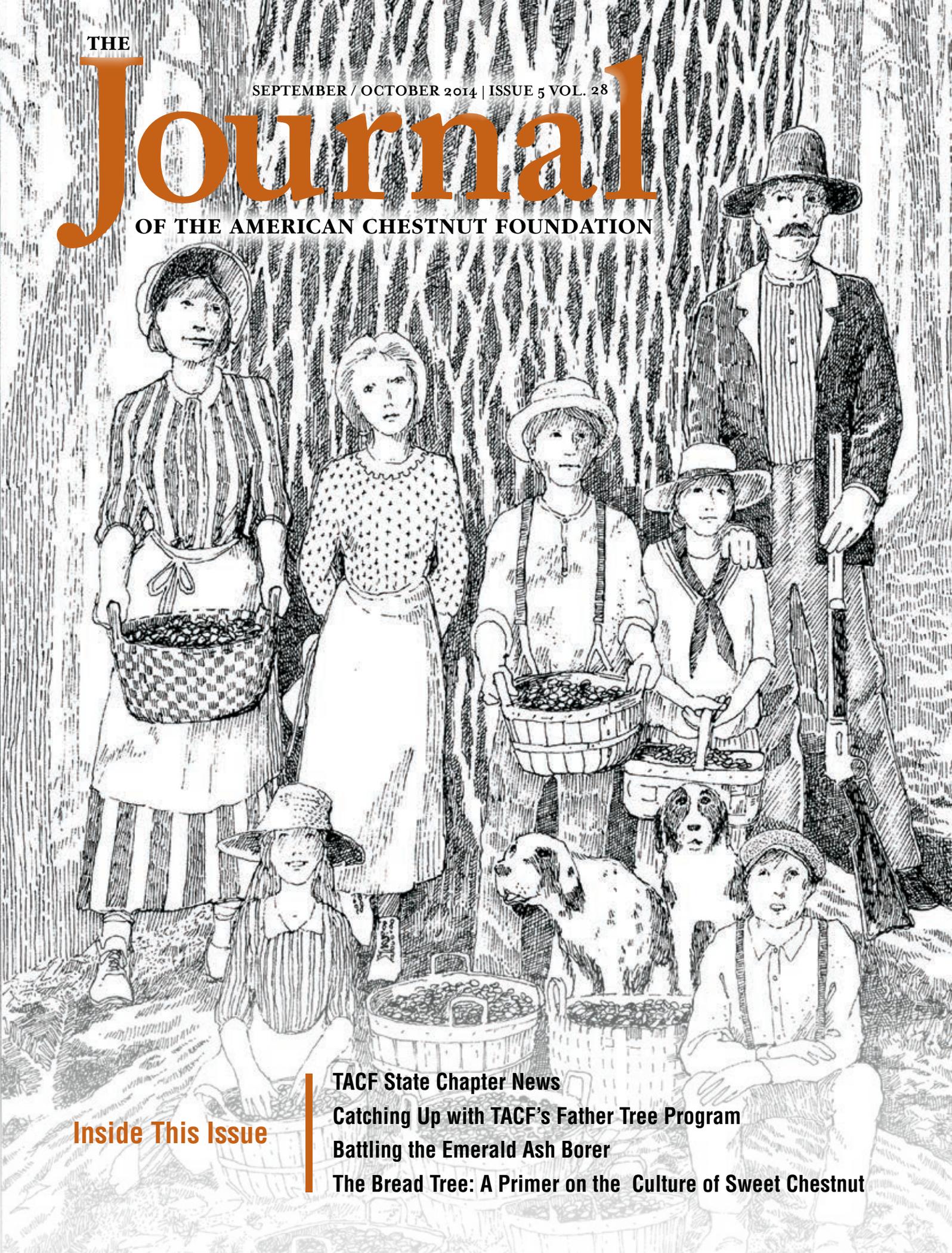


THE

SEPTEMBER / OCTOBER 2014 | ISSUE 5 VOL. 28

Journal

OF THE AMERICAN CHESTNUT FOUNDATION



Inside This Issue

TACF State Chapter News

Catching Up with TACF's Father Tree Program

Battling the Emerald Ash Borer

The Bread Tree: A Primer on the Culture of Sweet Chestnut

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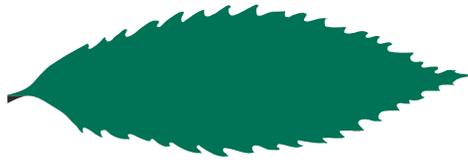
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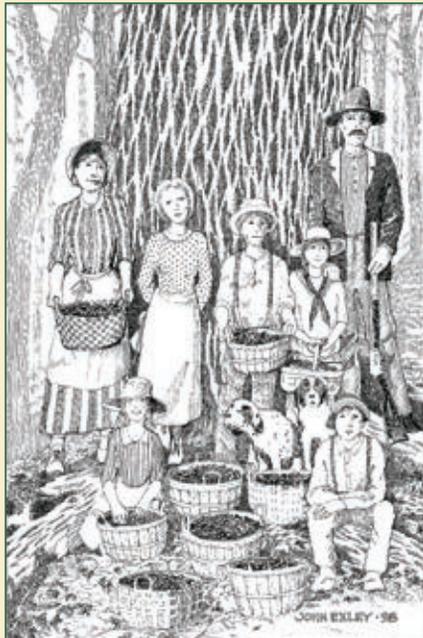


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The Mission of The American Chestnut Foundation

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 suitable for widespread testing 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

“Chestnutting”

Artist John Exley, who has produced several original illustrations for *The American Chestnut Foundation*, was imagining the following when he drew his illustration of an Appalachian family of a hundred years ago.

“Having driven their wagon up the hollow as far as the mountain slopes will let them, they climb with their baskets to gather up this year’s harvest of chestnuts to sell to buyers along the railroads for shipment to the cities. School has started; winter is coming; new shoes, a coat, a supply of coal oil will be needed, so every spare hour until the ‘can’t see’ light of dusk is spent gathering the bounty of the forest floors before the other foragers of the hills have swept them clean. The father carries his

rifle, never knowing who else might be in the groves with them. The family has a garden, a good stand of field corn, a couple of cows, but they also have hundreds of acres of chestnuts to gather. And now, for a moment before they start home again, they strike a period pose for our imagination, not knowing that within a few short years their family adventures into the hills will cease, their groves will become logs on a mountain railway, and their world — an entire culture for a thousand miles — will disappear.”

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50 N. Merrimon Avenue, Suite 115 • Asheville, NC 28804
(828) 281-0047

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- Michael French, Forester

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Dr. Fred Hebard
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Sara Fitzsimmons
Kendra Gurney
Tom Saielli |
| Associate Editor
Catherine Farist | |
| Design & Layout
Leslie Shaw | |

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- | | |
|--|---|
| Meadowview Research Farms
Jeff Donahue, Director of Operations
Dr. Fred Hebard, Staff Pathologist
Dr. Laura Georgi, Research Scientist
Dan Mckinnon,
Seed Orchard Supervisor
Eric Jenkins, Technical Coordinator
29010 Hawthorne Dr
Meadowview, VA 24361-3349
(276) 944-4631 | (802) 999-8706
Mid-Atlantic Regional Office
Matthew Brinckman,
Mid-Atlantic Regional Science
Coordinator
Virginia Dept. of Forestry
Central Office
900 Natural Resources Dr.
Charlottesville, VA 22903
(434) 906-9312 |
| New England Regional Office
Kendra Gurney, New England
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USFS Northern
Research Station
705 Spear Street
South Burlington, VT 05403 | North Central Regional Office
Sara Fitzsimmons, Northern
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Science Coordinator
School of Forest Resources
206 Forest Resources Lab
University Park, PA 16802
(814) 863-7192 |

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Chestnut leaf near Brasstown Bald Mountain, Georgia.
Photo by Joe Nicholson



Betsy Gamber

Harvest Time

by Betsy Gamber, Interim President & CEO

Fall is in the air. As the early light of day filters through the mist, you can hear the sound of ladders extending, bucket truck engines powering up, and staff and volunteers rallying in a collective voice. For us, fall is the time of year to pull on our thickest gloves and begin the harvest. It is the time when we are able to physically hold the tangible results of our labor and the results of our commitment to restore the American chestnut.

Just as harvest is another cycle in the growing season, so is the season of change within our organization. As TACF searches for a new CEO to further our mission, it is important for us to reflect on where the organization started and where it is today. On October 11th, Meadowview Research farms celebrated its 25th anniversary with a special event to acknowledge the individuals who dedicated time, knowledge, tools, property, funding, and most of all passion for the American chestnut. These early contributions were critical in beginning our mission.

We also celebrated the volunteers and staff who planted the first orchards and gathered the first harvest. Some of these individuals are still with us and some have moved on, however, their vision and efforts were instrumental in shaping The American Chestnut Foundation. In fact, today our annual harvest activities

stretch from Meadowview throughout all 16 state chapters including partnering organizations, private landowners, annual members and many more. This year, we expect to harvest more than 70,000 seeds at our Meadowview Research Farms alone.

Help us continue on this path of success by contributing to our 2014 Fall Appeal. TACF's bi-annual appeals provide operational funding for research and maintenance throughout the year, and your participation allows us to continue this important work. There are many options available when making a gift to TACF. Please call us or visit acf.org to learn more about how your gift, large or small, really makes a difference.

After 31 years, our shared dreams of a potentially blight-resistant tree are now coming to fruition. Yes, we have many more years of research, testing, planting, and harvesting ahead of us. However, we look forward to the challenges of this future work. We have your support, we have some of the brightest minds conducting our science, and we have a mission that is achievable. That alone makes you want to pull on your thickest gloves and climb a ladder.

