SPRING 2017 ~ ISSUE 2 VOL. 31

Chestnut

THE JOURNAL OF THE AMERICAN CHESTNUT FOUNDATION

A BENEFIT TO MEMBERS

THE AMERICAN CHESTNUT FOUNDATION®

100K Tree Day ~ Chestnut Germplasm ~ Chinese Research on Chestnut Blight ~ Queen of the Chestnuts

SPRING 2017 ~ ISSUE 2 VOL. 31

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IN MEMORY AND IN HONOR

Lisa Thomson

President and CEO

DEAR CHESTNUT ENTHUSIASTS,

Early spring has bloomed all over, from the mountains to the sea. We are busy preparing for the growing season ahead and looking for new and innovative ways to be more efficient in all areas of our organization, with an eye on the wisest use of our limited resources.

To that end, we announce some cost-cutting ways to enhance our reputation as a conservation organization. One example is the new schedule of the *Chestnut* magazine which decreased the quantity, increasing the quality of the publication. Kudos to our co-editors Jules Smith and Ruth Goodridge for their hard work in publishing this award-winning journal, which elicits many compliments from our readers. Our other significant publishing piece, the Annual Report, is now offered digitally. Please keep an eye out in your email inboxes for it, as well as on our newly redesigned website. The website redesign was a monumental project more than a year in production. We ask for your feedback, and patience, as we work out launch glitches but initial reviews have been positive!

Our spring fundraising appeal, traditionally sent in the form of a letter with remittance envelopes, will be completely online through our social media platforms (if you haven't friended us on Facebook, followed TACF or me on Twitter or received our online newsletter, e*Sprout*, please consider any or all of those ways to receive information). Finally, we will be discontinuing the distribution of board bookbinders at our twice per year meetings, which sounds like a minor thing, but actually costs a great deal of time and money to produce. When we set up our assembly line at the Asheville office to compile them, with our printer cranking out reams of paper, we all feel a sense of guilt for what may be material that is eventually thrown away.

When this issue goes to print, we will be putting the final touches on our comprehensive Strategic Plan, a process more than a year to complete. It is a practical, visionary document that I look forward to sharing with all of you as it will drive the goals, strategies and actions of our dedicated staff and volunteers for the next 10 years. I am deeply grateful for the volunteer leadership behind this plan. Look for it in a future issue of *Chestnut* and on our website.

I will be on the road quite a bit this year and hope to see you in person, to thank you for your loyal support of our mission. Mark your calendars for the exciting fall meeting in beautiful Portland, Maine, at the height of fall color, October 5-7. It was high time we held a meeting in New England, with thanks to the energetic Maine Chapter board leadership helping us plan and find sponsors. Held in conjunction with the Maine Society of American Foresters meeting, we will be in good company with other stalwart tree-huggers!

With best wishes,

Lisa Thomson

Lisa Thomson, President and CEO
The American Chestnut Foundation

Follow me on Twitter (@MadameChestnut).

"Xena the Hedgehog" by Jeannine Kazacos

This African pygmy hedgehog, posing beside an American chestnut seedling, is the winner of our 2016 TACF Photo Contest. The seed, given to Jeannine by NY-TACF President Allen Nichols, was planted in the fall of 2015 in Mount Vision, NY.

THE AMERICAN CHESTNUT FOUNDATION®

WHAT WE DO

The mission of The American Chestnut Foundation is to restore the American chestnut tree to our eastern woodlands to benefit our environment, our wildlife, and our society.

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Chapter Science Meeting

By Sara Fitzsimmons, Director of Restoration

Bill Powell leads a discussion on strategies for incorporating the transgenic chestnut into TACF's work.

Over a late February weekend in 2017, close to 50 TACF members, associated research scientists, and staff gathered under 75F temperatures at the Fern Hollow Nature Center in Sewickley Heights, PA, just west of Pittsburgh. The goal of this meeting was to assemble a group to share and contribute in an open dialogue format regarding the next few years of science, research, and development within TACFs regional restoration programs. It had been 12 years since the last time such a meeting was held, the one at the University of Miami Ohio, in February 2005.

The timing for another meeting was right with three major documents having been recently approved and/or close to being approved: 1) the Foundation's Science Oversight Committee (SOC) had recently approved a new science plan penned by Dr. Jared Westbrook; 2) the SOC also approved a new direction for collaboration and formal unification of the newest restoration technologies in the 3BUR document ; 3) and a new 10-year strategic plan for the Foundation was on the horizon. With new results to share and directions for research proposed, the meeting sought to not necessarily get everyone on the same page, but at least make sure everyone was reading the same book, even if some were on different chapters of that book.

Participants were each asked to come up with science-based topics and questions which could be addressed to or from the group. With many overlapping submissions, organizers devised a list of 17 overarching topics, some of which had very specific questions to be addressed. Each topic was introduced through one or more short (10-20 minutes) presentations by those most familiar with recent advances on the subject, followed by 0.5-1.5 hours of Q&A and open discussion.

With transgenic trees on the cusp of deregulation, incidences of *Phytophthora cinnamomi* infestations creeping northward, the Superdonor hypovirulent strain now in field-testing, many chapters are reaching an apex of their originally-defined breeding program. This winter was an excellent time to get everyone up-to-date on where all those projects are, how they fit together, and how the chapters can play a part in each of those technologies. Organizers are still working on compiling materials from the meeting, including minutes, associated documents, and new research plans. They will be published on the PSU Chestnut Growers Website this spring. Perhaps the greatest benefit of a meeting such as this was the periods of open discussion. There is no doubt that some, if not all, participants came away with more questions than answers, but the hope is that everyone came away with newfound optimism and energy to continue this long-term project of chestnut restoration.

100,000
trees

20,000
volunteers

95
counties

40+
planting events

1
day

100K Tree Day:

RECORD NUMBER OF TREES PLANTED IN TENNESSEE

By Vicki Turner, Tennessee Chapter President

Jeff Barrie, Director of Sustainable Tennessee and Vicki Turner, TACF's TN Chapter President at the tree distribution outlet in Montgomery Bell State Park. ~Dickson County

Girl Scout Troop 1195 planting trees at their school and at their homes today! ~Sumner County

"Planting our trees. Thank you!" ~Tipton County Master Gardeners

"Thank you, Tennessee Environmental Council! Planted our 20 trees and had three wonderful helpers." ~Megan Fielder, Henderson County

The Tennessee Environmental Council organized the planting of 100,000 trees in one day (February 25, 2017) in all 95 counties engaging 20,000 volunteers and 40+ public planting events. This is the largest community tree-planting event in the state's history.

The trees were delivered from nurseries earlier in the week to eight field offices of the Tennessee Department of Environment and Conservation (TDEC) and then to 132 distribution points across the state. Trees were Yellow [Tulip] Poplar, Shumard Oak, American Plum, Eastern Red Bud, and Virginia Pine.

The tree giveaway was the brain child of the Council's CEO, John McFadden. "We started the tree planting in 2012 for my 50th birthday by planting 5,000 trees in one day," says McFadden. "That was 5K tree day. Soon after, we did a couple of 10k tree days. Those were harder because we were managing multiple sites and recruiting volunteers to plant the trees."

In 2014, Jeff Barrie joined the Council as their new Director of Sustainable Tennessee and he was motivated! "He called me an 'underachiever,' said McFadden. "He wanted to plant 50,000 trees in a day, taking the effort statewide. So, I said, let's plant 50K." However, with only one week before the first 50K planting, there were only 800 volunteers and 13K trees committed.

McFadden recalls, "Jeff asked me for $500 to market on Facebook over the weekend. That was Friday. By Monday we had 1,200 volunteers and 24,000 trees committed. By Thursday we had all the trees committed and 3,000 volunteers. It was like Black Friday at Walmart at the tree distribution centers."

"We have learned a lot since then, so planting 100,000 trees in every corner of our state has been much smoother than those 50,000 two years ago."

This year during 100K Tree Day, while most people registered for one to five trees of each species, one farmer from Cookeville took 400 trees to reforest part of his farm.

TN State Representative, Roger Kane, took 1,000 trees and organized his own giveaway in Knoxville, as did the cities of Lebanon, Goodlettsville, White House, and Mount Juliet.

An Eagle Scout candidate planted 30 trees at Ellington Agricultural Center while clearing invasive species of plants.

Congratulations to all who participated. Tennessee Environmental Council has orchestrated a TREE-mendous effort and achieved an historic success to be applauded!

PRELIMINARY RESEARCH TO ASSESS OVERSTORY TREATMENT INFLUENCE ON SURVIVAL, GROWTH AND POTENTIALLY BLIGHT-RESISTANT American Chestnut Hybrids IN SOUTHERN HARDWOOD FORESTS

By Tom Saielli, Mid-Atlantic Regional Science Coordinator

Since 1983, The American Chestnut Foundation (TACF) has been committed to restoring American chestnut. However, our breeding is still a work in progress, with course corrections needed to ensure successful future restoration. With increasingly hotter, drier, and longer growing seasons, the potential for drought is a growing concern, particularly for newly established seedlings that may be vulnerable to desiccation and high mortality. With this in mind, we are now exploring silviculture strategies that may provide some insight into increasing drought tolerance while also providing for reasonable growth rates.

An amazing group of collaborators established a study planting in March of this year. Volunteers included the Department of the Army represented by the District Commander, the U.S. Army Corps of Engineers Wilmington District, Appalachian State University, TACF Chapter volunteers, North Carolina Department of Agriculture Forest Service, West Wilkes High School Agriculture Program, and Friends of W. Kerr Scott Lake.

The study involves a series of hybrid American chestnut plantings located at W. Kerr Scott Dam and Reservoir, in Wilkesboro, North Carolina. Overall, this research will provide an initial set of data regarding the growth, survivorship and drought tolerance of American chestnut hybrids within a southern forest habitat. We will also observe long-term blight resistance and competitiveness.

The genetic component of this research includes the establishment of nine families of advanced American chestnut hybrid seedlings (B_3F_3), one 50/50 Asian x American chestnut hybrid (F_1) family, and three 25/75 Asian x American (B_1) families, in a replicated design under three levels of silvicultural overstory treatment: open canopy (no forest cover overhead), closed canopy with release after two years, and closed canopy with release after four years.

Although growth of American chestnut is significantly correlated with exposure to sunlight, chestnut seedlings planted in open sites are often exposed to greater environmental pressures, such as drought, freezing injury and competition from grasses and understory vegetation. Chestnuts that persist in the forest understory may be protected from harsher environments, but experience little to no growth. However, seedlings with well-established root systems will often out-compete understory vegetation once the canopy is removed.

Expected Results:

As progress continues through the TACF breeding program, American chestnut is poised for future reintroduction throughout its former range. It is our hope to expedite the restoration of this species in the south by examining genetics x environment interactions related to drought resistance, blight resistance, and American traits such as early rapid growth, timber form, and nut production.

