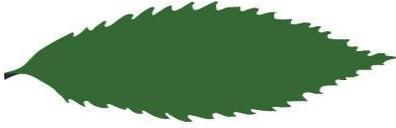


Maryland Chapter of The American Chestnut Foundation

Fall 2018



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FOUNDATION®

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Maryland Chapter Fall Meeting

Our annual meeting will be on Saturday, November 17, 2018, 10:00am-2:30pm, at the National Wildlife Visitor Center Patuxent Research Refuge, 10901 Scarlet Tanager Loop, Laurel, MD 20708.

In addition to our annual updates and elections, we will also hear from special guests **Lisa Thomson, President of the American Chestnut Foundation** and **Dr. Jared Westbrook, TACF Director of Science**, who will speak on “*The evolving effort to restore the American chestnut, and how TACF’s Chapters help ensure mission success.*”

Free American chestnut seeds and seedlings will be available too!

2018 Orchard Activities in Review

by Ron Kuipers

The Maryland Chapter breeding program made progress this year, despite losses due to weather, disease and undetermined causes.

Our first big spring event, at the end of March, was planting seeds that were harvested the previous fall. This year, our plantings at our two Clapper seed orchards were modest compared with the two previous years. We planted two 150-seed plots at WSSC and three 150-seed plots at CMREC. Almost all of the Clapper seeds germinated and are growing great.

In contrast, we had a setback with the complete failure of the roughly 200 Musick backcross seeds we planted at our BARC and Lyles orchards. We suspect that the germination failure was caused by some event during winter storage.

April was a busy month for orchard maintenance, primarily weeding, watering and spraying for Ambrosia beetles. We were especially concerned about beetle damage this year because the seed orchards now contain thousands of trees that have reached the size that the beetles prefer. Much to our relief, beetle damage was minor, possibly because of our spraying effort.

In late May/early June, chapter volunteers inoculated a large number (nearly 2,000) of trees in the CMREC, WSSC and Hampstead orchards to test for blight resistance. These

trees will get their first evaluation by our regional science adviser, Tom Saielli, this fall, after which we will start removing the most blight-susceptible.

Pollination season (mid-June) was complicated this year by unusually wet and cloudy weather, which caused erratic timing in the development of both male catkins and female flowers. Nevertheless, we attempted to hand-pollinate and bag one Musick B2F1 tree in the Monocacy orchard, one American tree near Lake Needwood, one American tree in the IWL-Rockville orchard and nine Clapper B4F1 trees in three family lines in the IWL-Damascus orchard. (Regretfully, the Damascus trees require hand pollination because two large Chinese trees are nearby.)

Our harvest results in late September/early October confirmed that the wet year jeopardized the hand pollinated harvest (see chart below). Even many open-pollinated trees had fewer burs than normal. As a result, our planting goals for next spring will not be met. To make up for the shortfall in hand pollinated seeds from the IWL-Damascus orchard we plan to plant some of the open pollinated nuts in a greenhouse and screen them after leaf-out to identify and eliminate the ones with Chinese character. If this succeeds, we may still be able to fill out the two plots we plan for each seed orchard. (It may also give us an alternative to hand-pollinating at Damascus, which is a cumbersome process involving the use of cherry-pickers three times in a season.)

Generally, the harvest was light, even from our pure American and Chinese sources.

But we'll make the best of what we got, and look forward to a completely different set of problems next season.

Source orchard/family line	Open-pollinated nuts	Hand-pollinated nuts	Nuts needed	Target Orchard
IWL-Damascus				
MD45A	1,145	53	600	CMREC and WSSC
MD40A	848	271	600	CMREC and WSSC
MD4361	958	195	450	CMREC and WSSC
IWL-Rockville				
Burton 27A	0	116	100	Lyles
Monocacy	0	27	100	Lyles
Needwood 79A	0	23	100	Lyles
WMREC				
WMREC46A	500	0	600	CMREC and WSSC

Phytophthora hits MDTACF orchards by Bruce Levine

Last year, patches of seedlings planted at our BARC Musick B3 orchard suddenly turned brown and died. This year, we saw the same symptoms on one plot of B3F2s at our WSSC seed orchard. In both cases, the Plant Diagnostic Lab at the University of Maryland, determined the cause to be *Phytophthora*, most likely *P. cinnamomi*. *P. cinnamomi* is an invasive soil microorganism that causes the deadly disease Phytophthora Root Rot (PRR). PRR occurs in moist areas, and is spread mainly by spores that swim through the

soil. It can be killed off by prolonged dry periods, very cold temperatures, and by the application of specific fungicides. Previously found only in warm, wet, lowland regions of the south, *P. cinnamomi* is now being found as far north as Pennsylvania, most likely due to rising temperatures.



WSSC seed orchard plot 35, killed by PRR in August, 2018. Photo: Ron Kuipers

The good news is that Chinese chestnut is resistant to PRR. The bad news is that most of our breeding lines have not inherited that resistance. Previous tests carried out by TACF collaborators have found that the Clapper source of blight resistance, the forbearer of all the trees at WSSC, does not carry PRR resistance. Some Musick trees that have been tested did appear to have PRR resistance, but many seedlings at BARC, all of which were Musick trees, are obviously susceptible.

