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Vermont-New Hampshire Chestnut Notes

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HOW WILL AMERICAN CHESTNUT SPREAD?

Studying the Berlin, VT American chestnut stand

Sara Fitzsimmons, TACF North Central Regional Science Coordinator

Starting in the summer of 2013, researchers from Purdue University, Penn State University, Wilkes University, and William and Mary College began gridding and sampling the American chestnut tree population in Berlin, VT. This three-acre site north of Montpelier has been known by the VT/NH Chapter for many years. Several of the larger trees were previously used to create backcross progeny for TACF's regional breeding program. The site may hold additional information to further aid in TACF's American chestnut restoration program.

The field crew getting ready to start inventory work in Berlin, VT.
Photo courtesy of Sara Fitzsimmons.

A major question facing TACF in its quest to restore the American chestnut is how best to integrate blight-resistant American chestnuts into the landscape. Some questions related to this involve silvicultural examinations: Is it better to plant bare root, containerized seedlings, or direct seed? What kind of weed control is best: herbicide, weed mats, or none? What's the best way to protect newly planted trees from browse? Luckily, there are many test sites with multiple cooperators aimed at answering these questions.

However, other questions aren't easily or quickly tested with direct experimentation. For example, how many nuts need to be produced in a given location to overcome predation? How many trees of what sizes are needed to produce that many nuts? Once a population is established, how will the progeny from that population spread? Direct experimentation to answer these types of questions might take 20 to 40 years. But if there is a decades-old, self-perpetuating population of American

(Berlin research site, Continued on page 2)

JOIN US FOR OUR SEVENTH ANNUAL MEETING!

The VT/NH Chapter will hold its seventh Annual Meeting on **Saturday, April 25, 2015** at the Vermont Institute of Natural Science (VINS) Nature Center in Quechee, VT. The meeting will include a keynote presentation by TACF's new President and CEO, Lisa Thomson, discussing her vision for the future of the organization, updates on the work of your local VT/NH Chapter, and free admission for attendees to explore the VINS exhibits, programs, and nature trail. Please see page 7 for more information. **Hope to see you there!**

PRESIDENT'S CORNER

Yurij Bihun, VT/NH TACF President

VT/NH Chapter President, Yurij Bihun.
Photo courtesy of Yurij Bihun..

The past year has been marked by milestones and transitions as we continue to play an integral part in the effort to restore the American chestnut to its rightful niche in the eastern forest. Let us not tread lightly on our task or accomplishments; the restoration of an entire tree species is unprecedented in the history of North American conservation!

In addition to establishing a new breeding orchard at Merck Forest in Rupert, VT, the chapter continued to create new breeding lines with controlled pollinations last summer that yielded a respectable [860] nut harvest for further propagation. Inoculations were done in June at the Valley View orchards in Shelburne, VT and rated this fall. The Chapter is also continuing to develop and discuss new partnerships and programs. Although still in an early phase, we are starting to talk about developing seed orchards, which are a long-term commitment of 30-45 years. As a forester, I am also pleased to see forest planting efforts expanding to include silvicultural trials with the Monadnock Conservancy and other partners in Gilsum, NH, as well as a planned University of Vermont project to plant Restoration 1.0 chestnut in an overstory removal on the UVM Jericho Research Forest in Jericho, VT.

Membership, which has remained flat over the last few years, has shown a small bump as the National office implemented a membership campaign to follow-up on expired memberships. This resulted in a 10% increase in VT/NH members to an all-time high of 207! We continue to face challenges with changing of the guard in the Board of Directors. Currently, key Officers and other dedicated Board of Directors members who have served mightily since the formation of the Chapter will be departing. We are discussing strategies to encourage members to participate in board activities. Therefore, I encourage members to become active on the board, to volunteer with education and outreach, and for hands-on activities in the field to restore American chestnut.

BERLIN RESEARCH SITE (continued)

chestnuts, some of those questions might be answered through sampling of that site.

Chestnut blight eliminated most of the potential for many decades-old, self-perpetuating American chestnut sites. On the edges of the range, however, a few populations escaped infection long enough to enjoy one or more generations of naturalizing. The Berlin chestnut population is one of those. It is one of three currently being studied to determine what factors affect long-term American chestnut establishment and growth.