Thank you for your past and future support of The American Chestnut Foundation. Thank you for believing in our mission.

New Faces at TACF

Dan Mckinnon, Seed Orchard Supervisor

Dan Mckinnon joins TACF as its new seed orchard supervisor at Meadowview Research Farms. Dan has a long history in agriculture and Appalachian forestry, ranging from trail conservancy to the U.S. Forest Service. As a local native of Marion, VA, Dan has worked and resided in the mountains surrounding Meadowview for most of his career. His expertise covers farm and facilities maintenance; field crew training and supervision, with an emphasis on workplace safety; and coordinating volunteer groups. Dan earned a degree from the Virginia Highlands Community College in Horticulture Technology and Landscape Management.



Dan Mckinnon

“I have lived here for 36 years, hiked thousands of miles in these mountains collecting American chestnut specimens (leaves, twigs, and pieces of stumps), and reclaimed wormy chestnut lumber. I’ve even shopped at the greenhouse next to the Farm (Indoor Farms) for a decade, but I never knew TACF was right here. Now I have the opportunity to do WHAT I love, WHERE I love!” said Dan.

He has held positions with the U.S. Forest Service, Virginia Department of Conservation and Recreation, Virginia Department of Game and Inland Fisheries, The Appalachian Trail Conservancy, and the U.S. Marine Corps.

“His experience and familiarity with the area made him a strong candidate in our eyes,” said Jeff Donahue, director of operations at Meadowview Research Farms.

In his spare time, Dan spends time with his fiancée, Megan, and their two “boys,” Fox and Spaz, their cat and dog. He also likes to fish, camp, hike, watch basketball, and go to the gun range. The couple has grapevines, apple trees, walnut trees, and an organic vegetable garden that also keep them busy.



Catherine Farist

Catherine Farist, Communications Specialist

Catherine Farist comes to the TACF National Office as a communications specialist. She graduated with a bachelor of arts in journalism and a minor in German language and literature from Samford University in Birmingham, AL.

“Rounding out my senior year of college, I was set on a path to work in newspapers, but I discovered that newspaper journalism wasn’t my passion anymore. I started looking into agriculture sustainability and preservation communications and that’s how I learned about TACF. I fell in love after one interview,” said Catherine. “In discussing this opportunity with my folks in Franklin, NC, I discovered a family history rich with American chestnut trees. In the 1930s, my great-grandparents built their first home (which still stands) out of chestnut wood.”

“We are so excited to have Catherine on board,” said Ruth Goodridge, TACF’s director of communications. “She has a wonderful skill set and background in journalism. In addition to that, she brings such passion and energy to work every day. She is extremely insightful and eager to learn more about our breeding programs, fieldwork, and volunteer base. We feel very lucky to have her as part of our team.”

Catherine’s strong editorial background includes working as both an editorial assistant and a news editor, and she is very accomplished in graphic design, photo editing, and social media. Catherine also helps out as an assistant coach with the Asheville Youth Rowing program, a passion she developed during her four years of rowing at Samford.

USDA Regional Research Project, NE-1333

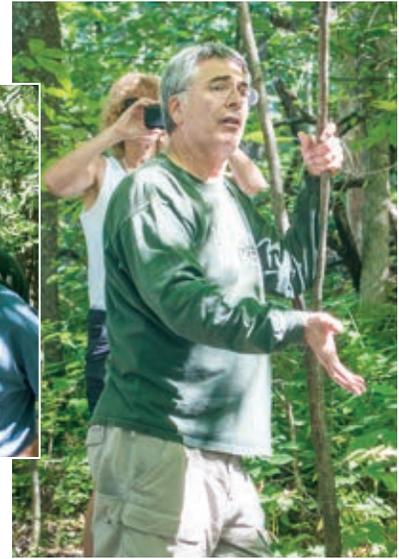
By Mark Double

The problems plaguing American chestnut (chestnut blight, ink disease, gall wasp) are complex. Other issues such as breeding and evaluating backcross hybrids, pollen compatibility, marketing chestnut products, etc. make for many areas of investigation. Scientists from varied backgrounds gather once a year to share information and discuss ways to collaborate. Under the umbrella of the United States Department of Agriculture, multistate research programs enable research on high priority topics among the State Agricultural Experiment Stations (SAES) in partnership with other research institutions and agencies (like The American Chestnut Foundation) and with the Cooperative Extension Service (CES). In this way, complex problem-solving activities which are beyond the scope of a single SAES, can be approached in an efficient and comprehensive way. These activities involve cooperative, jointly planned research employing multidisciplinary approaches. Among the Northeast states, there are 21 such projects. The project on chestnut is NE-1333.

The NE-1333 project had its beginning in 1982 as NE-140, a regional project with five collaborating experiment stations. Interest in chestnut has grown; as of 2014, there are 18 cooperators working on the project. The initial impetus for the regional project came with the discovery of the phenomenon of hypovirulence and



Bill McDonald and Myron Smith



Dennis Fulbright

the level of blight control that it brought to areas of the world, once decimated by the disease. Understanding the biology of hypovirulence and how to exploit it successfully, however, has been a complex issue, and initiating biological control artificially using hypovirus-infected strains has not been widely successful in the eastern U.S. Yet, in areas of Michigan and Italy, hypovirulence remains the only plausible explanation for the recovery of the significant stands of American and European chestnuts from blight. The challenge of utilizing hypovirulence still drives much of the research associated with this project. While research on the deployment of hypoviruses continues, other dimensions have emerged that require research attention.

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In Memory of and In Honor of Our TACF Members July - August 2014

In Memory of

Billy F. Caudill

Billie Caudill

Richard Coker

Helen Lee

Lynne Hall

Jim McMichael

John Hoffman

Ron Barwick

Wylie Pierson Johnson

Melanie Fay Johnson

Alice Jakobi Klein

Sberry and Bob Volk

George M. Knebel, Jr.

Jane Berry

Auden Orion Rafert

*Jacqueline Gabrysb
Margaret Shillingford*

In Honor of

John Emery and

Janice Corkin

Rudolf

Lois Doerr

Frances Fitch

Priscilla Fitch

Joan Gaumnitz

Beverly Gee

Lenore and Irving

Goldstein

Patricia Henaghan

Susan Higley

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David Morris

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THE
AMERICAN
CHESTNUT
FOUNDATION®

2014 FALL APPEAL



Our goal this harvest season is to raise \$100,000 by December 31st to further the research and hands-on work that is needed in the coming year:

Planting trees in the field

This year alone TACF will plant more than 20,000 trees in test and restoration plantings throughout Appalachia. Whether it's test orchards, demonstration plots, or reforestation of damaged minelands, getting chestnuts in the ground helps us develop a stronger tree.

Breeding a diverse chestnut

Our 16 state chapters will establish 20 new breeding orchards in 2015. These orchards will produce regionally adapted blight-resistant American chestnuts.

Meadowview Research Farms

We are harvesting 70,000 seeds this fall, including 50,000 Restoration Chestnuts 1.0 – the most blight-resistant American chestnuts to date. We will also plant 12,000 trees in the spring.

Join the thousands of concerned people who, like yourself, believe that it is our responsibility to restore the American chestnut to our eastern forests. Please make your gift to restore the American chestnut today.

Three easy ways to make a gift:

- fill out and mail the enclosed reply envelope;
- donate online today at: www.acf.org; or
- call us at: (828) 281-0047.



continued from page 5

Today, NE-1333 embraces research in several fundamental areas. The first is the selection and breeding of blight resistant trees for forest and orchard settings. Although the approach utilizes traditional breeding methods, one goal is to incorporate molecular techniques to aid in the selection of desirable trees. Advances in the breeding effort over the past decade have provided genetic material needed to accomplish much of the genomic work that should prove instrumental in identifying the genes that impart resistance to blight and other organisms that threaten chestnut. Fortunately, the breeding efforts have expanded and now are collaborative with numerous state programs and efforts in the province of Ontario. Another noteworthy breeding-related issue has been the emergence of the Asian chestnut gall wasp (ACGW) in the early 1970s. Since the first reports of this exotic pest, the insect has been identified in a significant portion of the natural range of the American chestnut in the southern Appalachians. Although some varieties of Chinese and Japanese chestnut appear resistant, knowledge of how this pest might influence natural populations of chestnut sprouts and backcross trees from The American Chestnut Foundation's (TACF) breeding program is required. For the central and southern Appalachians, root rot caused by *Phytophthora cinnamomi* also poses a significant threat, if not to nursery grown seedlings, then to outplanted stock. This disease, therefore, also must be considered as the breeding program advances.