The consequences of this are potentially very serious. Under the right conditions, *Phytophthora* can quickly spread through an orchard and kill everything. Imagine all the work that goes into establishing an orchard being lost in the space of a few

weeks! For this reason, TACF is working on plans to breed PRR resistance into all restoration lines. The exact genes responsible for resistance are not yet known, but promising work by Dr. Tetyana Zhebentyayeva at Clemson University, based on genetic analysis of trees from the TACF research farm in Meadowview, appears to be zooming in on one. Once validated, this finding would enable us to genetically screen trees for at least this one gene. Dr. Steve Jeffers also operates a PRR resistance screening center at Clemson, and is working on new, faster methods to screen trees or tree parts for resistance. These methods could help us determine which parents carry PRR resistance, even without knowing what genes we are looking for.

In the meantime, our only recourse for BARC and WSSC is to practice very good orchard sanitation. Infected areas need to be cordoned off and taken permanently out of production. The area and surrounding areas should be sprayed with appropriate fungicides (we used Agriphos at BARC and WSSC). Anyone entering those areas should clean and disinfect their boots, tools and equipment every time they leave. And good luck would also help.

High in the Treetops

by Dave Gill

Nowadays, you see drones everywhere, from search and rescue to your nightly news reports. Advances in the technology are coming quickly as are creative ways in which drones can provide assistance. One of the areas showing promise is in the forestry arena. Research is proceeding on ways to use sophisticated cameras attached to the drones to pinpoint insect or disease

damage within the treetops. Drones have now matured to the point where they have contact avoidance sensors that allow them to get very close to objects without the potential for a collision. As this technology matures, there are multiple opportunities to assist our program to restore the American chestnut.

Some of these future benefits include identifying potential pure American trees within forest tracts by quickly scanning the tree canopies for the telltale catkins (male flower of Chestnut trees). As the drones continue to improve their capability to carry heavier loads, there is the potential to equip them with propellant canisters to spray pesticides or fungicides in targeted areas. There is even the potential to deliver a blast of pollen to a mature flower, replacing the arduous hand pollination process. With their ever-improving camera options, the drones could be used to survey orchards to determine the maturity of flowers at pollination time, thus saving the time of going up and down ladders and improving the safety of our work crews.

Drones are not at the stage where we can use them in our work, but the possibilities of how drones might assist our chapter are only limited by our imaginations. If there are any drone pilots among our readers that would like to explore potential uses of their piloting skills and drones in our orchard work, please contact Dave Gill at orchardsteward@gmail.com.

If you would like to see a drone video of our Central Maryland Research and Education Center seed orchard, go to <http://mdtacf.blogspot.com/2018/07/cmr>

[ec-video.html](#). It gives you a real bird's eye view of the orchard.



Dave Gill at the controls. Photo: Sandy Gill

Maryland chestnuts serving science by Bruce Levine

The Maryland chapter often accumulates a surplus of nuts that we can give away or provide to researchers for specific projects. Here are some current projects in which our nuts and seedlings are being used for research:

Small Stem Assay research: MDTACF provided about 750 American (Burton), Chinese and F1 seedlings in spring 2018 for TACF's ongoing research into the small stem assay (SSA) method for testing blight resistance. These and other seedlings will be used to confirm whether SSA's can measure resistance at least as accurately as our standard inoculation method, what the best type of inoculum, incision type and measurement methods are, and how to maximize survival rates of trees that tested with SSAs and then planted in orchards.



Small stem assay inoculation. Photo: Bruce Levine

Research into root fungi: MDTACF has provided 200 pure American chestnut seeds from our IWLR orchard, 100 B2F2 seeds from Monocacy, and 100 chinkapin seeds from the Black Hill orchard to Dr. Ton Bisseling, a renowned expert in plant-fungal associations at the University of Wageningen in the Netherlands. The nuts will be used in a joint project carried out at the Beijing University of Agriculture, in which Dr. Bisseling, Dr. Ling Qin and Dr. Qingqin Cao will analyze and compare the types of fungi that live on the root surfaces or inside the root tissue of Chinese, American and hybrid chestnut trees. The goal is to understand whether and how these fungi contribute to the health of trees, e.g. by protecting against pathogens.

Studying fungal genetics: Board member Bruce Levine is using several hundred seedlings grown from American (Scrivener - thanks Tom!), as well as dormant American chestnut stems harvested from MDTACF orchards, in his master's research. The seedlings and stems will be used as living petri dishes for inoculations

to test the virulence of strains of chestnut blight fungus with specific genes deleted.

Stratification requirements: A small experiment at the University of Maryland last year showed that chestnut seeds need to mature for about 60 days in order to produce a seedling, but that it did not matter whether they were stored in the cold or at room temperature. This year, we are scaling up that experiment, using 11 blocks of 32 American (Scrivener) seeds and 11 blocks of 32 Chinese chestnut seeds, kept in cold or at room temperature for different periods of time. Laura Barth at TACF is replicating the experiment with several American lines from different regions at TACF's greenhouse in Meadowview, VA.

Volunteers needed!

The success of our breeding program has resulted from the support of many enthusiastic volunteers, including several members who have volunteered to be orchard stewards. We always could use more help, including for routine, unscheduled orchard maintenance. The next big jobs this fall will be harvesting around the end of September and tree culling, which is scheduled periodically. Notice of scheduled events goes out by email to those members who have indicated that they want to be on the list. If you want to help with routine maintenance in an orchard call Ron Kuipers at 240-838-9992 or email him at m_rkuipers@yahoo.com.