The West Virginia Chapter
of
The American Chestnut Foundation
NEWSLETTER
In the heart of American chestnut's natural range
April 2024

Table of Contents

Hybridization of Castanea.....Page 1
Spring Potting.....Page 3
Burnsville Lake Planting.....Page 4
Central Preston Middle School....Page 4
Updated Strategic Plan.....Page 5
WV Spring Chapter Meeting.....Page 6

Ancient Hybridization in the Evolution of Extant Chestnut (*Castanea*) Species

The February 2024 *Chestnut Chat* featured **Dr. Joanna Malukiewicz** from the German Primate Center in Göttinberg, Germany. The word, 'extant', in the title may be somewhat confusing, but it simply means still living or not destroyed.

Malukiewicz listed *Castanea* species world-wide. They are:

North America
- *Castanea dentata* (native to North America)
- *Castanea alabamensis* (native to North America)
- *Castanea pumila* (native to North America)
- *Castanea ozarkensis* (native to North America)

Eastern Asia
- *Castanea mollissima* (native to China, Taiwan and Korea)
- *Castanea henryii* (native to Southeast China)
- *Castanea seguinii* (native to Southcentral and Southeast China)
- *Castanea crenata* (native to Japan and Korea)

Europe and Asia Minor (Turkey, Northern Iran, Eastern Russia and Azerbaijan)
- *Castanea sativa*

The objectives of her talk were to answer the following questions:
- What are the phylogenetic patterns between *Castanea* species?
- What are the divergence times between *Castanea* species?
- Do we see evidence for global and localized hybridization between *Castanea* species?
- How could evolutionary history of *Castanea* influence resistance/susceptibility of various species to the chestnut blight fungus?

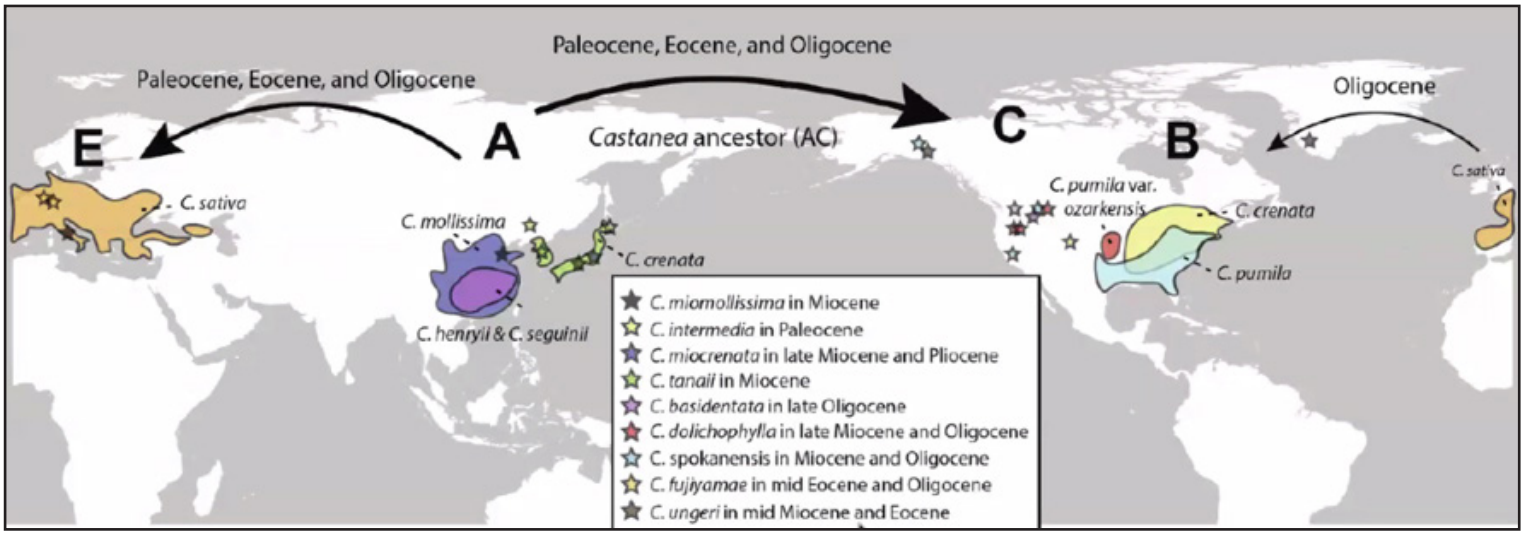
Phylogenetic relates to the evolutionary development and diversification of a species or group of organisms. Simply put, it is the study of evolutionary relationships among biological entities. Malukiewicz is attempting to understand how *Castanea* species evolved world-wide and determine the timeline for species movement.