	2012	2013	2014
Total Chestnut Trees Measured	105	453	197
Chestnut Trees > 4" dbh	1	2	2
Chestnut Trees < 4" dbh	104	451	650
Newly Established Chestnuts		21	67
Grid Points		105	105
Grid Points without chestnut		24	24

Table I. Annual accounting of American chestnut trees found at the Berlin site.

BERLIN RESEARCH SITE (continued)

(Continued from page 2)

The first step in evaluating this and the other sites is to set up a sampling grid. For this, a crew was sent out to create a grid with points 10 meters apart. Thankfully the understory of the Berlin site is relatively open (see photo at right) and made for relatively easy grid work.

Once the grid was established, work to sample the trees and a few abiotic factors began. At each grid point, a fisheye photo was taken to measure canopy openness. At every tenth grid point, a soil sample was collected to sample how much variation in soil nutrition and moisture there is across the site.

A second crew was assigned solely to locate and measure all American chestnut seedlings less than 4" DBH. This may not sound like a hard task, but it really can be! This crew had to be especially systematic since one-year-old seedlings can hide in many places, particularly under tall ferns. At least two passes across each 10m x 10m grid cell was done and each seedling marked with an orange flag. Once all the trees were found, each seedling was measured for height, root collar diameter, and an estimate of the tree's age. The tree was then be given an official tag and number.

Table 1 (see page 2) shows an accounting of all the American chestnut trees found at the Berlin site. In 2012, TACF's New England Science Coordinator Kendra Gurney sought to get a quick idea of how many chestnut trees might be on the site. She and her intern found 105. In 2013, the research team of about 10 individuals, including Kendra, laid out the sampling grid. Through a systematic approach, almost four times that many trees were found. New recruits in 2013 were relatively few, but jumped three-fold this past season. Was this because seed set was high in 2013? Or because predation was low? Hopefully long-term sampling of the site will reveal trends that allow us to answer these questions.

Another crew was in charge of finding, tagging, labeling, and measuring the DBH of all types of trees with a 4" DBH or greater. Table 2 shows this site is dominated by sugar maple trees. The largest tree on the site, at 35" DBH, is a sugar maple.

Once the grid crew, seedling crew, and DBH crew had all completed at least four cells, the mapping crew started its work. Using an instrument called a PosTex, the crew set the PosTex in the middle gridpoint and then mapped all points of interest including all chestnut seedlings, all trees greater than 4" DBH, and all gridpoints. In this way, the spatial arrangement of all these points could be made (see photo at right).

Grid crew using the PosTex to map the site.
Photo courtesy of Sara Fitzsimmons.

There is still work to be done, especially to analyze these data. Once the spatial arrangement of all the trees is analyzed, more inferences about American chestnut spread may be made. How far are the seed traveling? What are the soil characteristics that determine where and how well a given tree grows? What about shade? By studying this site, and at least two others, researchers will gain a better understanding of the factors that dictate American chestnut establishment and growth.

Species	Number of individuals	Maximum DBH (inches)	Average DBH (inches)
sugar maple	384	35.00	11.61
eastern hemlock	13	12.70	5.83
American beech	13	32.00	7.86
eastern white pine	12	27.90	8.58
ash (green/white)	13	19.40	8.96
yellow birch	5	13.40	7.22
American basswood	5	8.70	5.80
red maple	5	22.00	16.50
hop hornbeam	1	4.80	4.80
black cherry	1	4.40	4.40

Table 2. Number of trees, greater than 4" DBH, in the Berlin site by species.

MEMBER PROFILE: CURT LAFFIN AND CAROL WALLACE

Curt Laffin planting restoration American chestnuts at Benson Park in Hudson, NH. *Photo courtesy of Emily Provencher.*

Curt Laffin and his wife Carol Wallace are active volunteers with the VT/NH Chapter of TACF. Both were introduced to the American chestnut tree by their fathers at a very young age. Curt was about five when his father showed him a chestnut tree in Harvard, MA. That memory stuck; when Curt learned that an organization was on the verge of restoring the American chestnut, he got involved.

