Education credits for attendance at TACF's 30th Annual Meeting in Herndon, Virginia, October 18-20. For more information, visit www.acf.org/annualmeeting.php.

30th Annual Meeting Attendees To Take Home a Piece of Forestry History

Most people are familiar with the Biltmore Estate, but few can identify a "Biltmore stick." At first glance it looks like a yardstick, but further scrutiny shows that it is clearly more than that. In fact, with a bit of practice, this tool can be used to provide a reliable estimate of tree height and diameter, which can then be used to determine tree value.

The Biltmore stick was developed at the Biltmore Estate in Asheville, NC, which is considered the birthplace of American forestry. Gifford Pinchot, future first chief of the US Forest Service, and then Carl A. Schenck were hired in the 1890s to restore 125,000 acres of land around the Biltmore Estate to a healthy forest. Schenck went on to establish the Biltmore Forest School and develop the Biltmore stick, which foresters still use today to quickly cruise timber and determine lumber value.

Biltmore sticks crafted by woodworker Chris Ditlow for TACF's 30th Annual Meeting in Herndon, Virginia, this fall.

TACF's Asheville Office is the temporary home to hundreds of Biltmore sticks, designed by Asheville graphic designer Leslie Shaw and beautifully crafted out of rustic chestnut wood by the Pennsylvania Chapter's Chris Ditlow. Come October 17th, these sticks will be transported to our Annual Meeting in Herndon, Virginia, and presented to attendees as 30th anniversary mementos, and hopefully, useful tools for measuring American chestnut trees in the woods. We are thrilled to celebrate 30 years of restoring the American chestnut tree with a commemorative American chestnut Biltmore stick!

In Memory of and In Honor of Our TACF Members July/August 2013

In Memory of

Willam Paul Dunn
Debra and David Allen

In Honor of

Daniel and Nicole Rope
William Trimmer


Lynn Hitchcock

Join the effort to restore the American chestnut tree

to our eastern woodlands by making a gift today.

We are well on our way to bringing back the American chestnut. You can help by making a year-end tax-deductible donation.

Donate online at www.acf.org
Call 828.281.0047

Top 5 Reasons to Save the American Chestnut (in a nutshell)

1. **Healthy forests** – restoring the chestnut will improve biodiversity in our forests.
2. **Restoring an American legacy** – the American chestnut is an important part of our history and culture.
3. **Food for wildlife** – chestnut trees provide an abundant and nutritious food source for animals.
4. **Reclamation** – fast-growing and tolerant of poor soils, the American chestnut can help turn degraded landscapes into forests.
5. **Road map for the future** – we're creating a template for restoration of other threatened species.

THE AMERICAN CHESTNUT FOUNDATION®

Thank you for helping to bring back this magnificent tree!

ALABAMA

Alabama Chapter volunteers retrofit existing seed beds with weed control matting at Edwin Camp's orchard in Trussville, Alabama. Photo by Jack Agricola

Alabama Chapter Receives Funding to Upgrade Orchards

A handful of Alabama Chapter volunteers started their day of orchard rehabilitation very early one July morning at Edwin Camp's orchard in Trussville, AL. They were joined by Tom Saielli, TACF's Southeast Regional Science Coordinator, who directed this group on an "orchard overhaul," which included retrofitting the existing seed beds with rolls of weed control matting, securing them with landscaping pins, and then topping off each seedling with a quart or so of pine mulch for moisture retention. This was no easy task, as it required strength and a coordinated effort to shimmy 30-35 openings in the 100-foot lengths of weed matting over existing seedlings. If the Chapter volunteers learned nothing else that day, it was to perform this important step at the time of planting the seedlings.

Volunteer participants from all parts of the state included Jack Rist, Hartwell Davis, Dr. Jim Maddox, Jack Agricola and, of course, Edwin Camp, whose hospitality included a wonderful picnic hosted by his spouse Sheryl. By the end of the day, Edwin's orchard was in tip-top shape.

Other Alabama cooperator orchards are scheduled for work in the coming months. Supplies for these overhauls have been generously provided by funding from The Curtis and Edith Munson Foundation of Washington, DC. Also included were funds to install three-wire, solar-powered electric deer fences (an exciting new approach to protecting against deer browse). The Alabama Chapter wishes to express its gratitude to its benefactors and the TACF National Office for their support.

- Submitted by Jack Agricola

CAROLINAS

Doug Gillis, President of the Carolinas Chapter, and Bruce Elliott, a Catawba Lands Conservancy volunteer, examine one of a dozen chestnuts at Daniel Stowe Botanical Garden. Photo by Carmen Bray

American Chestnuts to Return to the Carolina Thread Trail

The Carolinas Chapter is collaborating with the Catawba Lands Conservancy, the lead agency for the Carolina Thread Trail, to plant American-type chestnut trees along a section of the trail 15 miles southwest of Charlotte, NC, at the eastern edge of the natural range of the American chestnut. This section will be part of a system of trails that reaches 15 counties in North and South Carolina with 119 miles currently open to the public. The Thread Trail preserves natural areas and provides a place for the exploration of nature, culture, science, and history.

Locations where chestnut trees could be planted are being cleared of invasive, non-native plant species, including kudzu. Nearby, at Daniel Stowe Botanical Gardens, a dozen potentially blight- and root rot-resistant trees, supplied from Chestnut Return Farms Research Station near Seneca, SC, are into their fourth year of growth, providing a gauge for how well a demonstration planting might do along the Thread Trail. Signage would be added once trees are established to tell about the restoration of the American chestnut tree.

- Submitted by Doug Gillis

CONNECTICUT

Bartlett arborist Charlie White pollinates the New Hartford tree. For nearly ten years, Bartlett Tree Experts have volunteered their time and equipment for pre-flower bagging, pollinating and re-bagging, and harvesting trees in CT-TACF's backcross program. Photo by Bill Adamsen

New Hartford Tree Hangs On

In spring of 2010 Bartlett Tree Experts assisted the Connecticut Chapter of TACF with pollinating a pure American chestnut located on the shores of West Hill Pond in New Hartford, CT. The nuts produced by the tree were planted the following spring at the Chapter's Great Mountain Forest backcross orchard. Today, the tree's progeny are growing there along with four other lines with the expectation that they will be inoculated for selection in 2015 and intercrossed for placement in a seed orchard sometime thereafter.

Two years after harvest of the backcross nuts, the tree continues to survive and flower. Fully formed burs indicate that indeed this tree is getting open pollinated from some tree nearby - whose exact whereabouts remain a mystery. Each year the fungus reaches more of the cambium layer and makes survival seem less likely. Despite its decline, the New Hartford tree has supplied the Chapter with a valuable source of genetic material from the northwestern part of the state and added to the overall diversity of the breeding program.

- Submitted by Bill Adamsen

GEORGIA

Georgia Chapter members finish the state's first blight-resistance test inoculations at the Berry College backcross orchard. Left to right: Martin Cipollini, Lynne Womack, Tom Saeilli, Sam Watkins, Theron Kantelis, and Erin Coughlin. Photo by Martin Cipollini

New People, New Vigor, New Ideas

At its May annual meeting, GA-TACF welcomed a new president, Mark Stoakes, and new board members Lynne Womack and Ralph Tanner. Mark has worked with TACF for many years, and has plans for expanding membership and the breeding program. Lynne is the GA Forestry Commission Forest Health Specialist for northern GA, and Ralph teaches at the Atlanta English Institute.

Also in May, GA Chapter members performed the state's first blight-resistance tests at the Berry College and UGA Mountain Research and Education Center backcross orchards. Four maternal lines were inoculated, with hopes of selecting good trees in each line for the generation of the Chapter's first B3F2 and B4F2 progeny.

The Chapter made good progress in its backcross breeding program this summer, collecting pollen from 15 trees and pollinating 12 trees. New crosses included four F1, one B1, one B3, and four B4 lines, several using parents carrying resistance to *Phytophthora*. Along with seeds from these pollinations, GA-TACF will receive about 700 B3F3 seedlings from Meadowview for a progeny test planting this fall; the next problem (a good one to have) will be locating good orchard sites.