Volunteers plant hundreds of seedlings in an open field at W. Kerr Scott Reservoir. The open field represents one of three treatments.

Student volunteers from West Wilkes High School plant seedlings, record data, and install tree tubes and cages.

2017 TACF Spring Appeal

PLEASE HELP US MEET OUR GOAL OF $100,000 FOR THIS CRITICAL CAPITAL PROJECT.

The Meadowview Research Farms are in urgent need of new and upgraded seedling propagation facilities. A generous bequest has jumpstarted this project, but additional critical funds are needed. **We must ensure a state-of-the-art greenhouse facility, with appropriate equipment, can finally become a reality.**

Our goal, with an eye on large-scale restoration, is to double seedling production from 10,000 to 20,000 annually. We expect production to only increase over time as our distribution reaches regional proportions. **Please help us meet our goal of $100,000 for this critical capital project.**

Something new for this year's spring appeal: we are going paperless!
In an effort to ensure TACF embodies sustainable business practices, we are requesting donations be made online, which is a great opportunity to check out our new and improved TACF website (acf.org). Of course, if you prefer to mail a check or give a gift of stock, please contact us at our national office: TACF, 50 N. Merrimon Ave., Suite 115, Asheville, NC 28804, or contact Vic Hutchinson, director of development, at vic.hutchinson@acf.org or 828-281-0047.

THE AMERICAN CHESTNUT FOUNDATION®

ADVANCED HYBRID CHESTNUTS PLANTED AT

Sandy Creek Nature Center

By Dr. Martin Cipollini, Georgia Chapter Member and Dana Professor of Biology at Berry College

The American Chestnut Foundation's (TACF) Georgia Chapter members were among more than 50 volunteers who helped plant 300 advanced hybrid chestnuts at Sandy Creek Nature Center near Athens, GA on Saturday, March 4.

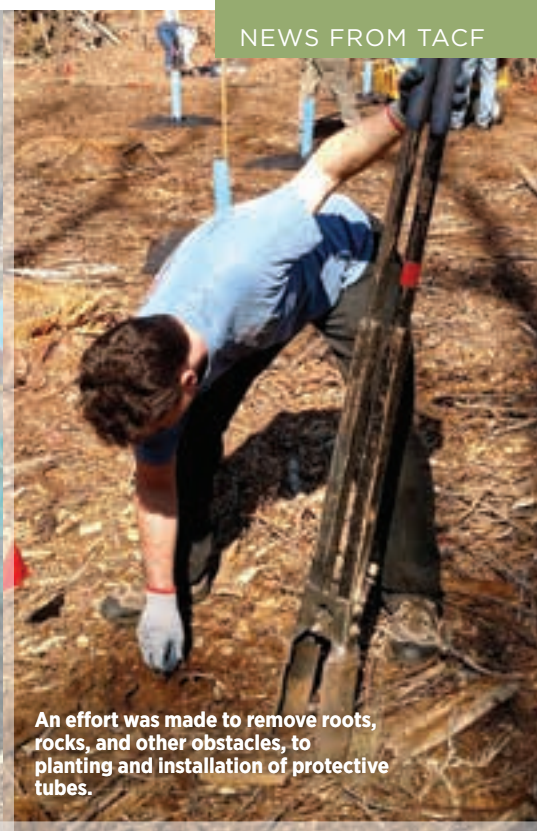
This planting is part of a managed forest project initiated and organized by Michael Wharton, Operations Administrator for the Athens-Clarke County Department of Leisure Services and others with the Department. TACF's involvement on the project included site surveys and advice from Georgia Chapter board members Dr. Scott Merkel, Erin Coughlin (University of Georgia), Dr. Martin Cipollini (Berry College), TACF's newly-minted Southern Regional Science Coordinator Ed Schwartzman, and Dr. Steve Jeffers (Clemson University), who tested the soil for presence of *Phytophthora*).

The trees were direct-seeded potentially blight resistant BC_3F_3s from Meadowview's seed orchards. In addition to serving as a public education site, this planting will help to inform TACF about the use of direct seeding in regenerating nuclear chestnut plantings in small clear cuts. In other parts of this managed forest project, numerous other hardwood and softwood species will be planted. The very public location of the Sandy Creek Nature Center (just on the outskirts of the bustling city of Athens) will afford easy opportunities to engage the public in methods, promises, and even the potential pitfalls of chestnut restoration.

We hope you enjoy the pictures of the day's activities included here. With these many volunteers, it took only two hours to get everything in the ground! Kudos to Michael and his Athens area partners for an extremely well-organized event. The Georgia Chapter looks forward to continued engagement with this forward-looking project.

Volunteers of all ages joined in the fun. It doesn't take a lot of experience to participate in such events – just a little interest and willingness to get a little dirty!

Teams were led by pre-trained leaders who dispensed seeds and tags in exchange for the return of a red flag. No flag, no seed!

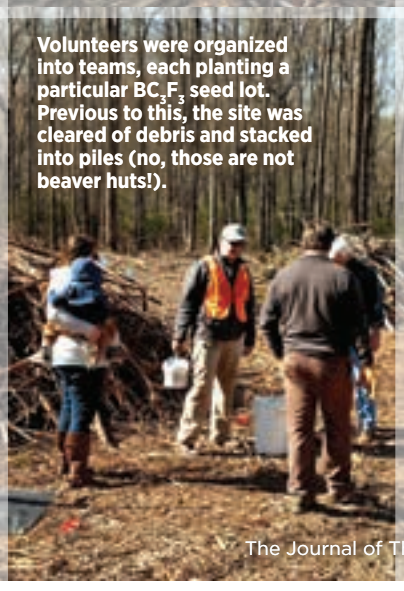


An effort was made to remove roots, rocks, and other obstacles, to planting and installation of protective tubes.

GA-TACF volunteer Tom Harris (left) getting assistance from GA-TACF/Berry College intern John Patten Moss.

After planting, protective animal guards were installed, staked into place with bamboo stakes, and tagged with aluminum tags. That little one is making sure he does it just right!

The next generation planting the next generation!



Volunteers were organized into teams, each planting a particular BC_2F_3 seed lot. Previous to this, the site was cleared of debris and stacked into piles (no, those are not beaver huts!).

The inspiration for this project was a talk given to the Mushroom Club of Georgia by Dr. Martin Cipollini. Here, Mushroom Club members who helped initiate the project with Athens-Clarke County, assist with planting.

Volunteer Planting

AT SEVEN ISLANDS STATE BIRDING PARK

On a cool day in early March, the sun was out and the ground was ready to conceive new life. Even though it was still technically winter, it was a perfect day for volunteers in TACF's Southern Region to plant backcross seedlings at the Tennessee seed orchard in Seven Islands State Birding Park, Kodak, TN. Located on a peninsula of land along the French Broad River, Seven Islands features more than seven miles of trails passing through native grass fields along the river, wooded areas, and rolling hills with views of the Smoky Mountains.

It took a large number of dedicated volunteers to get the job done!

All of the volunteers met late morning, tools in hand, and ready to dig into the earth to make a new home for nearly 300 seedlings. The trees planted in the seed orchard were comprised of different backcross chestnut lines crossed with Tennessee native American chestnuts delivered by Dr. Hill Craddock, TACF Board member and professor at the University of Tennessee's Chattanooga campus.

Volunteers first met with Ed Schwartzman, TACF's Southern Region Regional Science Coordinator, and Justine Cucchiara, Park Manager at Seven Islands. As hosts, Schwartzman and Cucchiara spoke about the day's activities and expectations. When asked about the park's involvement, Cucchiara said, "We are so proud to be part of this exciting restoration project. The American chestnut is such an enigmatic species for so many. You can tell that these trees not only were significant for their role within the ecosystem, they also held an important place in people's hearts."

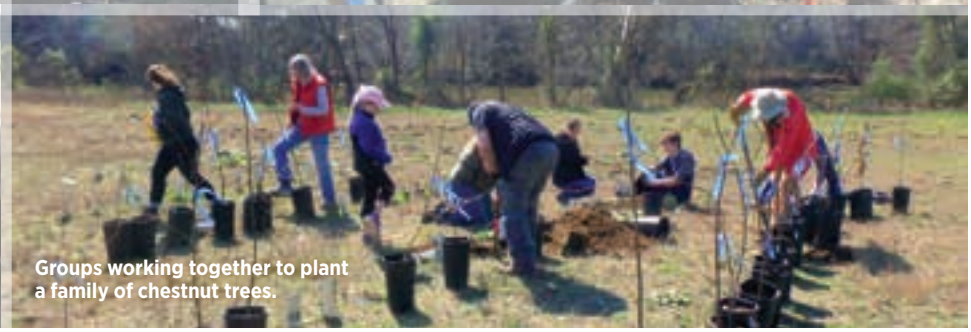
One after one, volunteers marked and dug the holes, then planted the seedlings. The crew worked tirelessly to finish the job, getting all of the seedlings into the ground. Going forward, these trees will be screened for superior blight resistance. Selected trees will open-pollinate to produce resistant B_3F_3 seed adapted to Tennessee's environment.

After the plantings were finished, the volunteers held a recruitment session to build a seed orchard management team. Several people signed up and committed to help out with much-needed routine maintenance, such as weeding and watering. This is a huge help to Justine and staff at the park. "We need a dedicated team of 'Chestnut Champions' to care for the seedlings as they become established. I don't like to refer to the staff at Seven Islands as 'limited' because the two of us get an awful lot accomplished, but having more helpful hands will give this project a greater chance of success."

TN Chapter President, Vicki Turner prepares to plant a chestnut seedling.

Dr. Hill Craddock begins digging holes as Justine Cucchiara looks on.

Volunteers gather to learn about TACF's mission prior to the planting.



Groups working together to plant a family of chestnut trees.

If you're interested in being part of the dedicated volunteer team maintaining the orchard at Seven Islands, please contact Ed Schwartzman at ed.schwartzman@acf.org.

Tallest Tree

IN NEW YORK

By Allen Nichols, New York Chapter President

Dave Pringle stands next to the award-winning American chestnut tree he discovered in Niles, NY.

2017 New York Tallest Tree Contest

$200 REWARD

LOOK FOR open burrs on the ground and 6-9 inch slender leaves with pinpointed teeth that have a fishhook profile.

Last year, TACF's New York Chapter posted a $200 reward for anyone who found the largest, healthiest American chestnut tree in New York State. Out of 26 submissions, nine were pure American.

The winner of the 2016 reward was Dave Pringle, whose tree measured in at 20.7″ diameter-at-breast height (DBH) and was found in Niles, NY, about 25 miles southwest of Syracuse. Congratulations, Dave! Another sizable tree that qualified for a $50 reward was submitted by Bob Osterhout. This tree was 17″ DBH.