Curt is retired from the US Fish & Wildlife Service Wildlife, has volunteered with NH Fish & Game, and served on the Merrimack River Watershed Council Board of Directors. He and Carol also do local projects such as organizing youth groups to plant restoration chestnuts at Benson Park in Hudson, NH where they live.

Curt and Carol have found and pollinated mother trees, planted and done maintenance work at orchards, made chestnut wood items for fund raising events, and attended TACF National Meetings. However, their most ambitious activity is outreach that builds membership. They have developed a Power Point presentation explaining the history of the American chestnut tree, how the blight nearly rendered it extinct, and TACF restoration programs. Since November 2010 their presentation has been seen by roughly 850 people.

Anyone who would like to schedule a presentation should contact Curt at (603) 889-4643 or at calaffin@comcast.net.

This large tree in Rumney, NH provided an opportunity to include a new tree, as well as a wonderful new cooperator (NH Electric Co-op), into our program. *Photo courtesy of Gary Robertson.*

MANY THANKS FOR POLLINATION DONATIONS!

The VT/NH Chapter again received very generous donations in support of their 2014 pollination season. A special **thank you** goes out to ***Public Service of New Hampshire (PSNH), Green Mountain Power (GMP), Vermont Electric Power Company (VELCO), NH Electric Co-op, Asplundh Tree Expert Company*** and ***Davey Tree Expert Company*** for helping us get up into the trees for our pollination work.

Pollination of a wild American chestnut mother tree requires coordination between the landowner, the bucket truck provider and mother nature. Our volunteers handle that coordination and often fly high into the canopy to make the pollinations. A special **thank you** goes out to ***Grace and Randy Knight***, ***Doug McLane, Gary Robertson***, ***Todd Ross,*** and ***Hope Yandell*** for their 2014 volunteer pollinations efforts.

Anyone interested in donating or volunteering their services to the VT/NH Chapter should contact Kendra Gurney: kendra@acf.org or (802) 999-8706.

VT/NH CHAPTER BEGINS ORCHARD INOCULATIONS

Kendra Gurney, TACF New England Regional Science Coordinator

This summer the Chapter's breeding program hit a major milestone. We inoculated our first breeding orchards with chestnut blight! This important step will help to determine the blight-resistance of our trees and hone in on breeding selections for the next generation of crossing. So what exactly does this mean and why is this step so important?

What is Inoculation?

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

When we inoculate chestnut trees we introduce fungal mycelium of the chestnut blight fungus, *Cryphonectria parasitica*, into the cambium, or living tissues under the bark, of a chestnut tree. This produces an immune response in the tree, but not in the same way it would in a human. Unlike mammals, trees do not have an adaptive immune system that "remembers" a pathogen to help guard against future infection. But what it does do is infect the chestnut tree with chestnut blight in a controlled manner, such that we can evaluate the blight-resistance of the tree.

When do we Inoculate?

Inoculation usually occurs in early summer, once the trees are fully leafed-out and have all the resources they need to handle the intentional infection. The size of the trees is also a consideration, and the ideal size for inoculating depends on the breeding generation of the tree. Backcross trees (BC3), such as we inoculated this summer at the Valley View Farm orchards in Shelburne, VT, are only expected to be moderately blight-resistant and we typically wait until they are ***at least*** 2" in diameter at breast height.

How do we Inoculate?

The inoculation process is fairly simple. We use two strains of *C. parasitica*, one known to be highly virulent (EP155) and one known to be mildly virulent (SG 2,3). This allows us to see a range in responses and helps us select the most blight-resistant trees for further breeding.

We use a standardized process for inoculation throughout all of our TACF orchards. A cork borer is used to punch a hole through the bark and cambium of the tree. The same cork borer is used to create a plug of fungal mycelium and growth media from the Petri dish where they are grown. The plug is then inserted into the hole in the bark and secured in place with masking tape. Because we are using two strains of the blight we create two inoculations, one for each strain, with the weaker strain placed about 12-18" above the stronger.

Kendra Gurney inoculates a tree at the Valley View Farm orchard in Shelburne, VT.
Photo courtesy of Paula Murakami, USDA Forest Service

How are Inoculations Used?