Helpers this summer included Berry College/GA-TACF interns Theron Kantelis and Sam Watkins; Chapter members Marshall Adams, Ronnie Camp, Martin Cipollini, Barbara Cox, Joe Nicholson, Jim Watkins, and Lynne Womack; and TACF Regional Science Coordinator Tom Saeilli. Former Berry College intern Erin Coughlin also helped out. Erin, who interned with GA-TACF for three years, has been accepted into graduate school at the University of Georgia, where she will be conducting research on plant/fungal interactions – possibly including chestnut blight!

continued

Georgia *continued*

Finally, in a unique side project, GA-TACF board member Ronnie Camp conducted preliminary tests using the fungicide propiconazole on blight-stricken Allegheny chinquapin. After applying monthly foliar and soil treatments, subsequent inspection found no stem dieback and many cankers showing signs of healing. Follow-up tests will be conducted next spring, and Ronnie hopes this approach may help keep blight-susceptible chestnuts alive long enough for flowering and breeding work.

- *Submitted by Martin Cipollini, Theron Kantelis, and Sam Watkins*

INDIANA

The Youth Conservation Corps works with the US Forest Service to maintain chestnut plantings in Hoosier National Forest. Pictured from left to right: Andrew Froehlich, Gage Otto, and Ross Fischer. Photo by Chris Thornton

Youth Conservation Corps Helps Maintain American Chestnuts on National Forest Land

Under the direction of long-time TACF friend and Hoosier National Forest Silviculturist Chris Thornton, Youth Conservation Corps members Andrew Froehlich, Gage Otto, and Ross Fischer have been maintaining two of the Indiana Chapter's Restoration Chestnut 1.0 plantings in the Hoosier National Forest in southern Indiana.

Sara Fitzsimmons flew out in April to assist IN-TACF members and the US Forest Service in re-planting the two sites. The sites are part of the natural chestnut range in Indiana and were first planted in 2011 but suffered high mortality due to the exceptional rainfall in April of that year. Another re-planting took place in May of 2012 only to encounter record heat and low precipitation levels. The USFS fire teams tried to help by watering the seedlings but their efforts were ineffective and another large round of mortality ensued.

While this story highlights the difficulties that Mother Nature can throw in the path of chestnut restoration, the silver lining is that the trees that survived the elements are doing well and this year's re-plant has been nearly perfect.

- *Submitted by Ben Finegan*

KENTUCKY

Kentucky Chapter members on a field trip to the state champion American chestnut tree in Adair County in 2009. Photo courtesy of KY-TACF

Kentucky Champion American Chestnut Tree Lives On

The state champion American chestnut tree, located on private farmland in Adair County, is alive and doing well. This is one of the largest surviving American chestnut trees in the southeastern United States. It measures approximately 52 feet tall, with a diameter of nearly four feet. Kenny Pyles with the Kentucky Division of Forestry recently visited the tree and found that other than one branch that appeared blighted, the tree looked to be in good health.

The 80-year-old tree, first discovered in 1999, has been pollinated often by TACF and plays a significant role in its backcross breeding program. A B3 generation of nuts was produced from the Adair tree and planted in an orchard at Robinson Forest in Breathitt County. Four of the 60 survivors in the orchard were selected for blight resistance and will be used to create a B3F2 generation of nuts. Trees grown from the Adair tree's seeds have already been planted in state and national forests across the state. Some of the pure American crosses from the Adair tree are growing very well. Specifically, several healthy Adair County x Clinton County American trees are growing in Fayette and Jefferson counties. The tree in Fayette County started producing nuts in 2012.

continued

Kentucky *continued*

During the August KY-TACF Board Meeting, representatives from the Kentucky National Guard, Eastern Kentucky University, and Bernheim Arboretum and Research Forest discussed their interest in working with the Chapter to establish new breeding orchards, seed orchards, demonstration plantings, and educational plantings on their properties. Follow-up meetings have been scheduled to complete plans. The possibilities are enormous!

- *Submitted by Scott Freidhof, Michael French, and Bethany Baxter*

MAINE

Revolutionary War reenactors in front of a four-year-old Restoration Chestnut 1.0 at Leonard's Mills Museum, near Bangor, ME. Photo by Glen Rea

Testing Restoration Chestnuts 1.0 for Cold Hardiness in Maine

Part of the distribution plan for TACF is to test B3F3 Meadowview seedlings for "cold hardiness." In Maine, there is ample opportunity to experiment with extreme temperatures. Pictured is a B3F3 tree, or Restoration Chestnut 1.0, that was planted in 2009 (along with two others) at Leonard's Mills Museum, located 11 miles north of Bangor and situated at a latitude of approximately 45 degrees North. The low temperatures for the winter in this area range from -15 to -20 degrees Fahrenheit. The tree is doing great; having already grown 13 feet tall, it is surviving the low temperatures and enjoying 16 hours of sunlight in the summer months.

- *Submitted by Glen Rea*

MARYLAND

At the planting of American chestnut seeds at Stella's Dream Farm in Barnesville, MD. Pictured left to right: Stan Fisher, MD Chapter; Julian (Che) Caballero, Poolesville High student; Dr. Steve Haggblade, MD Chapter; and Graham Taylor, Poolesville High student. Photo courtesy of Poolesville High School

Maryland Students Promote Chestnut Restoration

Four students of the Global Ecology Program at Poolesville High School in Montgomery County, MD, conducted two separate projects to promote the restoration of the American chestnut tree. In recognition of their contribution, the students were presented with awards from the Maryland Chapter of TACF on May 15, 2013.

Julian (Che) Caballero and Graham Taylor conducted a project entitled "Chestnut Trees at Stella's Dream Farm." They researched the plight of the American chestnut and current efforts to restore it and presented this information to their fellow students. Another component of the project was to plan, organize, and execute a large planting of American chestnut seeds at Stella's Dream Farm in Barnesville, MD. They coordinated this project with their sponsor, Maryland TACF board member Dr. Steve Haggblade, the owner of the farm, and with TACF. Che and Graham also created a poster session for their project, took pictures of the plantings, and developed a spreadsheet of the planted seeds along with previously planted trees.

The second project, by Kirby Carmack and Nicole Rodriguez, was titled "Elgin Park American Chestnut Demonstration Orchard and *Legend of the American Chestnut Tree* Children's Book." The project was coordinated with their sponsor, Dr. Steve Haggblade, the builder of Elgin Park homes development, and TACF. Kirby and Nicole took over maintenance of previously planted American chestnut trees in Elgin Park, diagnosed a serious drainage issue with the plantings, and designed and implemented a drainage solution. They also created a children's book explaining the history and current efforts to restore the American chestnut. The book has been added to the TACF website.

- *Submitted by Stan Fisher*

MASSACHUSETTS/RHODE ISLAND

Paul Wetzel, Smith College's Environmental Research Coordinator, and student intern Greylin Nielsen plant chestnuts in the Chapter's new seed orchard. Photo by Brian Clark

Massachusetts/Rhode Island Chapter Plants New Seed Orchard and Forges Partnership with Smith College

This spring, the Massachusetts/Rhode Island Chapter planted a new seed orchard at Smith College's MacLeish Field Station in West Whately, MA. Smith College gave the chapter access to the land with a 30-year easement. It consists of .8 acre with an initial planting of approximately 360 BC3F2 nuts and seedlings that represent three lines, or separate genetic families, from local American "mother trees." When fully planted, this seed orchard will have 20 lines, with over 3,000 trees, and will be selected down to 20 trees.

Using a tip from the University of Rhode Island Master Gardeners who started a seed orchard last year, a golf hole cutter was used to quickly cut and remove sod plugs of just the right size for planting nuts and inserting mouse guard tubes. To protect from deer browse, the chapter installed a "three dimensional electric" fence, which consists of two sets of vertical conductors separated by three feet.

The Center for the Environment at Smith College is also utilizing the seed orchard and several other chestnut experiments at the field station to involve students directly in a large-scale conservation project.

- Submitted by Brian Clark and Paul Wetzel

NEW YORK

The planting of Darling 4 American chestnut trees in a demonstration plot in front of Moon Library on the SUNY-ESF campus, Syracuse, NY, during the 2012 NY Chapter Annual Meeting. Darling 4 was the first transgenic line of trees demonstrating enhanced blight resistance intermediate between Chinese and American chestnut. Participating in the planting left to right are Dr. Bill Powell, Herb Darling, Dr. Chuck Maynard, and Bryan Burhans. Photo courtesy of the New York Chapter

New York Chapter Plans for Upcoming Annual Meeting in Syracuse

The New York Chapter is gearing up for their 23rd Annual Meeting October 11-12 at the State University of New York College of Environmental Science and Forestry in Syracuse. The New York Chapter, formed in 1990, was TACF's first chapter and has since grown to be one of the largest.