In September, Dr. Anita Davelos Baines of the University of Wisconsin-La Crosse hosted the NE-1333 meeting in La Crosse, near the famed West Salem American chestnut stand. The group of 25-40 scientists hails from all areas of the country, from Connecticut to New Mexico. Expertise of the members include: plant pathologists (who work on chestnut blight and ink disease); entomologists (who work on chestnut gall wasp and other insect pests); plant breeders (who work to improve resistance of American chestnut to several pests); molecular biologists (who work to understand problems at the molecular level); virologists (who study viruses associated with the fungus); and marketing specialists (who try and produce and market chestnut products). Each year the group spends two days presenting data. There is generally an accompanying field trip and also non-scientific opportunities. Some of the highlights from the 2014 meeting included:

- Transgenic trees, created at the State University of New York, contain a gene from wheat that helps break down a compound used by the fungus to kill cambial tissue in the tree. This inserted gene allows the tree to grow, despite infection by the chestnut blight fungus.
- Work is being conducted in Clemson, SC on understanding how ink disease affects some of the hybrid chestnut trees being produced at the TACF Meadowview farms.
- Gall wasp is very destructive to chestnut throughout the native range—the wasp is an aggressive pest that greatly affects nut production and tree growth. At the University of Kentucky, the reproductive potential of wasps (egg load) is being studied to better understand the potential for this insect to invade.
- At the University of Tennessee-Chattanooga, beneficial fungi may be harmed with the addition of a material (phosphite) used to control ink disease. They are studying the impact of phosphite on beneficial soil microorganisms.
- The American chestnut stand in Wisconsin is a living laboratory. Researchers from West Virginia University, Michigan State University, and UW-La Crosse are working to find ways to spread a virus that will slow the growth of the chestnut blight fungus.
- Researchers at the University of Maryland and New Mexico State University are working to understand the complex molecular problems associated with the chestnut blight fungus with the hope of developing tools that will aid in combating this disease.
- Many groups are working to understand the genetic differences between the American and Chinese chestnut trees. Penn State, Clemson, University of Kentucky, and TACF are working collaboratively to try and determine the specific genes responsible for resistance in Chinese chestnut.

This group of researchers is very collegiate and cooperative. Everyone involved, from faculty members to graduate students, is working toward the goal of restoring American chestnut to eastern forests. Complete information on all USDA CSREES Northeast Regional Projects – Chestnut is available online at: <http://ecosystems.psu.edu/research/chestnut/meetings/crees-ne-projects>.



Sally and Harmon Weeks inspect the chestnut birdhouse, as the bluebirds nestle in.
Photo by Sally Weeks

“You Volunteer for the Things that are Dear to Your Heart”

Volunteer Spotlight on Sally Weeks

While Sally Weeks was a student at Purdue University, she first discovered her passion for trees. Luckily, she decided to make her love affair for the chestnut tree public when she and her husband, Harmon P. Weeks, Jr., joined TACF in 2002. Currently, she also writes the IN-TACF newsletter and cooks wonderful dishes for chapter events. In a recent project, she and her husband built a bird box from reclaimed chestnut wood, in which, after a hard fought battle between swallows and bluebirds, was claimed by two broods of bluebirds.

“Although I don’t currently have lots of time to volunteer, like anyone, you volunteer for things that are dear to your heart, and the idea of bringing the American chestnut back to help “reconnect” the web of life seems like an obvious goal for anyone interested in natural resources,” said Sally.

She was born and raised on a dairy farm, which she initially never wanted to leave, near Winamac, IN. She went on to receive a BSF in wildlife management and a MS in Forestry from Purdue’s Department of Forestry and Natural Resources. She has now taught

Dendrology at Purdue for more than 25 years and has created two new courses, Native Shrubs of Indiana and Plants of Hoosier Habitats.

Sally and her husband reside in Attica, IN, where her husband is a retired wildlife professor. A fellow Purdue grad, he received a PhD in Wildlife Science in 1974. He was on the faculty of the School of Forestry and Environmental Studies for a year before being invited to return to a faculty position at Purdue.

Sally loves to photograph trees and is working on her 3rd book (*Bark of Eastern Trees*). Her husband is the co-author of her first two books (*Native Trees of the Midwest* and *Native Shrubs of Indiana and the Midwest*). Together, they love to travel to remote areas of the US—her husband is an avid birder and an amazing naturalist, so there is always something to see. She also loves to quilt and dye fabric for her quilting using natural dyes.

Seasonal changes

COMING IN 2015

WINTER



SPRING



SUMMER



FALL

THE AMERICAN CHESTNUT FOUNDATION
is pleased to announce a new
QUARTERLY PUBLISHING SCHEDULE
for The Journal.



Beginning in January 2015, *The Journal* will become a quarterly publication (4 issues/year).

This new schedule allows for timely, seasonal content that aligns with the growing seasons of the American chestnut, and TACF is very excited to bring this enhanced version to our members!

WHAT CAN YOU EXPECT?

Quarterly issues of *The Journal* will include more content - additional articles, new feature columns, and guest writers. With each issue, members will find information about TACF's science programs, farm updates, research news, grants, and volunteer activities.

Thank you for your continued support!

ALABAMA



(L-R) Pete Laurie and Laura Schnitzlein pollinate mother trees with Alabama pollen. Photo by Jeff Donahue

Alabama Takes Its Father Tree Program to New Heights

Submitted by Jack Agricola

Long-time members of TACF recall the birth of the Father Tree Program as a “watershed event” in our short, 30-year history. Initially conceived by Michael French of the Kentucky Chapter, this program was adopted quickly with the full support of Drs. Hebard and Sisco. Since its inception, the program has become noteworthy for its obvious pragmatic benefits. It also provides TACF members with a type of spiritual retreat that is enriching, reinvigorating and restorative.

The program calls for volunteer participants from TACF’s southern chapters. The energy from this intensive commitment of altruistic labor offers many

opportunities to meet and be enriched by mutual exchange with other citizen-scientists, ripe with solutions and common-sense praxis. All return to their respective chapters rewarded by communing with kindred spirits while refreshing and retouching many core values--values often forgotten or overlooked by the cold science of restoring health to the forests of chestnut’s native range.

Almost in contrast to the meditative quiet of Meadowview is the incredibly busy season at the home chapters, harvesting pollens, pre-bagging, urgently pollinating days-old receptive flowers, and orchestrating seasonally timed production schedules.

So this image evokes an especially warm moment of recollection for those Alabama Chapter members who have travelled to Meadowview on this environmental hegira. It is particularly rewarding to have captured TACF’s own Director of Development, Laura Schnitzlein, taking time away from her daily duties to jostle Alabama pollen into the Meadowview mother trees, furthering the chestnut’s return to our forests.

Good work, Laura; and many thanks from the Alabama Chapter. Your smile says it all.

CAROLINAS



Doug Gillis, using Fred Hebard’s trusty transit, takes a reading on a survey rod held by Jeff Donahue, who is helping do preliminary survey work that will lead to construction of the Field Operations Building at the Price Farm in Meadowview. Photo by Ruth Gregory

Field Operations Building for Meadowview Research Farms

Submitted by Doug Gillis

Last spring, I accepted Bryan Burhans’ request to help TACF staff with development of plans for a Field Operations Building at the Price Farm. In mid-August, I met with TACF staff in Meadowview to finalize a basic concept plan for the building, which would be an insulated steel frame structure approximately 50’ X 100’ built on a concrete foundation/slab. Shed roofs would extend from some of the outside walls of the building to provide additional covered space over concrete flooring.

The building would provide all-weather work space for manual labor activities, which include processing and sorting chestnut burs and seeds, sowing seeds in containers for nursery production, and sorting and packing tree seedlings for transport to planting sites. Occasional equipment repairs would be made in the heated space during cold weather. One third of the space under the main roof would be heated and air conditioned and provide office space for three field staff, a men’s and a women’s bathroom with separate showers, and a break room. Rudimentary sleeping quarters for occasional overnight stays of visiting TACF employees is being considered.

The concept plan will be reviewed by county Building Department officials to ensure zoning regulations are being met. A Request for Proposals for professional design services will be prepared. Qualified firms will be interviewed, and one selected to produce construction drawings and documents and to perform contract administration services for construction of the building.

GEORGIA



Pictured from left to right: Sim Davidson (GA State Parks south GA resource manager), Ronnie Eakins (retired GA State Parks), Dr. Martin Cipollini (GA-TACF), Ronnie Camp (GA-TACF), and James Hamilton (GA State Parks program manager). Photo by Joe Nicholson (GA-TACF)

GA-TACF Establishes Formal Partnership with GA State Parks

Submitted by Martin Cipollini

In 2006, the southernmost population of flowering American chestnut was discovered at Franklin Delano Roosevelt State Park on Pine Mountain (Harris County), by GA Department of Natural Resources biologist Nathan Klaus. About the same time, flowering American chestnuts at Fort Mountain State Park (Murray County) were shown to members of the GA-TACF chapter by ex-president Dr. Donald Davis. GA-TACF volunteers have since bred several lines of backcross progeny from trees at both locations. More recently, demonstration/test orchards have been established at James Floyd State Park (Chattooga County) and Smithgall Woods State Park (White County).

After many years working piecemeal in ways such as these, GA-TACF has recently entered into a formal partnership with GA State Parks. The agreement covers parks within the historical range

of the chestnut (+/- 30 of Georgia's 49 state parks) and is designed to foster public education and outreach (beginning with the distribution of TACF fliers at these parks), and to streamline the process of working with wild trees and facilitating the establishment of orchards on state park lands. The agreement stems from a meeting initiated this summer by state park program manager James Hamilton and north GA resource manager Brian Nichols. After some discussion of mutual interests and a review of GA-TACF activities already underway, a draft memorandum of understanding was drawn up and then finalized in August. As the coordinator of the state-wide breeding program for GA-TACF, I welcome this partnership and look forward to enhanced opportunities for collaboration with GA State Parks.

INDIANA



Stephanie Eft measures the American chestnut in Roselawn using a Biltmore stick. Photo by Ben Finegan

Research in Roselawn

Submitted by Ben Finegan

Volunteers and members of the Indiana Chapter of TACF visited a very special American chestnut tree in Roselawn, IN. The goal of the visit was to measure the tree for TACF research, make informal observations of the natural regeneration occurring in the grove, and enter the tree into the 2015 Indiana Big Tree Register (<http://www.in.gov/dnr/forestry/8169.htm>).