There are still many large trees out there and the New York Chapter wants to know where they are, so we're offering the $200 reward again in 2017. The tree must be found in New York State and the property owner must allow the chapter access for pollination and/or seed collection. It must also be identified as pure American chestnut.

When searching for a pure American, keep an eye out for open burs lying on the ground. They will be light brown with long, sharp spines and measure about three inches across. Also look for slender leaves that are 6-9 inches long with pinpointed teeth that have a fishhook profile.

For more information or questions about identifying a tree, contact Allen Nichols at 607-263-5105 or fajknichols.75@gmail.com.

Thanks to everyone who submitted trees in 2016 and good luck locating more in 2017!

WORKSHOP ON THE AMERICAN CHESTNUT AT

Iowa State's Shade Tree Conference

By Paul Sisco, Carolinas Chapter

This past February, I had the privilege of conducting a two-session workshop at the 61st Annual Iowa Shade Tree Short Course given at Iowa State University in Ames. In my workshop – Breeding Blight and Root-Rot Resistant American Chestnut Trees – I discussed the work of The American Chestnut Foundation (TACF) and what's being done to breed in resistance to root-rot caused by *Phytophthora cinnamomi*.

About 75 people attended both workshops, including Dr. Mark Widrlechner, a former student of Dr. Charles Burnham, TACF's founder. Dr. Widrlechner was Vice-President of TACF's Board of Directors in the early days of the Foundation and had supplied seed from some Iowa trees to TACF's breeding program.

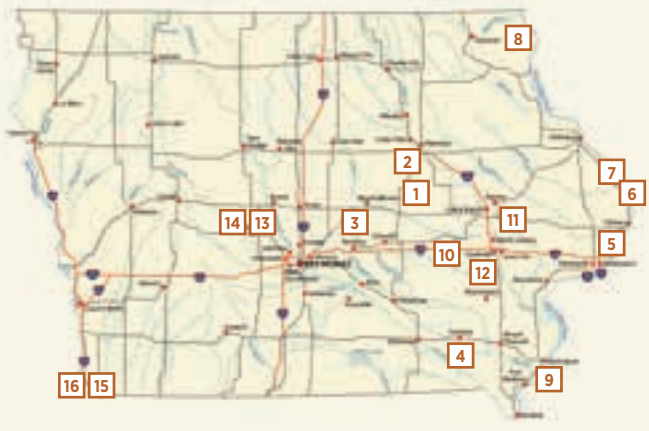
As part of my talk, I showed a map and photos of surviving chestnut trees in Iowa, compiled by TACF member Ross Rogalski in 2004. This was of great interest to the audience, and I challenged them to update the map. Dr. Widrlechner gave me a written list of trees he knew about in the state.

Dr. Steve Leath, President of Iowa State University and a former colleague, invited me to dinner at the President's House, "The Knoll," along with Harry and Molly Stine. Harry is President of Stine Seed, which now supplies 2/3 of the soybean seed grown in the U.S. He also grows nut trees on his Iowa farm and treated me to some improved black walnuts that he developed. Dr. Leath has a farm in Ashe County, NC, where he grows potentially blight resistant chestnut trees that he received as a member of TACF.

Dr. Steve Leath and his wife Janet at the Reiman Gardens at Iowa State. The Leaths have spearheaded a 20-year project to expand and improve the gardens.

Dr. Thomas Harrington, forest pathologist, gave me a campus tour that included visits with two of my former colleagues in maize genetics, Dr. Pat Schnable and Dr. Roger Wise.

This is always a well-attended annual conference of professionals working with trees from all over the U.S., including arborists, landscapers, and people working in arboretums. I was pleased to have had the opportunity to share information about TACF and the work being done to restore the American chestnut.



A = Confirmed American UA = Unconfirmed American E= European
UE= Unconfirmed European J = Japanese C = Chinese or Asian Hybrid

1 Marshalltown, 2 ea A, J, E
2 Buckingham, Traer, 3 ea A, 2 ea UA
3 Newton, 8 ea A, 3 ea C
4 Bonaparte, A
5 Bettendorf, A
6 Mt. Carroll, IL 5 ea UA
7 Mississippi Palisades, 4 ea UA
8 Waukon, UA
9 Burlington, 3 ea UA
10 Coralville, UA
11 Dion, UE?
12 Washington, UA
13 Casey, UA
14 Adair, UA
15 Sidney, UA
16 Morton State Park "Arbor Lodge" 3 A, 3 C

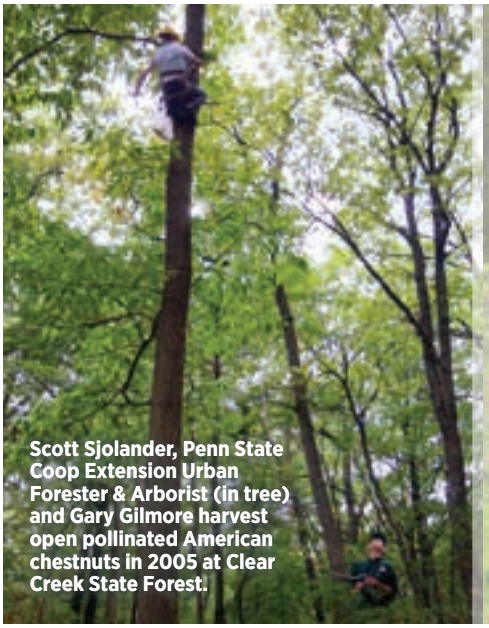
VOLUNTEER SPOTLIGHT

Gary Gilmore

In early 2001, Smith Research Farm was established when the Marion Stewart Smith and Barton Shaw Smith family donated 82 acres of land, located in eastern Jefferson County, PA, to The American Chestnut Foundation (TACF). Smith family members worked with Dr. Bill Lord, Board Emeritus, to coordinate the transfer as a form of partnership with the Pennsylvania Department of Conservation and Natural Resources (DCNR). At that time, DCNR assigned Service Forester Gary Gilmore to act as the land coordinator in managing the property.

Gary Gilmore processing the fall chestnut harvest at the Smith Farm, totaling over 2,700 chestnuts.

Orchard #1, fenced and started by Gary Gilmore in 2002. At the time of this picture, the orchard contained 145 plantings.



Scott Sjolander, Penn State Coop Extension Urban Forester & Arborist (in tree) and Gary Gilmore harvest open pollinated American chestnuts in 2005 at Clear Creek State Forest.

A group of PSU professors, students, and others gathering to discuss research findings that were done on the Smith Farm. L-R: Gary Gilmore; Dr. Aaron D. Stottlemyer, PSU Professor; Two PSU Professors; Student; Student; Dave Sorg, PSU Professor; Gary Frank, District Manager DCNR; Bryan Burhans, former TACF CEO; Unnamed.

"After the land was dedicated, everyone walked away and the property just stood there. No plans, nothing. I decided to go ahead and plant a small orchard of chestnut," said Gary, and so his 15+ year volunteer effort commenced. He not only monitored the property but also worked to ensure any activities or expenses occurring on the Smith Farm over the years were offset by funds generated by the property. This included smaller initiatives such as leasing sugar bush access to a local maple sugar maker and selling firewood from culled and fallen trees. He also applied to include the farm in various programs for conservation stewardship practices as administrator on behalf of TACF.

"I was so impressed with Gary's attention to, and knowledge of the property, its history and the various activities that have been taking place there. I am so grateful for his help in overseeing the Smith Farm for all these years, and I applaud his willingness to stay involved," said Heather Nelson, TACF's Accounting Manager, who nominated Gary for the Volunteer Spotlight.

Thousands of trees have been planted on the property since Gary has been involved, including a large number of research plantings. These types of plantings are due to Gary's extension of invitations to nearby educational institutions. "Not long after I started at Penn State, I was contacted by Gary, asking if I would be interested in being involved in some chestnut projects," said Dr. Aaron Stottlemyer, Assistant Professor of Forestry at Penn State's DuBois campus. "Over the past nine years now, these projects have provided valuable opportunities for countless students to learn about and gain hands-on experience with chestnut ecology and restoration, invasive species management, and other topics. Gary is always anxious to help conduct field- or classroom-based learning activities and interact with students. They love it when he is involved with projects because of his tremendous sense of humor and his ability to communicate complex information in meaningful, interesting ways."

However, Gary would be the first to say that he could not have done this substantial amount of work alone. Throughout his tenure, he has had strong support from the PA DCNR, current and former TACF staff members, and many, many volunteers including Dave Lazor. Dave is a woodland owner who wanted to get acquainted with his designated DCNR service forester. As a result, he has been working closely with Gary since 2001, dedicating countless hours at the farm. Dave stated, "Gary has been the key enabler of all things accomplished at TACF's Smith Research Farm. His skills and talents extend across many disciplines, like blacksmithing (making iron gates for the property), his expert use of a chainsaw to clear group openings safely and effectively for plantings, and all sorts of power equipment necessary to manage the extensive property."

TACF's Director of Restoration, Sara Fitzsimmons, has collaborated with Gary since she began working with the Foundation in 2003. "He and Dave Lazor started making crosses for the Smith Farm, working with local Jefferson County trees for controlled pollinations in 2003. The trees were then planted at the Smith Farm in 2004, but they were also used as initial crosses to help the Maryland Chapter at its large Foxhaven orchard that same year." When asked to share her thoughts about Gary, Sara replied, "He is quite the fellow! Wherever I go, he's there. I'm convinced there has to be more than one of him for all the work he accomplishes."

Clearly, this is a TACF volunteer whose passion and commitment has made (and will continue to make) a difference for years to come. Although Gary has moved to a new position as Woodland Stewardship Coordinator at the PA Department of Conservation and Natural Resources Bureau of Forestry, he assures TACF that the Smith Farm is in good hands. He will remain involved with the care of the land alongside his replacement, Forester John Brundege.

Thank you, Gary Gilmore, for being such a fine steward of TACF's property and for your tireless effort and care over the last 16 years!

CONSERVATION OF WILD AMERICAN

Chestnut Germplasm

THROUGH
GERMPLASM CONSERVATION ORCHARDS (GCOs)

By Sara Fitzsimmons, TACF Director of Restoration

A common misconception is that the native American chestnut is endangered, threatened, or even extinct. In actuality, none of those terms may be technically applied. Recent analysis of US Forest Service's Forest Inventory Analysis (FIA) data suggest an estimated 431 million American chestnut trees are still alive in the eastern United States (Dalgleish et al 2016). That's a lot of trees, but certainly much less than the estimated 4 billion that existed prior to introduction of the blight fungus.