Highlights of the upcoming meeting consist of a BBQ dinner Friday night followed by the New York Harvest Exchange, which boasts a tasty fare of chestnut beer and liqueur and homemade chestnut ice cream. Saturday morning includes business meetings and reports of the latest science developments. After lunch participants can tour the facilities, attend science workshops, or go sightseeing in Syracuse. Saturday dinner takes place at the Museum of Science and Technology where tours will be offered as well. For a full schedule of events and to download a registration form, visit www.esf.edu/outreach/chestnut/.

- Submitted by Herb Darling

OHIO

Ohio Chapter volunteers working in the Dysart Woods. Pictured left to right: Ohio University graduate student Lauren Bizzari; Greg Miller, OH-TACF; and Dawn McCarthy, US Forest Service. Photo by Brian McCarthy

Recurrent Selection Planting at Dysart Woods

The Ohio Chapter has been hard at work for five years creating a recurrent selection planting at Dysart Woods in east central Ohio. According to land manager Brian McCarthy, "Dysart Woods is a 450-acre land laboratory, containing 50 acres of old-growth mixed mesophytic forest—the only such example left in the state." Greg Miller, who supplied all of the material to get this project started, said: "We are employing first-generation backcross seedlings from Bob Leffel's male sterile orchard in Gratland, Pennsylvania." The seeds from Gratland were collected from selected hybrids that are male sterile. They were open pollinated by inter-planted pure American chestnuts, thus making them B1s. Pure American chestnut seedlings from Ohio's Harlem seed orchard and from the West Virginia State Tree Nursery are also planted at Dysart. The hybrids and American chestnuts are planted in alternating rows. Miller said: "Well over a thousand seedlings have been planted, with room to plant several hundred more. We plan to rogue out 90% leaving 10% for the next generation."

To date, survival has been modest (<50%) due to aggressive old-field vegetation, low soil fertility, poor drainage, and mammal damage. Flowering and fruiting have not yet commenced. It is expected that half of the hybrid chestnuts will be male sterile, half will be fertile. This hypothesis will be tested. Three types of seeds should be produced. Seeds on the hybrid trees will have been pollinized either by other hybrids (forming B1F2) or by pure Americans (forming B2). Seed on the pure Americans will have been pollinized either by hybrids (forming B2) or by other pure Americans (forming pure Americans). Fruit will be collected from the most resistant trees with the best form. Chestnut blight will occur naturally, so there will be no need for inoculation. Seed from each mother tree will be kept separate for progeny testing. Pure Americans will act as controls. Over generations, male sterility will be naturally and deliberately selected against.

- Submitted by Greg Miller and Brian McCarthy

PENNSYLVANIA/NEW JERSEY

Pennsylvania volunteer Alan Tumblin inoculates a chestnut tree in the PA/NJ Chapter's House Rock Orchard. Photo by Sara Fitzsimmons

Busy Summer for Staff and Volunteers in Pennsylvania and New Jersey

Summer time is "go time" in Pennsylvania and New Jersey. Staff and volunteers are busy with field operations; planting, inoculating, and pollinating the orchards; and also with hosting and attending outreach events throughout the growing season.

The growing season began with plantings at House Rock Orchard near Lancaster, PA. This was followed by a large planting at the Arboretum at Penn State's University Park campus in the first week of June, which attracted over 20 new volunteers from the State College area and garnered national attention after being covered by a local newspaper and then picked up by news outlets all over the country. The season has continued with a number of volunteer efforts in other orchard operations, all culminating in another harvest later this fall.

While many volunteers are busy investing sweat equity toward the mission of TACF, others apply their efforts toward sharing their knowledge with the public. They attend events such as The Ned Smith Nature and Arts Festival in Millersburg, PA, and the PA Festival of Wood in Milford, PA. The PA/NJ Chapter does its part by educating the general public through outreach events, such as the chestnut hike at Hawk Mountain Sanctuary in Kempton, PA, on July 27th. These events invigorate existing enthusiasts and attract new interest in TACF's work. You can view the event calendar at http://www.patacf.org/get-involved/event/.

- Submitted by Stephanie Dempsey

TENNESSEE

The B3F2s and B4F2s for the first blocks of the TN-TACF seed orchard were planted at Dave Cantrell's farm just north of House Mountain, near Corryton, TN. Dave already has two backcross orchards on his beautiful property. Photo by J. Hill Craddock

Tennessee Establishes First Seed Orchard

The Tennessee Chapter of TACF is making significant contributions to the restoration of the American chestnut, and has passed several important milestones on the road to restoration this year. In the past 12 months a meeting of the southern chapters was hosted; thousands of hybrid seeds from the 2012 crosses were harvested, processed and planted; the backcross breeding program was continued, using Tennessee mother trees and father trees; several selections of Tennessee F1s were advanced to the first backcross level; continued intercrossing was done of Tennessee B3s and B4s to produce F2s; screening was completed at another two backcross orchards, evaluating the trees on their response to inoculation with two different strains of the blight fungus, *Cryphonectria parasitica*; another *Phytophthora* root rot screening trial was completed; B3F3 progeny tests were established in forests; and several new orchards were planted in the state.

The most important milestone, however, was probably the planting of initial blocks of the first Tennessee seed orchard. The establishment of this orchard culminates almost 15 years of work by volunteers and citizen scientists working together with TACF and the University of Tennessee at Chattanooga (UTC). It will eventually consist of selected B3F2s and B4F2s from which the seeds of tomorrow's restoration effort will be harvested; plans are to include up to 20 lines (separate genetic families) representing the Clapper source of resistance. The first planting of Tennessee F2s used one-year-old container grown seedlings from the 2011 breeding season. Seedlings from the 2012 season are currently in the UTC nursery and 2013 is shaping up to be a bumper crop!

- *Submitted by J. Hill Craddock*

VIRGINIA

Cicadas are responsible for killing the top of the main stem of this three-year-old seedling at the Georgia Pacific progeny planting site in Big Island, VA. Photo by Matt Brinckman

Despite Cicada Damage, Virginia Chapter Perseveres

While most of the east coast was lucky not to have been inundated with cicadas this summer, parts of Virginia (VA) were impacted heavily. Areas where serious infestations occurred were spotty from central to northern VA. Several VA-TACF board members witnessed firsthand damage to chestnuts that affected the backcross breeding efforts this year. John Scrivani, who lives in central VA, had to drive only a few miles to a nearby Chinese chestnut orchard to see entire crowns of trees flagging from the effects of cicadas. "Flagging" is used to describe the brown, droopy branch tips, in this case caused by female cicadas carving slits in the undersides of branches to lay their eggs. Nearby, a wild surviving American chestnut discovered by Warren Laws was ruled out for pollination due to heavy flagging.

Kathy Marmet went to great lengths to protect the Restoration Chestnuts growing in her yard by draping mesh netting over the trees. Regional Science Coordinator Matt Brinckman was surprised by the intense damage caused by cicadas at a progeny test planting near Lynchburg, VA. Over 90% of surviving three-year-old seedlings had their tops killed at the site, owned by Georgia Pacific.

Chapter President Jack LaMonica saw the worst damage in Northern Faquier County, where he observed large surviving chestnuts with every branch tip hit by the insects. Although it was disappointing to have *continued*

Virginia *continued*

to abandon so many pollinations in the area, Jack remains positive about the effect it may have in the coming years. "Cicadas are nature's pruners; the trees responded by sending out multiple shoots from the damaged tips that may serve to increase the number of flowers in the coming years."

In the absence of having controlled pollinations to harvest in the northern part of the state, the Chapter will concentrate on collecting American seeds for research this fall.

- *Submitted by Jack LaMonica and Matt Brinckman*

VERMONT/NEW HAMPSHIRE

TACF Intern Dan Hale and Parks Supervisor Denis Lincoln planting at Lake St. Catherine in Poultney, VT. Photo by Kendra Gurney

Plantings and Pollinations in Vermont and New Hampshire

Members of the VT/NH Chapter were busy this spring planting three new orchards in Jamaica and Poultney, VT, and Bristol, NH, with great volunteer turnout at all three plantings. Chapter members also established a test planting at the Merck Forest and Farmland Center in Rupert, VT, in anticipation of installing a full orchard there in 2014.