The fungal inoculations are left to grow for the rest of the season and the resulting cankers are rated for resistance by assessing their relative size and character. The trees showing the best resistance are then evaluated for an assortment of morphological traits specific to American chestnut, such as leaf shape and dentation. Those trees with the best blight-resistance and American chestnut character are used for the next generation of breeding. The initial ratings of the trees we inoculated this summer were conducted this fall and look good - we'll continue to work next summer to hone in on our breeding selections.

"Those trees with the best blight-resistance and American chestnut character are used for the next generation of breeding."

(Inoculation, Continued on page 6)

INOCULATION (continued)

What's Next?

There are a few important and exciting steps that follow inoculation. As we zero-in on our breeding selections we start rogueing, or cutting out, the trees that don't make the cut. This often means that in an orchard of 300-400 trees we might ultimately keep about a dozen.

But those dozen backcross, or BC3, trees are proven breeding selections that are allowed to intercross, producing B3F2 offspring. These B3F2 intercrosses will hen be planted in seed orchards, grown, inoculated, and selected once more, before they ultimately produce B3F3 nuts, which we hope are a generation of trees with reliable blight-resistance and regional adaptability.

How Can You Help?

We inoculate an entire orchard at one time, which can be a lot of trees! This summer, a group of students and researchers from the University of Vermont and the US Forest Service helped to inoculate the Valley View Farm orchards - a group of about 8 inoculated 217 trees in a few hours. We may not inoculate another orchard until 2016 - stay tuned for opportunities to help!

A bigger challenge is finding sites to plant the B3F2 nuts that will eventually be produced by this orchard. TACF's breeding program prescribes that the B3F2 generation be planted in a seed orchard. While these plantings may take up only about one acre of land, they require a 30-45 year commitment to see them through from start to finish. The VT/NH Chapter is actively seeking partners to help support this important next step.

If you are interested in helping inoculate or rogue an orchard, or might consider hosting a seed orchard, please contact Gary Robertson, volunteer science coordinator (603-528-5217 or bicycle81@yahoo.com), or Kendra Gurney, TACF Regional Science Coordinator (802-999-8706 or kendra@acf.org) for more information.

If you are interested in helping inoculate or rogue an orchard, or might consider hosting a seed orchard, please contact Gary Robertson, (603-528-5217 or bicycle81@yahoo.com), or Kendra Gurney, (802-999-8706 or kendra@acf.org) for more information.

COOKING WITH CHESTNUT:
CHESTNUT CASSEROLE - NORTHERN CALIFORNIA

Shelling chestnuts.
Photo courtesy of The Savvy Sister.

Yield: 6 servings

Ingredients:

2 tablespoons butter
1½ tablespoons flour
3 cups chicken broth
3 cups shelled chestnuts *
4 slices bacon, cooked until crisp, crumbled
salt and pepper to taste

Directions:

Preheat oven to 400 degrees.

Melt the butter in a heavy casserole.

Blend in the flour and gradually stir in the broth. Add the chestnuts, crumbled bacon, salt and pepper.

Cover and bake, stirring occasionally, for 3 hours or until chestnuts are tender.

*To shell chestnuts, make a cross slit on the flat side of each chestnut. Fry in 1 tablespoon butter in a heavy skillet for 5 minutes, tossing frequently. Bake 5 minutes in oven set at 375 degrees. Shell and skin chestnuts as soon as they can be handled.

Good served with baked ham or roast turkey.

From: *The New York Times Heritage Cook Book* by Jean Hewitt, 1972.

JOIN US FOR OUR SEVENTH ANNUAL MEETING!

The VT/NH Chapter's Seventh Annual Meeting will be held on **Saturday April 25, 2015** at the **Vermont Institute of Natural Science (VINS) in Quechee, VT.** See schedule on page 8. We hope you can join us!

Highlights:

This year's keynote speaker will be Lisa Thomson, TACF's new President and CEO. She will be discussing her vision for the future of the organization (see below).

VINS is a compelling venue, offering a variety of educational programs, exhibits and a nature trail. The mission of VINS is motivating individuals and communities to care for the environment through education, research, and avian wildlife rehabilitation. In lieu of a afternoon field tour, attendees are encouraged to check out the Nature Center and the live raptor program at 2:00, as admission is included for all meeting attendees.