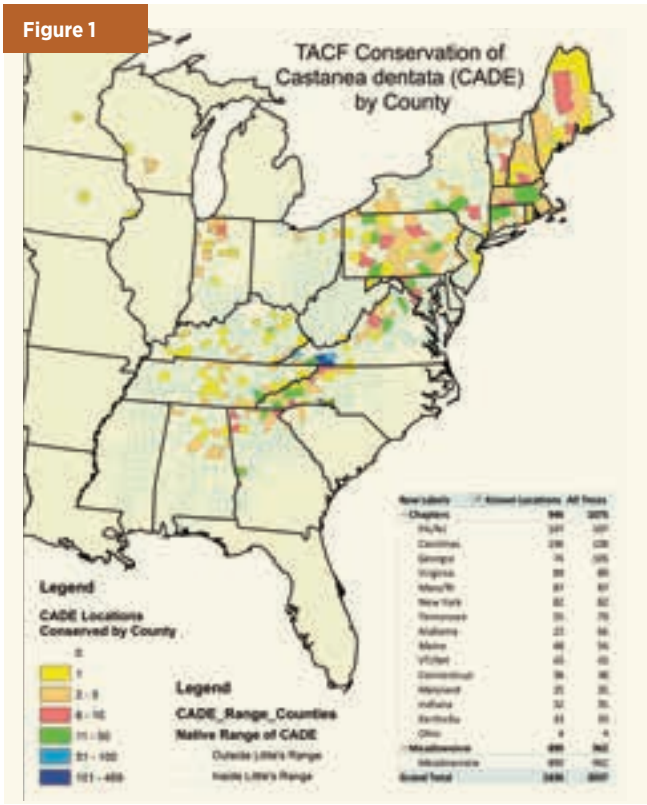
While the American chestnut is not technically endangered or extinct, it is certainly under threat. In all but very rare instances, chestnut blight has virtually ceased natural regeneration of this species. For that reason, one might term the status of the American chestnut as "effectively extinct," as the species no longer performs what a species is supposed to do – continue its survival through sexual reproduction.

Further analysis of FIA data indicates a reduction, although quite small, in overall number of chestnut stems throughout the eastern United States' forests (McWilliams et al 2005). Different management strategies, the threat of development, the importation of other exotic and invasive species, and the influence of ravenous deer all have had an effect on the species capacity to continue surviving simply through resprouting. In some cases, trees simply fail to resprout (Griffin 1989).

Although the American chestnut population as a whole is not in danger of disappearing any time soon, certain sub-populations are under those looming threats and could be lost. For that reason, and with the potential for introgression with blight-resistant transgenic trees in the next several years, now is the time to capture and use the diversity of native germplasm available, the benefits of which can be many.

While *in situ* conservation (conserving trees in the wild through, for example, management techniques) are going to be applied by TACF, a main priority for the near-term is to capture native diversity *ex situ*, so that many trees of many varieties can be combined into easily accessible orchard locations for future use. These "Germplasm Conservation Orchards" (GCOs) have many uses besides being holding pens for future breeding. In as little as five years, these orchards can begin producing large amounts of chestnuts that can then be used for additional functions such as regionalizing transgenic materials, various research plantings, providing an "expendable" resource for new volunteers to learn how to plant and grow chestnuts, attracting wildlife, and affording social opportunities such as harvest festivals and chestnut roasts. As the blight settles into these orchards – which is inevitable - the dead stems can provide wood for assorted woodworking projects that can be used for fundraising and other outreach projects.

Figure 1



Prioritizing Trees for Conservation

Wild American chestnut trees are largely catalogued by TACF members and volunteers scouting for them and participating in TACF's Tree Locator Form Program. These forms are available online by visiting TACF's website: www.acf.org/resources/ (click on "Identification"). You can also call one of TACF's offices www.acf.org/about-us/ (click on "Contact Us"). If someone, member or not, finds a tree, they should send in the form with a leaf and twig sample for morphological identification. These forms capture data such as location, accessibility, ownership, etc. Those data are then used to: 1) track locations of trees for the purpose of ecological modeling and 2) try to find volunteers who can harvest nuts from those trees, both American chestnuts and other chestnut species.

Through that program, TACF and its chapters have located and captured close to 2000 American chestnut stems/locations within GCOs and/or various breeding generations (**Figure 1**). As part of an effort to better determine how much diversity that captures, some effort should be made to better categorize the diversity those trees represent.

At this time, there has been some effort to formally prioritize capture of specific categories of American chestnut trees range-wide, but more could be done. For example, the Carolinas Chapter has worked to ensure harvest of trees from both high elevation and low elevation trees. The Pennsylvania Chapter has actively marketed the Tree Locator Form to areas where trees are underrepresented in the Chapter's conservation and breeding orchards. Through 2016, the New York Chapter held a contest to find the largest American chestnut stem in the state, the submitter of which would win $200. The winning entry was 21.3" dbh and 80 feet tall.

Of most importance, however, is capturing as much diversity as possible within the southern region. Current research shows that a majority of American chestnut diversity is held in the southern Appalachians (Gailing and Nelson 2017; Li and Dane 2013): northern Alabama, northern Georgia, western Carolinas, and eastern Tennessee. While Figure 1 shows that many stems have been conserved, there are not many individuals existing from those trees. While it is not uncommon for members in more northern states like PA, NY, or ME to collect 100s or 1000s of nuts from a single American chestnut stem, that is not the case at all in the southern states where volunteers are lucky to collect 20 nuts from a single tree. Therefore, to get adequate conservation of those lines, multiple trips for harvest and finding more trees in a given area are necessary.

Collection of materials for conservation

The easiest and most common way to collect materials for *ex situ* conservation is through the harvest of open-pollinated seeds. To date, there is no good way to store these chestnuts for conservation for more than 6 months following harvest. Studies are needed to improve seed storage duration, as well as for long-term gene conservation practices. There do exist national programs by the USDA and the USFS that perform such research and store seeds and plant tissue for long-term conservation, and it could be

OUR VOLUNTEER
LIKE THE T

TACF CELEBRATES ITS VOLUNTEERS DURING 20

Thank


Volunteers boring holes at Chattahoochee National Park.


Student volunteers from West Wilkes High School.

Volunteer planting at the University of Maryland.


Jim Gage rogueing at Swann Farm Orchard in Connecticut.


Working with seedlings at the University of Chattanooga.


Jon Taylor roasting chestnuts in Asheville, NC.


Planting at a seed orchard in MD.


Volunteers harvesting chestnuts at Valley View Farms, VT.


PA-TACF member,Tim
volunteers at the PA Fa

THE AMERICAN CHESTNUT FOUNDATION®

S ARE RESILIENT,
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017 NATIONAL VOLUNTEER WEEK (APRIL 23-29)

K you!


Volunteers at George Washington National Forest


Establishing a seed orchard at Seven Islands State Birding Park.


Park Ranger Kat Pavolillo and TACF volunteer Kelly Chopko.


Volunteers inoculating trees at Meadowview Research Farms.


Learning about potentially blight resistant chestnut trees in IN.


PA Chapter volunteers, Kristin and Mari, filling pots.

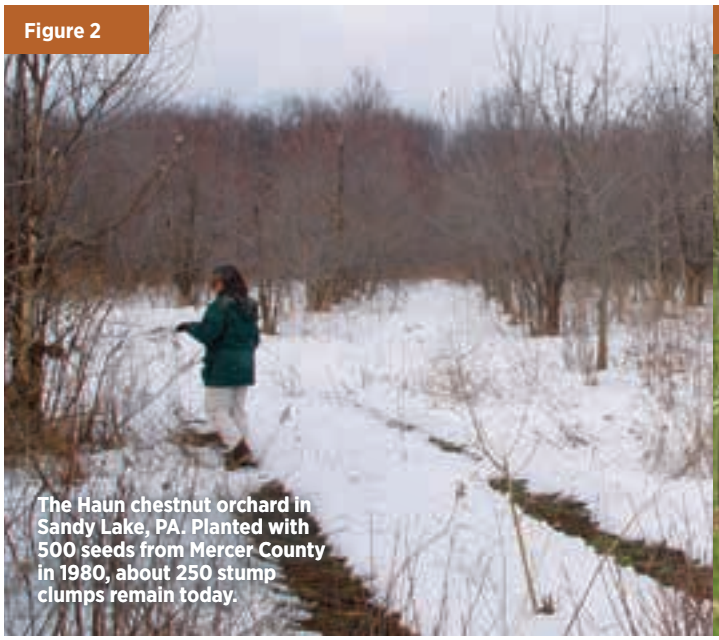

RSC Kendra Collins, with hard-working volunteer crew in MA.


It takes teamwork to get those trees in the ground.


Volunteers boring holes at Chattahoochee National Park.

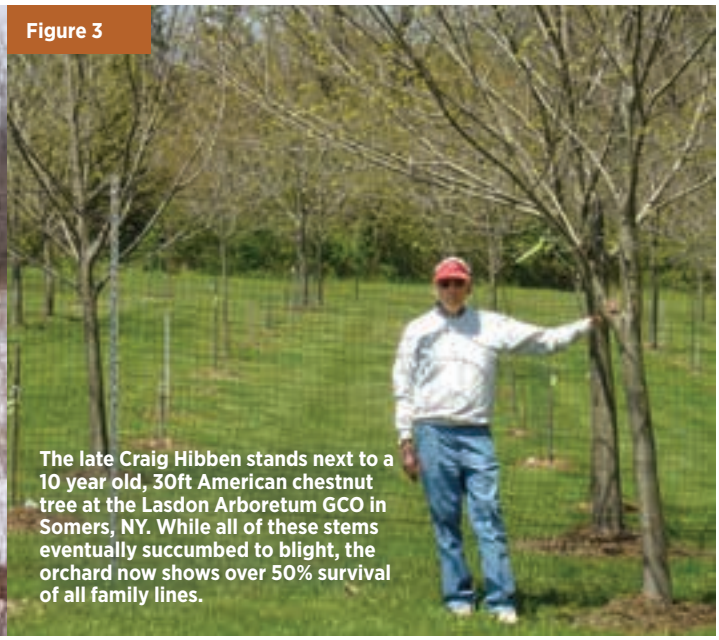

Eck, arm Show.

Figure 2



The Haun chestnut orchard in Sandy Lake, PA. Planted with 500 seeds from Mercer County in 1980, about 250 stump clumps remain today.

Figure 3



The late Craig Hibben stands next to a 10 year old, 30ft American chestnut tree at the Lasdon Arboretum GCO in Somers, NY. While all of these stems eventually succumbed to blight, the orchard now shows over 50% survival of all family lines.

in TACFs interest to examine the potential for partnering with one of these programs for just that purpose.