In June and July, members pollinated six trees for the VT/NH breeding program – in Rockingham and West Woodstock, VT (with support from Green Mountain Power); in Chester and Windsor, VT (with support from VELCO); and in Antrim and Eaton Center, NH (with support from Public Service of New Hampshire [PSNH]). Nuts from these six crosses will be planted in Chapter breeding orchards in the spring of 2014. In addition, three trees were pollinated to assist with the *Phytophthora* root-rot resistance program. These trees were located in Hollis, NH (with support from PSNH), Bristol, NH, and Shelburne, VT. The nuts from these three crosses will be sent to the Meadowview Research Farms to be incorporated in the screening program developed in collaboration with the southern chapters.

- *Submitted by Yurij Bihun*

WEST VIRGINIA

Taking part in the June 1st planting at Summit Bechtel Reserve, left to right: Richard Grist, Foxfire Realty; Tom Neas, Troop 45, Chapel Hill, NC; Jimmy Jenkins, WV-TACF President; Joe Golden, WV-TACF; Allison Schapker, Trinity Works; Lucas Neas, Troop 45; Kathy Neas, Troop 45; Matt Brinckman, TACF; Brian Perkins, WV-TACF Vice President. Photo by Richard Grist

West Virginia Volunteers Gather to Plant Chestnuts at Summit Bechtel Reserve

On June 1st the West Virginia Chapter planted 48 Restoration Chestnut 1.0 seedlings at the Summit Bechtel Reserve (SBR) in Glen Jean, WV. The SBR is the newly opened adventure center for the Boy Scouts of America (BSA) as well as the home of the National Scout Jamboree. Matt Brinckman, Mid-Atlantic Regional Science Coordinator, and Jimmy Jenkins, WV Chapter President, worked hard to make the necessary arrangements with the construction company, Trinity Works, and the BSA.

There was wonderful weather for the handful of volunteers at this late planting. Trees were planted at one end of the CONSOL Energy Bridge. Matt's power auger worked well to create suitable planting holes in the compacted soil. After planting, volunteers erected wire cages around each tree to prevent deer browse. The trees were lucky to receive plentiful rain in the latter half of June and most of July. The WV Chapter plans to continue working and planting trees at this site, and a kiosk and orchard sign are likely to be placed near the seedlings.

- *Submitted by Brian Perkins*

American Chestnut's Role in the Ecological Restoration of Coal-Mined Landscapes

Jenise M.Bauman[1], Caleb Cochran[1], Brian C. McCarthy[2] and Carolyn Keiffer[1]

[1] Miami University Department of Botany, Oxford, Ohio, 45056 and [2]Ohio University, Department of Environmental and Plant Biology, Athens, Ohio, 45701

Background

The American chestnut's fast growth rate, early nut production, and quality of timber make it a valuable tree for use in coal mine restoration projects (Figure 1). This species tolerates a wide range of ecological conditions, including dry soils and low pH, which are typical of some sites previously mined for coal. Experimental planting methods are currently being studied to determine protocols most conducive for establishing chestnut trees on these sites. The Forestry Reclamation Approach (FRA) proposed by the Appalachian Regional Reforestation Initiative (ARRI) recommends the selection of proper soil substrate, a deep rooting zone, appropriate herbaceous vegetation, and the proper planting of ecologically valuable trees (Zipper et al. 2011). The premise is that established trees, like chestnut, can accelerate native forest recovery by adding organic matter to the soil, attracting seed-carrying wildlife, and providing reservoirs for beneficial soil microorganisms.

Coupling FRA planting protocols with the goals of The American Chestnut Foundation's (TACF) restoration program accomplishes two objectives. For one, this partnership introduces a valuable native tree for the restoration of Appalachian landscapes impacted by mining. Second, large-scale ecological restoration projects provide an opportunity for the directed experimental plantings of various chestnut seed lines. The ultimate goal is the successful establishment of founder populations of chestnut that can potentially produce blight-resistant offspring that migrate into surrounding forests (Jacobs 2007). This paper summarizes a portion of a long-term study in southeastern Ohio that is evaluating FRA soil ripping as a preparation method for the planting of pure American and backcrossed chestnut lines (B1-F3 and B2-F3) on a reclaimed coal mine site. Growth and survival of the different chestnut seed lines and the presence of chestnut blight cankers are reported.

Figure 1. Dr. Jenise M. Bauman standing next to a seven-year-old chestnut on a reclaimed mine site in southeastern Ohio. Chestnut trees are responding well to the soil conditions and the planting methods. When assessing the plots in summer 2013 it was noted that many trees were tall enough to escape herbivory from deer and impose shade on the surrounding vegetation. Photo by Caleb Cochran

Methods

The field site is located in southeastern Ohio and was mined for coal in the 1970s and reclaimed in 1978-79. Three experimental blocks were installed in the spring of 2007 each containing four treatments: (1) a control (C) that was left undisturbed, (2) a plot cross-ripped (R) at a depth of approximately 1 m created by a D-6

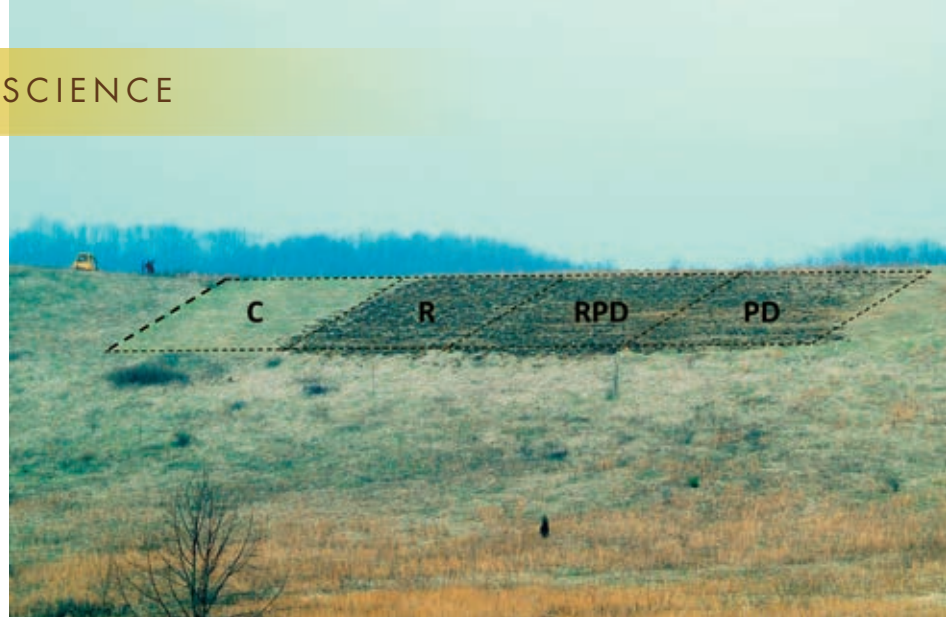

Figure 2. Design of one field block consisting of four treatments: control (C), ripped (R), ripped + plowed and disked (RPD), and plowed and disked (PD). Each block was 73 x 36 m with each treatment 18 x 36 m within. There were three replicated blocks. Photo by Dr. Brian C. McCarthy

dozer with steel ripper bar, (3) a ripped + plowed and disked plot (RPD), and (4) a plowed and disked (PD) plot by a conventional tractor (Figure 2). A total of 1,200 one-year-old chestnut seedlings spaced 2.15 x 2.15 m were planted in the treatment plots as bare rootstock in March of 2007, 400 in each block.

The seed types were randomly placed in treatment plots in the following quantities: 520 pure American, 257 B1-F3 (3/4th American chestnut progeny of P-11 × open), and 423 B2-F3 seedlings (7/8th American chestnut progeny of SA417 × open). The backcross seed were obtained from the Meadowview Research Farms of The American Chestnut Foundation. In August of 2012, survival data were recorded and the height of each chestnut seedling was measured. An analysis of variance (ANOVA) followed by a Tukey's post hoc test was used to determine significant differences. All seedlings were scored for the presence or absence of natural chestnut blight cankers as evidenced by the presence of the orange fruiting bodies called stroma (Figure 4A). A sub-sample of cankers was selected for culturing to confirm the presence of chestnut blight fungus, *Cryphonectria parasitica* (Figure 4B).