She stated that when we look at similarities and differences, more often two species share more similarities than differences. She found that the Asian species are related to each other and that North American species also are related to each other. European chestnut is more closely related to American species than Asian species, but it is a hybrid between Asian and North American species.

Castanea had it origins in Asia and migrated to Europe and Asia Minor and lastly to North America. She outlined the following geologic periods:
Paleocene 65.5 - 55.8 MYA (million years ago)
Eocene 55.8 - 33.9 MYA
Oligocene 33.9 - 23 MYA
Miocene 23 - 5.3 MYA

Malukiewicz estimates that *Castanea (C. mollissima)* first appeared 60 MYA during the Paleocene period. About 40 MYA, the Asian species split (*C. henryii, C. seguinii* and *C. crenata*) while the European (*C. sativa*) and the North American species appeared about 38 MYA during the Oligocene period.

American chestnut shares 2%-19% (average 10.5%) of its genetic code with Asian species due to historical hybridization. Malukiewicz's data suggests that there was a 2-way introgression with North American chestnut from both Europe and Asia as depicted in the diagram below.

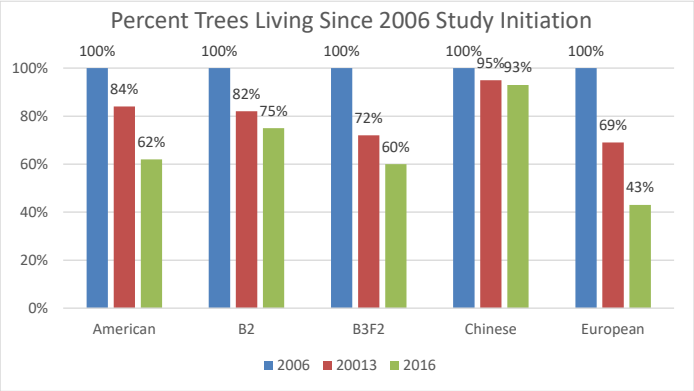


Her hypothesis is that chestnut moved across the Bering Land Bridge 38 MYA in addition to movement from Europe into North America. In terms of resistance to the chestnut blight fungus, she feels that resistance of Asian species can be explained by ancient hybridization. However, Asian species are not uniformly resistant. She pointed out that there are hundreds of genes responsible for blight resistance making resistance difficult to overcome.

One of her final points was that European chestnut is second in resistance to Chinese chestnut, *C. mollissima*. On a personal note, I disagree with that finding, based on data from a Morgantown chestnut planting.

Back in 2006, 900 chestnuts were planted at the Agronomy Farm at West Virginia University. There were six plots, each containing 150 trees (60 backcross, 30 American, 30 Chinese and 30 European). The goal of the study was to determine if hypovirulence (virus-infected fungus) can play a role in survival among the various species and backcross trees. The trees grew until 2013 at which time they were inoculated with a virulent isolate of the chestnut blight fungus. The cankers that resulted from the artificial inoculations were measured and tree health was assessed through 2016.

The data of tree survival is shown on the graph on the following page.



The far left blue bars show that all trees were living the year they were planted. The middle red bars list those trees living in 2013 while the far right green bars list the trees living three year post-inoculation in 2016. In 2016, 62% of the American chestnut trees were living compared to only 43% of European chestnut.

Malukiewicz based her findings that European chestnut is second in resistance only to *C. mollissima* on small stem assays conducted by **Dr. Hill Craddock** at the University of Tennessee, Chattanooga. While small stem assays have been used for years by TACF to ascertain if certain families have resistance, the data in West Virginia was conducted on 7-year-old trees, not small stems.

