



Maine Chapter

The American Chestnut Foundation



TWO UPCOMING EVENTS!

The TACF Maine Chapter will be both at the 2020 Eastern Maine Sportsmen's Show and the Maine Flower Show. Please stop by or mention to your friends that we will be there. We will be ready to discuss our chestnut restoration efforts with you!

The Eastern Maine Sportsmen's Show

<http://conservationassociation.org/eastern-maine-sportsmens-show/>

Dates: March 13-15

Place: University of Maine Field House
Orono, Maine 04469

The Maine Flower Show

<https://maineflowershow.com/>

Dates: March 25-29

Place: Thompson's Point Brickyard South
8 Thompson's Point Rd.
Portland, ME 04102

GRANT NEWS

Congratulations to Tom Klak and Bucky Owen who have received a \$12,500 grant from the Quimby Family Foundation to partner with land organizations to sow chestnuts in greenhouses, to plant and care for seedlings, to control-pollinate trees, and to harvest fertile seeds anticipating the USDA release of transgenic chestnuts for outplanting targeted for June, 2021.

If you are part of a Maine land organization interested in partnering with us on the Quimby chestnut restoration project or you'd like to volunteer to help with controlled-pollination this summer, please contact Tom Klak at tklak@une.edu.



Partnerships are key in planning for transgenic chestnut outplanting in Maine. Courtesy of The Quimby Family Foundation Grant, TACF-Maine Chapter Intern Andrew Grammas leads a presentation at the Sebec Regional Land Trust in mid-February.



Again courtesy of the Quimby Family Foundation Grant, Kennebec Land Trust Director Sarah Stanley visits the UNE chestnut speed breeding facility with Tom Klak on Feb 19, 2020. In the high light chamber, transgenic pollen is produced that will then be taken to the field in July for the first crosses between blight-tolerant “Dads” and wild Maine “Moms.”

TRANSGENIC CHESTNUT RESEARCH \$3.2 MILLION AWARD

The Environmental Science and Forestry School (ESF) at SUNY in Syracuse has been awarded a \$3.2 million from the Templeton World Charity Foundation, Inc. to support three years of chestnut research and restoration work.

Earlier in 2019, the ESF research team, led by William Powell and including researcher Allison Oakes, who visited and lectured in Maine in April, 2019, submitted to federal agencies a 286-page petition that lays out the case for why officials should grant regulatory approval for public distribution of genetically engineered, blight-tolerant American chestnut trees developed at ESF. The request must be approved by the U.S. Food and Drug Administration, Environmental Protection Agency, U.S. Department of Agriculture, and the Canadian Food Inspection Agency.

The ESF team has developed new strains of American chestnut that can withstand the invasive blight. The scientists add a single gene from wheat to the tree's genome; the additional gene allows the tree to detoxify the oxalic acid produced by the fungus.

Lab tests show that subsequent generations of trees are also blight resistant and produce gluten-free chestnuts. The genetically engineered trees are not significantly different from wild American chestnut trees in terms of their effect on insects and wood frog tadpoles that feed on leaves, leaf decomposition, seed bank germination in leaf litter, or beneficial mycorrhizal fungi root colonization.

Please note that the USDA petition has been approved as "complete." We will notify you later this month when the 60 day public comment period opens and invite you to express your views about deregulation. We will provide any necessary directions and links for doing so at that time.



Blight-tolerant American chestnut pollen as seen through a microscope at UNE.

CHESTNUT RESTORATION EFFORTS IN THE NATIONAL NEWS!

First, two podcasts on NPR: one on [The Pulse](#) and the other on [Short Wave](#). The Pulse interviewed Sara Fitzsimmons and Bill Powell and is 49 minutes. Short Wave interviewed Jared Westbrook and Rex Mann and is 12 minutes. There also has been an article published in the Washington Post. [Click here](#) to access it. Please be sure to scroll down and read the comments after the article as well.



MEET OUR MAINE INTERNS

Tyler Riendeau (on the left): My family lives in Goffstown, New Hampshire, and I am an Environmental Science student in my junior year at UNE.

So far my internship with the foundation has been great, and it is truly rewarding to know that my work efforts are significantly contributing to restoring the once thriving species back to its native habitat.