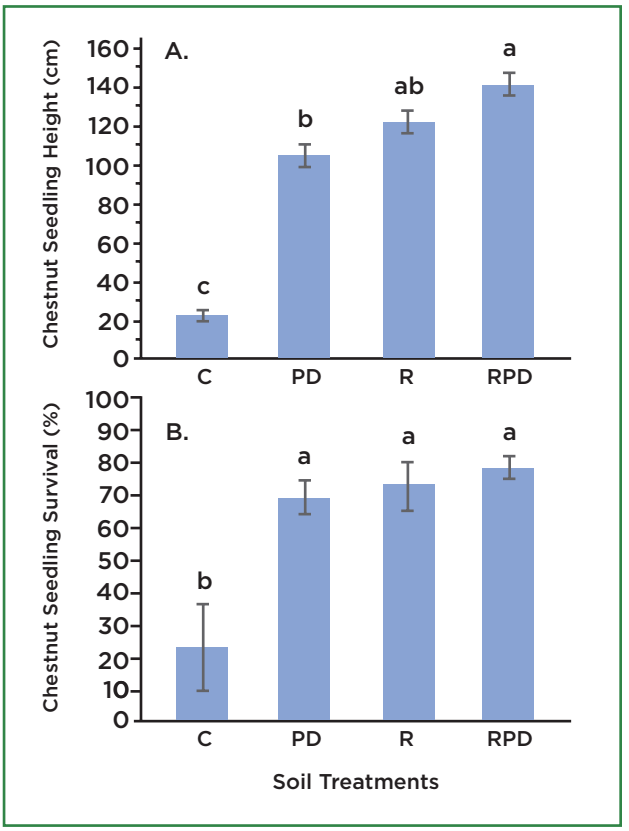

Figure 3. Panel A. Seedling height (cm) compared among the treatments: control (C), ripped (R), and ripped + plow and disk (RPD), and plow and disk (PD). Plots that applied the ripping techniques (R and RPD) had significant increases in seedling growth when compared to the PD and the C plots ($F = 115.3$, $P < 0.0001$). **Panel B.** Chestnut seedling survival compared among soil treatments. Plots that applied some form of soil preparation (PD, R, RPD) had significantly higher survival than the control plots ($F = 9.38$, $P < 0.005$). Error bars are ± 1 SE, bars sharing common letters do not differ significantly from each other (alpha = 0.05) as determined by Tukey's HSD.

Results

Seedling Growth and Canker Production

Plots that applied some type of mechanical treatment bore trees that were significantly taller than seedlings in the untreated control plots (Figure 3A). Of the treatments, the plots that employed FRA recommended ripping (R and RPD) performed the best. Although the chestnut trees in the ripped plots were the tallest, seedlings in the PD plots also outperformed the seedlings in the untreated controls. When seedling types were compared, no significant differences existed between

Figure 4. Field cankers and cultured fungi documented from chestnut bark in the study plots. **Panel A.** Photograph is of a basal canker with evident orange stroma protruding from the bark of a pure American chestnut tree. **Panel B**. Bark samples that were extracted from a sub-sample of field cankers yielded chestnut blight fungus *C. parasitica in vitro*. Photos by Dr. Jenise M. Bauman

the pure American chestnut and B2-F3. Both were slightly taller than the B1-F3 seedlings (data not shown).

Survival resulted in the same pattern: highest survival in the RPD plots (80%), high survival in the R plots (73%), adequate survival in the PD plots (69%) and very low survival in the control plots (22%; Figure 3B). When seed types were compared across the treatment plots (control plots not included), B2-F3 had the highest survival (ranging 86-75%), followed by B1-F3 (75-68%) and the pure American seedlings (75-63%). When cankered trees were compared, the majority of infected seedlings were pure American chestnut, with just a few documented cankers on the B2-F3 seedlings, and no cankers on the B1-F3 seed types at this time. Bark plugs extracted from canker margins verified the presence of the chestnut blight fungus (Figure 4).

Summary

The results of this study suggest that after five field seasons: (1) chestnut growth was increased in plots that had some type of soil surface mechanical treatment, (2) chestnut seed types were similar with regard to height, and (3) cankers were found predominately on the pure American seedlings. Chestnut seedlings in plots that employed FRA recommended ripping performed the best. Enhanced seedling growth and survival after soil ripping has been reported in other projects in southeastern Appalachia (reviewed in Zipper et al. 2011). Proper site selection was equally as important as soil preparation. Historically, chestnut was adapted to acidic and well-drained upland habitats. Because coal mine reclamation sites vary in soil chemistry, we were mindful to select sites that had an average pH of 5.5. Other silvicultural treatments were applied, such as individual weed mats, spot treatments of herbicide, and individual deer fencing to prevent browse (McCarthy et al. 2010).

Chestnut seedlings began reproducing seed by the fourth field season. After the fifth growing season, one- and two-year-old chestnut recruits were documented in the test plots. Although we do not know the parentage of these seedlings, some offspring will inevitably be the progeny of the backcross chestnut trees. As chestnut blight spreads through the stand we predict increased mortality of pure American seedlings and anticipate loss of the backcross seed types. Cankers often begin to appear on chestnut trees around the same time they begin to produce nuts. Therefore, we can hypothesize that seed types that lack genes for resistance may eventually fail to reproduce while trees with adequate blight resistance will increase in population. Once forming an established chestnut

Figure 5. Caleb Cochran collects data for his Senior Capstone project for the Department of Biology at Miami University. In addition to evaluating growth among chestnut seed lines, he is currently analyzing seed production and viability on this mine site. Photo by Shanon Wise

restoration stand, we anticipate that nuts will be carried into the adjacent forests by birds and mammals. Future studies are required to better understand how chestnut will compete with invasive plant species, survive other introduced pests, respond to heavy populations of white-tailed deer, and adapt to changing climate conditions.

Data reported here suggest that when implementing the proper methods and site selection, American chestnut is a valuable tree for use in coal mine restoration. Other studies from this site are currently being analyzed; these include seed production, vegetation community composition, and beneficial mycorrhizal fungi. The value of this project has been multidimensional; using chestnut as a pioneer forest tree may aid natural forest recovery, provide habitat for wildlife, and produce a valuable timber commodity for areas where soils are in a state of recovery. In addition, this project provided exciting opportunities for students to learn valuable research techniques while they took part in advancing the mission of TACF (Figure 5). And last, the love for this tree species continues to bring together a multitude of people all working toward the common goal of restoring American chestnut to the Appalachian forests.

Acknowledgements

This work was supported by The American Chestnut Foundation Research Support Grant, the Ohio Chapter of TACF, Miami University Research and Grants, and National Technology and Transfer funds from the US Department of Interior (Office of Surface Mining). Authors thank Dr. William MacDonald and Mark Double of West Virginia University for their assistance with culturing fungi from bark samples. We also thank The Wilds student interns Jessica Spencer, Andrea Renshaw, Jason Capello, Samantha Zelenka, and Dana Dudra for their field support.

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Hybridizing Chestnuts (*Castanea* Miller) Via Dried Pollens and Cyclone Pollinator

by R.C. Leffel and A.G. Leffel

Figure 1. The cyclone pollinator used in this study was provided courtesy of Davis M. Gerwig, Tree Improvement Center Leader, Forestry Division, Mead Westvaco Corporation. Photo courtesy of Steven E. McKeand

The elimination of contaminating pollen during controlled pollination activities is crucial to retrieving seed stock suitable for subsequent genetic studies and analysis. Current methods for breeding chestnuts involve three steps. First, in early summer, female chestnut flowers (burs) are protected from nearby pollen sources with a wax-infused paper bag. Second, about two weeks following bagging, selected pollen is applied to the receptive stigma of the previously bagged burs. In current pollination methods, the bag must be removed so that the pollen can be applied. The bag is then replaced and left until harvest occurs, generally in mid-September through October. Potential for contamination by airborne pollen can happen at both step one, if the bag is applied too late, and at step two, when the bag is removed to apply selected pollen. Leffel (2004) reported contaminants as high as 29% in controlled crosses involving American and Chinese chestnut parents.

Eliminating the need to remove the bag during the pollination step could reduce possible contamination and give researchers more confidence that the products of a given cross have the genes from parents they used. A tool called the cyclone pollinator, developed by the US Forest Service, could help improve both the efficiency and accuracy of current chestnut controlled pollination methods.