The above chart and other data were sent to **Sara Fitzsimmons**, TACF's Director of Restoration, and she stated that in her experience European chestnut does not fair well in the United States, especially in colder areas like northern WV and central PA. Sara is dubious to say that *C. sativa* is second in resistance only to *C. mollissima*. Sara feels that the data from Malukiewicz does not agree with other historical data or her personal observations.

While Joanna Malukiewicz presented some interesting findings, her findings about resistance of European chestnut do not agree with our findings from the inoculation study in West Virginia.

Spring Potting in Morgantown

On 9 March 2024, 10 individuals gathered at the Davis College greenhouse on the campus of West Virginia University to pot about 1,000 chestnuts. Many nuts were germinating, some with radicles 2" long. We potted mostly American chestnuts, but also some Chinese, European and hybrid backcross nuts from TACF's Meadowview Research farm in Virginia. We had a variety of sources of American chestnuts in 2024, from Clements Tree Nursery in Mason County along with sources from Hardy, Preston, Tucker Counties in WV and Garrett County, MD. Many of the seedlings that result will be planted across the state of WV.

Earlier this year, the WV Division of Forestry asked if the WV Chapter could supply chestnut seedlings for all seven state forests in WV: Coopers Rock (Preston County); Greenbrier (Greenbrier County); Cabwaylingo (Wayne County); Calvin Price (Pocahontas County); Camp Creek (Mercer County); Kumbrabow (Randolph County); and Seneca (Pocahontas County). The current plan is to plant 40 seedlings at each state forest, 20 American and 20 backcross.

Below are some photos from the potting in Morgantown.

Chestnut with a long radicle.

Robert Sypolt and Darrell Dean potting chestnuts into D40 pots.

Bernie Coyle and Blaise Hollot potting into 4" square pots.

Bernie Coyle, Blaise Hollot and Linda Coyle at work.

Bernie Coyle, Blaise Hollot, Michael Frasher, Robert Sypolt, Janis Boury, Darrell Dean, Linda Coyle and Mark Double after potting.

One of the reason that some 4" square pots were used is that the seedlings designated for the seven state forest plantings will probably not be returned. The D40 conical pots are more expensive, and the WV chapter strives to have as many pots returned as possible as a cost-saving measure for next year.

Burnsville Lake Planting

Cassie Stark, TACF's Regional Science Coordinator for KY, MD, VA and WV, has written an updated Stategic Plan for the WV chapter, and a 100-tree germplasm conservation orchard (GCO) is one of our goals for 2024. Just by happenstance, the WV chapter was contacted by **James Carson** with the Army Corps of Engineers at the Burnsville Lake, a recreational and flood control reservoir on the Little Kanawha River, located southeast of Burnsville in Braxton County. James indicated a desire for a chestnut planting, and this dovetails perfectly into our plans for 2024. James and the WV DNR have identified a site on Burnsville Lake's 13,000, and the soil has been tested for *Phytophtyhora*. Wire cages will be pre-built and the holes will be pre-dug before planting sometime in mid-May after the threat of frost.

Potting Chestnuts at Central Preston Middle School

Robert Sypolt coordinated with **Nikki Seese,** Central Preston Middle School science teacher, for lessons on American chestnut. Robert talked to the class and then he helped 24 students pot American chestnuts. Kudos to Robert for his continued presence in Preston County educating students on the value and history of the American chestnut.

Some of the Central Preston Middle School students.

Update on a Strategic Plan for the WV Chapter

As stated above, **Cassie Stark** provided an updated strategic plan for the WV chapter. While the plan is 21 pages long, here are some of the action items proposed for 2024.

Science Program:
1. Build out one GCO in WV with 10 different lines/sources with 10 trees representing each line/source. Have this GCO accurately mapped and labeled in ***DentataBase***.
2. Take inventory and survival data on existing GCOs.
3. Plan two WV chapter-led hikes to ID both American chestnuts and their habitat to encourage chapter members to search for wild-type chestnuts on their own.

Chapter Administration:
1. Review WV's bylaws/founding documents to see if they need to be updated. Identify any areas that need to be updated, or have any missing information. It may be beneficial to form an ad-hoc committee for this purpose.
2. Create suggestions for updating the bylaws. Realistically, bylaw updates/ammendments should de done at an annual board meeting, possibly by the Fall of 2024.