Indiana science director Jim McKenna, Chapter president Ben Finegan, visiting Iranian scientist Dr. Aziz Ebrahimi, and volunteer Stephanie Eft took measurements of the tree's circumference, crown spread, and height. Initial estimates are that the tree is around 80' tall, 36" dbh, and has a crown spread of about 64' – large enough to be a new state record! From anecdotal research, the tree is probably between 50 and 70 years old. The group was able to observe bag worms on the tree, Japanese beetle damage, and possibly leaf miner damage (white leaves). Despite those pests, the tree appeared otherwise healthy, with no signs of blight.

The group also followed up on some regeneration work that had been done by scientists in the Indiana and Pennsylvania Chapters in 2011. Two of the four original parent trees have died from lightning strikes. The larger of the two remaining trees (and the one we measured) appears to be having more

continued

Indiana *continued*

success in establishing seedlings, with several vigorous offspring from previous markings still doing well. There are some gaps in the canopy near the smaller parent tree that could lend themselves to another round of seedling establishment. Both of the remaining parent trees had green burs on them high up in the canopy. The two remaining trees may be far enough apart that future pollination will not be sufficient to produce large viable seed crops.

This tree was incorporated into the Indiana Chapter's breeding program. Stay tuned for more developments on this grove and on chestnut restoration in Indiana!

KENTUCKY



Jonathan and Tommy Garrison planting chestnut tree at Abraham Lincoln Birthplace National Historical Park. Photo by Lynn Garrison

Potentially Blight-Resistant Chestnuts Planted at Abraham Lincoln Birthplace National Historical Park

Submitted by Lynn Garrison

May 17, 2014, was a beautiful day at the Abraham Lincoln Birthplace National Historical Park, with temperatures in the low 60s and just a trace of wispy clouds; it was also a historic day. Volunteers, National Park staff, and TACF Kentucky Chapter representatives gathered in the picnic area for a ceremonial planting of 20 potentially blight resistant American chestnuts. Once again visitors to the park will be able to experience the fascinating story of the American chestnut. Bill Justice, Park Superintendent, discussed the historic significance of the tree. He said, "Families in rural America, including the Lincoln family, once depended heavily upon the American chestnut for both

food and shelter. The trees grew straight and tall and were rot resistant, making the wood desirable for construction. The small nuts were sweet and fed entire families, as well as livestock and many species of wildlife."

At the time Abraham Lincoln was a young boy living in what is now Larue County, Kentucky, the American chestnut was one of the dominant trees in the local forest. The first quantitative timber study in Kentucky was completed by the Forest Service and the Kentucky State Board of Agriculture, Forestry and Immigration, 100 years after his birth. It showed 24% of the standing timber over 12" dbh in Larue County were American chestnuts. That was more than any other species and was the highest percentage in the state.

These chestnuts will not only contribute to restoring the ecosystems here, but they will also restore an important component of the culture.

MAINE



Air Campaign to Discover Mature Chestnut Trees in Maine Takes Off

Submitted by Brian Roth

With the discovery of a 95-foot tall, disease-free American chestnut tree in Hebron, Maine, in 2012, came the excitement that there may be more of these rare trees still undiscovered in the woods of Maine. "These native trees hold important sources of information and germplasm that is needed for the restoration of the species," according to Dr. Brian Roth, a forest researcher at the University of Maine (UMaine).

continued

Members of the Chestnut Discovery team with a University of Maine Cessna 172 in a hanger at the Bangor International Airport. The cameras are mounted underneath the airplane and are controlled from the cockpit. Photo by the University of Maine

Maine *continued*

There is a sense of urgency to discover the locations of these trees hidden in the Maine woods before they succumb to the blight. "About half of the known mature chestnut trees in Maine have died since I became involved with TACF in the late 1990s," said Roger Willby, chairman of the Gene Preservation Committee of the Maine Chapter (ME-TACF).

To this end, ME-TACF has partnered with the Maine Image Analysis Laboratory and the Barbara Wheatland Geospatial Analysis Laboratory at UMaine to launch a two-year chestnut discovery air campaign. The unique spectral signature of mature chestnut trees in bloom is detected and mapped using sophisticated cameras, software, and geographic positioning systems mounted under a Cessna 172 airplane. It is expected that the first discoveries will be made in the summer of 2015.

MASSACHUSETTS/RHODE ISLAND



Pittsfield's Spring Side Park deer farm work in progress. Photo by Brian Clark

New Orchards in Pittsfield and Weston, MA

Submitted by Yvonne Federowicz and Brian Clark

The MA/RI Chapter had a busy spring in 2014! Our volunteers planted seed orchard plots at numerous locations, including new sites in Pittsfield and Weston, MA, as well as at several existing sites. Approximately as many new trees were planted this spring as in the previous 15 years of the Chapter's history combined.

The Pittsfield Springside Park seed orchard was taken from open field on May 15 to fenced seed orchard with over 1,600 trees planted on May 24. Great luck on weather; the predicted rain held off on Friday as fabric was laid down and on Saturday as planting was done. There was an outstanding turnout of volunteers from the Pittsfield community (thanks to Bob Presutti), with Kendra

Gurney doing almost continuous training sessions as the volunteers trickled in nearly all day. Pittsfield Mayor Dan Bianchi and the Parks and Rec program manager Jim McGrath were there first thing in the morning and both worked for a few hours before going off to other obligations. This was a wonderful day for the MA/RI Chapter with great team work and leadership by Brian Clark, Lois and Dennis Melican, Kendra Gurney, interns Jamie Van Clief and Josh Soojian, initial contact and legal agreement work by Elizabeth Callahan and John Mirick, and all the others who contributed to getting this seed orchard established.

By June 29, the orchard looked great—Jim Pelletier had recently mowed it and Bob did some more herbicide spraying around the fence and in plot areas for next year, to prep for rototilling later this summer. Based on a quick count, the germination and early survival for most plots was 85-95%.

Congratulations to the Pittsfield volunteers as well as our TACF folks on a job well done!

NEW YORK

NY Chapter President Stepping Down

Submitted by Richard Radel

The New York Chapter of The American Chestnut Foundation has had a most eventful year. We have over 1,500 transgenic American chestnut trees planted in eight locations across New York state that we believe are blight resistant. The trees with Oxalate Oxidase genes show high levels of resistance, while some other trees with different combinations of genes show intermediate levels of resistance. The research group from SUNY-ESF is currently working under the "Regenerating Transformation Events into Whole Plants and Expansion of Field Trials" grant from the New York Chapter. All of the donors to this grant should be very proud that we have invested \$138,151 as of June 2014 and will make the final payment of \$75,765 on this grant in June of 2015.

We are nearing the period when, with government approval, we will be able to distribute truly blight resistant American chestnut trees. However, there still remain regulations to satisfy and time needed to show that we have what we believe we have.

continued

State Chapter News

New York *continued*

After many years of service and much hard work, Herbert F. Darling Jr. is going to step down as president. Herb and the Wirsig's started the NY Chapter in the spring of 1990 and under his leadership the Chapter presently has over 600 members and has made grants to research in excess of \$900,000 over the last nine years.

We are very fortunate to have Allen Nichols as nominee for president and to have his wife Fran as the nominee for treasurer, to be elected at the annual meeting in October. The New York Chapter is awaiting one of its members to inform the nominating committee that he or she would consider being secretary for the Chapter.

PENNSYLVANIA



Stephen Hoy, the new orchard manager of the PA Chapter breeding orchards. Photo by Stephanie Bailey

worked closely with the PA Chapter PR/marketing committee to develop a brand new display that is beautiful and informative. We've already been using it at events like Ag Progress Days and have received wonderful feedback.

Per usual, the majority of helpful hands this season have been those of our dedicated volunteers. Thanks to their help this spring, we planted over 10 new orchards in Pennsylvania and New Jersey. We look forward to thanking our volunteers at a wonderful fall member meeting on November 1, 2014, at the International Conservation Center in Fair Hope, PA. We hope to see you there!

Helpful Hands in Pennsylvania

Submitted by Stephanie Bailey

The Pennsylvania Chapter has greatly benefitted from extra hands on deck over the past several months. Stephen Hoy joined us in the spring as the new orchard manager of the PA Chapter breeding orchards in and around Penn State's Arboretum property in State College, PA. Hoy has put his experience in forest technology and leadership skills from many years of hot-shot forest fighting to use in managing a crew of two interns this summer, and will stay with us year-round to assist with the orchards and breeding efforts.

We also employed the talents of Jennifer Stingelin Keefer for several months this year to oversee the culmination of two important projects: the development of a new Project Learning Tree Curriculum and a new display for event presentation. Jenn

TENNESSEE



Jack Torkelson high in the chestnut tree to collect pollen. Photo by Joe Schibig

Two New American Chestnut Father Trees in Cannon and Cumberland Counties, Tennessee

Submitted by Joe Schibig

The tall Cannon County tree was discovered by chance by Mark Vance in the fall of 2013, on a wooded hilltop close to Woodbury, TN. Mark developed a keen eye for spotting chestnut trees from helping to inventory American chestnut trees in Mammoth Cave National Park several years ago. As a wildlife management officer, he was looking for an offender in a remote wooded area when he noticed an American chestnut tree leaf on the ground and then found the tree nearby. Mark, Jack Torkelson, and I obtained pollen from this tree in June of this year and mailed it to Tom Saielli, Southern Regional Science Coordinator.

continued

Tennessee *continued*

The second tall flowering chestnut tree was discovered recently by Don Hazel and some friends as they were hiking through a wooded area close to Crossville, TN. Don sent leaf and twig specimens to Tom, who identified it as an American chestnut. After hearing the good news, my friend Jack Torkelson and I visited the tree in June to obtain pollen. The flowers were over 50 feet above ground, so Jack climbed a tall ladder and then, climbed 20 more feet to snip off the flowers with his pole pruner. Jack has done this innumerable times and has helped the TN Chapter greatly.