While conservation of genetic diversity through the collection of open-pollinated seeds is perhaps the easiest, there are several drawbacks and roadblocks to this method. First, some of the most desirable American chestnuts are isolated and will not be pollinated to produce open-pollinated nuts. Therefore, in order to get seeds, pollen would need to be imported to the desired tree. One of the biggest shortcomings to this method is that the genetics of any given seed is only half that of the parent from which they were collected when all of that background may be desired. Ways to overcome these and other issues is to utilize various forms of vegetative propagation and cloning techniques.

These vegetative propagation and cloning techniques are not without their difficulties. In a recent article in this publication, McKenna and Beheler (2016) showed that after five years, only 41% of grafted trees in their orchard in Indiana had survived, with some lines suffering complete losses. At this time, grafting for American chestnut conservation appears to be a more short-term solution than a long one, but one which should be employed in certain situations and settings.

Other methods are available for cloning chestnut, and vary in cost, feasibility, and longevity. At this time, cloning native American chestnut populations is generally of low priority, but should not be overlooked by the Foundation or partners interested in helping to preserve certain genetic lines through this methodology.

Germplasm Conservation Orchards

The more trees that are found, the more trees that can be used in the breeding program, and the more trees from which can be harvested open-pollinated seed. While a lot of people say “Why should I plant a tree that’s just going to die from the blight,” there are many reasons to plant what we call “Germplasm Conservation Orchards” (GCOs).

In preserving native germplasm, we can help to guarantee that the genetic background of trees currently living in our forests will be conserved for future generations. The trees can also be used for future breeding, primarily to increase the diversity of future blight-resistant stock. In these orchards, one can and should plant several genetic backgrounds at a time, whereas it might take hours or even days to work with that many in the forest.

Currently, chapters have to travel to the American trees used to make their crosses. Traveling to each tree can often be extensive and the timing of flower development may be hard to predict, which only adds to the challenge of getting to each tree during a short window when pollen and/or buds are ready. If genetic material is relocated into GCOs, travel time is reduced, monitoring flower development becomes easier, multiple trees can be monitored at a time, and working with the trees can be much easier (especially if orchard ladders or bucket trucks are needed). Additionally, once trees are moved to GCOs, they can be pampered, managed and fertilized to push their growth, achieving reproductive maturity faster and with better predictability than in the wild. Further, if scions from wild trees are top-grafted onto mature rootstock, pollen can be collected within the very same growing season.

Pennsylvania and New York have some of the most senior germplasm conservation orchards. To date, over 650 locations with one or more American chestnuts in Pennsylvania and New York have been reported, and the chapters have collected seed from almost 200 of those locations.

Size of a Germplasm Conservation Orchard

While GCOs can be of virtually any size, we recommend following a “10 by 10” rule, giving a good minimum size of 100 trees for this type of planting to be meaningful in the long-term. This means planting at least 10 seeds or seedlings from at least 10 different genetic backgrounds. It is not necessary that all of these seeds or backgrounds be

planted at the same time, but may be planted over the course of several years.

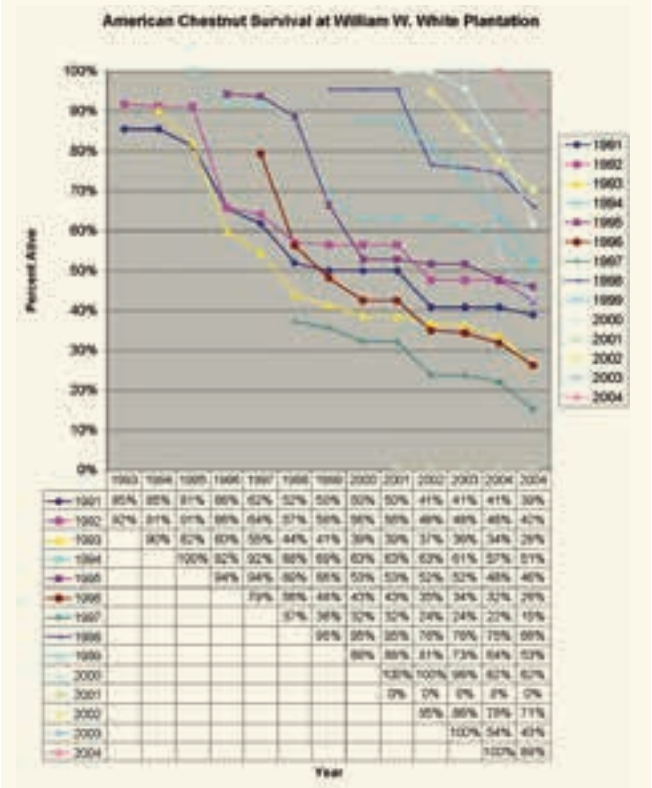
There are few guarantees in life, but one is that any planted American chestnut tree will eventually die from the blight. Most American chestnut orchards become overwhelmed by blight by year 5 and, by year 10, virtually all original stems will be eliminated (**Figure 2**). Even though the original stems will most likely be eliminated by age 10, most trees will produce chestnuts for harvest before they succumb. In addition, most of the trees will resprout creating a "perpetual orchard." Based on data from the PA and NY Chapter plantings, about 50% of planted American chestnut trees can survive for decades as resprouts. (**Figure 3, 4**) Therefore, we recommend that a minimum of ten individuals from any given American chestnut background be planted to better ensure long-term conservation of that line.

How much diversity in a GCO, and how many replications?

A common question regarding the GCOs pertains to the origin of materials. Should they all come from one state and be planted in the same state? Or from one "ecotype"? Or from across a large geographic area and then replicated multiple times across that geographic area? All of these types are needed! While the easiest type of GCO to complete is usually one with only locally sourced germplasm, that is not a requirement, nor is it the only type TACF wishes to complete. To install large, range-wide provenance or common garden trials will involve a great more coordination across multiple chapters, volunteers and staff, so it is likely these will be established in fewer numbers, but that does not diminish their importance.

While an average of 50% of "pure" American chestnut trees survive in most GCOs planted with TACF, there is a history of spectacular failures for one reason or another. Therefore, TACF recommends planting a given genetic background in at least two locations, more if possible. When harvesting from a given location, then, volunteers should aim to collect about 50 seeds from a given tree, either in one harvest, or across multiple years.

Figure 4



Survival over time of several American chestnut lines at the William W. White plantation in Zoar Valley, NY.

Next steps

We need to find more fruiting American trees, especially in the southern Appalachians, and will need help harvesting from those trees. In response to this article, we hope many of our readers will be inspired to get outside this summer and find trees. While we will take reports of any trees, for the purposes of filling GCOs, we need those which are most likely to be producing nuts. This means trees whose canopies are showered in 100% sunlight most of the day, usually trees in recent clearcuts, along roads, powerlines, fields, or wide trails.

On your walks, hikes, or drives, don't forget to take along a GPS unit or your phone, and a few Tree Locator Forms to document your finds. Send these forms, along with a sample to your nearest regional office. Once the samples are identified, the information will be logged into our databases, and you will be contacted in the early fall with a call to harvest.

We will look forward to updating you all on the progress of this program in the next few years. As with any TACF project, please don't hesitate to contact your local TACF chapter or office with any questions or for more information.

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[1]http://ars.usda.gov/Main/docs.htm?docid=23235

[2]A "genetic background", a/k/a a "family line" is defined by the common ancestor of a given group of trees. Genetic backgrounds can be broken down by different categories, depending on what one is testing and how far back in a population's pedigree one goes. You can follow a father, mother, maternal grandmother, paternal grandfather, and so forth. In the case of American chestnut germplasm conservation orchards, where we typically plant open-pollinated seed, the genetic background will be defined by the maternal parent. Trees derived through vegetative propagation or from control-pollinated crosses may be tracked by other categories, again, depending on the goal of a given planting and/or subsequent analysis.

Junior High Partnership

GROWS AMERICAN CHESTNUTS AND STUDENTS

By Jesse J. Greene, 7th Grade Life Science Teacher at Tantasqua Regional Junior High School

It has been one year since 7th grade science teachers of Tantasqua Regional Junior High, in Fiskdale, MA, gathered in a science classroom with board members from the MA/RI chapter of The American Chestnut Foundation (TACF). They discussed how a partnership might bolster the school's life science curriculum to match students' enthusiasm and will to "do something to help" the American chestnut. After learning about the demise of the tree and the resulting social, economic, and ecological catastrophe that ensued, students repeatedly expressed both concern and an urgency to participate in the 100+ year effort to restore this grand tree to our forests and our common memory. A unique partnership evolved, and an ongoing environmental stewardship program has become part of the 7th grade curriculum, with the American chestnut tree as the centerpiece.

One of the first burs harvested, following June cross pollinations.

After a hot afternoon of tagging candidate trees for backcross pollination, Tantasqua Chestnut Project students, their teachers, and MA/RI chapter president Lois Melican, take a rest in the shade.

A student gently transfers blight-resistant pollen, provided by TACF's Director of Science Jared Westbrook, onto the styles of a pure American chestnut, flowering atop Mt. Ella, at Flynt Park in Monson, MA.

The program launched last spring, exposing all 300 seventh-grade students in the Tantasqua Regional Junior High School to the important ecological lessons inherent to the story of the American chestnut. Shortly after, a group of enthusiastic students joined together with their science teachers to form a group called the Tantasqua Chestnut Project. They have been working after school hours and throughout the past summer, mentored by MA/RI TACF board members, with the goal of establishing a 200-tree research orchard on school grounds. At the suggestion of TACF director of science, Jared Westbrook, the orchard will be used to develop a regionally adapted tree for Massachusetts' forests, and diversify the gene pool of potentially blight resistant trees. Throughout the process, students have been afforded an array of experiences. They have learned to identify American chestnut in the wild and have sought out, pre-bagged, backcross pollinated, and harvested hybrid seeds from flowering, native Massachusetts chestnut trees. Their work has inspired an additional partnership with the Town of Monson, MA, the location of the native flowering trees. The Monson Parks and Recreation Department agreed to designate the mountaintop site of the flowering American chestnuts as an American Chestnut Management Area, open to the Tantasqua Regional School District and other interested schools for ongoing research endeavors. Students have been working to manage the area to encourage continued flowering of the chestnuts there, for future backcross pollinations. In addition to their field work, students of the Tantasqua Chestnut Project have been furthering the cause through presentations to the Tantasqua School Committee, TACF board members and enthusiasts at the MA/RI Chapter annual meeting, and to a panel of Mass Audubon naturalists at the Broad Meadow Brook Wildlife Sanctuary, in Worcester, MA. Students are currently working in preparation of the establishment of their research orchard this spring. Organized into subcommittees, students are constructing an indoor seed starting station and an outdoor cold frame for hardening off chestnut starts. They're also drafting plans for the layout of the research orchard and an outdoor classroom area, creating a public art installation for the research orchard that will depict the story of the American chestnut and the lessons it can teach all of us about human impact on ecosystems. To top it off, they are organizing both a planting event and ribbon-cutting ceremony for the opening of the orchard this coming June.