Create a Chapter Volunteer/Membership Coordinator:
1. Survey current board members and membership to see if anyone may be interested in this role. When soliciting interest, be sure to include the duties of a volunteer coordinator that feel relevant to the WV chapter.
2. At your Fall board meeting, hold a vote to elect the Volunteer Coordinator.
3. After the Fall board meeting, **Catherine Martini** (Regional Outreach Coordinator) will reach out to the new Volunteer Coordinator to provide training and support.

Transition to a Volunteer Tracking System:
1. Once TACF's volunteer software is purchased and set up, begin by having 1-2 people on the board trained on how to use the system. These people can be your "on the ground" experts.
2. Have 5-10 regular volunteers use the software, and provide feedback to the Regional Outreach Coordinator.
3. After feedback is acted upon, roll the software out to all members. This should be done in a newsletter, and announcements can be made at the Fall meeting. Catherine Martini can be on-hand to train new volunteers and explain the benefits of the new software.

Field Safety Training:
1. Before the field season starts, volunteers can fill out, at home, the Risk Management Plan for frequently-visited orchards.
2. Orchards managers and usual volunteer event leaders should be gathered in person and/or virtually for a safety meeting before the field seasons starts in April/May. These concrete plans should include the Risk Management Plan, Ladder Safety, and guidance on holding Tailgate Safety Trainings before starting work days.
3. Orchard managers should report to the WV-TACF board or Catherine Martini that safety trainings were completed at each event.

Follow-up on Outreach Plantings:
1. Determine status of backcross orchards listed in DentataBase: reach out to landowners and ask about the status of each orchard.
2. Collect survival data on prioritized backcross orchards.
3. Identify “Orchard Committee” to help with upkeep of orchards.

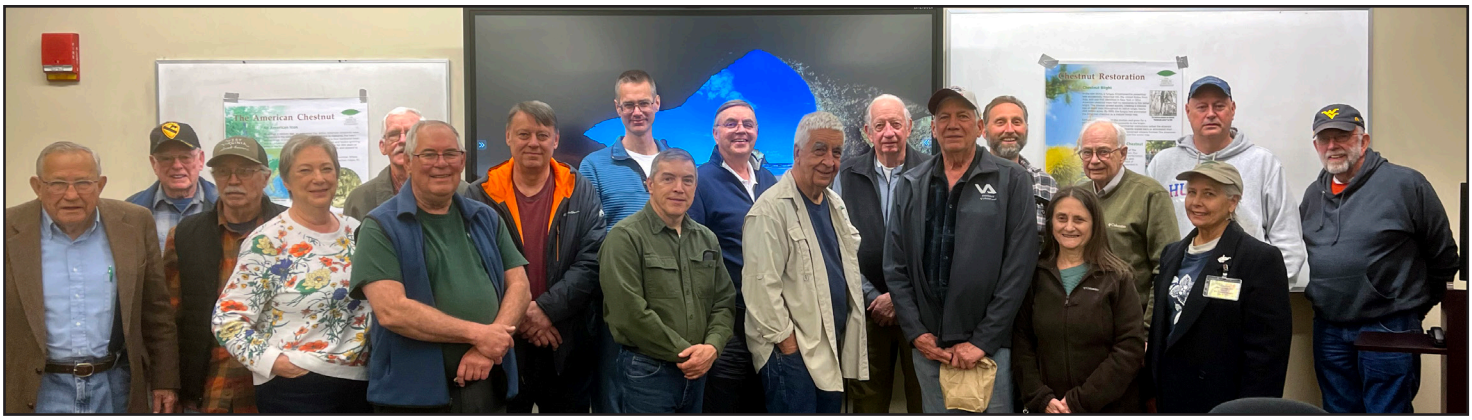
Join/Expand Educators Group:
1. Identify a leader on your current board to take the initial steps on this project. Once recruitment is done, this person may step down if needed. This should be done as soon as possible so work can begin on step #2.
2. Collect information from educators in WV that may be interested in developing a curriculum or using the American chestnut in their classroom/camp. A good place to start on this may be individuals or organizations that applied for a grant from the chapter. Catherine Martini also can help with crafting a survey about general volunteer interests to your membership, and include "education" in the survey.
3. Over the summer (likely in July or August), host one "getting to know you" meeting where educators can share how they've used the American chestnut in their lessons, or how they hope to. Catherine Martini can host this meeting via TACF's zoom and facilitate the meeting.