VERMONT **Berlin, Vermont, Chestnut Site Continues to Generate Interest**

Submitted by Yurij Bihun

In addition to its importance for pollination and studying the regeneration of American chestnut, the Berlin, Vermont, chestnut site continues to generate interest beyond the scientific and conservation community.

One of the largest American chestnuts (>27" dbh) at the Berlin site was salvaged in the fall of 2012 after succumbing to the blight. The VT/NH Chapter has been waiting for the sawtimber to air-dry and has been slowly utilizing roundwood pieces for turnery items and other products. Since last spring, the Chapter has been working with Tom Thiel of Northwind Tonewoods in central New Hampshire. Northwind has carved out a niche by pioneering new and unusual wood species for luthiers and fine woodworkers.

In May, Tom exhibited at Fender's Invitational Wood Symposium in Los Angeles. Fender, like all guitar and other fine wood manufacturers, is beginning to stretch its perceptions of appropriate wood. Although only a handful of woods dominates musical instrument construction, there is a stable of lesser-used species that are suitable. Tom presented 15 offerings at the fringe of the norm for electric guitars. Front and center were samples of wood from the Berlin chestnut. American chestnut is suitable for guitar necks, bodies, and overlays. It also has potential for acoustic guitars, but requires further development. Samples were shown along with engineering data to an audience of over a dozen executives and decision-makers from product development, marketing, manufacturing, and technology and custom/specialized products departments. Despite initial interest, only time will tell if chestnut makes the cut.

WEST VIRGINIA



More than 60 boy scouts participated in the planting at SBR on April 19. Photo by Jessica Perkins

Boy Scouts Partner with WV Chapter

Submitted by Brian Perkins

The WV Chapter partnered with the Summit Bechtel Reserve (SBR) in Glen Jean, WV, and the Boy Scouts of America, Seneca District of Buckskin Council, to plant 400 Restoration 1.0 chestnuts on April 19, 2014. The goal of the planting is to raise awareness of the American chestnut among Boy Scouts. Approximately 60 Boy Scouts from Pack 466 of Hinton, Pack 4008 of Oak Hill, Troop 75 and Pack 75 of Sophia, Troop 3 of Beckley, and Troop 1885 of Oak Hill and their parents participated along with Chapter volunteers. The WV Chapter raffled off two legacy tree chestnuts to members in order to encourage attendance at the event. The trees were planted at one end of the Consol Energy bridge, an excellent location with a lot of foot traffic during events

held at the SBR. The SBR and council staff were excellent hosts. They provided food, shelter, and planting supplies. A few weeks later, Sam Muncy, WV Chapter treasurer, and volunteers protected the trees with cages paid for by a large donation from proceeds of a seminar conducted by Geo/Environmental Associates Inc.. The WV Chapter would like to thank Matt Brinckman and Kimberly Bennett for planning and conducting this tree planting!



This white ash tree shows typical, dramatic bark damage caused by woodpeckers, in search of EAB larvae beneath the bark, in Morgan County, WV. Photo by Dan Stiles

Emerald Ash Borer larva. Photo by Dan Stiles

Battling the Emerald Ash Borer

by Rebecca E. Hirsch

Ash trees had been dying in Detroit for several years, a die-off initially attributed to ash yellows, a bacterial disease. On June 25, 2002, five entomologists traveled there to examine some dying trees. Their visit was prompted by the observation a week earlier of a shiny metallic green beetle crawling out of an ash log. Several of the entomologists identified the insect as a member of the genus *Agrilus*, although they could not name the species. On July 9, Eduard Jendek of Slovakia positively identified it as *Agrilus planipennis*, a wood-boring insect native to China, Japan, and Russia.

To TACF members, the story of the emerald ash borer (EAB) will sound depressingly familiar: a pest from Asia is accidentally introduced into North America and quickly spreads, leaving landscapes of dead and dying trees in its wake.

However, untold numbers of non-native species make their way around the world each year, and when one is identified in a new territory, it can be tough to predict whether it will become a problem. “A lot of species don’t become pests,” said Leah Bauer of the USDA Forest Service, whose lab in Lansing, Michigan, is a couple of hours from ground zero for the emerald ash borer invasion.

And yet, to Dr. Bauer and others investigating the case, the large areas of dead ash trees were ominous signs.

The following year, five to seven million ash trees were dead or infested in a six-county area of southeastern Michigan, and it was dawning on experts that the pest had the potential to devastate the tree across North America.

North American Ash Trees

Unlike the American chestnut (*Castanea dentata*), ash is not one species, but an entire genus with at least sixteen species native to North America. Green ash (*Fraxinus pennsylvanica*) is the most widespread and occurs along streams and moist bottomlands. White ash (*F. americana*) is valued as a timber product and often grows in mixed stands with other hardwood trees. Black ash (*F. nigra*) grows in swampy northern woodlands, either in pure stands or mixed with beech and maple.

Within forest ecosystems, ash trees influence everything from hydrology—ash trees suck up a lot of water—to the cycling of nutrients through fallen leaves. They provide cover, protection, and browse for white-tailed deer and moose. Their hanging clusters of maple-like seeds provide food for ducks, songbirds, small animals, and insects. Dozens of insects feed on ash trees, and those insects also provide food for birds.

Ash wood has many uses, from furniture and tool handles to cardboard and paper. White ash is the

preferred wood for professional baseball bats, and black ash is used in traditional Native American basketry. Ash trees also are frequently planted as shade trees in parks and lawns and along streets in cities and towns. These trees are at risk as the insect bores its way across the country.

EAB Life Cycle

The adult beetle is metallic green and about half an inch long. It lives high in the treetops and feeds on ash foliage. The adult insects are not particularly damaging to trees, although their size and life cycle make them extremely difficult to detect.

The adult female lays her eggs singly in crevices in the bark. The eggs hatch, and the larvae tunnel under the bark, remaining hidden during the most damaging part of their life cycle. Under the bark the larvae chew serpentine (S-shaped) galleries through the phloem and xylem, the tissues that transport food and water throughout the tree. As the larval tunnels grow more extensive, the flow of nutrients and water in the tree is reduced, and the tree weakens.

The larvae overwinter under the bark, still hidden. In spring they pupate, and the adults emerge three weeks

later through D-shaped exit holes. The tiny holes are difficult to spot, particularly on large older trees with thick, rough bark.

Signs and symptoms of an EAB infestation include: upper crown dieback, water sprouts, woodpecker damage, D-shaped exit holes, S-shaped galleries under the bark, and the emergence of adult beetles. By the time these signs and symptoms appear, the tree is usually too sick to save.

Battling a Killer

Unlike the chestnut blight fungus, which quickly spreads by spores, EAB adults are strong flyers, but typically do not travel distances greater than a half mile. How, then, do they move further than that?

Most new infestations are caused by people who transport infested ash wood to an uninfested area. It can be difficult to tell that a piece of firewood is infested, as the larvae live beneath the bark and can survive for up to two years.

Officials in Michigan battled to stop the movement of firewood. A quarantine was instituted in 2002, with fines for moving ash trees or wood. The public was blitzed with billboards and public service announcements,



"D" shaped exit holes on the tree show evident adult Beetle damage. Photo by Dan Stiles

urging them not to move firewood. In 2005, the Michigan Department of Agriculture set up a checkpoint at the Mackinac Bridge, which connects Lower Michigan with the Upper Peninsula. Officials confiscated hardwood, firewood, logs, and untreated wood. Still, it wasn't long before the beetle appeared in the Upper Peninsula.

"With all the effort to prevent people moving firewood and nursery stock, EAB is all over the place. Those efforts didn't really work," said Dr. Gould of the USDA.

Officials tried eradicating the beetle by cutting swaths of ash trees from the forest, a tactic once used to try to contain the chestnut blight.

In both cases, the strategy failed. The EAB can fly more than half a mile on its own, which meant the beetle often flew over the eradication zones. And people were still moving firewood. Finally, as with chestnut blight, officials in Michigan gave up and accepted that the invader was there to stay. Quarantines and firewood campaigns are still in place in other states.

To date, the borer has spread to Colorado, Connecticut, Georgia, Illinois, Indiana, Iowa, Kansas, Kentucky, Massachusetts, Maryland, Minnesota, Missouri, New Hampshire, New Jersey, New York, North Carolina, Ohio, Ontario, Pennsylvania, Tennessee, Quebec, Virginia, West Virginia, and Wisconsin. The latest location to join the invasion list is the city of Boulder, Colorado, which identified the beetle in September 2013. Here, too, the movement of firewood is thought to be behind the beetle's spread.

Although slowing the spread of EAB has proven extremely difficult, researchers have had success in reducing the pest's deadliness. One highly effective tool has been insecticide. There are different methods of treatment, including an organic option. Depending on the product, insecticides can be injected into the trunk,

How to Identify an Ash Tree

Branches and Buds

Branches and buds are directly across from or opposite each other. Not many trees have an opposite branch pattern. Remember that buds or limbs may die, so not every branch will have an opposite partner.

Leaves

Compound leaves are composed of five to eleven leaflets. The only other oppositely branched tree with compound leaves, box elder, almost always has three to five leaflets.

Bark

On older trees the bark has a tight pattern of diamond-shaped ridges. On young trees the bark is smooth.