The cyclone pollinator was developed for use with controlled crosses of species in the genus *Pinus*, and has been shown to improve pine seed yields (Matthews and Bramlett 1981). The cyclone pollinator works by (1) sticking a needle through the bag and (2) using a bulb to expel the pollen into the bag, thus eliminating the need to remove the pollination bag. The study reported here, conducted in the summer of 2008, looks to determine the efficacy of controlled hybridizations in chestnuts using the cyclone pollinator.

MATERIALS AND METHODS

A cytoplasmic male-sterile (CMS) F1 chestnut tree [American (A) x Chinese (C)] designated BR97-161 seeded in 1997 in the Brogue, PA, orchard, pedigree 'Ort' x 'CLN', was utilized as the female tree in this study. Tree BR97-161 has been consistently CMS since its first catkins were produced in 2001. In 11 backcrosses with fresh pollen from 11 different PA-American (PA-A) trees, 631 BC1 seed were produced from 2002 to 2007, averaging 1.4 seeds per bag. In 2008, the 11-year-old tree BR97-161 was approximately 18 feet tall with multiple branches at 3 feet, its trunk was 11.5 inches in diameter at a height of 2 feet, and its canopy was 17 feet. The tree was producing thousands of female flowers.

Subsequent to emasculation of CMS catkins and prior to stigmas' receptivity to pollen, 250 Lawson #421 pollination bags[1] were attached to the prepared twigs on June 20. Bags were numbered 1 to 250 with permanent marker pens. Bag #1 and every tenth bag

thereafter were utilized as 25 check bags (no pollinations), leaving 225 bags for crossing. Each bag was secured to the twig with a jumbo paper clip and check bags were also coded with long, green twist ties. The green twist ties were used to identify check bags, because previously entire crosses have been lost to hurricanes' removal of all bags, leaving only the paper clips and a bag fragment beneath, making it impossible to identify hybridizations versus check bags.

Twenty-one PA-A trees at the Gratland F1-A orchard (Leffel 2004) provided the pollen for this study. One hundred fifty catkins were collected from each of 12 earlier blooming American (A) chestnut trees on June 23 and from 9 later blooming A trees on June 30, for a total of 3,150 catkins. Pollen and unavoidable debris were thoroughly mixed after two passages through a very fine screen and dried in small vials via silica gel.

The cyclone pollinator (Matthews and Bramlett 1981) depicted in Figure 1 consists of a squeeze bulb and a hollow and sharpened needle attached to a small vial containing the pollen. Each bag to be pollinated was pierced with the needle, the bulb was squeezed twice to produce two puffs of pollen, the small hole was immediately sealed with masking tape upon withdrawal of the needle, and the bag was shaken vigorously to circulate the pollen within.

All 225 bags scheduled for pollinations, plus 1 check bag pollinated by mistake and immediately identified as pollinated, were pollinated on July 2, 12 days after bagging. A second pollination was scheduled for July 4 for about one-half of the 225 bags to be pollinated, but rains on July 4 and 5 delayed some of the second pollinations until July 6. Thus 36 bags were pollinated for the second time on July 4 and 72 bags on July 6, 14 and 16 days after bagging, respectively. The July 4 and July 6 second pollinations were coded with long red and black twist ties, respectively. All bags were harvested September 27 when open-pollinated (OP) burs of BR97-161 were observed to be cracking open. All burs were opened September 30 and seeds per bag recorded for each bag.

The one pollination treatment 12 days after bagging of emasculated burs averaged 0.93 seeds per bag,[2] approximately the one seed per bag usually obtained with fresh catkins. The second pollinations, 14 and 16 days after bagging, produced 3.29 and 2.61 seeds per bag, respectively. Thus the repeated pollinations produced two to three times more BC1 seed than did one pollination only. This BC1 produced on tree BR 97-161 was included in the 2008 release of BC1 seed from the Gratland orchard.

A close up of a male fertile catkin (above) and a male sterile catkin (below).

Cytoplasmic male sterility (CMS)

Cytoplasmic male sterility (CMS) is one type of male sterility in plants. The usual cause of CMS is an incompatibility between nuclear and mitochondrial genes, often arising in a cross between species. To learn more about male sterility in chestnuts, visit http://www.acf.org/pdfs/resources/journal/journal_fall04.pdf to read two related articles in the Fall 2004 issue of *The Journal of The American Chestnut Foundation* by Paul Sisco and Robert Leffel.

Yet the potential seed set within pollinated bags is far short of that obtained via OP on the same tree. Check bags ranged from 3 to 16 burs per bag and averaged 7.8 burs per bag. Tree BR 97-161 produces a relatively high number of small burs per twig with very small, spherical seed (usually 3 seeds per bur), as shown in Figure 2.

The number of repeated pollinations during stigma receptivity to obtain maximum efficiency in hybridization may vary with genotype, season, etc. Clapper (1954) concluded that "The period of receptivity of chestnut stigmas was determined as beginning a few days after the staminate catkins began to blossom, reaching its highest degree about 12 days later, and extending nearly three weeks" (207-208).

The cyclone-pollinator technique requires the collection of catkins at anthesis, and preparing, drying, and storing of pollens. It should provide hybridizations between and within species varying greatly in times of flowering. Long-time storage of chestnut pollen may be possible if the technique is not already known. Simulated OP with bulk pollens can be more random than OP per se. With sufficient quantities of dried pollens it may be possible to eliminate the required inclusion of A

RESULTS, DISCUSSION, AND CONCLUSIONS

BC1 seed production for the pollination treatments is presented in Table 1.

POLLINATION			HARVESTED		
Date	Treatment	# Bags	# Bags	# Seeds	Seeds/Bag
July 2	None	24	24	2*	0*
July 2	1st pollination	226			
July 2	1 pollination only	118	117	109	0.93
July 4	Pollinated 2nd time	36	35	115	3.29
July 6	Pollinated 2nd time	72	71	185	2.61

Table 1. First backcross seed (BC1) production by CMS F1 BR97-161 chestnut tree, bagged June 20 and pollinated with bulked pollen from 21 A trees via cyclone pollinator, July 2008.

* Each of two torn check bags with cracking burs and one loose seed each. Heavy production of OP seed in top of the tree could have dropped seed in the bags.

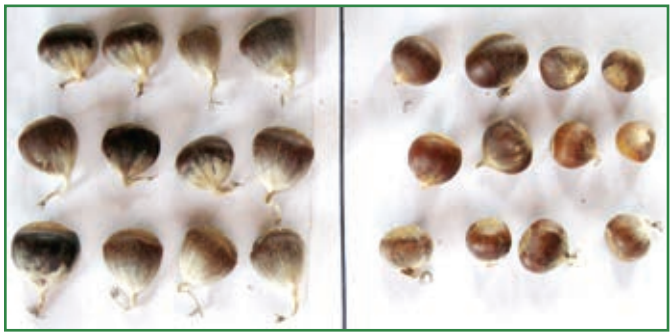

Figure 2. Open pollination seeds from American trees at Gratland (left) compared to open pollination seeds from tree BR 97-161 at Brogue (right). Note that BR 97-161 is an F1 (American x Chinese).

trees as pollinators in CMS A x C F1s and subsequent backcross generation(s) orchards as proposed by Leffel (2004). It may be possible for the chestnut breeder to play pollinator with dried pollens, diluted with a carrier such as dry cornmeal or cornstarch, dispersed with back-pack mister as used in vineyards and orchard sprayings. Dried pollens can be transported to any desired location and utilized for the various progeny tests as in plant breeding programs for the past 80 years.

We conclude that the cyclone pollinator with dried pollens can be a more efficient and accurate methodology for controlled crosses in chestnuts. The methodology deserves further experimentation.

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1. Some chestnut growers use #401 corn tassel bags as another option for bagging.
2. The statistic "seeds per bur in bag" instead of "seeds per bag" could be a more accurate measurement for this study. For example, some bags contain only one bur and some contain up to six burs. In the first case the maximum seed that could be produced per bag is three, but in the second case, up to eighteen seed could be produced per bag.

TACF Honors Its Volunteers

Jack Torkelson stands by a backcross chestnut tree at Harold Kemp's orchard in Macon County, TN. Photo by Joe Schibig

Jack Torkelson

Submitted by Joe Schibig, Tennessee Chapter President

Jack Torkelson has been an invaluable volunteer with the Tennessee Chapter and a friend of mine since 2002. His contributions run the gamut from pollinating chestnut trees in the TN woods and at Meadowview Research Farms to cloning superior American chestnut trees.