Table/Display for One New Event:
1. It may be good to either form an ad-hoc Out-

reach Committee or give leadership of this task to a single person.
2. Research festivals, fairs, etc. that fill in these gaps. Share the resulting list with your volunteers/members to solicit interest in attending at least one.
3. Register for and table at the festival. It may be beneficial to edit your table set-up to fit the specific interests of the group - for example, if you're tabling at an event in an urban area, you may want information on how Chestnuts can be used in a "food forest.

WV Spring Chapter Meeting

WV Chapter President, **Bernie Coyle**, led the spring WV chapter meeting at Glenville State University on 6 April 2024. The meeting was attended by more than 30 people, both in person and on-line via a Zoom link. The meeting began with presentations by two of our national personnel, **Cassie Stark** (our Mid-Atlantic Regional Science Coordinator) and **Catherine Martini** (our Regional Outreach Coordinator). Both joined via Zoom.



Pictured above are some of the in-person attendees at Glenville State University.

The meeting was held in a classroom at Glenville State University.

Cassie Stark talked specifically about the strategic plan for the WV chapter. She outlined her talk based on goals for the chapter. She noted that there are 27 germplasm conservation orchards, GCOs (pure American chestnut plantings) in the state, although most are smaller with only a few sources of American lines. The goals for GCOs are: genetic diversity (trees from various mother trees around the state); preservation of local germplasm from wild trees; and eventually breeding of these trees with more resistant material. An ideal GCO contains 100 trees, 10 trees from each of 10 different mother trees. The first goal for the WV chapter is to develop a 100-tree GCO. As it turns out, the planting at Burnsville Lake, described on Page 4, will meet that goal. We hope to install that

planting sometime in May this year.

Cassie then talked about Dentatabase, TACF's database that keeps track of all plantings, wild trees, etc. throughout the range of American chestnut. We need to record our data as we put a lot of effort into planting and maintenance of orchards, and we need to data for future reference. The database includes: tree source; location; the number of trees from a given mother tree; map of orchards (where each tree is planted); and the date planted. Cassie has been using metal tags to ensure accurate data. The WV chapter has both GCOs (27) and backcross plantings (71) across the state and we need up-to-date inforamtion on those plantings. If trees have died in the GCOs, they can be replanted with additional seedlings, with the hope of expanding some GCOs to 100-tree plantings. We need to ask the landowners of both the GCOs and backcross plantings to provide data on how many trees are surviving, data on presence/absence of the chestnut blight fungus, average height of trees, etc.

Given the number of orchards we have in the state, another goal is to prioritize existing orchards. Some orchards have not had sufficient maintenance while others are difficult to access or have too many dead trees. Those orchards should be abandoned and our efforts should be focused on thriving orchards.

Another goal for the WV chapter is to lead two hikes to source wild American chestnut trees. This is a good way to expand our GCOs as scionwood can be collected and grafted seedlings can be used to fill in gaps from dead trees. It can be difficult to find American chestnuts that are producing nuts, so scion wood can be taken from trees that are too young to produce seed. Bernie Coyle noted that there are hundreds of wild American chestnuts on windmill land near Keyser, and this might be a site for a chestnut hike if permission can be provided by the landowner.

Catherine Martini spoke about outreach objectives. In order to achieve science plans, we also need people. Thus, we need to reach out and invite people to planting, maintenance events around the state. Catherine also is asking all chapters to update their bylaws. WV is an unincorporated chapter, so we need to coordinate with the national office. One update might be to add 'virtual meetings' to our bylaws given the use of technology such as Zoom.