Seeds

Seeds are oar-shaped winged seeds, like those of maple. The seeds hang in clusters.

sprayed on the trunk, or applied to the soil. Timing of treatment is critical. According to Dr. Dan Herms, a professor of entomology at The Ohio State University in Wooster, with proper treatment, insecticides have proven 100% effective at preventing EAB mortality of ash trees.

That is good news for cities and towns hoping to save their ash trees. Milwaukee is one success story. The city has been treating its ash street trees at two-year intervals, an approach that not only saves trees but also keeps populations of EAB in check. According to Dr. Deborah McCullough, a professor of entomology and forestry at Michigan

State University, ash trees will tolerate low levels of insect damage: "If the population doesn't get a chance to build up to high levels, the ash trees won't die."

For towns and cities, the ecological services provided by large urban trees more than make up for the cost of treatment, not to mention that the cost of removing and replacing dead trees can be greater than treatment options. Although insecticide is not a feasible option for saving all the ash trees in forests across North America, Dr. Herms's group has been investigating the use of insecticides as a way to preserve genetic diversity by saving large forest trees and maintaining seed production.

Long-Term Strategies

In Asia, severe outbreaks on ash trees are rare. There, the beetle, its predators, and host trees have co-evolved for thousands of years. Asian ash trees have natural resistance that, together with natural predators, keeps beetle populations in check.

But in North America, native ash trees have little resistance to EAB. Woodpeckers and some native wasps



Photos courtesy of Bugwood.org (l-r): David R. McKay, USDA APHIS PPQ; James W. Smith, USDA APHIS PPQ; Daniel Herms, The Ohio State University

will prey on the beetle, but not at levels necessary to control the population. Yet it is worth noting that several North American species of ash are grown in Asia, without significant EAB-induced mortality. Studies show that natural predators of EAB can reduce the beetle's effects on those trees.

Several EAB parasitoids (organisms that parasitize and then kill their host) were discovered in China and are being evaluated for biological control of EAB in the United States. These wasp-like insects include *Spathius agrili*, *Tetrastichus planipennisi*, and *Oobius agrili*, which lay their eggs on or in EAB larvae or eggs. The parasitoids ultimately kill the host, and new parasitoids emerge to find new hosts to parasitize. Early signs of establishing parasitoids in the U.S. are promising, with increasing rates of parasitism of EAB as the wasps become established and their population slowly grows.

"Biocontrol is by nature a very long-term process," said Dr. Gould. Researchers agree that a sustainable approach for EAB management may involve a blend of biological control and pesticides.

Another possible solution is the breeding of EAB-resistant ash trees. One approach is to search for resistance in natural stands of ash trees that have otherwise been wiped out. Lingering trees may carry genetic resistance. The other strategy is to cross susceptible North American trees with resistant Asian trees, similar to the backcross breeding program of The American Chestnut Foundation. The breeding work is still at an early stage, with researchers trying to overcome barriers such as mating incompatibility between different

ash species. Another novel approach involves the development of transgenic ash trees expressing genes used to control EAB.

Meanwhile, as the emerald ash borer continues to spread, the most severe impacts will likely be felt by green ash and black ash, two ecologically important species that are also highly susceptible to the beetle. Some species may fare better. Blue ash (*F. quadrangulata* Michx.), a species of limestone slopes and moist valleys, shows some resistance. White ash is susceptible but appears able to resist the borer in some locations in Michigan.

Still, in states where EAB is widespread and well established, the main hope for ash trees comes later, after the first wave of trees dies. Lacking hosts, EAB populations then crash. This has already happened in Michigan, where beetle levels are now very low. At that point, biocontrol or natural resistance may help keep EAB populations in check, allowing ash seedlings in the understory to grow. But until—and if—that happens, the losses are serious.

"We're not just potentially losing a species," Dr. McCullough said, "we're losing a bunch of species—maybe even a genus of trees—in a relatively short time span."

Dr. Rebecca E. Hirsch is the author of dozens of books on science for children and teens and currently serves on the board of directors of the Pennsylvania Chapter of TACF. She holds a Ph.D. in plant cellular and molecular biology from the University of Wisconsin-Madison.

To learn more about the emerald ash borer and programs to combat them in your state, visit www.emeraldashborer.info.



Martin Cippolini in the field pollinating “baby” trees. Photo by Ruth Gregory

Catching up with TACF’s Father Tree Program

by Mila Kirkland

Every summer since 2007, members of TACF’s southern state chapters have descended upon Meadowview Research Farms en masse. The reason for this migration is the Father Tree Program, a cooperative effort that has created rapid advancements in the southern chapters’ breeding program. As a result, most of the southern chapters are making great progress with their Meadowview sources of resistance, and some have even completed their initial lines and have started working on new sources of resistance; these are two principal goals of the chapters’ breeding programs.

Origins of the Program

The Father Tree Program officially began in 2007, when representatives from several southern chapters brought pollen from wild American chestnut trees in their areas to Meadowview to cross onto selected backcrosses. TACF’s Forester Michael French, who had worked as an intern for the Kentucky Chapter, paved the way the previous year when he brought pollen from Kentucky to Meadowview.

“Before then, TACF had only used the terminology ‘mother trees,’ the trees that chapter volunteers pollinated in their region with pollen sent from Meadowview

Research Farms,” said Dr. Paul Sisco. At the time, Sisco was the TACF Southern Regional Science Coordinator. “When we decided to work in the other direction, using pollen from the southern chapters to pollinate mother trees at Meadowview, I came up with the term ‘Father Tree Program’ and it stuck.”

The Father Tree Program was initiated in the areas of the southern chapters for several reasons. First, American chestnut trees growing there often bloom earlier than the trees at Meadowview. Variations in the timing of flower development correlate with climatic variations, with flowers developing sooner in warmer than in cooler climates. Although Meadowview is close to Tennessee, it is in the Virginia Highlands, above 2,000 feet in elevation, which makes it even cooler than sites in the same latitude but at lower elevation. If the trees at Meadowview do not produce pollen by the time the mother trees in the southern chapters are receptive, pollen stored over winter from the last year must be used instead, and stored pollen is not as viable as fresh pollen. Another factor hampering the use of flowering American chestnut trees in the South as mother trees is that many are either too tall or too remote to access; in contrast, the trees at Meadowview are readily accessible.

“In North Carolina,” said Sisco, “it could cost us up to \$3,000 to pollinate a mother tree.” The majority of the cost comes from renting a bucket truck. The solution, then, for the southern region was to collect the pollen from the early developing trees there, bring it to Meadowview, and make the cross when the female flowers at Meadowview were ready. The results were astounding. With the implementation of the Father Tree Program, Sisco said, the Carolinas Chapter immediately increased their nut harvest by a factor of 10 or more.

“This is a great advantage for the southern states,” says Southern Regional Science Coordinator Tom Saielli; “because of the timing of flower development, the south has the opportunity to bring pollen to Meadowview. Other states don’t have that option, at least with fresh pollen; because their trees develop later, they must bring Meadowview pollen to their American chestnut trees. Their trees aren’t any easier to get to or cheaper to work on than the trees in the south; we’re just lucky.”

David Morris of the Alabama Chapter notes in TACF’s quarterly newsletter, *The Bark* (Spring 2008): “In total, the 2007 Father Tree Program resulted in 36 different pollens from the five chapters being applied to 27 Meadowview trees. An incredible 2,800 bags were placed on Meadowview trees and 3,791 nuts harvested. All this in the first year of the program!”

Logistics

A lot of planning is involved in the Father Tree Program; just ask Tom Saielli, who currently manages the program. Saielli spends a significant portion of his summer at Meadowview coordinating the people, trees, and materials involved. He monitors the progress of the selected female flowers in the orchards at Meadowview, keeps in contact with chapter volunteers about the development of pollen from the father trees in their region, and coordinates volunteer visits.



Tom Saielli prepares a vial of pollen that will be used to pollinate a Meadowview backcross tree.
Photo by Ruth Gregory

Since the program has been in operation for seven years, the volunteers also know the ropes pretty well. They tend to come in shifts so that there is no need to be there more than a week; for convenience, they can stay free at a handful of dorms at Emory and Henry College in nearby Emory, VA. Chapter volunteers also help out by bagging and pollinating for each other when the need arises. “At one point [in 2007], we had folks from three or four states all working together on the same tree,” said Michael French, the first Father Tree pioneer. This is still a common sight today.

There’s no doubt about it, a special kind of camaraderie spills over from working together all day for a common purpose. Volunteers across state borders get to know one another better

after spending time together at the top of flowering chestnut trees. At the end of a long day, there is always a group dinner trip to celebrate the accomplishments of the day. Having the pollination volunteers over for a cookout is one of the highlights of the social life of Fred Hebard and family.

Lessons Learned

Even with all its benefits, the Father Tree Program doesn’t solve every pollination problem in the southern region. “We have several high-elevation trees that bloom much later than those at Meadowview,” said Saielli. “Ironically this often results in missed opportunities since the trees at Meadowview pass the point of being receptive.”

For example, this past summer, several southern chapters had one or two trees bagged and ready to pollinate at Meadowview while volunteers waited for the pollen to mature from father trees in their states. “In some cases we made it in the nick of time, in other cases the window closed before we were able to get the pollen,” said Saielli. In one instance, members of the Carolinas Chapter monitored catkins on a remote tree on Pilot Mountain for weeks, waiting for the pollen to mature. Incidentally, the tree was dying and the pollen was

Why Plant a Germplasm Conservation Orchard?