I first met Jack at Volunteer State Community College when he walked into my office with some leaves from a small tree on his property. As a former dendrology teacher, I was able to verify that the tree was indeed a surviving American chestnut. Since then, Jack and I have found several flowering American chestnuts in Tennessee and have applied Meadowview pollens to most of them. In recent years, we have shipped our pollens to Meadowview where they have been utilized in the Mother Tree Program. The key to Jack's pollination expertise is that he is an exceptional tree climber and is not afraid of heights. In fact, he delights in climbing tall chestnut trees to obtain or to apply pollen.

Also instrumental in the TN Chapter's work is Jack's cloning of large, surviving American chestnut trees, such as the ones in Amherst County, VA, and Adair County, KY, by nut grafting. With Jack's patient persistence on this project, a few of the resulting grafted trees will soon be producing seed!

Walt and Donna Lange stand by their tree farm sign in Swanton, Ohio. Photo by Carl Anderson

Walt Lange

Submitted by TACF Staff

Once Walt Lange and his wife Donna discovered TACF's restoration efforts, they wasted no time integrating them into their own forestry practices. The Langes own 52 acres near Swanton, Ohio, which they've been reforesting since 1966. Their work has not gone unnoticed: In 2010 they were named "Ohio Tree Farmers of the Year" and the following year "North Central Region Outstanding Tree Farmers of the Year." In 2004 Walt joined The American Chestnut Foundation and later, while serving as president of the Ohio Forestry Association (OFA), he won 200 pure American chestnut saplings at an auction. Immediately he planted 100 and distributed the rest to neighbors and local arboreta.

As self-educated tree farmers, the Langes want to share their knowledge, so educating the public is a top priority. They serve as education coordinators at OFA's Paul Bunyan Show, the largest forestry festival in the eastern US. One of the most popular events they coordinated last year was the American Chestnut Growers School, taught by Sara Fitzsimmons of TACF. This year, the Langes are holding the workshop again and working to strengthen the Ohio Chapter's presence at the show. Walt recently led the establishment of a TACF demonstration plot at Ohio's Maumee State Forest and is currently working to create another demonstration site at 4-H Camp Palmer in Fayette, OH.

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Book Review

Paolo Squatriti, *Landscape and Change in Early Medieval Italy: Chestnuts, Economy, and Culture*

(Cambridge University Press, 2013), 236 pages, maps, bibliography. Hardcover: $85.

By Donald Edward Davis

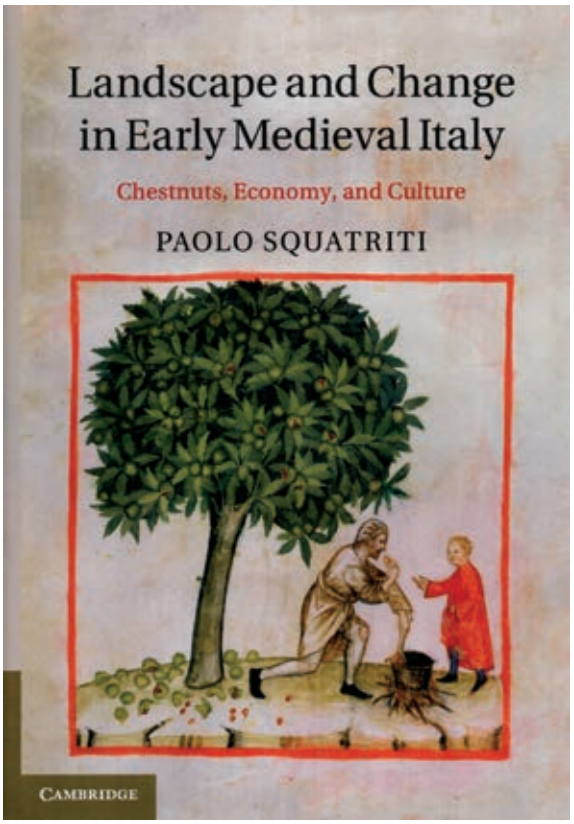

Photo courtesy of Cambridge University Press

This scholarly book is a must read for chestnut enthusiasts who thought they knew everything about chestnuts and chestnut history. The book's author, Paolo Squatriti, is an Associate Professor of History and Romance Languages at the University of Michigan. A native of Italy, Squatriti received his doctorate from the University of Virginia in 1990. He has written several books about Italy's medieval environment, including *Water and Society in Early Medieval Italy, AD 400-1000* (Cambridge University Press, 1998).

An environmental historian, the author is most interested in documenting the role played by the European chestnut (*Castanea sativa*) in early medieval life and culture. After the fall of the Roman Empire, says Squatriti, close reciprocal relationships developed "between nature and culture, between people and ecosystems" across much of the Italian peninsula (p. 25). By the end of the first millennium, those interactions had created unique and specific landscapes--including chestnut woodlands--that were "neither natural nor cultural but *both*" (p. 25). Although the bulk of the book focuses on chestnut forested communities of the 10th and 11th centuries, there is considerable treatment of the late Roman period as well. Squatriti believes that chestnut refugia survived the last ice age on the Italian peninsula, which means the trees have occupied Italy's soil "since Neolithic farming started there" (p. 18). Indeed, one has to go no further than the eastern slopes of Mount Etna to find one of the world's oldest and largest trees--a European chestnut--that is estimated to be 4,000 years old.

Chapter 1 is perhaps the most accessible chapter in the book, especially for general readers who wish to learn more about how chestnut trees grow as well as the advantages they possess over other species. We learn, for example, that the European chestnut is similar to the American chestnut in that it is "one of the last trees, if not the very last, to unfurl its leaves" (p. 38). They also resprout extremely well after being cut, a characteristic that led early Italians to grow entire forests of trees by coppicing them intentionally.

Although a historian, Squatriti is also keenly aware of the vast literature on what he calls "castaneiculture," that is, the art and practice of growing chestnut trees on European soils.

Chapter 2 not only summarizes recent attempts at finding the location of chestnut refugia during the last ice age, but also the later spread of the chestnut landscape over the Italian peninsula and into the rest of Europe. Squatriti provides considerable evidence that chestnuts were not taken directly by Romans to other European locations, as the trees apparently arrived in those countries at a much later date. Romans were not avid growers of chestnuts, relying more on the cultivation of grains and other conventional crops (they did commonly use chestnut stakes in their vineyards, however). The fall of the Roman Empire not only allowed the reforestation of many parts of Italy, but also encouraged the cultivation and harvest of chestnut trees. As Professor Squatriti argues, "it is clear that not the prosperous and confident Romans of the high empire, but the subjects of the embattled later one, propagated *Castanea*" (p. 66).

Chapter 3 is perhaps the most difficult to follow of the book's five chapters, but it is also the most well researched, using original Latin, Italian, and French sources. Here the author addresses the literary and scholarly treatment of chestnuts in classical and post-classical literature, including discussions of chestnuts by Pliny the Elder, Palladius, and Saint Augustine. Squatriti provides a fascinating look at the origins of

This European chestnut near Mount Etna, Italy, is known as the "Hundred Horse Chestnut" and is one of the world's oldest trees, estimated at 4,000 years old. The tree owes its name to a legend in which a queen and company of one hundred knights were surprised by a sudden rainstorm and sought shelter under the massive tree. Image originally published in Popular Science Monthly Volume 3, 1873.

the word used for the chestnut genus—*Castanea*—suggesting that it may come from the Greek word "kastanian," and not the Greek town called Kastanea, "where the ancients sometimes thought the plant had first come under cultivation." According to Isadore de Seville, a leading scholar of the early Middle Ages, the word for chestnut actually derives from the Greek term for castration, since removing pairs of chestnuts from their burs "is as if they were being castrated." Saint Augustine was much less certain about the origins of the term, however, and remained resigned to the idea that *castanea* was a word "whose basic ambiguity was insurmountable…for it could mean (and did mean) multiple things at the same time" (p. 99).