One aspect of my job that I've found surprising is the how much Social Science goes into it. I had anticipated a strong science emphasis, focusing on things like identifying further steps toward preserving genetic diversity and raising transgenic seedlings for their pollen producing capabilities. Although this focus does take up the majority of time, my supervisor Dr. Tom Klak also emphasizes peer outreach and educating the public about American chestnuts. This work is critical, especially interacting with people at large who may not know about TACF and the Maine Chapter and their efforts to restore the Eastern forest landscapes.

In addition to peer outreach, education, and presentations, my intern work includes testing water pH and creating dosages to meet the needs of the American chestnut; PAR testing; transgenic pollen collection and storing; as well as plant maintenance: watering, powdery mildew cleansing, mealybug extermination, transgenic seed propagation, seed coring and slicing, and soil mixing.

Andrew Grammas (on the right): Like Tyler, I am also a UNE Environmental

Studies major and supervised by Dr. Thomas Klak, but I'm a senior. I was born and raised in Gloucester, Massachusetts and currently reside in Maine. I spent my freshman and sophomore years of college at the University of Colorado, Boulder and then transferred to UNE, where I first learned about American chestnut restoration efforts.

Since my initial involvement, I have become increasingly passionate about this work, and my internship has further developed my interest in saving this keystone species. The multifaceted nature of this job allows me to engage in the many different aspects of restoration, from scientific research and experimentation to community engagement and partnership building. It is a great learning opportunity.

A typical internship day might include watering, fertilizing and planting both wild and transgenic chestnut trees, removing pests from trees, conducting experiments, strategizing public outreach, attending meetings and presentations, and locating enthusiastic people and land trusts partners. This wide scope of internship responsibilities is giving me quite an education.

I look forward to the rest of the semester's work and value the knowledge and connections that I am gaining along the way.

BREEDING PROGRAM UPDATE

From Eric Evans, Maine Back-Cross Breeding Coordinator

Since its founding in 1983, The American Chestnut Foundation has been coordinating a six-generation back-cross breeding program, both in the TACF's research farms in Meadowview VA and in over a dozen state chapters. In Meadowview the 5th-generation orchards have been yielding 6th-generation seeds for ten years. In Maine our 5th-generation orchards will begin producing nuts for testing in the next few years.

TACF's founders based the program on research suggesting that Chinese chestnut blight resistance is relatively simple and controlled by just two or three genes. These findings would have allowed chestnut breeders to recover blight-resistance in each back-cross generation (to pure American chestnuts) while also maintaining all other American traits.

However, last year the TACF science staff reported that the most advanced genetic analyses and mapping indicate that blight resistance is a much more complex trait than originally thought and that it is controlled by many separate genes. The result is that the 6th-generation Meadowview trees are not exhibiting the necessary Chinese levels of blight resistance.

Our emphasis in Maine will be the following:

1. Complete the planting of 54 more plots from our back-cross orchards (4th-generation) into our seed orchards in the next 2-3 years.
2. Evaluate trees in our seed orchards, eventually culling them down to the best trees in the 300+ plots. Using more stringent selection criteria based on genetic tests as well as field observations, we will remove the poorest of the 40 breeding lines from the existing seed orchard plots and future planting plans. A new challenge will be to maximize blight-tolerance WHILE maintaining high enough genetic diversity for the widest adaptability in future forest plantings.

Our work continues. The key differences will be an increase in culling and the use of some new analytical tools. *How blight-tolerant and how American must a restoration chestnut population be in order to return the trees to their place of importance in Maine's forests?* This question will guide our work in the coming years.

Below is an outline of our orchard work for this year. And we will need lots of volunteers to implement these activities!

1. We have no seeds for planting in seed orchards this year but expect to have lots for next year.
2. In June we will inject live blight fungus into the bark of about 3,000 trees in our seed orchards: Searsport, Phippsburg, Stetson, Hartland, and Winthrop. These inoculations will start the process of evaluating blight-tolerance in these trees.
3. Remove and burn trees with low blight-tolerance in all seed orchards. Roguing can conceivably be done any time May-October.
4. We expect to have good chestnut crops in our back-cross orchards in Hope, Morrill, Unity, Lovell, Bradley, and Veazie. Harvesting will be September 25 through October 10.