Chapters plant Germplasm Conservation Orchards (GCOs) 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. Also, GCOs are a great tool for planting hard-to-reach trees on a site where they are easy to work with, monitoring flower development is convenient, and flower timing will likely be better.

For more information about Germplasm Conservation Orchards, read Sara Fitzsimmons' article in the February edition of TACF's eNewsletter, *eSprout*, at www.acf.org/newsletter2.20.14native_conservation.php.



Photo by Ruth Gregory

hard to reach, so it was difficult to assess development. Meanwhile, the mother tree at Meadowview was becoming unreceptive. Ultimately, the Carolinas Chapter could not get the pollen from that specific tree in time and had to switch to alternate pollen at the last minute.

So what's the solution for cases like this, when the pollen develops too late or the flowers are too hard to access? There are several options for the southern chapters to consider, depending on the situation:

1. Bag the tree - If the issue is timing of flower development, but it is an easy tree to reach and work with, bag the tree and bring pollen to it. In fact, any American chestnuts that produce female flowers, or that can be pushed to produce flowers for future bagging, should be on the chapter's radar no matter when the flowers develop.

2. Transfer germplasm to a Germplasm Conservation Orchard (GCO) - There are three ways to do this. Note that the last two methods require working with dormant trees. Identify and flag trees in the fall while they are leafed out and easy to find. Also, avoid planting in a backcross orchard, which is screened with blight fungus and rogued. In a GCO, trees will be cared for as long as they live, and eventually utilized in the breeding program.

- **Collect nuts from the tree** - If the tree produces viable nuts, collect them and plant them in a GCO.
- **Collect sprouts from the tree** - Sometimes, wild American chestnut trees produce small sprouts that can be

useful to the breeding program. The sprouts should be transplanted while they are dormant, and they need equal root-to-shoot biomass to survive. Be sure to locate smaller shoots; those that are more than one inch in diameter can be challenging to transplant.

- **Collect scion wood from the tree and graft onto rootstock** - Grafts don't usually last forever, but they may provide pollen for a few years. Grafts at GCOs are easier to access, monitor, and collect pollen from (see sidebar on how to collect scion wood this winter).

3. Transfer germplasm to Meadowview Research Farms - For the Father Tree Program, it is much easier to obtain the pollen right at Meadowview. Issues with timing of pollen development are solved and collecting the pollen couldn't be easier (see sidebar on how to collect scion wood this winter).

Talk to one of the many volunteers who have participated in the Father Tree Program and you will learn that it has had a huge impact on the advancement of their chapter's breeding program by significantly increasing nut production. Indeed, most of the southern chapters have completed or nearly completed their initial Meadowview Clapper and Graves lines and are now looking toward planting seed orchards, future work with new sources of blight resistance, and creating *Phytophthora*-resistant chestnuts. The Father Tree Program will continue to enrich the chapters' breeding programs for at least a few more years, through the implementation of Germplasm Conservation Orchards and scion wood grafting for even easier access to mother and father trees.



Landscape with chestnut trees at Montesinho Natural Park. Photo by Maria do Sameiro Patrício

The Bread Tree:

A Primer on the Culture of Sweet Chestnut (*Castanea sativa* Mill.) in Portugal

Maria S. Patrício,¹ Miguel Galante,² and Yuriy Bihun³

Background

The European or sweet chestnut (*Castanea sativa* Mill.) is an important multipurpose tree that is much heralded in Portuguese history and culture, for both the quality of its wood and its exceptionally versatile nuts. The sweet chestnut's specific nomenclature *sativa* is derived from the Latin botanical adjective meaning *cultivated* and is used to designate certain seed-grown, domestic crops. Most Portuguese take it for granted that the cultivation of the chestnut tree, or *castanheiro*, was introduced and spread by the Romans. Studies based on fossil records, however, reveal that the occurrence of the *Castanea sativa* formations in Portugal date as far back as 8,000 years—pre-dating the Roman occupation of the Iberian Peninsula by millennia (Paiva 2007).

Although chestnut can be found throughout Portugal, it is most widely distributed in the northern and central mountainous areas of the country. It can also be found in the mountains of São Mamede (northern Alentejo province) and the Monchique escarpment in the northern

Monumental Trees

Portugal has several notable “stands” or groves of monumental chestnut trees. Some of them are protected by law, such as the “Guilhafonso chestnut” in Guarda in east central Portugal which is believed to be over 500 years old. In the Trás-os-Montes region, there is a designated tourist route for these monumental chestnuts known as the “Millenary Route,” which provides an opportunity to observe these superb chestnut trees which, in the words of the Portuguese writer, Miguel Torga seem “as old as the world itself.” This route is based in Montesinho Natural Park (near Bragança, in the northeastern part of the country), which has adopted the chestnut bur as its logo.

¹Mountain Research Center (CIMO), Polytechnic Institute of Bragança, School of Agriculture, Bragança, Portugal (sapat@ipb.pt)

² Forestry Consultant, Lisboa, Portugal (mg.forests@gmail.com)

³ Director, Shelterwood Systems, Jericho, Vermont, and, President, VT/NHChapter, The American Chestnut Foundation (shelterwoodsystems@comcast.net)

Algarve, Portugal’s southernmost province. These discontinuous or disjunct populations are similar to the stands described by Acker in Jerez in southern Spain (Acker 2014).

Until the introduction and widespread use of potatoes in Europe, the nuts of the sweet chestnut or *castanha* were important in human consumption, particularly as a subsistence crop for rural populations in the more remote mountainous areas. Later, with the expansion of cereal production, wheat and other grains became the base for the white bread consumed in urban areas and larger population centers, while chestnuts remained in the dark, dried bread of the mountain regions. Even to this day, in the mountainous regions of rural Portugal, the chestnut tree is referred to as *a árvore do pão*—the “bread tree”—and the delimitation of land and its economic value is based on the number of grafted chestnut.

The bread tree has historical, economic and social importance unmatched by any other tree species in Portugal, especially in the northern and central part of the country. Given its cultural importance, “chestnut” is mentioned in the names of many villages and is the basis for countless traditions.

The Culture of Chestnut

One of the distinguishing characteristics of the montane chestnut-based economy was the introduction of plantations with large spacing between trees (10m x 10m) for multipurpose nut and wood production interplanted with agricultural crops, such as rye, or pastures in the open understory. In Portugal, this age old agro-sylvo-pastoral system is called *souto*. The exploitation of the multifunctional bread tree was a necessary precaution of the native highland populations, who were more or less isolated and had to become self-sufficient in food, timber and firewood (Monteiro and Patrício 2007).

In general, there are three major typologies applied in the cultivation of chestnut: (1) *souto* (grafted trees for nut production with traditional cultivars in an agroforestry system), (2) “low forest” or coppice culture (production from shoots of dormant or adventitious stump buds), and (3) *castiçal*, “high forest” planted or natural regeneration originating directly from seed or seedlings for large dimension roundwood production. Chestnut is usually grown in pure stands, but it can grow in mixed stands in closed forests with the maritime or cluster pine (*Pinus pinaster*), and oaks, such as Pyrenean oak (*Quercus pyrenaica*) and pedunculate oak (*Quercus*



Chestnut trees around a small mountain village in Trás-os-Montes. Photo by Maria do Sameiro Patrício



Old chestnut trees in a traditional fruit orchard (*souto*). Photo by Maria Eugénia Gouveia

robur). Consequently, these different cultural approaches provide different chestnut forest types and products that require appropriate management models.

In Portugal, sustainable management of chestnut woodlands is essential to maintaining and enhancing their economic, social and environmental value for present and future generations. The chestnut *soutos* are part of the mosaic of vineyards, olive groves, and cork oak (*Quercus suber*) savannas that make up the working landscape and often provide the only livelihood for people in the most disadvantaged rural areas. The

Nut Production

Portugal is one of the largest European producers of chestnut – over 20,000 tons/year. There are four regional chestnut cultivars, which have received the designation of Protected Designation of Origin (DOP) appellations under the EU legislation: “*Castanha da Padrela*,” “*Castanha da Terra Fria*,” “*Castanha dos Soutos da Lapa*,” and “*Castanha de Portalegre e Marvão*.”

The northeastern Trás-os-Montes region is the most profitable chestnut production area. In 2012, nuts sales for the DOP “*Castanha da Padrela*,” generated 15 million and the DOP “*Castanha da Terra Fria*” about €10 million. A significant part of the Portuguese chestnut production is exported. In 2012, Portugal exported 70% of its production, which represented 17.5 million in sales. The Portuguese chestnut is exported to 33 countries including Italy, France, Spain, Switzerland, Germany, Brazil, Angola, the United States and Canada.

economic future of the chestnut tree lies mainly in the net production of nuts obtained from the fruit orchards, associated with complementary products, such as firewood and mushrooms. There is also an interesting trend toward high-quality wood production that, combined with other non-wood forest products and ecosystems services, can become a profitable investment for forest owners.

Decline of Traditional Chestnut Culture

The second half of the nineteenth century brought significant changes to the established *souto* system with the rise of *doença da tinta*, or “ink disease” (caused by *Phytophthora* spp.), in Europe that threatened the sustainability of chestnut culture. Although major epidemics occurred during the nineteenth and twentieth centuries, due to the relative isolation of Portugal in the western corner of the Iberian Peninsula, the decline of this culture occurred mostly in the twentieth century. The phytosanitary situation of *souto* culture fell precipitously in the 1970s, following dramatic changes in rural landscapes resulting from shifting demographic patterns, with the exodus of rural populations to cities and abroad. This coincided with Portugal’s entry into the EU, and subsequent modernization resulted in the decline of handicrafts in favor of new, man-made materials. This had a particularly strong impact on the wine industry, which traditionally absorbed a large part

of chestnut material from the coppice culture to produce casks, baskets, and sticks and poles for vineyards. The combination of ink disease and the change in traditional livelihoods contributed to the abandonment of extensive areas of chestnut orchards and coppice culture.