Catherine stated the need for a volunteer coordinator. The national office is exploring new softward to track volunteer

WV chapter president, Bernie Coyle.

hours. Once a software program has been chosen and in place, all WV chapter members are encouraged to use the softward to enter hours worked, whether it is planting trees, mowing grass, installing fence. Also travel time will be included as part of the volunteer hours. They hope to have use of the software for a targeted audience in May/June with full rollout by Aug/Sept.

Prior to any event, each chapter should have field safety training, such as ladder safety, nearest hospital, etc. to ensure that all matters of safety are covered prior to the commencement of work.

As a chapter, we should expand our educator's group. Our first (and only) WV chapter grant recipient was **Alice Morgan** of West Virginia University's Science Adventure School. Catherine would like our chapter to reach out to other organizations that deal with youth and tell them of the chestnut story. **Robert Sypolt** has worked for years with students in science classes at Preston High School. Robert has the luxury of having the 100-tree chestnut orchard behind the school.

Another goal is to have a table/display at one

new event in WV. There are many fairs/festival in WV. For those interested in working a fair in the state, brochures, etc. can be provided.

At the close of the chapter meeting, President **Bernie Coyle** posed three questions from the national office, relative to strategic planning of the Foundation. Below are the questions with feedback from those in attendance.

1. What do you see as the main issue facing TACF's success and sustainability?

Group comments:

- We need ongoing maintenance of our orchards. A plan should be developed for orchard maintenance as many of the chapter members responsible for orchards across the state are getting to be 'long-in-the-tooth'.
- We need to develop leadership within the chapter and recruit younger people.
- We need to shrink the responsibilities of some of our orchards and focus on what we can reasonably maintain. We need to prioritize the orchards, and those that are not thriving or require difficult maintenance should be abandoned.
- A stable source of funding is required at the national level to make sure that our staff, most notably our Regional Science Coordinators, are funded adequately.
- Signage from the national organization is way too expensive. We need signs to inform the general public about the history of TACF and our goals, but the signs are too costly.

2. What is the main issue facing the science of saving and restoring the American chestnut?

Group comments:

- For some of the older plantings in WV that are now 10-12 years old, only a few trees are showing adequate resistance.
- Fully fund the genomic work for chapters that want some of their trees genotypes. Historically, buds/small leaves have been collected and shipped to Virginia Tech where the DNA was extracted and then shipped to Hudson Alpha in Alabama for genotyping. That was about $100/sample. More recently, tissue samples are being sent to a lab in Australia for $15 each, but shipments are generally sent only once a year. (**Note:** Tissue samples from a number of trees at the Clements Tree Nursery were collected in April 2023 and, as of this writing, there are no results).
- Some of the verbage to the general public states that our work is 'multi-generational'. This language may scare some potential members. Rather, we should be stating that some trees produce nuts in 6-8 years. This postivie language may interest certain groups such a turkey hununters who may be interested in joining TACF because they can see mast within a few years.
- There was some concern that results from soil testing for *Phytophthora* take too long. Cassie interated that soil samples generally take about 2 weeks. Soil sent to Clemson University is mixed with water and then the *Phytophthora* spores are bated with small leaves on top of the soil extract. Spores are detected microscopically.

3. Is there one area of focus the TACF board must address as part of stragetic planning?

Group comments:

- Overall funding is a priority.
- Germplasm conservation orchards (GCOs) are still a priority for the WV chapter (and other chapters too). It can be difficult to locate an American chestnut that is producing burs and nuts. Thus, it can be easier to find non-flowering trees and take scion wood from those trees for grafting. As such, grafted trees can be used for our GCOs. There are several problems with grafting. First, grafting American chestnut can be difficult with low success rate. Second, a stock of Chinese chestnut seedlings must be available, and this requires a year-round source of rootstock. That necessitates a greenhouse that can be used year-round. If funding was adquate, scion wood could be sent to Meadowview if they had staff dedicated to grafting, and the grafted seedlings could then be sent back to the state chapters for incorporation into GCOs.

Other Business:

Finances: The WV chapter has $72,125.40 in its account.

Membership: The WV chapter currently has 148 members.

Action Item: There was a motion for $2000 for the 2024 Rowlesburg Chestnut Festival. The motion was seconded and passed unanimously.

Next Chapter Meeting: Sunday, October 13 at the Szilagyi Center in Rowlesburg, WV.