> "...working with American chestnuts has become one of the best things I do each week. I've learned that I want to pursue biology..."

The chestnut project is helping to grow and develop the students who have been involved. Current 8th grade student, Quinn McHugh, stated during his presentation at the MA/RI Annual Chapter Meeting, "Initially, my mom convinced me to join the after-school group, but now, working with American chestnuts has become one of the best things I do each week. I've learned that I want to pursue biology and be a biologist someday." The project inherently provides a wide array of valuable experiences for students. Aside from science skills and

Students plant the first potentially blight resistant A. chestnut trees, in what will be many years of successive planting, at Monson's Flynt Park A. Chestnut Management Area.

knowledge, field work promotes outdoor physical activity, speaking engagements provide opportunities for students to develop both written and verbal communication skills, project challenges motivate students to be critical thinkers, problem solvers, and generally, can-do people. The subject matter raises students' awareness of the fragility and value of the natural environment, as well as the necessity for people to be good stewards of it. Lois and Denis Melican, MA/RI chapter president and board member, respectively, and faithful weekly mentors, sum it up perfectly.

"We are impressed and delighted with the students and teachers of the Tantasqua Chestnut Project. This project gives students hands on understanding of the effects we can have on the environment, as well as helping the TACF MA/RI chapter with a critical piece of our mission - promoting citizen science.

We can't wait to begin planting the first research orchard on school property this spring, then working with another class of 7th graders who will explore Mt. Ella, in Monson, pollinate more chestnut trees this summer, and then harvest the nuts this fall. Taking students through this process has been enlightening and exhilarating for us."

The Tantasqua Chestnut Project is a collaboration between TACF MA/RI chapter and Tantasqua Regional Junior High School, in cooperation with the Monson Parks and Recreation Department. Each year, 300 students will leave their seventh-grade experience knowing the history of the American chestnut, the ecological lessons it has to teach humans about the importance of environmental stewardship, and an increased awareness of the tremendous impact that humans have on ecological systems. Each year, some of those students will join the ranks of the after school Tantasqua Chestnut Project. They'll work as citizen scientists in the effort to restore the American chestnut to forest ecosystems, and as environmental activists, extending the ecological lessons learned in school and through the project, to the larger community.

For a closer glimpse into the first endeavors of the Tantasqua Chestnut Project, please visit http://tantasquachestnut.weebly.com/

FOUNDING STUDENTS: Alexis Carson, Ian Morrell, Louis Desy, Emma Foley, Sydney Leanna, Olivia Hood, Olivia Roy, Rebecca Mahon, Quinn McHugh, Spencer Cipro, Nadine Chidester, Brendan Metz

FOUNDING TEACHERS: Jesse Greene (7th grade Science), Kristin Daley (7th grade Science), Talia Quinta (7th grade Science), Don Lavin (7th & 8th grade Technology/Engineering), Carol Willard (7th & 8th grade Art)

Jesse Greene is a 7th grade middle school science teacher at Tantasqua Regional Junior High School in Fiskdale, MA. He first learned of the American chestnut as an undergraduate landscape architecture student at the University of Massachusetts Amherst, and has since, been finding ways to incorporate its lessons into the teaching of middle school ecology. Jesse and his colleagues use project based learning (PBL) in their teaching, to bring real world, authentic, contexts, added purpose, and heightened intrinsic motivation, to students' learning experiences.

Blight Small Stem Assay and Phytophthora Screening of Chestnut Seedlings:

A COLLABORATION BETWEEN THE AMERICAN CHESTNUT FOUNDATION AND THE U.S. FOREST SERVICE RESISTANCE SCREENING CENTER

By Ed Schwartzman, Southern Regional Science Coordinator

Sunny Lucas, the USFS RSC manager, explains the recirculating irrigation system designed to contain *Phytophthora cinnamomi*. Wearing disposable plastic booties in the greenhouse is an added precaution against spreading the pathogen outside the greenhouse in soil particles stuck to the bottom of shoes.

The American Chestnut Foundation (TACF) is beginning its second year of collaboration with the U.S. Forest Service Resistance Screening Center (RSC) in Asheville, NC to screen chestnut seedlings for resistance to Phytophthora root rot disease (causal agent *Phytophthora cinnamomi*). TACF is also expanding its collaboration this year to include small stem assays for chestnut blight (causal agent *Cryphonectria parasitica*) at the RSC. Over 4,600 plants will be tested in total between the two treatments in 2017.

Phytophthora root rot (PRR) disease is a persistent problem for chestnut reintroduction in the southeastern U.S., with potential to spread to additional areas as climates warm and change. Efforts to screen our potentially blight resistant chestnut trees have been underway for over a decade with several screening centers active in southern chapters. North Carolina State University and the University of Tennessee at Chattanooga both have screening programs, though the longest screening effort has been carried out by Dr. Joe James at his Chestnut Return Farms in Seneca, SC. With the help of Drs. Steve Jeffers, Tatyana Zhebentyayeva, and Paul Sisco, research at Chestnut Returns is yielding important insights into TACF chestnut lineages with Phytophthora resistance and the genetic basis for this resistance.

Because of the size and set up of the RSC, TACF will be able to increase the efficiency of disease screening. The Phytophthora resistance screening project will utilize 1,749 seeds from 44 previously untested Graves B_3F_3 families. Seedlings will be randomized and inoculated with *Phytophthora cinnamomi* in sub-irrigation tubs. A containment and treatment system is being constructed to prevent the spread of Phytophthora within the greenhouse or into the surrounding environment. Small stem assays for blight resistance will be conducted on 2,760 B_3F_3 seedlings corresponding to 29 Clapper and 41 Graves families. In order to compare resistance between small stem assays (SSA) and orchard blight progeny tests, the small stem assessment allocation includes 12 families that have previously been progeny tested in an orchard setting. The remaining 58 families in the SSA will be included in the orchard blight progeny test this year.

As part of the collaboration being developed between TACF and the RSC, TACF has agreed to assist with inoculations in the greenhouse. TACF is also providing volunteer labor to pot up the seeds, organize the plants into a randomized block design, and assess the blight and Phytophthora symptoms in the seedlings. TACF underwrites the cost of supplies and is providing the RSC with a modest fee for use of their facility and screening services.

In turn, the RSC is responsible for generating and maintaining the inoculant for blight and Phytophthora trials. The RSC is also designing and constructing the PRR containment system. Root rot disease must be controlled within the greenhouse, as many plant species are susceptible to the pathogen, and it could spread to non-target plants. Though PRR is known to be present in Asheville, limiting its further spread is a major concern. In order to contain the pathogen, all seedling containers are nested within large plastic tubs. As the seedlings are maintained in a sub-irrigation system, all wastewater from the Phytophthora screening will be collected in a containment tank, treated with bleach, and allowed to off-gas before being released to the environment.

History of the Resistance Screening Center

The RSC is housed at the Bent Creek Experimental Forest in Asheville and is managed by the U.S. Forest Service Forest Health Protection. The RSC has been in existence for more than 40 years and has provided enormous assistance to the timber industry and university cooperators over that time. The main objective of the center has been to test for resistance to a number of diseases particular to pine species, such as fusiform rust and pitch canker. The RSC is also responsible for the development of American dogwood cultivars that are resistant to dogwood anthracnose, a

Two volunteers (Susan Sunflower & Ian Sabo) work together to plant seeds.

Pots have been labeled to prepare for randomization in the greenhouse.

pathogen that is decimating this native species in the wild. The current venture with TACF represents a new partnership for the RSC, where its resources are being tapped to help combat an ecological conundrum a hundred years in the making.

Volunteers assessing the pots at the end of the day at the RSC greenhouse. Photo by Paul Sisco.

Volunteer Efforts

To initiate the project, TACF's Carolinas Chapter recruited a volunteer team to plant the approximately 4,600 nuts dedicated to the screening project. The RSC staff and over twenty volunteers, including local residents, students from UNC-Asheville, and even folks from several counties away, gathered on a cloudy February day to assist in the process. Long time volunteers were on-hand, notably Jon Taylor of Asheville, Don Surrette of nearby Pisgah Forest, chapter president Doug Gillis who came in from Charlotte, and even K.O. Summerville, who was on a mountain sojourn far from his Piedmont home. The star volunteers and retired TACF geneticist, Paul Sisco, provided critical support to the operation, directing volunteers and keeping track of the flurry of activity necessary to accomplish the task of planting thousands of little chestnuts.

An assembly line production was established to speed along the planting. Two separate soil prep/pot filling stations were set up along with a tray banger, needed to help settle soil in pots before planting. Once filled with soil, trays of pots streamed across the screening facility to the planting room, where volunteers potted and tagged seeds by family and meticulously kept track of the planting process so that all the screened families were accounted for. Once planted and tagged, trays of seedlings were then shuttled to the RSC greenhouse where they were accommodated and given an initial watering on the tender road to germination.

Randomization

The seedlings began to emerge in three weeks, at which point they were sorted into randomized blocks for inoculation later in the spring. Randomized seedling placement allows seedlings to be evaluated based on family and reduces the potential for physical space effects within the greenhouse, such as localized aphid infestations or environmental variation across the grow space. A group of seven students from the University of North Carolina – Wilmington (UNC-W) helped with the work, dedicating a day of their service learning vacation to the rearranging of all 4,600 seedlings.

Next steps

In mid-May, seedlings in the two treatments will be inoculated with two different strains of chestnut blight and a chestnut-specific isolate of Phytophthora, respectively. Chestnut blight resistance will be evaluated using the small-stem assay method, in which plugs of blight fungus are introduced into the seedling via a small incision in the stem. Seedlings must be at least 3mm in diameter in order to undergo inoculation. Use of seedlings greatly expedites the screening process, allowing blight resistance to be evaluated within one year as opposed to the 3-5 years required for typical inoculation methods. The large-scale of Phytophthora screening programmed for the RSC will accelerate the pace of our screening and will help identify Phytophthora-resistant families for expanded use in the breeding program and eventual crosses with transgenic American chestnuts.

Take Home Message

The collaborative project being undertaken by TACF and the USFS at the Resistance Screening Center enhances TACF's capacity to screen and evaluate chestnut seedlings. This enhanced capacity accelerates the speed at which we can screen seedlings and saves resources and sweat equity that are typically dedicated to the screening process. The collaboration with the RSC expands the partnership between TACF and USFS, a key partner for the future restoration of American chestnut to eastern forests. Finally, the screening project at the RSC also provides a unique opportunity to engage the Asheville community in TACF's efforts to restore the American chestnut and promote the species' comeback in the heart of its range.