Despite setbacks that have arisen throughout Portuguese history, chestnut culture fortunately continues to thrive in the new millennium. Outplanting chestnuts in new plantations is once again being advocated by foresters and sought by farmers, both for nut production orchards and silvicultural stands. Recently, the decline has stabilized, but the actual distribution area of about 40,000 hectares is a far cry from the 70,000 hectares registered in the first half of the twentieth century.

Threats to Sustainability

Over the course of the last three decades, globalization and changing climatic patterns with accompanying drought and erratic precipitation are increasing the incidence of forest pathogens such as insects and diseases. The main threats to the sustainability of chestnut throughout its range in Portugal and the Mediterranean basin are outlined below.

The roots systems of chestnut continue to be highly susceptible to ink disease caused by several species of the virulent, root-rotting fungi *Phytophthora* spp.; predominantly, *P. cinnamomi* and *P. cambivora* (Robin et al. 2006). Although ink disease is thought to have been present in Europe since the eighteenth century, the first incidence in Portugal was reported in 1838 (Fernandes 1955). This disease is by far the most common problem in orchards and is frequently exacerbated by incorrect cultural practices conducted by farmers.

Cryphonectria parasitica, the fungal pathogen responsible for the chestnut canker blight, was introduced in Europe around 1938. In Portugal and other parts of the range, this fungus does not cause large-scale dieback as witnessed in North America but is an opportunist pathogen principally infecting grafted trees. This pathogenic agent has a significant impact on the decline of orchards as well as high-forest stands of chestnut.

Oriental or Asian chestnut gall wasp (*Dryocosmus kuriphilus*), however, is a relatively new threat, which has the potential to be the most devastating pest of European chestnuts. Although the presence of the Asian chestnut gall wasp was identified early and its etiology has been well analyzed, control measures to



Young chestnut tree plantation for timber production. Photo by Maria do Sameiro Patrício

limit its spread are still being developed. The female gall wasp lays eggs in the buds of chestnut trees in early summer (May/June) and their growth begins the following spring, when the tree buds begin to develop. At this point in the life cycle, the larvae induce the formation of galls on the leaf buds, which can be very damaging to the tree. They occur on the new growth, disrupting the fruiting process, and can reduce the tree yield up to 70% and, in some instances, can cause mortality, particularly if the trees are stressed by drought or other site factors. It is estimated that this pest has the potential to cause 40 million in damages to Portuguese chestnut production. Control measures include pruning infested buds on trees. Pesticides are generally not effective because the insects take cover inside the galls. The most successful gall wasp control method is the introduction of the *Torymus sinensis* wasp. This parasitoid has proved effective as an agent of biological pest control against the gall wasp in Japan. Ongoing research in Portugal will determine the feasibility of its release into infected regions.

Paths for the Future

Portugal is a country with a long and rich tradition in the cultivation and management of sweet chestnut. The *soutos* and woodlands of *Castanea sativa* have exceptional environmental, economic and cultural importance not only for Portugal but for the global

patrimony as well. The potential of this multifunctional tree species is responsible for the peculiar “civilization of the chestnut” (Adua 1999) in the Mediterranean region. Throughout the range, millions of obstinate but modest peasant farmers have shaped beautiful landscapes and are the tireless producers of these precious nuts from generation to generation (Pitte 1992).

As we move further into the twenty-first century, the culture of chestnut is enduring and may even be considered to be thriving in Portugal. It is experiencing a renaissance as new growers and farmers return to chestnut culture with new varieties and techniques for nut-growing plantations, as well as silvicultural techniques for quality timber production. The taste and quality of Portuguese nuts, regarded as the best in the world, are the “new gold” for the next generation of small farmers in the north and central mountain areas.

In the forefront of this effort is the Mountain Research Center (CIMO), based at the Polytechnic Institute of Bragança, School of Agriculture, which is developing research on growth and yield modeling, sustainable management of chestnut production areas, genetic resources (namely, adaptive characteristics and resistance to diseases), health and phytosanitary protection of the chestnut, as well as production, technology and socio-economic valuation of the chestnut. The economic, ecological, and social importance of the chestnut justifies

the investment in combating its decline and promoting its protection and management. In Portugal, several NGOs are dedicated to promoting chestnut culture and its products. A good example is the Confraria Ibérica da Castanha, whose mission is to contribute to and enhance the chestnut sector. Although there are increasing threats to and demands on chestnut production, with the help of ongoing research, the “bread tree” will continue to produce nuts, shade, habitat, and timber as well as other ecosystem benefits for the foreseeable future.

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St. Martin's Day

In the autumn, fairs and festivals are made around the sweet chestnut, highlighting its social and economic value. Many of these festivities take place on or around November 11th—St. Martin's Day—*Dia de São Martino*—the day traditionally associated with the celebration of the year's wine maturation process and the first day when the new wine can be tasted. The celebration—*magusto*—is made by the family or in the community, traditionally, around a bonfire, eating chestnuts roasted in the embers and tasting the new wine (*água-pé*).

In collaboration with Portuguese counterparts, Yuriy Bihun, President of the VT/NH Chapter, TACF, is soliciting interest in organizing a fund-raising, study-tour to Portugal that coincides with the *Dia de São Martinho* festivities in November 2015. If you have ideas or are interested in being part of this tour, please contact Yuriy at ybihun@uvm.edu.

Maple-glazed Pan-roasted Brussels sprouts with Chestnuts

Photo by Viviane Bauquet Farre

Serves 4

Active time: 30 minutes



Ingredients

- 1 tablespoon sea salt for the blanching water
- 1 1/4 lbs (560 g) Brussels sprouts – trimmed and cut in half
- 1 tablespoon unsalted butter
- 3 tablespoons extra virgin olive oil
- 1 tablespoon maple syrup (or brown sugar)
- 4 oz (115 g) vacuum-packed whole roasted chestnuts
- 2 large shallots – skinned, quartered and finely sliced (1/2 cup)
- 1/2 teaspoon sea salt
- freshly ground black pepper to taste

Step 1: Fill a large bowl with cold water and several ice cubes.

Step 2: Fill a medium pot with water and bring to a boil. Add the salt and blanch the Brussels sprouts for 3 1/2 to 4 minutes (depending on their size) until tender. Scoop them out with a slotted spoon and transfer to the ice water bath until cool. Drain on paper towels. Once dry, transfer to a bowl and set aside.

Cook's note: The Brussels sprouts can be blanched up to 1 day ahead. Refrigerate until ready to use.

Step 3: Heat a large heavy-bottomed skillet over high heat. Add the butter, olive oil and maple syrup, stir well. As soon as the butter is melted, add the Brussels sprouts and chestnuts and toss carefully with two wooden spoons (so as not to break the chestnuts) until the ingredients are well coated with the oil. Sauté for 6 to 7 minutes until golden-brown, tossing occasionally. Reduce heat to medium-high, add the shallots, salt and pepper and sauté for 1 to 2 minutes until shallots have softened. Transfer to a serving platter and serve immediately.

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Chestnut Moments

The American Chestnut Station, Ghost Story Narrative



Photo courtesy of the Great Smoky Mountains National Park Library

The Ghosts of the Forest

by Courtney Troutman

The year was 1904 and my ancestors were growing strong and plentiful in the beautiful Eastern forests. Some called them “giants” and some “kings” because of their abundant gifts to mankind and magnificent size.

From Maine to Georgia and west to the prairies, they dominated the kingdom. The oldest of the giants grew slowly but surely for over 600 years; their leafy crowns reached 100 feet to the sky and their wide girths expanded 10 feet around.

They ruled the forest not only in great size but great numbers, too. It was said, “Where there are mountains, there are chestnuts.” They stood side by side and among other species in the Appalachian Mountains, where one out of every four trees was a chestnut.

Their presence and gifts were appreciated by many. Creatures of the forests and humans alike ate the chestnut fruits. The wood grew strong and straight and was highly favored by loggers seeking timber.

It was thought that such a powerful kingdom would last forever, but instead it vanished completely. In less than fifty years, my ancestors went from “giants” to “stumps” and from “kings” to “ghosts.”

The villain was called blight; a foreign disease brought to America from overseas. It spread quickly and fatally across the land, killing all the American chestnut trees left standing by the loggers.

Gone forever?

Not quite....

The ghosts of these kings have been haunting the forests from beneath the soil. Underground, in the roots, and safe from the disease, they have been waiting.

Now, they are coming back to life.

TACF REMEMBERS THE HEROES/PASSENGERS ON FLIGHT 93

TACF is very proud of its reforestation efforts with the National Park Service (NPS) at the Flight 93 National Memorial near Stoystown, Pennsylvania. Created to honor the victims of the terrorist attacks on September 11, 2001, the National Memorial was constructed on a reclaimed coal mine surrounding the crash site of United Airlines Flight 93.

This year, TACF was able to provide more than 1,300 Restoration Chestnut 1.0 seedlings for "Plant a Tree at Flight 93." More than 500 volunteers planted 21,050 seedlings across 30 acres. In total, TACF has provided nearly 2,000 Restoration Chestnuts 1.0 as a part of this living memorial, making it the largest mixed hardwood/American chestnut reforestation project that TACF has worked on to date.



Volunteer tree planters share some family time while planting at the Memorial