You can receive volunteering opportunity notifications if you subscribe here: <https://me-acf.us10.list-manage.com/subscribe?u=9fd5f48df5406c366fa466270&id=1579637224>



YUM! CHESTNUT ICE CREAM

For our December board meeting we were served American Chestnut Ice Cream. Ice cream entrepreneur and owner of The Sweet Cream Dairy in Biddeford, Maine Jon Denton, collaborated with Tom Klak, member of the Maine Chapter board and Professor of Environmental Science at UNE, to forage, shell, roast, and process chestnuts from local chestnut trees.

After much trial and error, they settled on pressure cooking the chestnuts to deepen their flavor and improve their texture. They did not add in any stabilizers and instead relied solely on the chestnuts' starch content to thicken the ice cream base. As a result, the end product was unusually rich and creamy with a healthy dose of that unmistakable chestnut flavor—in a word: delicious! Look out for more Roasted Chestnut Ice Cream in November!

For more information please contact Jon at jon@sweetcreamdairy.com or visit his website at <https://www.sweetcreamdairy.com/>.



SCIENCE EDUCATION AND CHESTNUTS

Welcome to this inaugural section of our newsletter! Its purpose is to examine how chestnut field work and research are being used or could be used in Maine classrooms, from the university and college level to nursery schools. If you are interested in developing chestnut curriculum or have been involved already with chestnuts and would like to share what you have been doing, please contact me at katebriggs2014@gmail.com.

At the University of Maine Orono, at Unity College, where pictured above students planted chestnuts this past fall, and at the University of New England, science faculty are using chestnut restoration as key components of their core science curriculum. Special thanks to Professor Ek Han Tan and Professor Matthew Chatfield for their input!

At the University of Maine, Professor Tan uses chestnut restoration in his Genetics course (Bio350), a service learning course required for most bio-related majors. There are not a lot of botanical exemplars generally used in genetics courses. Two major course concepts—backcross breeding and transformation—turn out to overlap well with chestnut research.

Because chestnut research is intensely interdisciplinary, it helps the upcoming generation of science students to understand the potentially multi-faceted future applications of their studies in genetics: from the lab to the field, from a conservation point of view, as well as from social and ethical considerations. Chestnut research provides examples of all of these.

Professor Tan takes a poll every year and has discovered that 95% of his students across the board know nothing about chestnut restoration. So as students study Genetics, he is increasing the public's awareness of what's happened over the past hundred years in our forests and addressing a younger audience through the process.

Professor Chatfield at Unity College incorporates chestnut restoration in his Conservation Biology and Biodiversity Capstone courses, required of many majors at the college. He points out that even though Unity is an environmental college, "plant blindness" is extensive. Students are so focused on wildlife, they often don't understand or appreciate the critical importance of plants.

He has students read articles on the cultural, economic, and ecological importance of chestnuts, invites chestnut researchers to speak with students, mobilizes students to plant chestnuts and collect data, and allocates classroom time to discussing the species history. These combined activities have made a huge difference in student perception not only of chestnut trees but also plants in general.

Many facets of chestnut restoration are directly applicable to Professor Chatfield's courses: ecological principles (e.g., definition of foundation species); traditional scientific approaches (backcross breeding); cutting-edge scientific approaches (transgenics); the rise of citizen science (TACF); the cultural/historical importance of restoration (e.g., shifting baseline syndrome); the importance of community partners (METACF); data collection and analysis; the opportunity for boots-on-the-ground conservation; and even basic plant biology.

Chestnut restoration really makes a perfect case study and is easily accessible for instructors to integrate into courses.



VOLUNTEER NEEDED TO ASSESS WILD CHESTNUT TREES

This beautiful giant wild American chestnut in Readfield, Maine is isolated and thus produces few if any fertile nuts. It is the kind of wild chestnut we need to know about, and there are more out there. We would like to breed Maine's surviving chestnuts with others to preserve their genetic diversity.

We are looking for a volunteer: a point person to follow up on the many leads we have for wild chestnut trees, to visit these on site, and to determine their viability.

Please contact Tom Klak at tklak@une.edu if you are interested.