Coffee, water and light snacks will be provided. A box lunch may be **pre-ordered** for $13 (for details contact Yurij Bihun at (802) 310-4491 or ybihun@uvm.edu) or attendees are welcome to bring a bag lunch.

Directions:
VINS
6565 Woodstock Road/
Route 4
Quechee, VT 05059
www.vinsweb.org

From I-89 in Vermont take Exit 1, US-4/ Woodstock/Quechee.

Follow Route 4 West for approximately 3 miles, crossing the Ottauquechee River.

VINS Nature Center and Store will be on the right.

For more information, please visit: www.vinsweb.org/index.php/visit/hours-and-directions

KEYNOTE PREVIEW: MEET LISA THOMSON

Lisa Thomson, the newly appointed President and CEO of TACF, looks forward to sharing her vision for the future of the organization and hearing from the VT/NH members about their hopes for the future, as well. Lisa joins us after a 28-year career in land management and fundraising with The Nature Conservancy, and 4 years as VP for Development at Rollins College, in Winter Park, Florida.

Meet Lisa:

The American Chestnut Foundation (TACF) appointed Lisa Thomson as President & CEO in January 2015. A lifelong conservationist, Lisa's previous experience includes 28 years at The Nature Conservancy, serving in leadership capacities in conservation land management and fundraising. Most recently, she served as Associate Vice President for Development at Rollins College in Winter Park, Florida, where she was recruited in 2010 to help lead their recently launched capital campaign. "We are extremely pleased that Lisa has joined us as CEO," said Kim Steiner, Chair of the Board of TACF. "She instinctively grasps the appeal and urgency of our mission, and her energy and enthusiasm match perfectly with TACF's ambitious conservation goals."

TACF President & CEO, Lisa Thomson.
Photo courtesy of TACF.

BEST-IN-SHOW AT THE VERMONT FARM SHOW!

The VT/NH Chapter received a "Best-In-Show" award for an educational exhibit at the 2015 VT Farm Show, held in late January at the Champlain Valley Fair Grounds in Essex Junction, VT. This award is a great honor and testament to the hard work our members put into these educational and outreach opportunities. Special thanks to Terry Gulick for setting up the display, as well as Yurij Bihun, Kendra Gurney, JP Powers and Paul Schaberg for helping out during the three-day event.

If you'd like to learn more about volunteer opportunities or report an American chestnut tree that may be useful for our breeding program, please contact Kendra Gurney at (802) 999-8706 or kendra@acf.org OR VT/NH Chapter President Yurij Bihun at (802) 310-4491 or ybihun@uvm.edu

VT/NH Chapter of
The American Chestnut
Foundation

Care of:
Kendra Gurney
TACF Regional Science Coordinator
705 Spear Street
South Burlington, VT 05403

Check out this newsletter on-line!
http://www.acf.org/ChapterNews_vt.php

CALENDAR OF EVENTS

Saturday, April 25, 2015
SEVENTH ANNUAL MEETING
9:30 am – 3:00 pm
VINS
6565 Woodstock Road/ Route 4
Quechee, VT 05059
Free admission included for attendees

Schedule of Events

9:30 am – 10:00 am: Registration and coffee

10:00 am – 12:00 pm: Annual Meeting, including keynote address by TACF's Lisa Thomson

12:00 pm – 1:00 pm: Lunch and Raffle (lunch order available - see page 7)

1:00 pm – 3:00 pm: Board meeting to discuss spring field plans and chapter business (members welcome)

2:00: VINS live raptor program

We hope to see you there!

UPCOMING EDUCATIONAL DISPLAYS

Sunday May 3, 2015
Herricks Cove Wildlife Festival
Rockingham, VT
Please contact Terry Gulick for more details:
(802) 885-5405

Saturday June 6, 2015
Strolling of the Heifers
Find us in the Woodland Exhibit on the Brattleboro Common in Brattleboro, VT
Please visit www.strollingoftheheifers.com for details

UPCOMING EDUCATIONAL TALKS
Thursday April 16, 2015
7:00 - 8:00, The Loon Center
Moultonborough, NH

Tuesday May 5, 2015
1:00 - 2:00, Squam Lakes Natural Science Center
Holderness, NH
Please see the VT/NH Chapter Google Calendar for more details: www.acf.org/ChapterNews_vt.php