Insights

FROM CHINESE RESEARCH ON CHESTNUT BLIGHT

By Bruce Levine, Maryland Chapter

If you search for "chestnut blight" in a research database like Web of Science you will find many articles published in American and European journals, but few from Asia. You might conclude that since blight is not a major problem in Asia, not much research is done there. In fact, the language barrier is a better explanation. In the course of my studies at the University of Maryland, I have found a wealth of chestnut articles published in Chinese journals that simply have not been translated. They can be found in the Chinese research portal CNKI.net and go back to the early 1990s. I have read and translated a few of these articles, which draw on studies of many chestnut-growing areas in China. They have changed my view of what an environment in which chestnut trees and chestnut blight peacefully co-exist looks like, and why breeding resistance into the tree alone may not be enough to achieve such equilibrium in North America. In this article, I would like to share with Chestnut readers a few of the insights these papers provide.


TACF takes bark sample in China, 2008


Blight invades orchard tree at wound site in China, 2006

❶ Chestnut blight is widespread and occasionally serious in China

Chinese researchers view chestnut blight primarily as an agriculture problem. Chestnut is an important cash crop in many parts of the country. Its cultivation has increased significantly since the 1980s, and the incidence of blight has increased along with it. Chinese researchers generally agree that chestnut blight is not a serious disease under normal circumstances, but that it can be a big problem in certain places at certain times. As one paper stated, "our understanding of chestnut blight has never been complete. Believing that Chinese chestnut does not get, or rarely gets blight, some areas avoid dealing with the problem out of fear that it is impossible to control, or out of concern about the short-term impact on local production, sales of trees, and reputation of their nuts. These areas do not understand the seriousness of the problem or the consequences of ignoring it."[1] Numerous surveys of orchards and wild areas in China report incidences of blight between 30 and 100 percent[2], though this varies by region and by cultivar. The disease rarely kills otherwise-healthy mature trees, but can result in reduced yields or kill young seedlings.

❷ Chinese chestnut is not uniformly resistant, and chestnut blight is not uniformly virulent

Chinese studies of blight resistance[1] report that different cultivars of Chinese chestnut have different degrees of resistance to blight, with only about a third of tested trees showing "strong resistance." Studies of chestnut blight fungal samples from different regions have also shown wide variance in pathogenicity. These findings have led researchers to recommend certain chestnut varieties as breeding stock, and the use of internal quarantines to prevent the transportation of new seed stock, and the fungi they may carry, into regions where highly virulent forms of the chestnut blight fungus are not present.

Some researchers describe chestnut blight as a "hybrid system" where both the resistance of the trees and the virulence of the fungal strains determine the severity of the disease in any given area. As one researcher states, "in certain regions, chestnut blight infection is severe, suggesting that Chinese chestnut is not, in fact, always highly resistant. The reason that chestnut blight is a mild disease in China is not just because of resistance."[2]

❸ Viral hypovirulence is a major factor controlling blight in China

Perhaps the most striking insight I gathered from Chinese research was that viral hypovirulence is widespread in China. Two cited studies reported hypovirulence in 34 and 49 percent, respectively, of chestnut blight cankers in surveyed areas.[2] This is closer to levels reported from Europe which range from about 40-90 percent than to levels measured within the native range of American chestnut, which have found hypovirulence in 10 percent or less of sampled cankers.[2,6] Chinese researchers tend to attribute low virulence entirely to hypoviruses, which they have detected throughout the country.[7] Though some researchers have used avirulent blight strains that do not contain any viral RNA as controls in their studies, I have seen no reference to Chinese research into variations in virulence due to differences within the fungal genome itself.

There is a great deal of interest in China in using viral hypovirulence as a bio-control against chestnut blight, following the example of Europe. About half of all chestnut blight papers published by Chinese researchers relate to the question of viral hypovirulence. However, I have not seen any reports of actual field experiments with hypovirulence in China. This may be explained by more than just a lack of urgency – the limited research that has been done on the genetics of chestnut blight fungus in China suggests that the number of vegetative compatibility groups (VCGs) within


Blight in a Chinese orchard, 2005


Isolating blight from a wild tree in China, 2008

the fungal population is far greater than that in Europe, and even than in North America. One study of 219 isolates of *Cryphonectria parasitica* in China identified 131 VCGs, compared to 64 presumed VCGs cited in North American papers and far fewer in Europe.[3] As in North America, the large number of VCGs in China makes transmission of the virus within the fungal population more complicated.

❹ The genetic diversity of chestnut blight fungus in China could pose new threats

It is reasonable to presume that, as the place of origin of the chestnut blight fungus, China would host a fungal population that has a higher level of genetic diversity than the populations in Europe or North America. The most recent and technologically up-to-date study of the genetic diversity of *Cryphonectria parasitica* shows regional variations in genetic diversity within China's *Cryphonectria parasitica* population, and suggests southwest China as the likely origin of the fungus, but does not provide a basis for comparison with the fungal populations in North America or Europe.[4] However, there are hints that the Chinese chestnut blight population is indeed more diverse. For example, research into *Cryphonectria parasitica* mating types found that the gene responsible for one of the mating types exists in only one form in Japan, North America and Europe, but has several variants in China.[5] This not only lends support to the theory that chestnut blight reached North America and Europe via Japan, but also reminds us that there may be genes within the global *Cryphonectria parasitica* population that are not yet represented in North America. Greater genetic diversity could mean greater potential for virulence or greater risk to hosts other than chestnut.

The American Chestnut Foundation and others are making great strides equipping American chestnut with genes for resistance to blight. However, a better understanding of the pathogen-host interaction in chestnut blight's native environment leads me to believe that work carried out on viral hypovirulence is also vitally important. Chestnut blight is now a global problem, and the fungus continues to expand its range and adapt. To create conditions in which American chestnut can exist in equilibrium with the blight fungus, it is vital that we understand both the host and the pathogen.

Bruce Levine is long-time TACF volunteer and board member of the Maryland Chapter. He is currently working on a master's degree in plant science at the University of Maryland.

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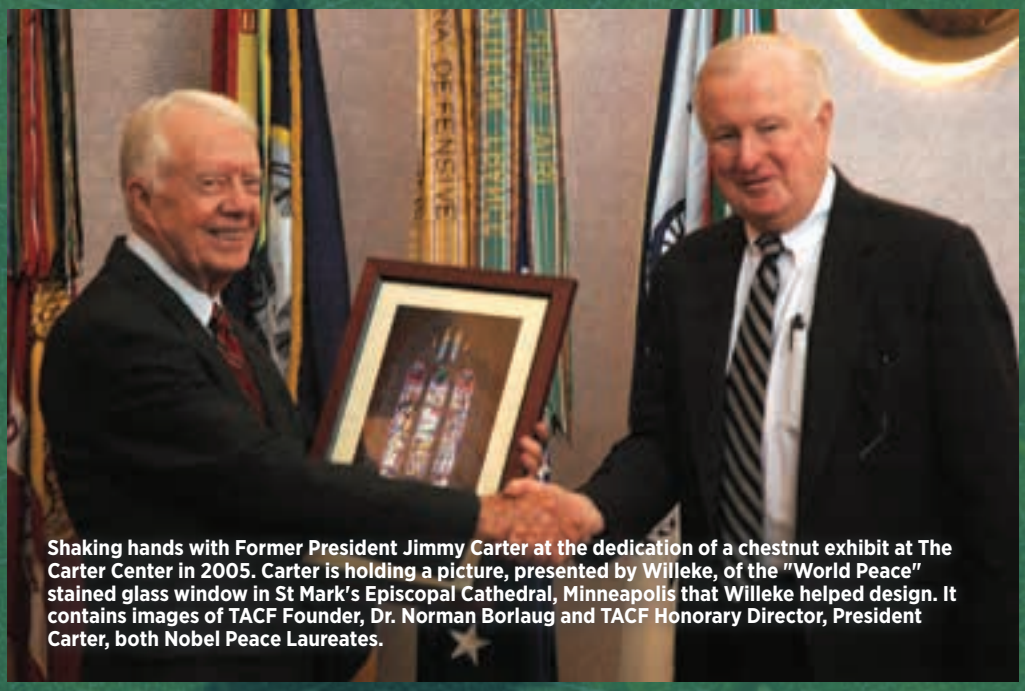
Don Willeke:

LOVER OF TREES, GO-GETTER, AND FIERCE ADVOCATE FOR THE AMERICAN CHESTNUT FOUNDATION

By Emily Nowels



Shaking hands with Former President Jimmy Carter at the dedication of a chestnut exhibit at The Carter Center in 2005. Carter is holding a picture, presented by Willeke, of the "World Peace" stained glass window in St Mark's Episcopal Cathedral, Minneapolis that Willeke helped design. It contains images of TACF Founder, Dr. Norman Borlaug and TACF Honorary Director, President Carter, both Nobel Peace Laureates.

"The skill of a lawyer is he learns just enough about other people's business to be dangerous." This is how the Minnesota attorney and American Chestnut incorporator, Don Willeke, describes how you become successful in his profession. Willeke took these words to heart some time ago. And while perhaps not dangerous, he is certainly a force to be reckoned with, as anyone who knows him will tell you.

Don is a sponge for topics that peak his interest, a characteristic illustrated by the frequency with which he quotes the many great minds he's studied, ranging from Jesus Christ to Winston Churchill. He can do the same when it comes to the complicated science surrounding the American chestnut tree. It is this skill that has made him a fierce and effective advocate for The American Chestnut Foundation (TACF).

Willeke's involvement with TACF stretches all the way back to the beginning – before the foundation was even a foundation. At that time, TACF consisted of a handful of dedicated scientists in Minnesota, who were interested in developing a blight-resistant chestnut tree. Willeke has often referred to this group as the "Chestnut Brain Trust."

At that time Willeke was already deeply involved with other conservation efforts in the area, which included serving as chair of the Urban Forest Council. It was his friend, David French, the head of the department of Plant Pathology at the University of Minnesota and a TACF founding member, who invited him to join a "Chestnut Brain Trust" meeting.

When asked to describe what the energy was like in those first meetings, Willeke laughed and said, "It was scientific." He said they would debate back and forth for hours, and, as is common in science, it often took a very long time to reach conclusions. For example, TACF's first president, Philip Rutter, said it took two years to determine that–yes, the genetics are right, and this tree can be developed.

And yet amongst all these discussions, most everyone could agree on one thing. If this group was going to invest in long-term research, they had to become a legitimate entity. "I said it's absolutely essential that we set up a foundation to which people can contribute, tax exempt, and then [we can] own land in perpetuity," Willeke said. "And of course, that is exactly what the foundation has done."

Standing by his chestnut tree at Meadowview Research Farms. The tree was dedicated to him by Richard Will, TACF Chairman Emeritus.