Chapter 4 focuses on the cultural and ecological footprint of chestnuts in the Campania region of southern Italy, where the author finds "evidence of chestnut cultivation from the 820s on" (p. 132). Before the end of the 9th century, improved chestnut cultivars had already been developed, chestnut groves were considered taxable property, and village experiments were often conducted in order to determine the best method of preserving the annual nut harvest. By the end of the 11th century, smoking chestnuts over a low smoldering fire was the most common method of preserving the nuts, a process that might take as long as three or four weeks. The technique also invited other commercial uses for the nuts as smoked chestnuts could later be ground into flour, a highly portable product with a shelf life of two years. As a result, large quantities of chestnut flour were loaded into boats and shipped far beyond the Campania coast, making the growing of chestnuts a much more lucrative enterprise.

The book's final chapter surveys the development and spread of the chestnut landscape across the Po Valley of northern Italy, particularly those villages situated nearest the Alps. According to Squatriti, the material record for the presence of chestnut trees and nuts in that area is "far richer," which suggests the trees were impacting daily life there at a much earlier date (p. 169). Chestnut timber was certainly used for construction purposes in Po Valley communities very early on, as carbonized chestnut wood fragments have been uncovered by archaeologists dating back to the 5th and 6th centuries. By the early medieval period, watercraft made wholly of chestnut were plying the waters of Lake Como, as the tree's tannic wood made it less susceptible to rot. Po Valley residents regularly coppiced chestnut trees, using the straight timber produced by the periodic cutting for roofing beams and palings. They also grew trees for nut production. According to archival documents, serfs living in the village of Canelle Secco near Erbusco paid to the nuns of the local abbey the rent in 4,000 kilograms (8,800 pounds) of dried chestnuts annually. This amount indicates both the size and value of chestnut groves in the Po Valley, as well as the transformative role the trees were no doubt playing in early medieval life and culture.

European chestnut cultivar located near Monviso at the headwaters of the Po River, in Piemonte, northwestern Italy. Photo by J. Hill Craddock

On the Necessity of a Cross-Generational Approach to Restoring the American Chestnut

By Tyler Kulfan

Students from Summit Charter School in Cashiers, NC, help plant a Restoration Chestnut 1.0 tree. Photo by Ann Austin

There is a popular adage regarding forestry work: "Foresters work now for an end that they cannot hope to see in their lifetime." There is no clearer example of the truth of this statement (and its many resulting complications) than the case of the American chestnut. Any newly planted hardwood tree will ordinarily take over a decade to reach sexual maturity and a century or so of growth and forest succession to reach the impressive heights and mass we associate with them. For the American chestnut, that already vexingly long period of growth must first be preceded by generations of research and selective breeding. The work of restoring the American chestnut is, as we knew it would be, a project that will outlive those who began it—a baton that must be passed from one generation to the next.

This brings to light, then, a fundamental problem regarding the future of the American chestnut: the generation that remembers healthy, full-grown chestnuts and witnessed the devastation of their decline cannot hope to see the happy ending of this ongoing project of restoration. Likewise, the generation that, we hope, will live to see the final fruition of the species' restoration has never known forests that contained mature American chestnuts. We are dependent upon this younger generation working towards something that, for them, has always been abstract history.

As a student of history, it was the (somewhat inconvenient) fact that the American chestnut's place in American ecosystems, economy, and culture can now only be understood through an historical lens that initially attracted me to the plight of the tree. It is only through old accounts and records of the past—as well as the stories of the people who remember the American chestnut—that we can assemble a holistic understanding of the role the chestnut played in our forests and society. Indeed, that role was great; but those (myself included) who have never lived alongside healthy chestnut trees can never fully appreciate their role and significance, and the unfortunate fact remains that by 1940 the majority of these great trees were already gone. That would put those who remember the tree even just from their early childhood at 80 years old. To remember Eastern American forests prior to the introduction of the blight, we'd have to go back even further—to 1904, when the chestnut blight was cultured and named. That means anyone alive to remember the pre-blight forests of America most likely would have to be a whopping 109 years old. There are not many of those folk out and about.

It is the younger generation—my generation—then, that must take up the task of restoration; it is the task of foresters who have never seen a mature American chestnut, ecologists who have never witnessed a forest dominated by these trees, carpenters who have only ever worked with reclaimed chestnut lumber, and street vendors who sell roasted European chestnuts instead of those American ones that Nat King Cole sang of, nostalgia in his voice (it brings a tear to my eye). But first, they must have knowledge of and faith in the importance of this enormous undertaking.

Fortunately, as far as raising interest in the restoration project among young people is concerned, the time is right. Be it a true and lasting shift in attitude and philosophy or a temporary fad, the generation that is now coming of age and taking its place in American society is keenly interested in environmental conservation. Recent years have seen increased usage of public transportation (U.S. Public Interest Research Group), consumption of organic foods (Organic Trade Association), and involvement in the establishment of a renewable energy infrastructure (Palakurthi, 2004) among young adults; the number of young people pursuing careers in ecology and sustainable agriculture is similarly on the rise (Natural History Network, *Sustainable Table*). Concurrently, there is a growing

Nick Kerlin, Ben Dreschel and Matt Slifko work alongside one another at a planting of American chestnut trees at The Arboretum at Penn State. Successful American chestnut restoration will require multiple generations working together. Photo courtesy of Centre Daily Times/Nabil K. Mark

interest in volunteering among young adults (Corporation for National and Community Service). With that in mind, there has never been a more ideal time for involving young people in restoration efforts. There is good reason to believe that the members of my own generation truly take environmentalism seriously and seek to commit their ideals to real action. Conversely, if "going green" is just another passing fad, well, we'd better cash in on it now before it goes out of style.

How will this be done? As I've suggested, the interest in and willingness to dedicate time and energy towards conservation is already here; it is a lack of familiarity with and appreciation of the issue of the American chestnut that are likely preventing young people from being actively involved. There is no one definitive way to go about remedying this and to get this largely untapped demographic involved; rather, we must simply be more intentional in our outreach efforts. Facilitating and expanding outreach to colleges, high schools, environmental volunteer agencies, and outdoor recreation facilities and clubs all come to mind as effective means of achieving this; expanding the TACF intern program (which is responsible for getting me actively involved) may likewise prove fruitful.

And, finally—and, perhaps, most importantly—these environmentally-minded young people ought to be brought into contact and conversation with those members of the older generations who remember the place that the American chestnut once held in the forests, commerce, and culture of America. It is through their stories, knowledge, and experience that true understanding and appreciation of what was lost might best be instilled in those who will live to see and, hopefully, participate in its ultimate restoration. This project of restoration is the work of many generations; with that in mind, constructing a cross-generational approach that will unite and involve young and old—those who spearheaded the project and those who will step up to inherit its work—is truly essential.

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Green Beans in Pomegranate Vinaigrette with Chestnuts

Recipe courtesy of *The Local Palate* magazine, www.thelocalpalate.com

Photo by Jennifer Hitchcock

Ingredients

3 cups fresh green beans

1 pomegranate, deseeded

¾ cup chestnuts, roasted and chopped

1 orange, zested and juiced

1 shallot, diced

1–2 tablespoons red wine vinegar

2 teaspoons whole-grain mustard

½–¾ cup olive oil

Salt and pepper to taste

Yield: 6 servings

Directions

1. Blanch green beans by placing in a pot of boiling water for 1–2 minutes; drain and cool immediately in a bowl of ice water; drain again and set aside.
2. Toss beans in a large bowl with the pomegranate seeds (to taste), chestnuts, and orange zest.
3. In a separate small bowl combine 2 tablespoons of fresh orange juice, diced shallot, red wine vinegar, and whole-grain mustard. Whisk all ingredients together. Continue whisking while slowly adding the olive oil until mixture is emulsified. Add more olive oil to taste, until acidity is balanced.
4. Toss bean mixture with vinaigrette. Add salt and pepper to taste. Dish can be served warm or cold.

CHESTNUT MOMENTS

"The question is frequently asked whether the chestnut will disappear altogether from our forests. My own opinion is that it will not. Calamities caused by the chestnut blight are not uncommon in the history of forests in all parts of the world.... In the end, although many of us will not live to see it, we may expect chestnut trees again to grow in the forests of Pennsylvania."

— Gifford Pinchot, American Nut Journal, June, 1920

The original "Grey Towers American chestnut tree," circa 1900. Grey Towers, located in Milford, PA, is the ancestral home of Gifford Pinchot, first Chief of the US Forest Service and twice Governor of Pennsylvania. This September, a Restoration Chestnut 1.0 was planted in the location of the original Grey Towers chestnut in celebration of Grey Towers National Historic Site's 50th Anniversary.
Photo courtesy of Grey Towers National Historic Site

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