To put it simply, Willeke loves trees.

And so, Willeke set about incorporating The American Chestnut Foundation, and since then has been the foundation's general counsel. During this time, he also served as the first Secretary of the Foundation and as editor of the first issues of The Journal of the American Chestnut Foundation, produced on his personal Lisa computer.

Another of Willeke's contributions to the group proved to be his ability to manage the board and keep the group focused, a skill for which Rutter called Willeke "critically important."

"They did see me as young. I was 36 sitting in a room of university departmental chairmen. It was a horrible time wrangling them," Rutter said.

Rutter said that often before meetings he would stay at Willeke's house, where the two would talk about what needed to be accomplished. And it was Willeke who made sure it all got done. His effectiveness led to an unlikely marriage–Willeke, a non-scientist, as the Vice Chairman of the science cabinet. They needed someone to keep them on track, and Willeke was just the man for the job.

"Don can be very outspoken, very forceful in his delivery. I often think, if I ever needed to hire an attorney, I'd want Don on my side. That's just his nature," Willeke's long-time friend and TACF board member, Bill MacDonald said. "I think he understands things quite easily and uses his skills as an attorney to get to the bottom of issues. [...] He was always good about bringing us back to the subject matter at hand."

Later, once TACF had begun developing the first generations of their trees, discussions began concerning how to protect them. It was Willeke who led the push to write and eventually pass TACF's Germplasm Agreement. This agreement was developed to prevent an unaffiliated party from obtaining and then selling TACF-developed nuts and trees before they are ready for public distribution. At the time this agreement was the subject of much debate, but many members saw the agreement as critically important to preserving the long-term goals of the agency. Willeke was a loud advocate for these protections, and although he may have ruffled a few feathers

along the way, there is at least one person who is very grateful that Willeke took on this battle.

"If I had to do that job, I would have gotten six ulcers and died," Rutter joked. "Don was the one who absolutely demanded that that agreement be set in place and made it stick. Don took care of that for us."

Willeke's love for nature extends far beyond his commitment to TACF. Willeke served as the first chair of Minnesota's Urban Forest Council, helped establish the Tree Trust in Minneapolis, served as vice president and then president of American Forests, and chairman of the National Urban Forest Council–to name a few.

To put it simply, Willeke loves trees.

Willeke poses with other TACF members and staff at the 2015 Annual Fall Meeting in Pennsylvania.

MacDonald recalled a meeting he attended in Minneapolis, which Don also attended. On the trip, the group visited Dean Park located in from of Willeke's home. The park contained elm trees, a species Willeke was working vehemently to preserve and protect from Dutch Elm's Disease. "And he would go on at great length about each one of the trees," MacDonald said. "And you could tell each tree was very near and dear to him. He knew exactly the source of it, the genetics of it, and so forth."

MacDonald's observation of the passion with which Willeke speaks about trees, is hard to miss. Occasionally, when Willeke, a bachelor, describes a tree, you might mistake him for a proud father boasting about a successful son or daughter. "To take an elm seed and see it turn into a huge tree…I've done that. Trees that I've literally held on my lap," Willeke trailed off before continuing his story emphatically. "In 1985 […], there was a picture of me in the newspaper holding a box of little one-year old trees on my lap, and now those trees are 70 feet tall, and I can't fit my arms around them."

Willeke said his interest in trees began when he was a child, and his father would take him on walks in the woodlands by their house, "We would pick wildflowers, and hunt for morels. It was the thing to do, to take a picnic out in the woods and see where the train wreck had occurred in 1917 and see still the wheels lying there by that little creek," Willeke remembered. "And ever since then I've been fascinated by trees. The oldest living things, the biggest living things. And the power that they have."

Protecting these trees has become Willeke's life work. To borrow one of Willeke's frequently referenced quotes that illuminates the importance of Willeke's many contributions: Reverend D. Elton Trueblood once said, "A man has at least made a start on discovering the meaning of human life when he plants… trees under which he knows full well he will never sit." But Willeke has sat in the shade of many trees he's planted.

Queen of the Chestnuts: A Tribute to Arlene Wirsig (1919-2017)

By Herbert Darling, Jr., President Emeritus, TACF

I always refer to Arlene Wirsig as the "Queen of Chestnuts." From the first day I met her, there was no question of her ability to get things done.

Arlene and Herb Darling stand beside an early version of a transgenic American chestnut in 2006 at Arlene and Stan's home in Youngstown, NY. The tree had been planted by Arlene's husband, Stan.

I first met Arlene and her husband Stan in 1989. It was in Buffalo, New York, where the first TACF state chapter was formed. I had recently learned about The American Chestnut Foundation. I believe Dr. Phillip Rutter, who was TACF's president in those days, told Stan and Arlene about my interest in American chestnut trees. The couple convinced me to join efforts with them to set up a transgenic program in New York to cure the blight problem. In a nutshell, that's how our relationship began.

Sharing a mutual concern for the American chestnut, Stan, Arlene and I agreed to meet at State University of New York College of Environmental Science and Forestry (SUNY-ESF) and discuss setting up a program with Dr. Charles Maynard and Dr. William Powell. The meeting took place on Wednesday, July 30, 1989, and we all thought the gene transfer method was the way to go. I agreed to talk to TACF about their research and setting up a program.

On Wednesday, December 13, 1989, TACF-NY was born. The chapter's first meeting was held at the Buffalo Museum of Science. The museum allowed us to use their address and also donated free space for our chapter to get started.

Stan, Arlene and I considered ourselves the founders of TACF-NY. I was elected president, Stan as vice-president and chief scientist, and Arlene as secretary/treasurer. Arlene grabbed the reins and partnered with my wife Jane and with Bethany White Ruane. Based on their leadership, TACF-NY got up and running immediately.

And nothing got by Arlene. She had the nicest way of getting you to do the job you agreed to do. As a result, the New York chapter grew quickly and it was soon one of the largest chapters right after it was formed. Arlene was articulate and everything she did was first class.

Arlene always provided beautiful flower arrangements at the meetings and was never without a warm and friendly welcome. She had a great deal of enthusiasm and ambition, combined with excellent ideas that led to the tremendous growth of the chapter. This caused the committee chairs to run at a very high level of performance.

We just made it happen! Stan took over as science director working with SUNY-ESF on a program to get the job done. It took 25 years, a lot of meetings, and even more hard work to accomplish this, but the seedlings are now being presented to U.S. regulators for approval.

Arlene deserves much credit for the progress. We all miss you, both Stan & Arlene. Thanks for a job well done and long live the American chestnut!

Reflections on Mom, Dad, and the Quest for the American Chestnut
by Victoria Wirsig Embree, Daughter

For as long as I can remember, Dad loved the American chestnut tree; he used to tell me about a beautiful tree that stood in the yard of his childhood home in Syracuse, NY. He was always pointing out little saplings wherever he found them, telling me how special they were, and nurturing them in the hopes that, against the odds, they might survive. Mom caught the "chestnut passion" from him and poured her marvelous talent for planning and organizing into supporting the work of TACF's New York Chapter. They were both enthusiastically devoted to the chestnut research endeavor, and we would get lively and detailed progress reports at every family gathering - it was their favorite topic of conversation! Their cherished dream was to see the American chestnut restored, and I hope our grandchildren and great grandchildren will see the fruits of this labor of love, in all its former glory.

Chestnut Buckwheat Cupcakes

By June Darville, Simply. Tasty. Good. Blog
junedarville.com/chestnut-buckwheat-cupcakes.html

Serves: 4 cupcakes
Prep time: 20 mins Cook time: 30 mins

Ingredients

2 oz buckwheat flour
3.5 oz chestnut puree
2 tbsp brown sugar
1.5 oz soft unsalted butter
2 tbsp cream
1 medium egg
Đ vanilla bean
Đ tsp baking powder
ground cinnamon
salt

Instructions

Add the chestnut puree, the cream, the brown sugar and the soft unsalted butter to the bowl of the stand mixer. Also add the seeds of the vanilla bean, the buckwheat flour, the baking powder, the whole egg and a little pinch of salt and ground cinnamon.

Attach the wire whip and lower the mixer head. Set the speed to 3 and mix the ingredients for 4 minutes. You should end up with a thick and sticky brownish almost grey colored cake batter.

Line a muffin tin with 4 paper cupcake casings and divide the cake batter evenly over them.

Bake the chestnut cupcakes in a preheated oven at 356°F for about 30 minutes until they have risen beautifully. Then take them out of the hot oven and let them cool down fully in the muffin tin.

You can prepare your favorite frosting in the meantime. Cream cheese, Nutella, cocoa powder... whatever combination you like for your chestnut buckwheat cupcakes! Pipe the frosting on top of the cupcakes only when they are fully cooled or the frosting will melt. Serve.

IN MEMORY AND IN HONOR OF OUR TACF MEMBERS

JANUARY 10, 2017 – MARCH 27, 2017

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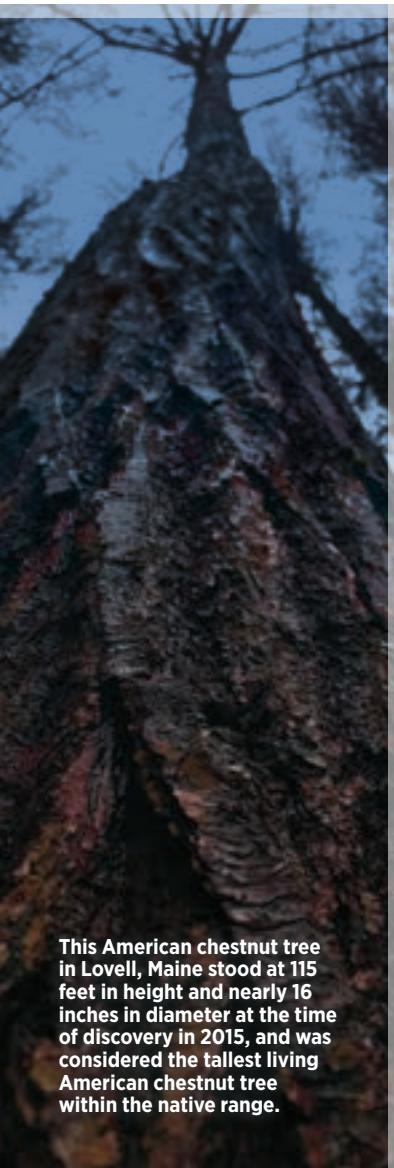

This American chestnut tree in Lovell, Maine stood at 115 feet in height and nearly 16 inches in diameter at the time of discovery in 2015, and was considered the tallest living American chestnut tree within the native range.

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Look for additional details this summer in our e*Sprout* electronic newsletters and on our Facebook and Twitter pages!